Skill India
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MINISTRY OF SKILL DEVELOPMENT
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Participant Handbook

Sector
Electronics

Sub - Sector
Industrial Automation

Occupation
Assembly & Integration

Reference ID : **ELE/Q6301, Version 2.0**
NSQF Level 3

Electrical Technician

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

Shri Narendra Modi
Prime Minister of India

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Certificate

COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

ELECTRONICS SECTOR SKILL COUNCIL OF INDIA

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role / Qualification pack: **"Electrical Technician"** QP No. "ELE/Q6301, **NSQF Level 3**"

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Electronics Sector Skill Council of India

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The preparation of this manual would not have been possible without the Electronics Industry's support. Industry feedback has been extremely encouraging from inception to conclusion and it is with their input that we have tried to bridge the skill gaps existing today in the industry.

This participant manual is dedicated to the aspiring youth who desire to achieve special skills which will be a lifelong asset for their future endeavours.

About this book

This Participant Handbook is designed for providing skill training and /or upgrading the knowledge level of the Trainees to take up the job of an “Electrical Technician" in the Electronics Sector.

This Participant Handbook is designed based on the Qualification Pack (QP) under the National Skill Qualification framework (NSQF) and it comprises of the following National Occupational Standards (NOS)/topics and additional topics.

- Introduction
- Integrate electrical subsystem (ELE/N6301)
- Communicate and coordinate effectively with others (ELE/N9972)
- Work effectively, sustainably and safely (ELE/N1003)
- Employability and Entrepreneurship Skills

Symbols Used


Key Learning Outcomes


Steps


Summary


Tips


Notes


Activity


Exercise


Unit Objectives

Table of Contents

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सत्यमेव जयते
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1. Introduction

Unit 1.1 Discuss in detail the introduction to electronic industry

Unit 1.2 Evaluate the job role of an electrical technician

Unit 1.3 Analyse the meaning of electrical technician

Unit 1.4 Analyse the scope of work of the electrical technician in India

Key Learning Outcomes

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

1. Discuss in detail the introduction in electronic industry
2. Evaluate the job role of an electrical technician
3. Analyse the scope of an electrical technician in India

Unit 1.1 discuss in detail the introduction to electronic industry

Unit Objectives

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

1. Discuss in detail the introduction to electronic industry

Discuss in detail the introduction to electronic industry

The industry of electronics or electronics industry it includes comprehensively a wide range of manufacturing processes and the products. The most visible products of the electronic industry are the consumer products such as computers, television sets, music systems and myriad other things. The manufacturing of the switches, semiconductor devices and Printed Circuit boards (PCB) and assembling of the complex computer system are all various facets of the electronic industry at large, and the fact that each of these activities will be performed typically by different organizations that show there are few of the factors that are common across the electronic industries component companies

electronics comprises of engineering, physics, technology and the applications that deal with the flow, emission and control of the electrons in vacuum and matter, electronics deals with electrical circuits that makes involvement of active electrical components like vacuum tubes, integrated circuits, sensors, optoelectronics associated passive electrical components and interconnected technologies

The techniques that are used in the manufacturing of the electronic devices have been changing radically with the emerging of new areas of application in the electronic sector. The traditional technique of processing the materials are being superseded and replaced by the process of manufacturing based on the use of many new techniques like electro-beam, plasma chemical techniques, ion implantation etc. The raw materials must be of extreme high purity, and the introduction of the impurities determines the specifications of the technicalities and the performing characteristics of the electronic devices

The output of the electronics industry is on a rapid growth, and the variety of the semi-conductor (specially the Integrated-Circuit), quantum and devices that are based on magneto electronics is rapidly increasing.

the Indian electronics industry is going through a very interesting and exciting phase and its due to the changes which has proved to be revolutionary in the technology sector, the launch of products that are innovative and the challenges that is met at global competition which means that the electronic product and the component manufacturers must focus continuously on improving the products

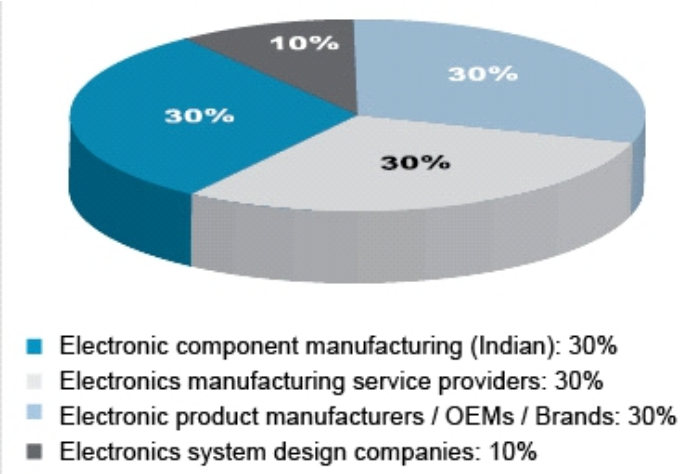

Fig 1.1.1: distribution of survey participants

Market size

the market of the electronics is one of the largest in the world, and as far as India is concerned, it is anticipated to reach US$400 billion in the year 2022 from US$69.6 billion in the year 2012.The market is projected to show a growth at a compound annual growth rate (CAGR) of 24.4% during the tenure of 2012-2020.

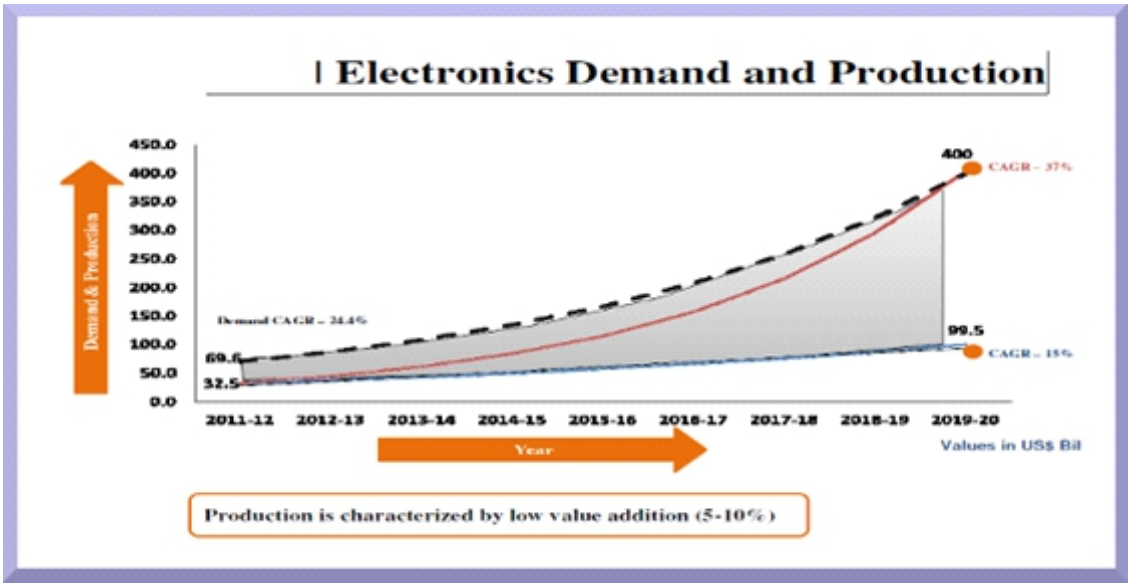

Fig 1.1.2: statistics of electronic industry in INDIA

Unit 1.2 Evaluate the job role of an electrical technician

Unit Objectives

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

1. Evaluate and learn about the various work load an electrical technician conducts
2. Assess and know about the essential qualities of an electrical technician

Evaluate and learn about the various work load an electrical technician conducts

An electrical technician carries out several duties that involve schematics to fixing wiring. However, going by the definition, the following can be broadly classified as job responsibilities of an electrical technician:

- Assemble, install, test, and maintain electrical or electronic wiring, equipment, appliances, apparatus, using hand tools and electronic tools.
- Diagnose malfunctioning of systems, apparatus, and components, using test equipment and hand tools.
- Connect wires to circuit breakers, transformers, or other components.
- Inspect electrical systems, equipment, and components to identify hazards, defects, and the need for adjustment or repair, and to ensure compliance with codes.
- Advise management about current situation of electrical equipment and recommend steps for improvement.
- Test electrical systems and continuity of circuits in electrical wiring, equipment, using testing devices such as ohmmeters, voltmeters, and oscilloscopes, to ensure compatibility and safety of system.
- Maintain current electrician's license to meet governmental regulations.
- Plan layout and installation of electrical wiring, equipment, based on job specifications.
- Train workers to install, maintain, or repair electrical wiring, equipment.
- Know how to use hand and power tolls like ammeters, voltmeters, thermal scanners, cable testers, screwdrivers, wire strippers, drills, and saws.
- Prepare sketches or follow blueprints to determine the location of wiring and equipment and to ensure compliance with safety codes.
- Perform business management duties such as maintaining records and files, preparing reports and ordering supplies and equipment.
- Repair or replace wiring, equipment, using hand tools and power tools.
- Place conduit (pipes or tubing) inside partitions, walls, or other concealed areas, and pull insulated wires or cables through the conduit to complete circuits.
- Provide preliminary sketches and cost estimates for materials and services.
- Provide assistance during emergencies by operating floodlights and generators, placing flares.

Assess and know the essential qualities of an electrical technician

- The electrical technician performs a wide ranging of tasks, that includes installation of the wiring in the new constructed projects to repairing and replacing of the older system
- Deductive Reasoning: Electrical technicians need to look for problems in complicated electrical grids, isolate the issue and solve it.
- Logic: Electrical techs need to be able to look at electrical blueprints and scan them for issues, and perform reasoning based on logic.
- Manual Skill: Working with wires, using hand tools and handling small components requires manual dexterity.
- The technician must have an aptitude for mathematics: the technicians must be able to use trigonometry, and calculus, use of trigonometry take place in bending of electrical pipes in certain angles, the need of calculus arises in electrical calculation for knowing the exact quantity of amps and bulbs that they need and algebra
- Observation: Electrical technicians need to be able to look at electrical grids and evaluate them for any problems.
- Problem-Solving: Electrical techs need to be able to identify issues and make corrective measures to fix problems. This requires analytical skills.

Unit 1.3 Analyse the meaning of the electrical technician

Unit Objectives

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

1. Explain electrical technician
2. Demonstrate the work range of an electrical technician

Explain electrical technician

Electrical technicians help to create, maintain and repair the electronic components and equipment used in any device that involves electricity. They can sometimes work with electricians or electrical engineers, or work on site. Electrical technicians use specialized measuring and diagnostic devices to evaluate how electrical equipment are working, build electronic devices based on reading schematics, inspect problems, replace old equipment and install new ones.

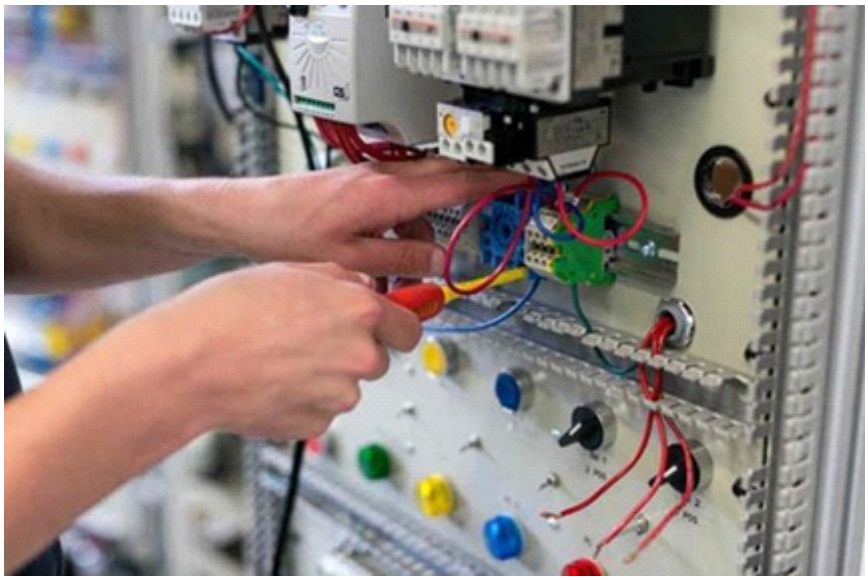

Fig 1.3.1: General technical fittings for an electrical technician

Difference between Electricians and Electrical Technicians:

Electricians learn through hands-on experience while completing training or a program at a technical school. Electricians are responsible for installing wiring systems into new buildings, or inspect the electrical systems in a building to identify the source of a problem.

Electrical technicians often work in offices or factories. They focus on repairing or constructing electrical systems. They work according to a device's design plan and construct the device's electrical systems, or they may repair an existing device. They also inspect products to determine if they are functioning properly.

Unit 1.4 Analyse the scope of work of the electrical technician in India

Unit Objectives

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

1. Evaluate and understand the areas of expertise that an electrical technician covers

Evaluate and understand the areas of expertise that an electrical technician covers

People with these job titles usually perform the same task but in different work contexts. Electricians typically focus on electrical construction on a project basis. An electrical technician works on a specific (complicated) system or works at a specific location; and in either case is more focused on maintenance and repairs.

An electrician mainly just does installations of electrical equipment and wiring machines and houses. An electrical technician mainly focuses on troubleshooting and fixing electrical problems in the field.

Fig 1.4.1: Electrical technician working on PCB

An electrician designs and executes the electrical plan that brings the appropriate power to important sections of a residential or commercial building. On the other hand, an electrical technician creates, maintains and repairs electrical components of devices that use electricity. They know how to build electrical machines based on schematics and, with the help of specialized measuring and diagnostic devices.

Power Control Centre

PCC or Power Control Centre is made to use for the distribution and control of the various source of power used in the industry. Normally the PCC's is installed near the source of the power so the fault level is higher. It is so designed so as to suit the fault level of 50KA or 65KA for 1 second. The Bus bar system in the PCC's are generally designed to suit the fault level and even the rise of temperature to 40degree centigrade above being ambient. Large amount of space is needed. Various amount of protections like overload, short circuit, earth fault, under voltage are provided for protection of the equipment and the source

Fig 1.4.2: Power Control Centre

Motor Control Centre

MCC (motor control centre) is used as an assembly to control some or all the electrical motors in the central of location. It comprises of multiple sections that is enclosed and have a common power bus where each section contains a combination starter, that consist of circuit breaker, fuse and motor starter and the power disconnect. A MCC can also comprise of metering equipment, indicator lights, variable-frequency drives, push buttons, programmable logic controllers. They are found in large commercial or industrial buildings where many electric motors function and are controlled from the mechanical or electric room also can be called the central location

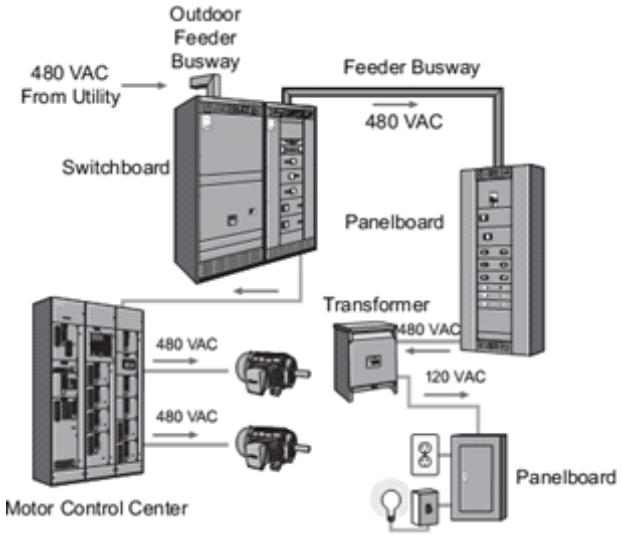

Fig 1.4.3: Motor Control Centre

Transformer:

A transformer is an electrical device that that helps and transfers electrical energy between more than two circuits through the process of electromagnetic induction. A current that is varying in one coil of the transformer, it produces a magnetic field that is varying that in turn gives rise to electromotive force (emf) or voltage in a second coil. Power can be transferred in between two coils, without the metallic connection between the two circuits

Fig 1.4.4: transformer

Summary

- Electrical technicians help to create, maintain and repair the electronic components.
- They can sometimes work with electricians or electrical engineers, or work on site.
- Electricians are responsible for installing wiring systems into new buildings, or inspect the electrical systems in a building to identify the source of a problem.
- Deductive reasoning, logic, mathematical knowledge are essential qualities of an electrical technician.
- Electricians typically focus on electrical construction on a project basis.
- An electrical technician knows how to build electrical machines based on schematics.

Notes

Exercise

State TRUE or FALSE:

a. Electrical technicians help to create, maintain and repair electronic components. [T/F]

b. Electricians learn through hands-on experience. [T/F]

c. Electrical technicians often work in offices or factories. [T/F]

d. Providing preliminary sketches and cost estimates is done by politicians. [T/F]

e. Planning layout and installation of electrical wiring is done by site engineer. [T/F]

Fill in the Blanks:

a. Electrical technicians use specialized measuring and diagnostic devices to _____.

b. Electricians are responsible for installing wiring systems into _____.

c. An electrician designs and executes the _____.

d. An electrical technician mainly focuses on troubleshooting and _____.

e. Two prominent power tools are _____ and _____.

Activity

- This activity will be in the form of “Video” session
- The Trainer will show the Trainees an introductory video on the overview of electrical technician.
- This video is based on US market for electrical technicians. Trainees would be able to relate aspects based on the Indian market.
- The link is : https://www.youtube.com/watch?v=sTedhNQVUf4
- The Trainees are expected to note down the important points.

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2. Integrate electrical subsystem

Unit 2.1 State the fundamentals of Electricity Such as Ohms Law, Difference between Ac and DC, Series and Parallel Connecions

Unit 2.2 Recognize the basic electronics of components such as diode, transformer, LED, photo transistor, capacitor, resistor, inductor, thermistor, Ics

Unit 2.3 Evaluate the Circuit design; block diagram of the product being assembled and funcioning of its different modules

Unit 2.4 Analyse the Electro-Mechanical Assembly Instrucions & General Principles of Wiring

Unit 2.5 State the Safety precauions while working in an electronic assembly unit, ESD precauions and protecive gear such as gloves, rubber base shoes

Unit 2.6 Explain in detail the quality and 5S standard

Unit 2.7 Recognise the maintenance of tools used during the assembly process

Unit 2.8 Idenify frequently occurring errors in the assembly process, causes and prevenive measure

Unit 2.9 Evaluate the documents and procedures used in the during the assembly process

Unit 2.10 Label the way of handling of different electrical and mechanical products

Key Learning Outcomes

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

1. State the fundamentals of Electricity Such as Ohms Law, Difference between Ac and DC, Series and Parallel Connections
2. Recognize the basic electronics of components such as diode, transformer, LED, photo transistor, capacitor, resistor, inductor, thermistor, ICs
3. Evaluate the Circuit design; block diagram of the product being assembled and functioning of its different modules
4. Analyse the Electro-Mechanical Assembly Instructions & General Principles of Wiring
5. State the Safety precautions while working in an electronic assembly unit, ESD precautions and protective gear such as gloves, rubber base shoes
6. Explain in detail the quality and 5S standard
7. Recognize the maintenance of tools used during the assembly process
8. Identify frequently occurring errors in the assembly process, causes and preventive measure
9. Evaluate the documents and procedures used in the during the assembly process
10. Demonstrate the way of handling of different electrical and mechanical products

Unit 2.1 State the fundamentals of Electricity Such as Ohms Law, Difference between Ac and DC, Series and Parallel Connections

Unit Objectives

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

1. Evaluate Ohm's Law
2. Differentiate between AC and DC
3. Elucidate Series and Parallel Connections

Ohms law

The current and voltage output in a circuit varies according to the type of connection, i.e., whether the connection is in series or parallel wiring. This phenomenon is governed by the Ohm's Law, which was named after the German Physicist and Mathematician, George Simon Ohm.

George Simon Ohm
(1789 - 1854)

The Ohm's Law states that the current through a conductor, between two points, is directly proportional to the voltage across the two points. Thus, the formula is:

$$V = I \times R$$

Here,

V = Voltage measured across the conductor in Volts

I = Current through the conductor in Amperes

R = Resistance of the conductor in Ohms

Here in this equation, R is proportionality constant and is independent of the current.

Difference between AC and DC

Technicians need to possess knowledge of the practical application of electricity in order to conduct various fitting operations.

In alternating current or AC, the movement or flow of electricity reverses its direction at regular intervals. This means that an electric charge would move forward, backward, then forward, again backward. This process will take place over and over again.

In direct current or DC, the flow of electricity is only in one direction. This means that the current steadily moves in just one direction. Its strength remains constant.

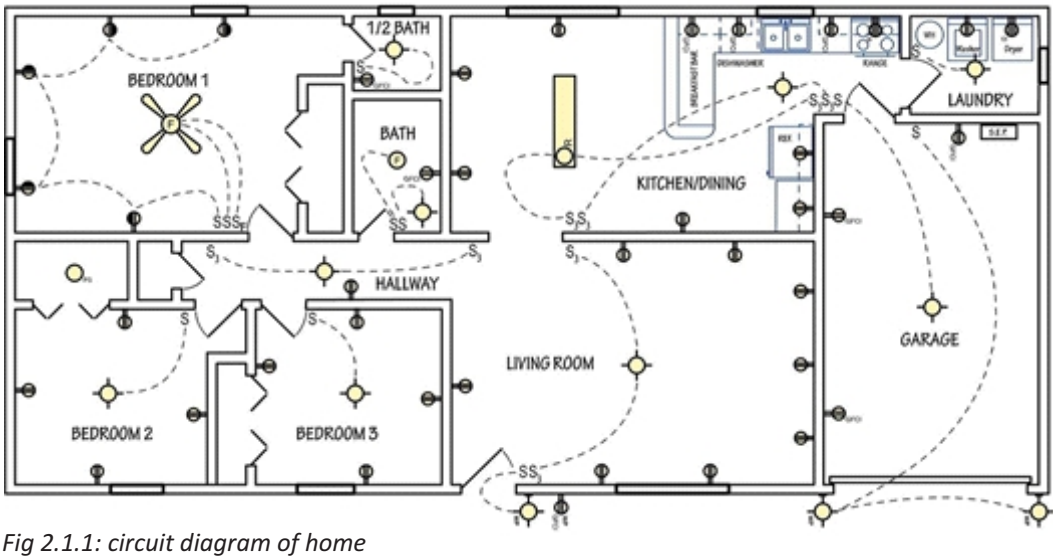


Fig 2.1.1: circuit diagram of home

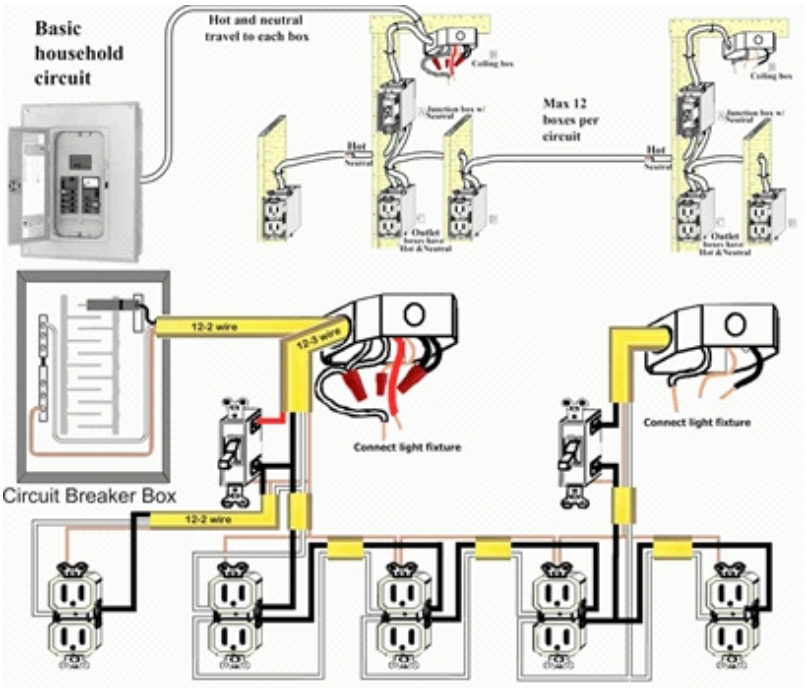


Fig 2.1.2: circuit diagram of home

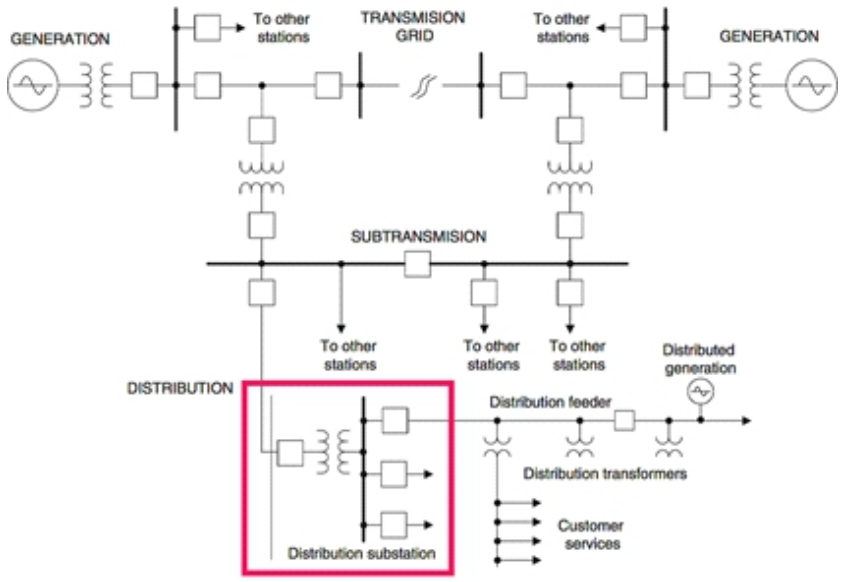


Fig 2.1.3: electric circuit diagram of a substation

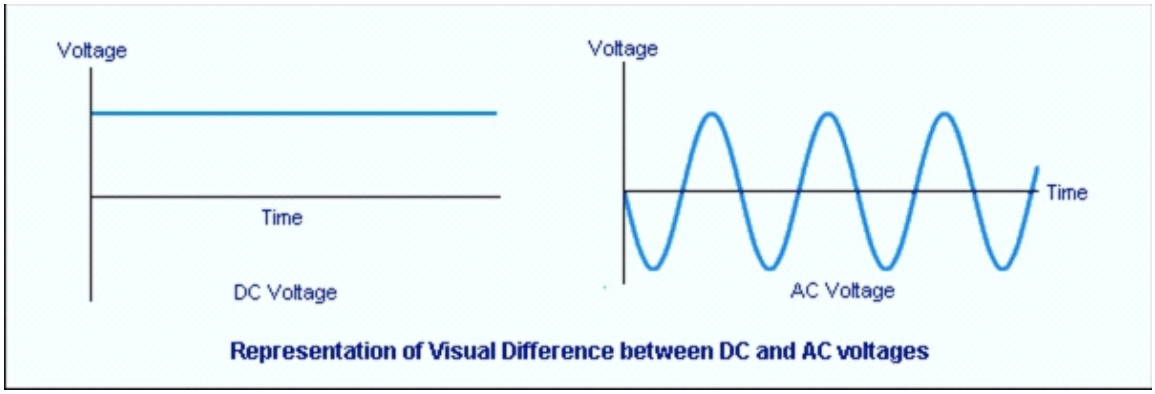


Fig 2.1.4: DC vs AC voltage plate

Criteria	Direct Current	Alternating Current
Types	There are 2 types - Pulsating and Pure	There are 4 types - Triangular, Trapezoidal, Square, Sinusoidal
Flow of Electrons	The movement of electron is in one direction	The movement of electron is not constant. They move backwards and forward
Current	Current of constant magnitude	Current of magnitude - time keeps varying
Frequency	Direct current's frequency is zero	The frequency depends on the country. It may be either 60Hz or 50Hz. in India, it is 50 Hz.
Passive Parameters	Resistance (Only)	Impedance

Series Connections

When the connection of negative and positive cells in a circuit induces an increase in the voltage, the connection is known as series connection.

This is similar to installing batteries in a flashlight. As you slide the batteries into the flashlight tube the voltage increases.

The other common names for series circuit are:

- Daisy chain-coupled
- Current-coupled

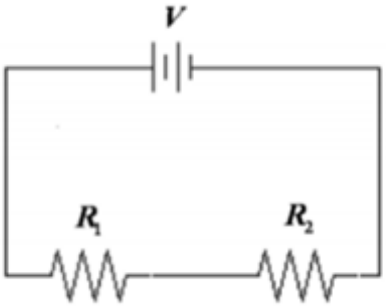


Fig 2.1.5: Sample series connection

The above image is of the Series Connection Circuit.

As you can see the diagram, the current in this series circuit goes through every component in the circuit. So, every component in a series connection carries the same current. There is only one path in a series circuit in which the current can flow.

The main disadvantage or advantage of a series circuit depends on its intended role - the product's overall design. As per this design, there is only one path in which its current can flow. Opening at any point or breaking of the series circuit can cause the entire circuit to "Open" or "Stop" the operation.

For example, if you pull out one of the wires of a series connected fairy lights, the entire string becomes dysfunctional. This will remain in this state until the wire is fixed.

Effect on Current Output

In a Series circuit, the current is the same for all of the elements. Thus,

I1 = I2 = I3 = I4 = ... = I (n), where 'n' is the total number of the said elements in the

Effect on Voltage Output

In a series circuit, the total voltage output can be obtained by adding all the voltage elements. Thus,

V (Total) = V1 + V2 + V3 + V4 + ...+ V (n), where 'n' is the total number of the said elements in the circuit.

Effect on Resistors

The total resistance of resistors in series is equal to the sum of their individual resistances. Thus,

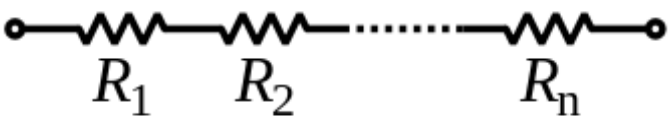


Fig 2.1.6: Sample resistor series

R (Total) = R1 + R2 + R3 + R4 + ……..+ R (n), where 'n' is the total number of the Resistors in the circuit

Effect on Inductors

The Inductor, also known as an Inductor coil or reactor, is a passive two-terminal electrical component that stores electrical energy in a magnetic field when electric current flows through it. An inductor typically consists of an electric conductor, such as a wire, which is wound into a coil around a core.

The **Total Inductance** of non-coupled inductors, connected together in a series circuit, is equal to the sum of their individual inductances. Thus,

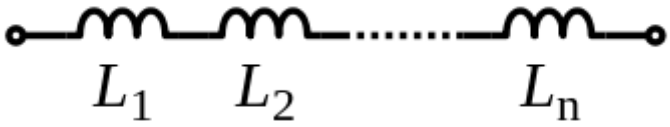


Fig 2.1.7: Sample resistor series

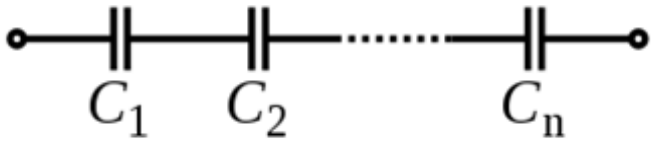
L (Total) = L1 +L2 + L3 + L4 + ……..+ L (n), where 'n' is the total number of the Inductors in the circuit

Effect on Capacitors

The Capacitor is a passive two-terminal electrical component that stores electrical energy in an electric field. The effect of a capacitor is known as Capacitance.

Capacitance exists between two electrical conductors of a circuit in sufficiently close proximity. A capacitor is specifically designed to provide and enhance this effect for a variety of practical applications. This is by consideration of size, shape, and positioning of closely spaced conductors, and the intervening Dielectric material. A capacitor was therefore historically first known as an Electric Condenser.

The Total Capacitance of Capacitors in series is equal to the Reciprocal of the Sum of the Reciprocals of their individual capacitances. Thus,



1/C (Total) = (1 / C1) + (1 / C2) + (1 / C3) + (1 / C4) + ……..+ [1 / C (n)], where 'n' is the total number of the capacitors in the circuit.

Parallel Connections

The manner in which the component connection within a circuit follows multiple paths, where the current is divided, that connection is known as parallel connection. In this case, voltage application in all components remains same. This connection is also known a shunt connection.

In parallel wiring, the positives of multiple modules are connected together and negatives for the same modules are connected together.

If two or more components are connected in parallel, they would have the same potential difference or Voltage across their terminals. The potential differences across the components are the same in magnitude, and they also have identical polarities.

The same voltage is applicable to all circuit components connected in parallel. The Total Current in a parallel circuit is the Sum of the Currents through the individual components.

Effect on Current Output

The current against each individual Resistor is found by the Ohm's law. Thus,

I (Total) = V [1 / R1 + 1 / R2 + 1 / R3 + …… 1 / R (n)], where 'n' is the total number of the Resistors in the circuit.

Effect on Voltage Output

In a parallel circuit, the voltage is the same across all elements. Thus,

V1 = V2 = V3 = V4 = …….. = V (n), where 'n' is the total number of the said elements in the circuit.

Effect on Resistors

In order to find the total resistance of all components, the reciprocals of the resistances of each component must be added and the reciprocal of the sum taken. Total resistance will always be less than the value of the smallest resistance in the circuit. Thus,

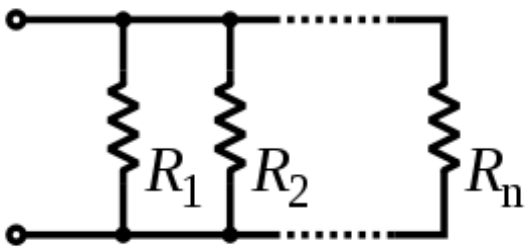


Fig 2.1.9: Sample resistor series

1 / R (Total) = (1 / R1) + (1 / R2) + (1 / R3) + (1 / R4) + ……..+ [1 / R (n)], where 'n' is the total number of the resistors in the circuit.

Effect on Inductors

In Parallel Circuit, Total Inductance of non-coupled inductors is equal to the reciprocal of the sum of the reciprocals of their individual inductances. Thus,

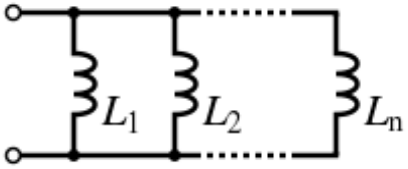


Fig 2.1.10 Sample resistor series

1 / L (Total) = (1 / L1) + (1 / L2) + (1 / L3) + (1 / L4) + ……..+ [1 / L (n)], where 'n' is the total number of the inductors in the circuit.

Effect on Capacitors

The total capacitance of capacitors connected in parallel is equal to the sum of their individual capacitances. Thus,

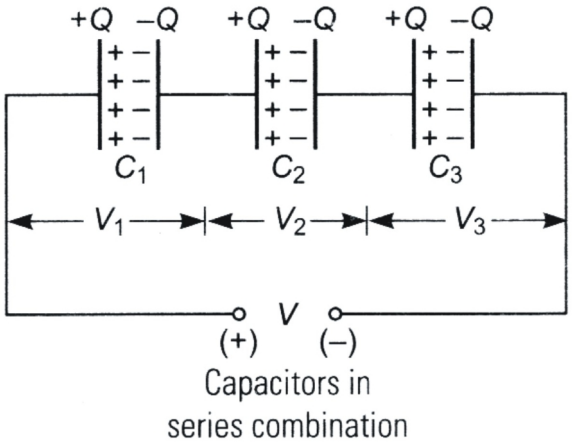


Fig: 2.1.11: Sample capacitor series

C (Total) = C1 + C2 + C3 + C4 + ……..+ C (n), where 'n' is the total number of the Capacitors in the circuit.

Unit 2.2 Recognize the basic electronics of components such as diode, transformer, LED, photo transistor, capacitor, resistor, inductor, thermistor, ICs

Unit Objectives

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

1. Evaluate and read values of resistors, capacitors, diodes and integrated circuits with specific reference to colour coding, polarity, orientation, tolerance

2.2.1 Evaluate and read values of resistors, capacitors, diodes and integrated circuits with specific reference to colour coding, polarity, orientation, tolerance

Diode

The key function of a diode is to control the direction of current flow. Current passing through a diode can only go in one direction. This is known as the forward direction. Current trying to flow in the reverse direction cannot act, as the pathway remains blocked. They're like the one-way valve of electronics.

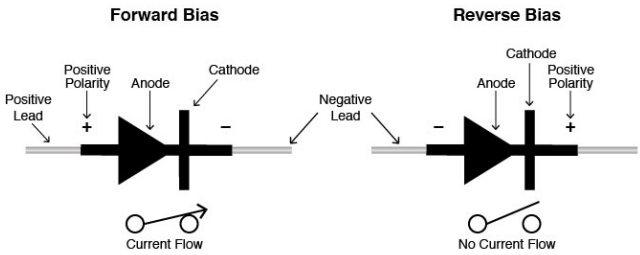


Fig 2.2.1: Diagrammatic presentation of a diode

The ideal diode looks like an open circuit. If the voltage across a diode is negative, no current can flow. In such a situation, the diode is said to be off or reverse biased.

As long as the voltage across the diode isn't negative, it will turn on, hence conducting current. Ideally a diode would act like a short circuit (0V across it) if it was conducting current. When a diode is conducting current, it's forward biased (electronics jargon for “on”).

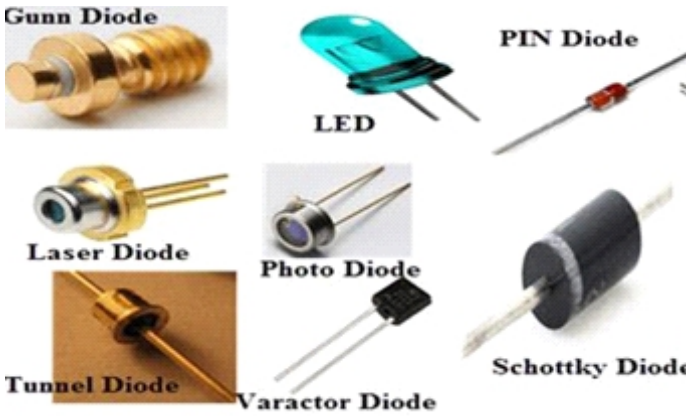
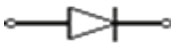
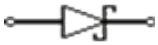
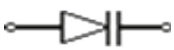
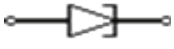


Fig 2.2.2: Types of diode

There are various types of diode. Some of them are like:

- Avalanche diode
- PIN diode
- Photo diode
- Laser diode
- P-N junction diode
- Zener diode
- Transformer

Diode / LED Symbols		
	Diode	Diode allows current flow in one direction only - left [anode] to right [cathode].
	Zener Diode	Allows current flow in one direction, but also can flow in the reverse direction when above breakdown voltage
	Schottky Diode	Schottky diode is a diode with low voltage drop
	Varactor / Varicap Diode	Variable capacitance diode
	Tunnel Diode	

LED

LED or light emitting diode is one of the active two-lead semiconductor electronic components. When current flows through this p–n junction diode, it emits light.

This happens due to the recombination of electrons with electron holes. The process initiates with the application of suitable voltage to the leads. The result is energy released as photons.

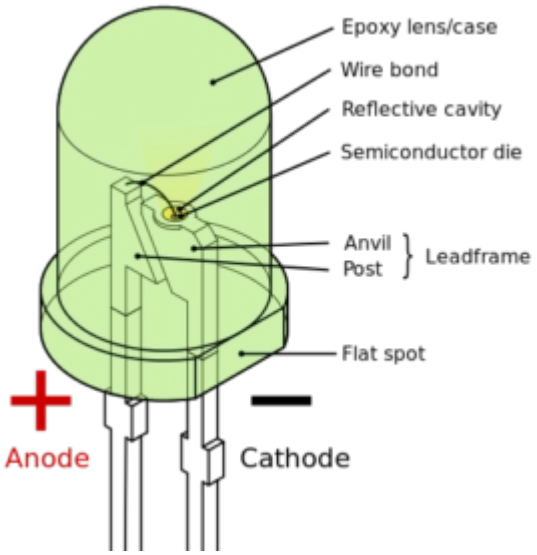


Fig 2.2.3: Diagrammatic presentation of an LED diode

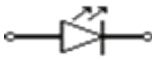
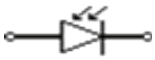
Diode / LED Symbols		
	Light Emitting Diode [LED]	LED emits light when current flows through
	Photodiode	Photodiode allows current flow when exposed to light

Photo Transistor

The resemblance of a phototransistor is quite similar to that of a transistor with a small exception.
The base terminal is present in transistor but absent in phototransistor.
Production of base current takes place when light strikes the base region (photosensitive semiconductor.
The incident light is converted into photocurrent by the help of collector-base p-n junction.

Phototransistor structure

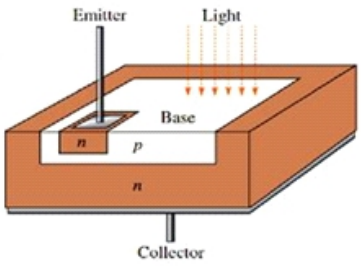


Fig 2.2.4: Phototransistor

Typical package

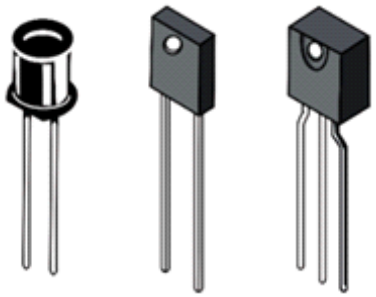


Fig 2.2.5: Package diode

Schematic symbol

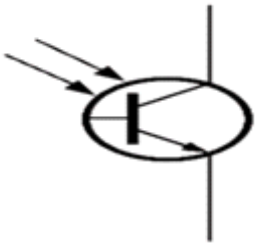


Fig 2.2.6: Diode symbol

Phototransistor circuit

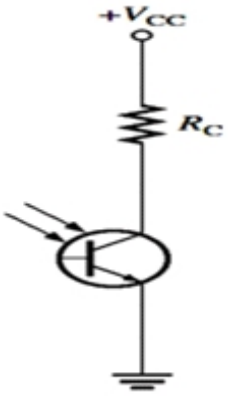


Fig 2.2.7: Phototransistor circuit

Transformer:

A transformer is a device that makes use of a static electricity, which transfers electrical energy between two or more than two circuits through the process of electromagnetic induction. A current that is varying in one coil of the transformer makes a production of varying magnetic field that in turn that in turn induces an electromotive force(emf) or 'voltage" in the second coil. power can be transferred between the two coils without a metallic connection being formed between two circuits

a transformer that is ideal, is theoretical, a linear transformer which is lossless and is perfectly coupled. By meaning perfect coupling implies to infinitely high core permeability of the magnetic.

a varying current in the transformers preliminary winding creates a magnetic flux which is of varying nature

Fig 2.2.8: transformer

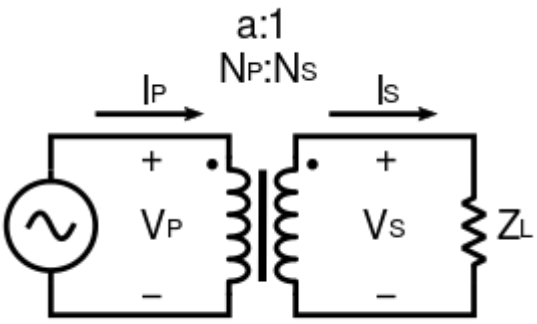


Fig 2.2.9: an ideal transformer

Inductor

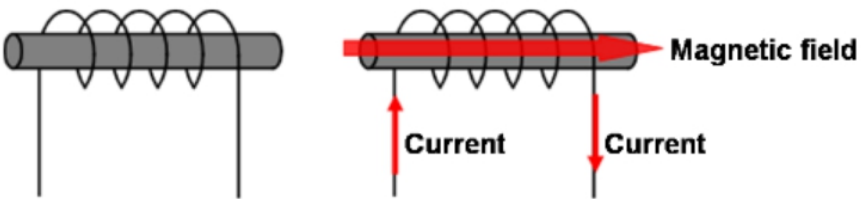
One of the passive electronic components, inductors can store electrical energy as magnetic energy.

The inductor can do so with the help of a conductor.

These conductors are wound into coils.

The generation of magnetic field takes place in clockwise direction as the flow of electricity is from left to right inside the coil.

Here are few diagrammatic representations.



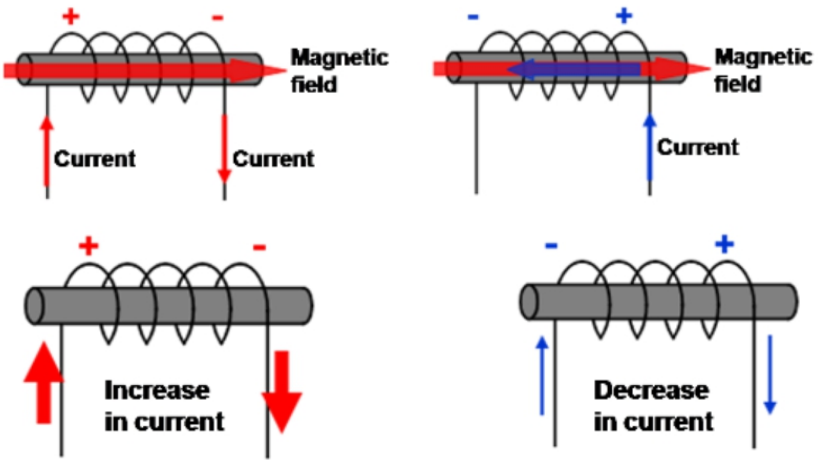
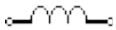
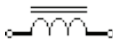


Fig 2.2.10: Diagrammatic presentation of an inductor

Inductor / Coil Symbols		
	Inductor	Coil / solenoid that generates magnetic field
	Iron Core Inductor	Includes iron

Thermistor

A thermistor is a temperature sensitive resistor which works on the principle of resistance. This resistance is completely dependent on temperature. A change in temperature ensures a predictable change in the thermistor's resistor

There are 2 types of thermistors,

- Thermistor Probes
- Thermistor Elements

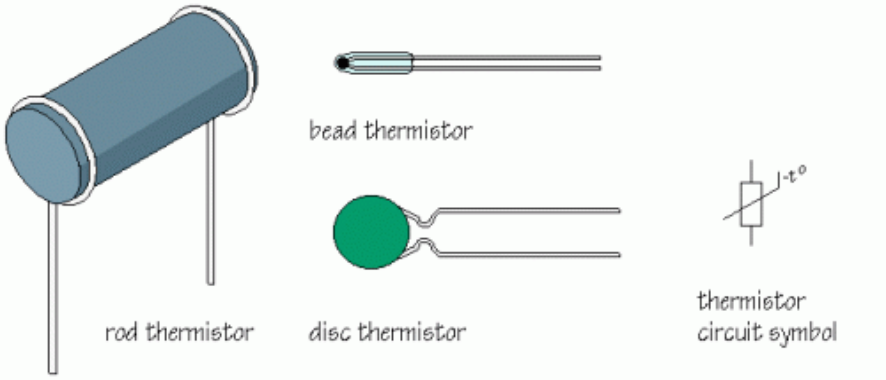


Fig 2.2.11: Sample Thermistor

There are various speculations regarding the thermistor's capability to read temperature. However, the truth is completely different - the thermistor cannot read temperature. Instead, the thermistor's resistance alters the temperature.

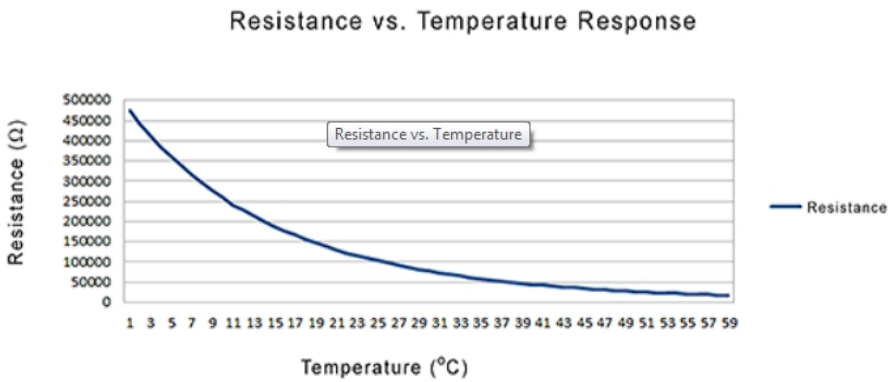


Fig 2.2.12: Resistance vs. Temperature graph

Here are few important aspects related to thermistors.

PARAMETER	THERMISTOR
Temp Range	Within ~50°C of a given center temperature
Relative Cost	Very inexpensive
Time Constant	6 to 14 seconds
Stability	Very stable, 0.0009°C
Sensitivity	High

Fig 2.2.13: A thermistors table

Capacitor

Being one of the passive components, capacitors do not involve in energy generation.

On the contrary, it is efficient to store energy.

The sources are like charged capacitor (different) or a battery.

On connection of a battery through a DC source, one of the plates attaches to the battery's negative end (plate-II) and the other to the positive end (plate-I).

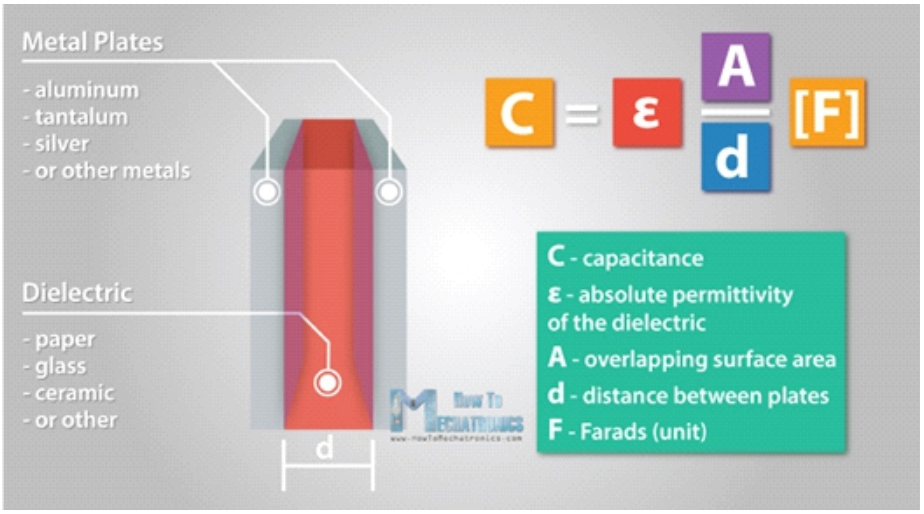


Fig 2.2.14: capacitor

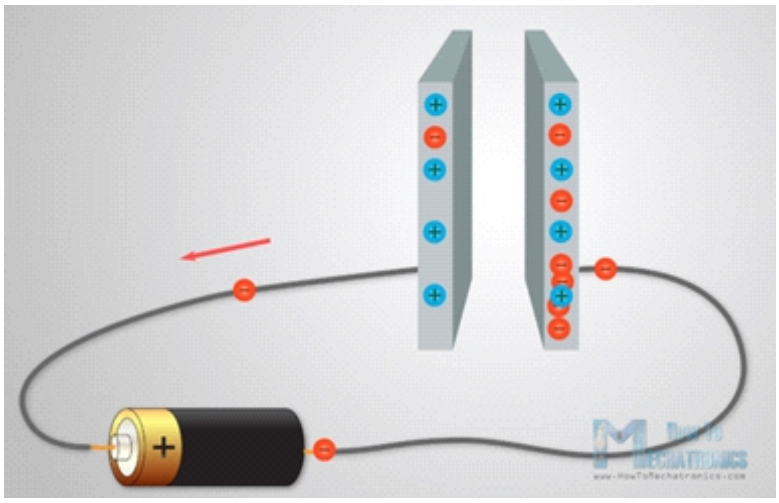
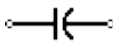
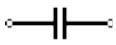
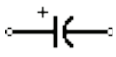
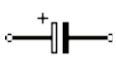
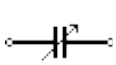


Fig 2.2.15: Diagrammatic presentation of a capacitor

Capacitor Symbols		
	Capacitor	Capacitor is used to store electric charge. It acts as a short circuit with AC and open circuit with DC.
	Capacitor	
	Polarized Capacitor	Electrolytic capacitor
	Polarized Capacitor	Electrolytic capacitor
	Variable Capacitor	Adjustable capacitance

Colour coding of capacitor

Capacitor Colour Code				
Colour	1st Digit	2nd Digit	Multiplier	Tolerance
Black		0	1	±20%
Brown	1	1	10^{-1}	±1%
Red	2	2	10^{-2}	±2%
Orange	3	3	10^{-3}	±3%
Yellow	4	4	10^{-4}	±4%
Green	5	5	10^{-5}	±5%
Blue	6	6	10^{-6}	
Violet	7	7	10^{-7}	
Gray	8	8	10^{-8}	
White	9	9	10^{-9}	±10%

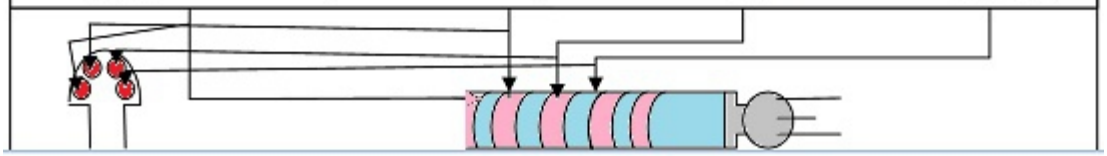


Fig 2.2.16: capacitor colour code

Band Colour	Voltage Rating (V)				
	Type J	Type K	Type L	Type M	Type N
Black	4	100		10	10
Brown	6	200	100	1.6	
Red	10	300	250	4	35
Orange	15	400		40	
Yellow	20	500	400	6.3	6
Green	25	600		16	15
Blue	35	700	630		20
Violet	50	800			

Grey		900		25	25
White	3	1000		2.5	3
Gold		2000			
Silver					

Fig 2.2.17: capacitor voltage colour code

Polarity of capacitor

For the determination of the polarity of the capacitor, electrolyte capacitors are often marked with a stripe, that particular stripe will indicate the negative lead. If it is a capacitor that is axial leaded(lead comes out of the opposite ends of the capacitor) then the stripe is accompanied by arrows that points to the negative lead

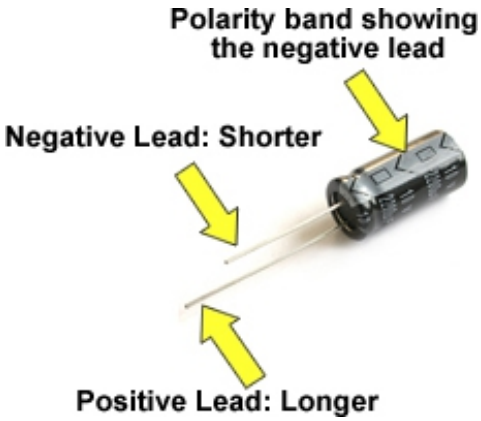


Fig 2.2.18: polarity of capacitor

Orientation

Not all the capacitors are polarized, and when they are polarized it is also very important not to mix both the polarities up. Ceramic capacitors are commonly yellow and are not polarized

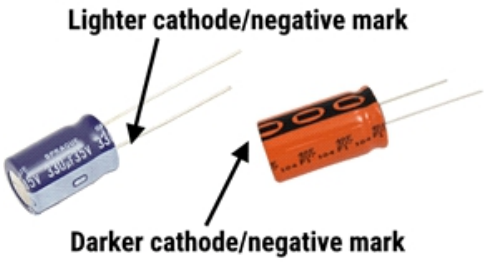


Fig 2.2.19: orientation

Tolerance

- the tolerance value is the extent to which the actual amaount of capacitance is allowed to get varied from its nominal value and can range from anywhere from -20% to +80%

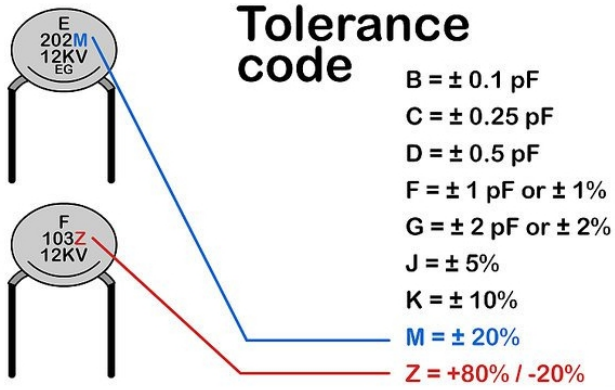


Fig 2.2.20: tolerance code

Resistor

The main work of a resistor is to obstruct current flow and impose a reduction in voltage. During this process, electrical energy is absorbed by the resistor. The resultant is in the form of heat.

Considering from the bottom to the top, the power dissipation ratings are:

- 1/8W
- 1/4W
- 1/4W
- 1/4W
- 1/2W
- 1W
- 1W
- 3W

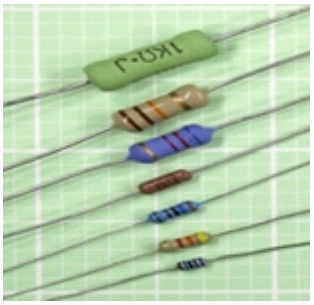


Fig 2.2.21: resistor

In a DC circuit, the power dissipated by the resistor is:

$$W = V * I$$

Colour	Digit	Multiplier	Tolerance
Black	0	1	
Brown	1	10	± 1%
Red	2	100	± 2%
Orange	3	1,000	
Yellow	4	10,000	
Green	5	100,000	± 0.5%
Blue	6	1,000,000	± 0.25%
Violet	7	10,000,000	± 0.1%
Grey	8		± 0.05%
White	9		
Gold		0.1	± 5%
Silver		0.01	± 10%
None			± 20%

Fig 2.2.21 resistor code table

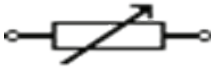
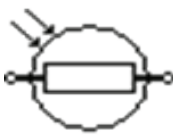
Resistor Symbols		
	Resistor [IEEE]	Resistor reduces the current flow.
	Resistor [IEC]	
	Potentiometer [IEEE]	Adjustable resistor - has 3 terminals.
	Potentiometer [IEC]	
	Variable Resistor / Rheostat [IEEE]	Adjustable resistor - has 2 terminals.
	Variable Resistor / Rheostat [IEC]	
	Trimmer Resistor	Pre-set resistor
	Photo resistor / Light dependent resistor [LDR]	Photo-resistor - change resistance with light intensity change

Fig 2.2.22: resistor symbols

ICs

IC or integrated circuits comprise of interconnected and inseparable elements. Commonly known as microchip or chip, ICs are semiconductor wafers comprising of millions of fabricated transistors, capacitors, and resistors. The functionality of ICs can be seen in:

- Microprocessor
- Computer memory
- Counter
- Timer
- Oscillator
- Amplifier

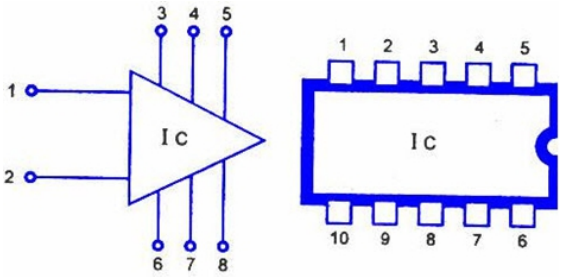


Fig 2.2.23: Sample IC

Integrated Circuit Symbol

Digital IC has 2 levels - 0's and 1's. Their working principle is based on Binary Mathematics. As per this, 0 means off and 1 means on.

Various types of ICs are:

- Power Management ICs
- Interface ICs
- Memory Chips
- Logic ICs

Applications of IC

- Radio Frequency Encoders
- Memory Devices
- Audio Amplifiers
- Juice Makers
- Wristwatches

Code	Ethnicity[2]
IC1	White - North European
IC2	White - South European
IC3	Black
IC4	Asian - Indian subcontinent
IC5	Chinese, Japanese, or other Southeast Asian
IC6	Arab or North African
IC9	Unknown

Fig 2.2.24: Coding of the IC

Polarity:

The ICs might range from eight to eighty pins, and each of the pin have got functions and position which is unique to it, and there is a good amount of chance that it will smoke, melt and will be ruined if not connected correctly

Through-hole ICs usually is available in dual-inline package (DIP) - two rows of pins are spaced by 0.1"which is wide enough for straddling the centre of a breadboard. DIP ICs usually contains an notch for the indication of which of the many pins is first. If not with the notch, the IC might have a dot in the casing that is etched near pin1

Fig 2.2.25: polarity

Orientation:

- a circle or dot which is next to the pin
- a half circle or the notch that is on the end of the chip, pin 1 remains to the left of the notch
- a bevelled edge or the notch down on side of the pins of the IC
- a bevelled edge on the end of the package

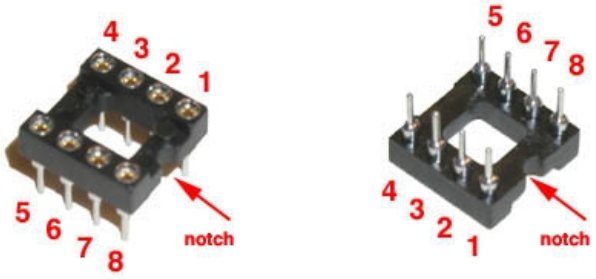
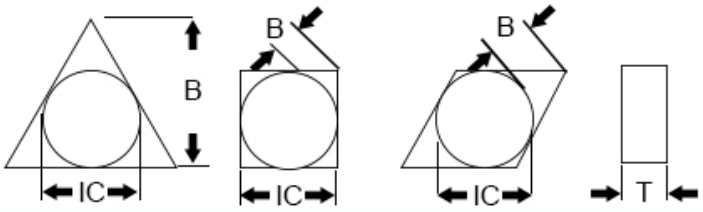


Fig 2.2.26: orientation

Tolerance:

Tolerances: apply prior to edge prep and coating

IC: theoretical diameter of the insert inscribed circle
T: Thickness
B: See figures below



Tolerance Class	Tolerance on "IC"		Tolerance on "B"		Tolerance on "T"	
	inch	mm	inch	mm	inch	mm
C	±.0010	±0,025	±.0005	±0,013	±.001	±0,025
H	±.0005	±0,013	±.0005	±0,013	±.001	±0,025
E	±.0010	±0,025	±.0010	±0,025	±.001	±0,025
G	±.0010	±0,025	±.0010	±0,025	±.005	±0,13
M	see tables at right		see tables at right		±.005	±0,13
U	see tables at right		see tables at right		±.005	±0,13

3 - Tolerance

Fig 2.2.27: tolerance of IC

Unit 2.3 Evaluate the Circuit design; block diagram of the product being assembled and functioning of its different modules

Unit Objectives

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

1. Evaluate and interpret accurately drawings, wiring and job specifications/instructions
2. Identify the modern wiring Materials and electrical materials
3. Apply and ensure that the finished assembly meets specifications
4. Use approved drawings, job instructions or work manuals

2.3.1 Evaluate and interpret accurately drawings, wiring and job specifications/instructions

Interpret accurately drawings

Interpretation of the drawing accurately is very important. If the technician can read and interpret the drawings accurately it will be of great value to the technician himself the design, angle of the wires, the types of wiring and properly deciphering them is important for a safe and secure wiring. The other important facets of interpreting the wire accurately would lead to

- **saving of time;** as the drawing would anticipate the key areas of the structure, the sharp corners, potential wet spots and the tight walls can always help the technician save time because they can clue out the problem before they reach the spot
- **it saves money;** if the drawing is planned ahead then it can help the technician to plan for the exact type and length of wire that will be needed for the various part of the project, which will ensure that no one has to go back and purchase or cut the additional wire that would otherwise escalate the cost
- **it prevents injury;** the diagrams help the technician to make an anticipation of the areas where they can get injured, this involves nails, sharp objects and also can get shock from the wiring that is put together

Wiring and job specifications/instructions

- the specification of the or the job requirement of the electrician would include
- Assembling, installing and testing of the electrical and electronic wiring, equipment, apparatus, appliances etc.
- connecting the wires to circuit breakers, transformers or other components
- inspection of the electrical components, systems for identification of the hazards and defects and the need for adjustment and repair
- testing of the electrical systems and continuity of the circuits in the electrical wiring, fixtures, equipment, and others for ensuring the compatibility and the system safety
- planning, layout and installation of the electric wiring, fixtures and equipment on the specification of jobs and local codes that are put to use

2.3.2 Identify the modern wiring Materials and electrical materials

Electrical materials

Electrical materials are elements which are used to make any project based on electrics. The electrical material ranges from a circuit of the small house to as large as an industrial plan

Electrical box

It is an enclose box that is used for multiple purposes like connecting, pulling or just terminating a particular circuit. Electric boxes can be fixed or set either indoor or outdoor, but if it is used indoor then it has to be set screw, whereas if it is used outdoor then it must be rain tight, these can be built of cast iron, aluminium, plastic, stainless steel or aluminium. As the requirement would necessitate it can include corrosive protection on explosion protected by design

Fig 2.3.2.1: electrical box

Electrical conduit and conduit fitting

Electrical conduit is a tube that empowers the carrying of electrical wire for communications or power. Conduit is basically made up of steel that is rigid ; the lighter steel is called IMC or the intermediate conduit; PVC or plastic ;or PVC coated or aluminium that is rigid and which is covered by 40 mil jacket of PVC. Conduit for the electrical varies from 3/8"-6"

whereas a **conduit fitting** is a part whose purpose is to join or make an adaption of other parts or the conduit carrying electrical power or communication wire. These fittings can either be placed indoor but it has to be set by screw and if it is set outdoor then it has to be watertight. They can vary from being couplings, connectors, locknuts, bushings and others. They come in sizes that range from 3/8"-6". These can also be corrosive protective by PVC coating or explosion which is protected by design

Fig 2.3.2.2 electrical conduit fittings

Fig2.3.3.3 electrical conduit

Explosion proof enclosures

It is a product design that contains an electrical short so that it does not get lighted up in hazardous atmosphere that might cause an explosion. Refineries, gas stations are well examples where these products must be used. These are usually made of heavy duty steel or aluminium by design and can also be made of fiberglass

Fig 2.3.2.4: explosion proof enclosures

Electrical wires and cables

These wires are made of copper or aluminium that takes the capacity of carrying the electricity through the means of an electrical circuit. These wires can be run overhead, underground by the means of flex; conduit or it may through open area. The wire is protected by design with the help of a jacket that totally depends on its usage. It might be flexible like when it is used in extension cord. The size can be very small like 26 gauge to as large as 2000MCM

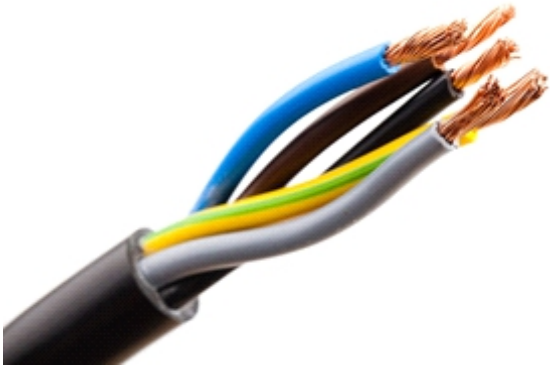


Fig 2.3.2.5: electrical cables

Electrical connectors

It is that part that joins or forms a connection or adapt one part to another. These ranges in sizes from 3/8"to 6".They can be either placed indoor, outdoors explosion proof and also corrosive protected

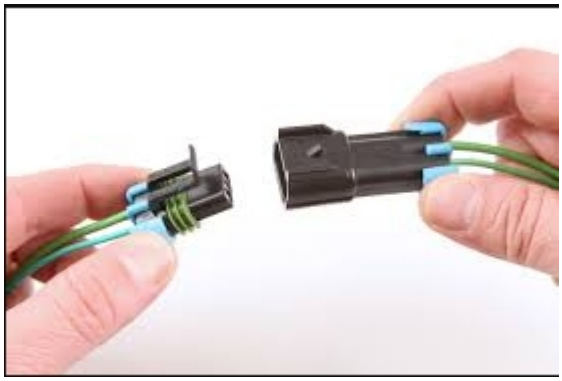


Fig 2.3.2.6: electrical connectors

Circuit breakers

These are devices that interrupt automatically with the flow of the current to provide a protection against an overload or short. These form protection for the smallest house circuit to the largest of industrial requirements

Fig 2.3.2.7: circuit breakers

Motor control

It is an apparatus which is used for regulation of a mechanism or motor. It can control the smallest of the mechanism to the largest of the turbines

Fig 2.3.2.8: motor control centre

Lugs

These are electrical connectors that terminate the electric circuit. They are made of copper; bronze and aluminium. They are made from the smallest wire whose size can range from 26 gauges to 2000MCM that is the largest. They can be mechanical or set screw; clamp type; compression or crimp and solder or weld

Fig 2.3.2.9: electrical lugs

Wiring Materials

Modern non-metallic sheathed cables, such as **Types NMB and NMC**, consist of two to four wires covered with thermoplastic insulation, plus a bare wire for grounding (bonding), surrounded by a flexible plastic jacket. Some versions wrap the individual conductors in paper before the plastic jacket is applied.

Rubber-like synthetic polymer insulation is used in industrial cables and power cables installed underground because of its superior moisture resistance.

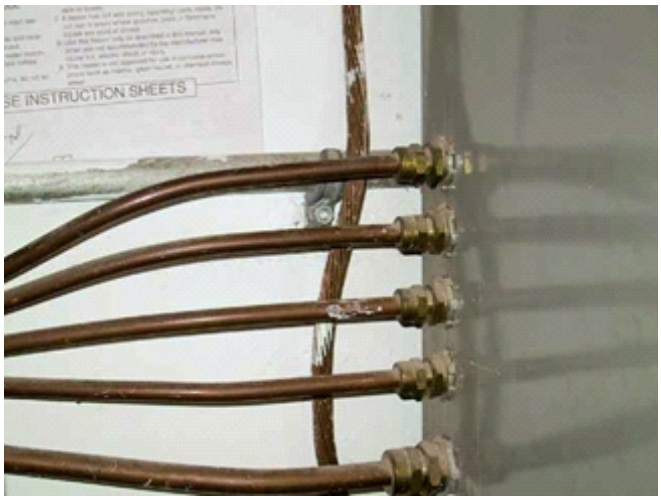


Fig 2.3.2.10: Non-metallic sheathed cables

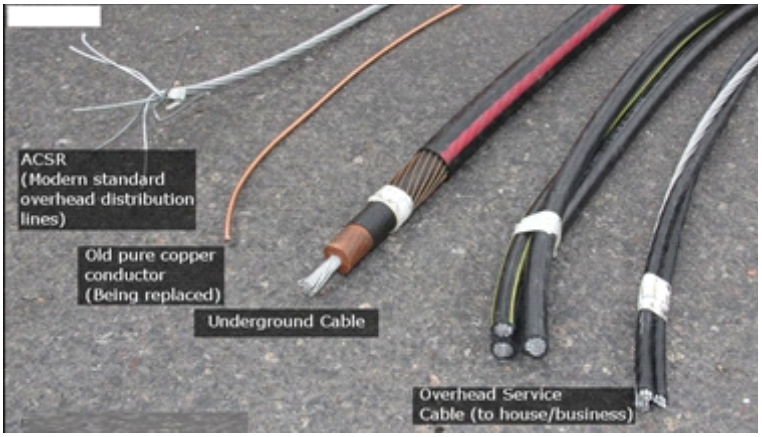


Fig 2.3.2.11: normal wires and cables

Insulated cables are rated by their allowable operating voltage and their maximum operating temperature at the conductor surface. A cable may carry multiple usage ratings for applications, for example, one rating for dry installations and another when exposed to moisture or oil.

- Cables for industrial, commercial and apartment buildings may contain many insulated conductors in an overall jacket, with helical tape steel or aluminium armour, or steel wire armour
- Cables intended for very flexible service or in marine applications may be protected by woven bronze wires.
- Power or communications cables (e.g., computer networking) that are routed in or through air-handling spaces (plenums) of office buildings are required under the model building code to be either encased in metal conduit, or rated for low flame and smoke production.
- Cables usually are secured with special fittings where they enter electrical apparatus; this may be a simple screw clamp for jacketed cables in a dry location, or a polymer-gasketed cable connector that electrically engages the armour of an armoured cable and provides a water-resistant connection.
- Special cable fittings may be applied to prevent explosive gases from flowing in the interior of jacketed cables, where the cable passes through areas where flammable gases are present.
- Cables must be supported near their entrance to devices and at regular intervals along their runs.
- In tall buildings, special designs are required to support the conductors of vertical runs of cable. Generally, only one cable per fitting is permitted, unless the fitting is rated or listed for multiple cables.

2.3.3 Apply and ensure that the finished assembly meets specifications

- All the production and specifications for assembly and processes are mandatory, the specifications must be verified and documented, instructions of work are provided for all processes in which the variations might and can result into absolute failure of the finished devices to meet the specifications.
- Typical process examples being molding, welding, sterilization etc. Drawings are used for assembly, fabrication. Procedural changes and specification verification, new procedures and verifications are reviewed and approved by using a formal process and procedure. Changes in the work instructions, instructional procedures and drawings must be made according to the formal controls
- Computers, components of computer and software storage media might be sensitive to the environment especially in regards to humidity, electrostatic discharge (ESD), temperature, electromagnetic interference (EMI) dirt/dust.

- Other products or finished devices might need to be handled or is manufactured in a clean room environment to negate the bio burden .Written procedures are needed to assure that the environment is controlled as when it is required
- It must be verified that there inspections that have been documented of environmental controls that do demonstrate the environmental systems of control are functioning properly. Fluctuating results or periodical spikes might be an indicator of problems

2.3.4 Analyse and use approved drawings, job instructions or work manuals

Approved drawings

- Very unlike the block diagram or a layout diagram the circuit diagram actually shows the connections that are electrical. A drawing that is meant to depict the way the wires and the components are placed in physical arrangement this is called artwork or layout, wiring diagram or the physical design
- The approved drawings represents and shows best and top level design of an electro mechanical assembly, it reflects the functionality of the product. the drawings and the schematics show their functions and their relationship, these approved drawings gives a representation of the form, the function and the way it fits
- the approved drawing of the electrical mechanical systems in large projects usually consist of the
- plot plan that shows and reflects the location of the building and the electrical wiring of the outside too
- the floor plans that shows the location on every floor of the electrical systems
- the diagrams of the power risers showing the panel boards
- control wiring diagrams
- schedules and other information that is needed for construction drawings

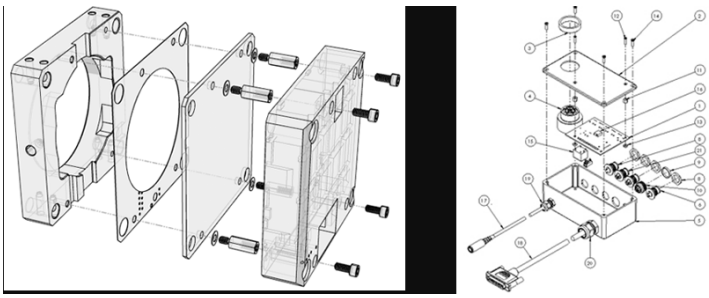


Fig 2.3.4.1 electromechanical assembly

Job instructions or Work manuals

- job instruction or work manuals will involve how the electricians will repair or assemble Printed Circuit boards, installation or replacing of the soldered capacitors, resistors, diodes and other parts that are similar
- he will understand and read both oral and written instructions
- understanding of the blueprints, schematics, blueprints, diagrams, procedures, manuals and part lists
- all the other instructions that will be provided in the work manual or the job instructions, the technician will be required to work in an environment , which has a good pace and also with good dexterity

Underline the assembly instructions: Instructions that is required for a successful assembling of the PCB are as follows

Tools that are required: There is always a minimum set of tools that is required for successful assembling of a PCB

Equipment for soldering: The most inexpensive and the simplest way of the technique of soldering that work by putting the iron plugs right inside the wall and have no means of the temperature being adjusted. Electronics work at a 15 to 30 watt iron is recommended. next comes the irons those are thermostatically controlled there are various ways how a temperature can be checked. Some irons are set by adjusting the dial of the temperature other make use of magnetized tips that have been set to a temperature

Types of solder: There are two types of solder for the work of electronics one is lead/tin alloy and lead free, there are also two lead/tin alloys which is being commonly used

Techniques of proper soldering: This techniques consists of the surfaces that is soldered being heated beyond the melting point of the solder that is being used so that the solder can flow on the surfaces freely without any interruption

Soldering taking place through-hole components: On a one layer of PCB the technician needs to insert the component and the leads are slightly bend to keep the solder in its place

Soldering of the two sided boards: The soldering in components make use of enough amount of heat and the solder so that the solder flows through the hole to the upper side of the PCB

Different types of electrical components: There are basically four kinds of electronic components like resistors, inductors, capacitors etc.

2.3.5 Evaluate the circuit design, block diagram of the product being assembled and functioning of its different modules (centrifugal pump)

different modules(centrifugal pump)

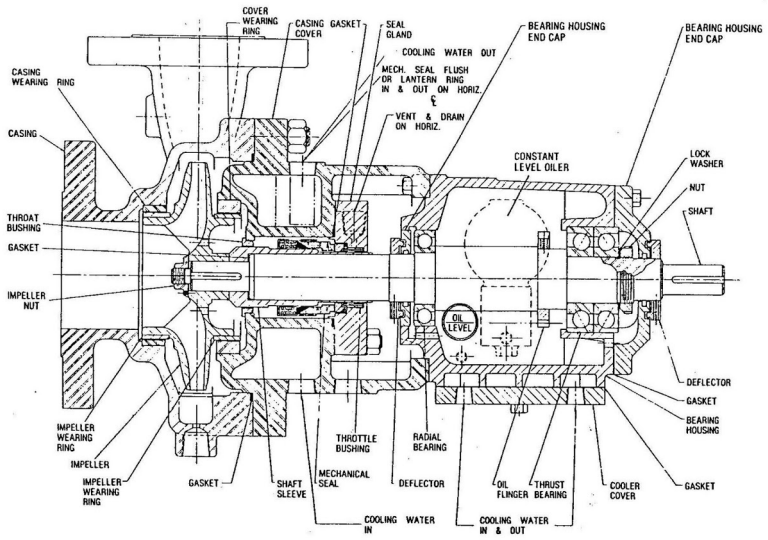


Fig 2.3.5.1 circuit diagram of a centrifugal pump

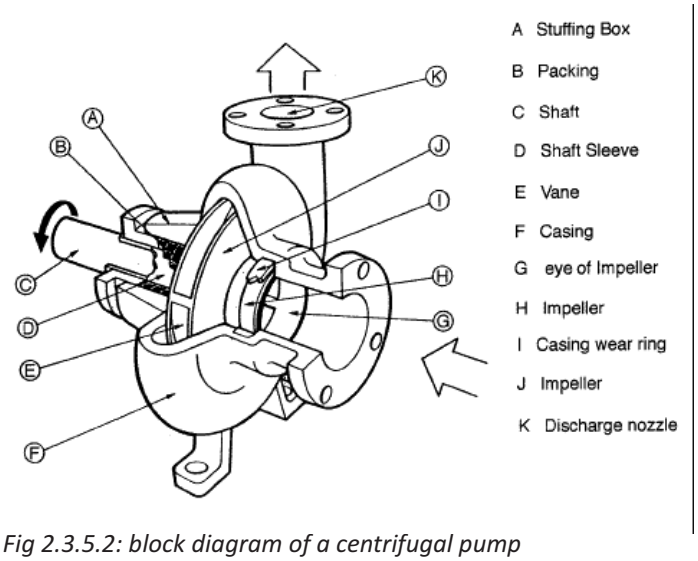
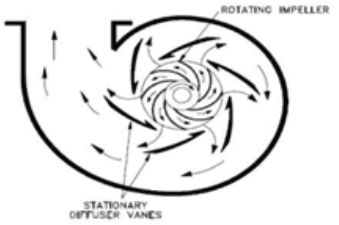
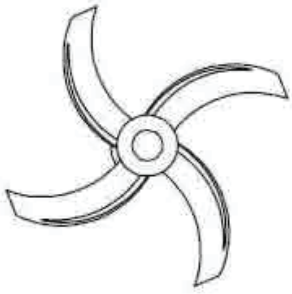
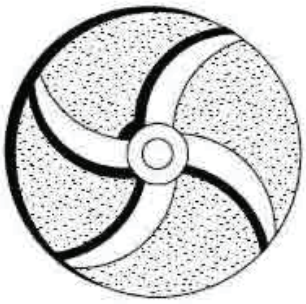
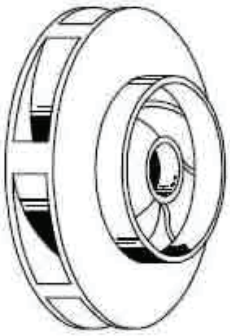


Fig 2.3.5.2: block diagram of a centrifugal pump

Each centrifugal pump consist and is made of hundreds of parts.to be very specific there are very few components that every centrifugal pump in general have in common. These components can be further divided into mechanical end and wet end

- The mechanical end consists of the parts that provide support to the impeller with the casing. The mechanical end of the pump make an inclusion of these parts shaft sleeve, pump shaft, sealing, bearings and bearings
- The wet end consists of those parts that determine the performance of the hydraulic pump. The two primary ends being casing and impeller

Parts of the centrifugal pump	Function	Images
Impeller	• it is a rotter that is used to increase the kinetic energy of the flow	
Casing(volute)	• it acts as the pressure containment vessel which contains the liquid and also gives direction to the flow of the liquid in and out of the centrifugal pump • it is also called volute, which is a curved funnel that takes the fluid or receives it which is being pumped by the impeller	
Shaft (rotor)	• the impeller is basically mounted on the shaft. It is a mechanical component that helps in transmission of the torque from the motor to the impeller	
shaft sealing	• the shaft sealing is the packing of rings that are provided in the centrifugal pumps that help prevent the leakage of the liquid that has been pumped	
bearings	• these constrain the relative motion of the shaft(rotor) and also helps in reducing the friction between the stator and the rotating shaft	

Types of impellers		
Open impeller	• structurally weak , typically used in diameter small pumps that are not that expensive and pumps that handle suspended solids	 open impeller
semi open	• mostly used in pumps of medium diameter and with the liquids that consists of small amounts of solids those are suspended	 semi-open impeller
closed	• Most commonly used pumps with closed impeller that can handle clear liquids. It is very complicated and have an expensive design not only because of the impeller because also of the wear rings that are additional and are needed	 closed impeller

Unit 2.4 Analyse the Electro-Mechanical Assembly Instructions & General Principles of Wiring

Unit Objectives

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

1. Identify consumables such as wires and connectors need for the assembly process
2. Identify and collect assembled PCBs from the assembly team
3. Record faults and pass the board on to the PCB assembly team for re-work
4. Describe the standard operating procedure to assemble the electrical sub system
5. Collect and assemble together various control boards and other electronic components in order to obtain the electrical sub system
6. Plan and achieve the required quality and meet overall quality standards
7. Arrange and place the assembled system in bins assigned and ensure that it is moved to final assembly area
8. Organize and coordinate with the PCB assembly team to ensure that production targets are met
9. Identify steps to ensure that the finished assembly meets specifications
10. Practice and Interact with the supervisor in order to receive clarity about the day's production requirement and collect the work instruction
11. Complete forms such as work orders, invoices, maintenance records

2.4.1 Identify consumables such as wires and connectors need for the assembly process

Electrical wiring is the installation of cables and associated devices such as switches, distribution boards, sockets and light fittings in a structure.

Wiring is subject to safety standards for design and installation. Allowable wire and cable types and sizes are specified according to the circuit operating voltage and electric current capability, with further restrictions on the environmental conditions, such as ambient temperature range, moisture levels, and exposure to sunlight and chemicals.

Associated circuit protection, control and distribution devices within a building's wiring system are subject to voltage, current and functional specification. Wiring safety codes vary by locality, country or region.

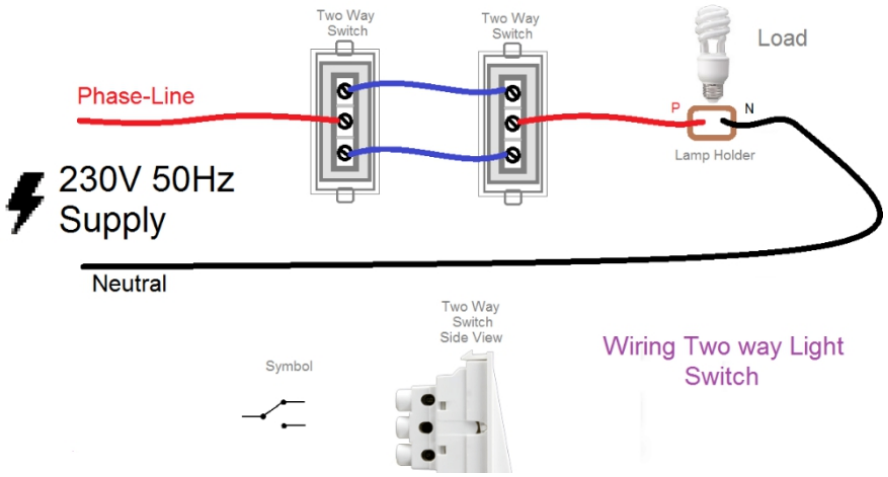


Fig 2.4.1.1 two way light switch connection

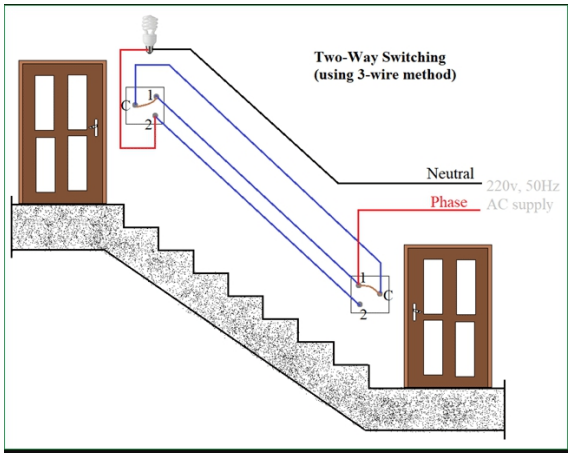


Fig 2.4.1.2two way switching using 3-wire methods

Identify consumables such as wires and connectors need for the assembly process

Materials for wiring interior electrical systems in buildings vary depending on:

- Intended use and amount of power demand on the circuit
- Type of occupancy and size of the building
- National and local regulations
- Environment in which the wiring must operate.

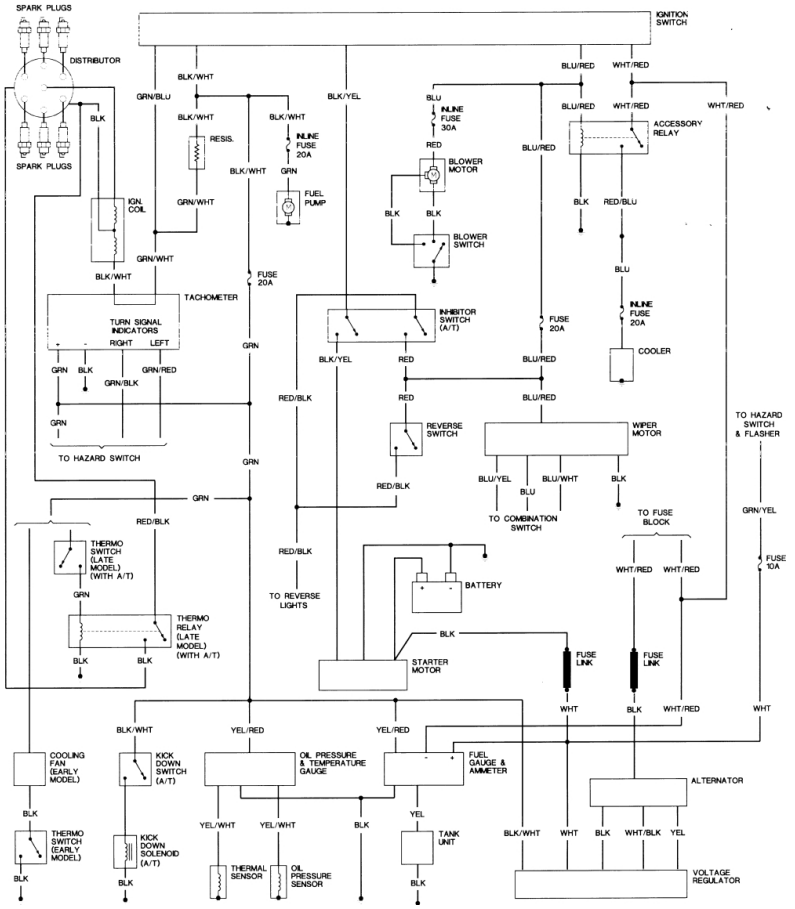


Fig 2.4.1.3: Sketch of house-plan for wiring layout

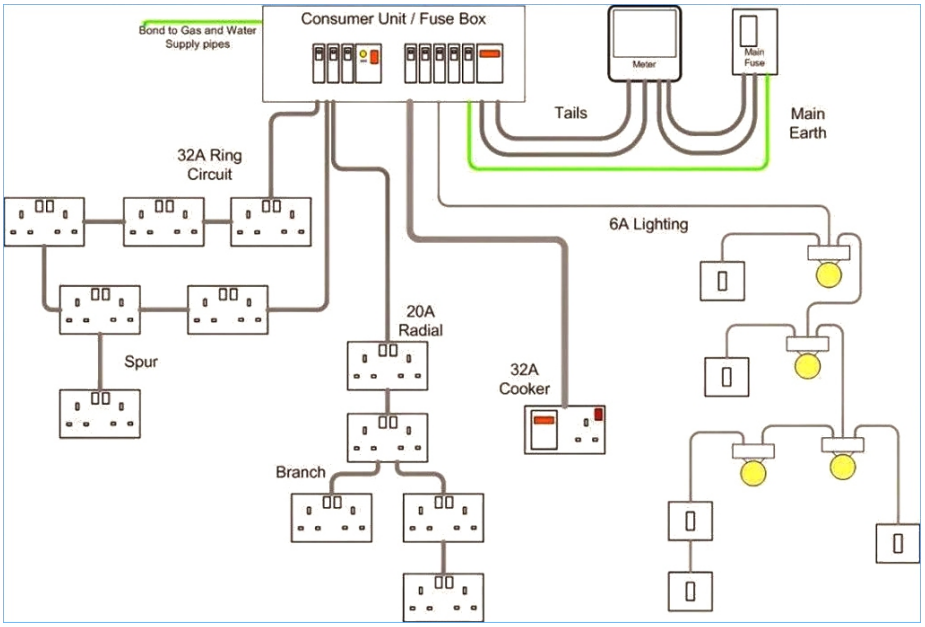


Fig 2.4.1.4 electrical wire diagram of a house

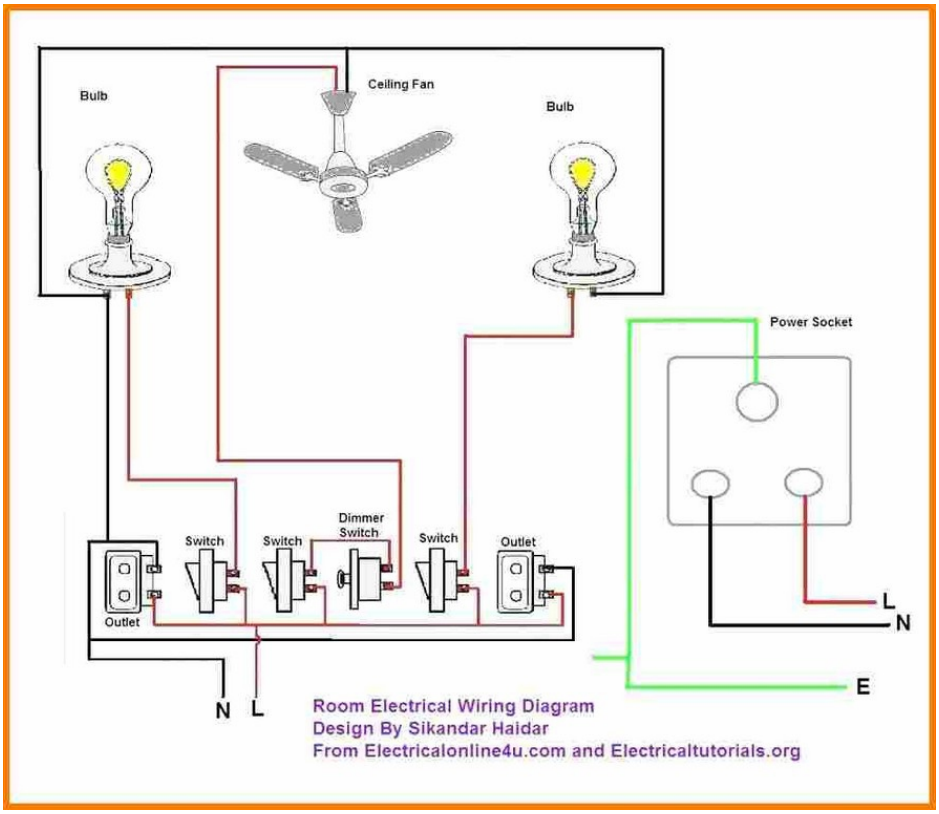


Fig 2.4.1.5: room electrical diagram (picture courtesy &design courtesy Sikandar

Haidar source Electricalonline4u.com&Electricaltutorials.org)

Wiring systems in a single family home or duplex are simple, with relatively low power requirements, infrequent changes to the building structure and layout, usually with dry, moderate temperature and non-corrosive environmental conditions. In a light commercial environment, more frequent wiring changes can be expected, large apparatus may be installed. Heavy industries have more demanding wiring requirements, such as very large currents and higher voltages, frequent changes of equipment layout, corrosive, or explosive atmospheres. Wires and cables are rated by the circuit voltage, temperature rating and environmental conditions (moisture, sunlight, oil, chemicals) in which they can be used.

Evaluate electrical wiring and its types

Electrical wiring is installing of the cables and devices that are associated along with it, such as the switches, light fittings, distribution boards and sockets. The wiring is always subject to safety standards for the design and the installation of the same

An electrical circuit is a course that is closed, and through which electricity flows in a continuous manner from the source through the means of a hot wire to the device so that it gets powered up and then it goes back to the source again through the neutral wire

There are three kinds of wiring; they are as follows parallel wiring; switch wiring; series wiring

Parallel wiring

for most houses the wiring is parallel, which means that several devices are powered on a single circuit. Both the neutral and hot wires, they run through the several of housing boxes that run along the route and finally branch off to individual receptacles and fixtures

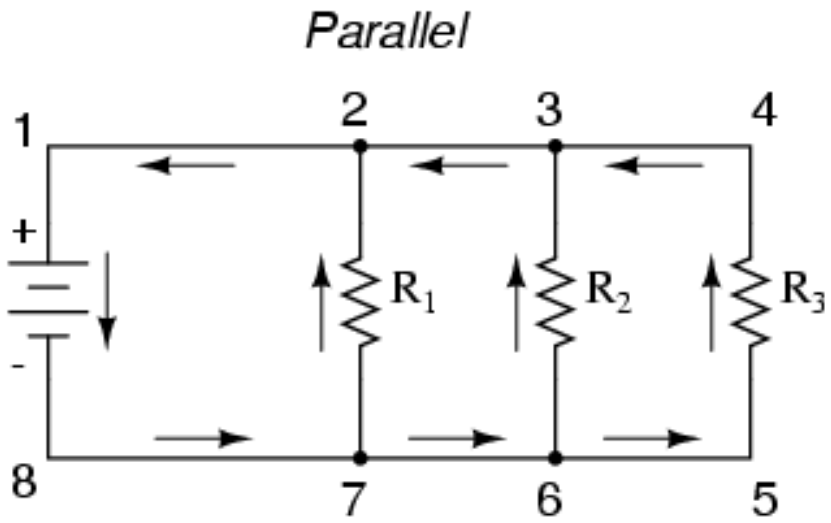


Fig 2.4.1.6: .parallel wiring

Switch wiring

Switches that are installed on hot wires, gives permission or do not permit the flowing of the current to a light or other device.

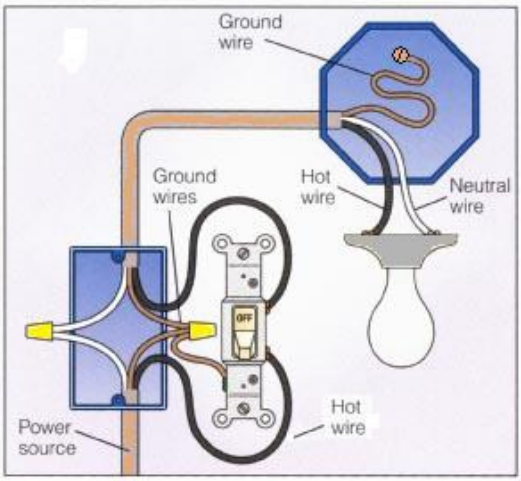


Fig 2.4.1.7: wiring a two way switch

Series wiring

This type of wiring is not used in modern day wiring; it is rarely used as it operates in the way as the Diwali lights, when one light burned out none would be illuminated. The series wiring routes the hot wire through the several devices and then it joins the wire that is neutral, that will lead back to the source

Fig 2.4.1.8 series wiring

2.4.2 Identify and collect assembled PCBs from the assembly team

A printed circuit board (PCB) electrically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate.

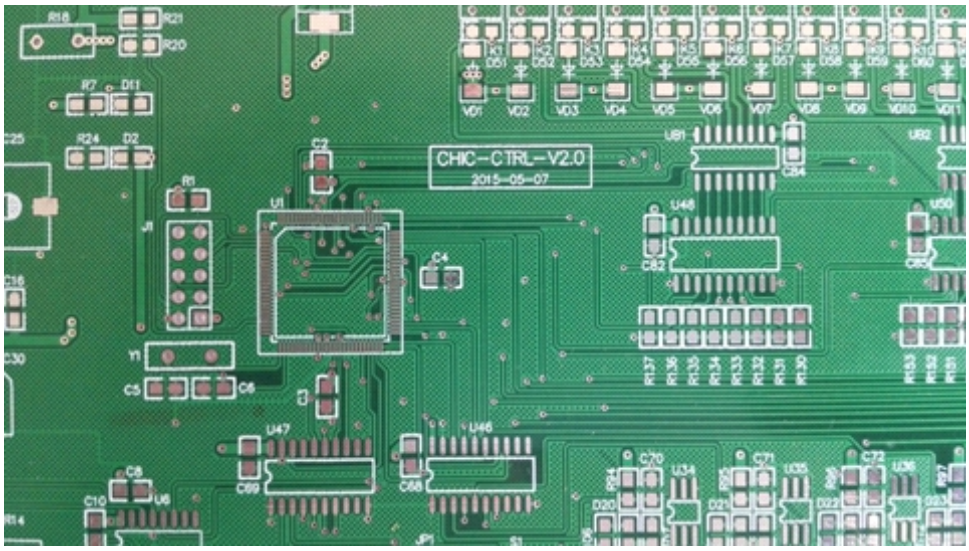


Fig 2.4.2.1: Sample PCB circuit board

It electrically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features. Printed circuit boards are used in almost all electronic products. They are also used in some electrical products, such as passive switch boxes. PCBs can be single-sided (one copper layer), double-sided (two copper layers on both sides of one substrate layer), or multi-layer (outer and inner layers of copper, alternating with layers of substrate).

How to assemble PCBs and required materials:

- **RoHS compliant PCB:** the Regulation of Hazardous Substances was created by the European Union that aims in removal and total eradication of varied hazardous materials from the industrial workplace. It focuses on the electronic industry as it works with various harmful chemicals for variety of purposes. All solder used must be lead-free, and all components mounted on the board must be free of lead, mercury, cadmium, and other heavy metals.

- **Laminates:** a PCB provides mechanical support and connects electrically all the electronic components that make use of conductive tracks, pads and other features that are etched from more than one layers of copper sheet that is laminated onto or between the layers of the sheet that is of a non-conductive substrate. They are manufactured by curing under pressure and temperature layers of cloth or paper with thermoset resin to form an integral final piece of uniform thickness. The size can be up to 4 by 8 feet (1.2 by 2.4 m) in width and length. Varying cloth weaves (threads per inch or cm), cloth thickness, and resin percentage are used to achieve the desired final thickness and dielectric characteristics.

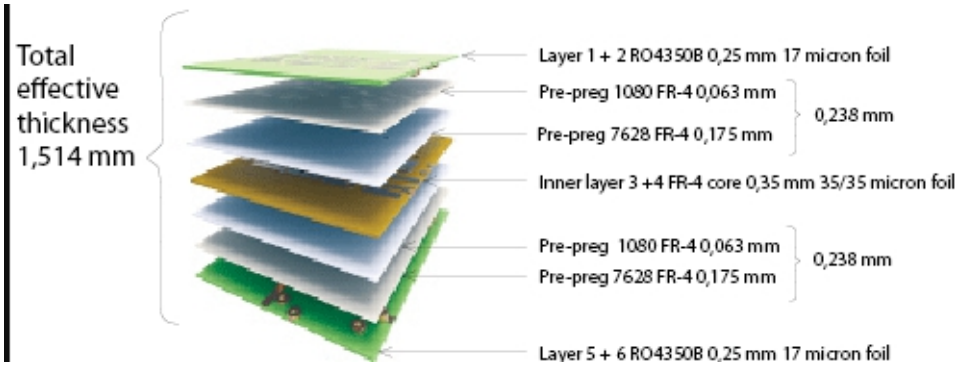


Fig 2.4.2.3: choosing the right laminate

- **Substrate Parameters:** The composites contain a matrix (usually an epoxy resin) and a reinforcement (usually a woven, sometimes nonwoven, glass fibres, sometimes even paper), and in some cases a filler is added to the resin (e.g. ceramics; titan ate ceramics can be used to increase the dielectric constant).

Underline the assembly instructions

Assembling Process:

Modern PCBs are designed with dedicated layout software, generally in the following steps:

- Schematic capture is done through an electronic design automation (EDA) tool.
- Card dimensions and template are decided based on required circuitry and case of the PCB.
- The positions of the components and heat sinks are determined.
- Layer stack of the PCB is decided, with one to tens of layers depending on complexity. Ground and power planes are decided. A power plane is the counterpart to a ground plane and behaves as an AC signal ground while providing DC power to the circuits mounted on the PCB. Signal interconnections are traced on signal planes. Signal planes can be on the outer as well as inner layers. For optimal EMI performance high frequency signals are routed in internal layers between power or ground planes.

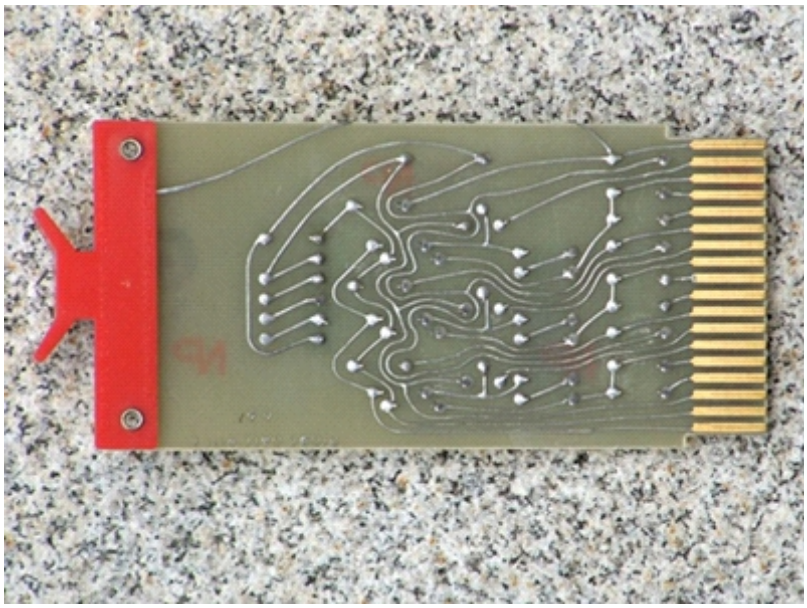


Fig 2.4.2.4: Layer stack on a PCB

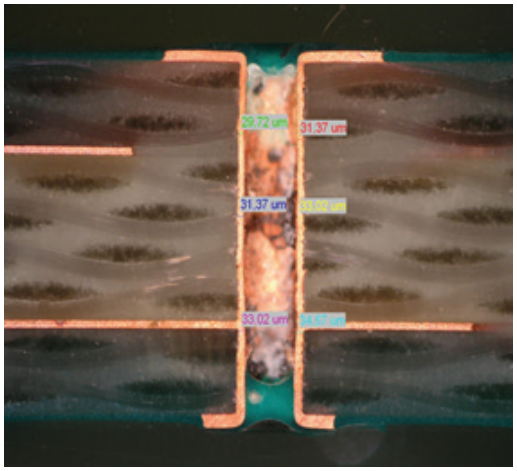
- Line impedance is determined using dielectric layer thickness, routing copper thickness and trace-width. Trace separation is also taken into account in case of differential signals. Micro-strip, strapline or dual strapline can be used to route signals.
- Components are placed. Thermal considerations and geometry are taken into account. Vias and lands are marked.
- Signal traces are routed. Electronic design automation tools usually create clearances and connections in power and ground planes automatically.

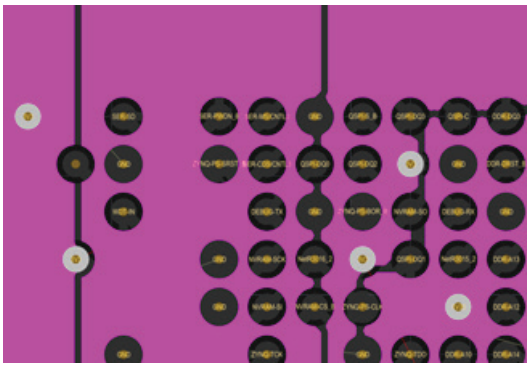
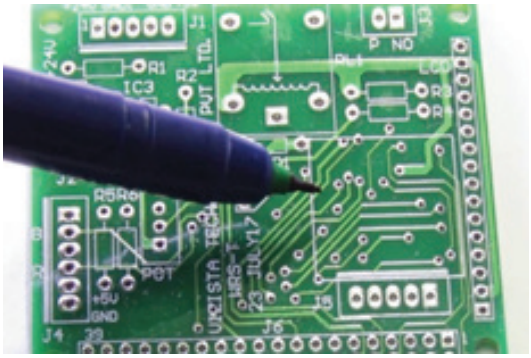
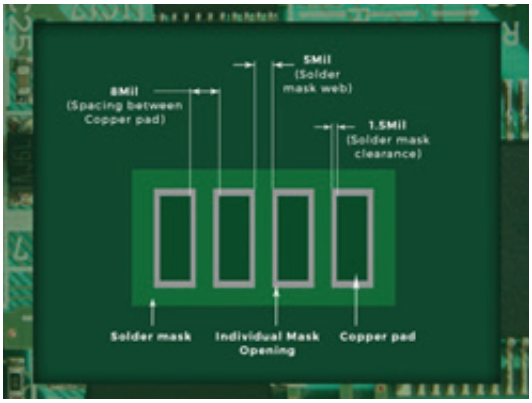
Gerber files are generated for manufacturing

2.4.3 Record faults and pass the board on to the PCB assembly team for re-work

The complexity of the PCB designing and manufacturing processes leads to numerous opportunities for PCB failure issues. Some of these failures are a result of design oversights, such as insufficient clearances or incorrect measurements. Others may result from problems in the manufacturing process, such as drilling errors, which can be equally dangerous.

Some common faults are:

	Plating Voids: • These holes allow electricity to be carried from one side of the circuit board to the other. • A layer of copper is then added to the surface of the material and along the walls of these holes through an electro-plating process. • While effective, the deposition process is not perfect, and under certain circumstances can result in voids in the plating. • Plating voids are effectively gaps or holes in the plating of the circuit board, and are usually the result of problems during the deposition process.

	Insufficient Copper-to-Edge Clearance: • To prevent corrosion and protect the copper from interacting with its environment, this copper is covered with other materials. • When a PCB is trimmed, if the copper is too close to the edge, part of this coating can be trimmed as well, exposing the copper layer underneath. • It is possible for the exposed copper planes to make contact with one another by simultaneously touching a conductive material, causing a short.
	Slivers: • Slivers are narrow wedges of copper or solder mask produced during the PCB manufacturing process, and can cause serious problems during the fabrication of circuit boards. • These detached slivers can float around in the chemical bath, and can potentially land on another board, adding an unintended connection.
	Missing Solder Mask Between Pads: • This solder mask is laid on top of the copper layer to insulate the copper traces from accidental contact with other metal, solder or conductive bits. • In some circuit boards, the solder mask may be partially or completely absent between pads. This exposes more copper than is necessary, and can result in solder bridges forming accidentally between pins during assembly. • This can result in a short, as well as reduced corrosion protection, both of which can negatively affect the functionality and longevity of the circuit board.
	Acid Traps: • They are referred to this way because these acute angles trap acid during the PCB etching process. • As a result, the acid can compromise a connection, making the circuit defective and causing more serious problems later on.

DFM stands for “Design for Manufacturing.” Or DFMA “Design for Manufacturing Assembly” In short, DFM or DFMA checking is the process of inspecting a circuit board layout to minimize any problems that could happen during the fabrication and assembly process. There are several key factors in DFM that ensures a consistent product that performs correctly. Unlike other standards that only look at how the circuit board will potentially work, DFM looks at how the circuit board will potentially break.

DFM issues are typically problems in the topology of the circuit board — those that may or may not result in problems during the manufacturing process. Some of these issues include those listed previously, such as slivers and missing solder masks. Often, the great majority of circuit boards produced with these design issues function perfectly normally, with only a small percentage of circuit boards showing any signs of defects. However, in the PCB industry, every scrapped board adds to the cost of.

2.4.4 Label and follow the standard operating procedure to assemble the electrical sub system

Label the standard operating procedure to assemble the electrical sub system

In electrical sub-system assembling, there are several scenarios that can arise due to malfunction or improper process flow. Hence, it is important to follow a standard set of protocols to ensure that the SOP is maintained. The following flow chart well describes the exact process to be followed.

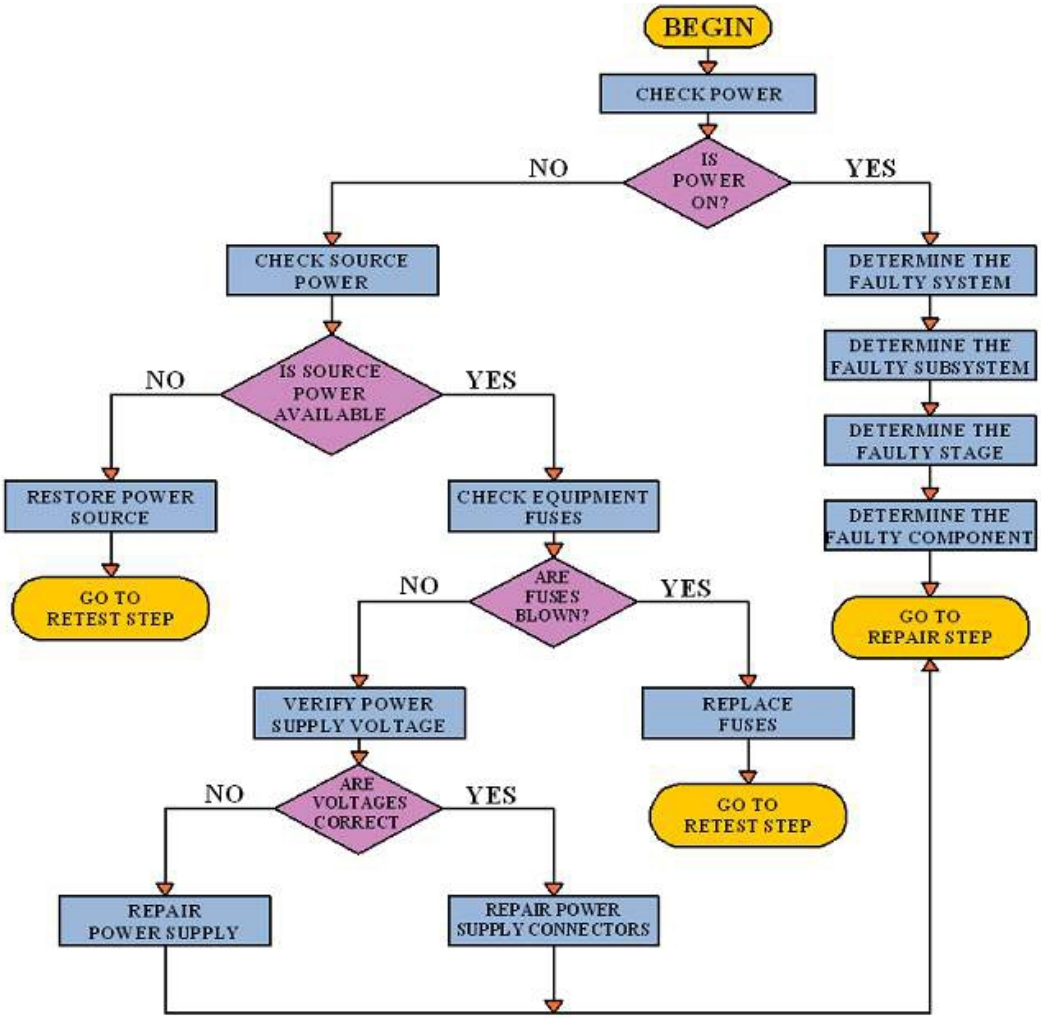


Fig 2.4.4.1: SOP chart for assembling operations

This not only shows the standard operating procedure, it also shows the decision making scenarios that has to be kept in mind while assembling.

Record the standard assembly procedure to assemble the electrical sub systems & integrate the electrical and electrical sub systems

- Always follow the blueprint of the machine while assembling the sub-assemblies.
- In case of any issues of confusion, the electrical technicians should consult with the sub assembly electrical sub system assemblers.
- Verify the necessary assembly tools like fixtures and hand tools
- The appropriate threaded fasteners (washers, nuts, bolts, screws) should be used in the correct places.
- The assembling of electrical sub systems should be accurate and the connections in place
- When joining the wires to the various parts of the assembled machinery, it is imperative to use protective equipment and gear

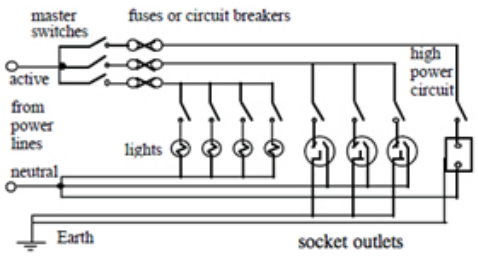
Use of appropriate voltage outlet is a must. This should be in sync with the voltage capability of the finished product.

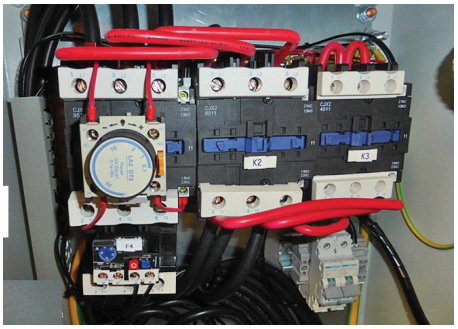
2.4.5 Collect and assemble together various control boards and other electronic components in order to obtain the electrical sub system

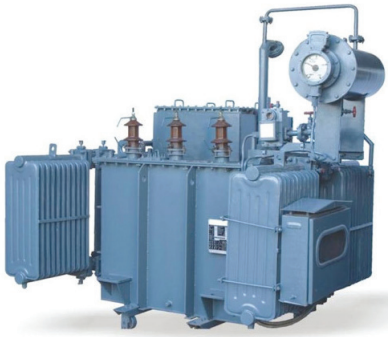
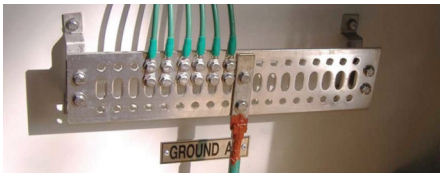
Electric control panels are designed and used in a way to control the mechanical equipment. Each one is designed for a specific equipment arrangement and also includes devices that make allowance for the operator to control the specific equipment. The electrical panel components control every piece of the equipment in every specific industry

Industrial Control Panels are available in different shapes and sizes and also require proper specialized in individual handling. The machines operate at a range of 600V or less than that and it well consists of power and control circuits. Their purpose is to control the equipment of the factory and also to provide a single collective base of operations designed for the engineers to keep the control of the manufacturing process. ICPs are available in either open or closed type panels and also depending on its use

Some of the key components of a typical industrial control would be as follows:

Key components	Description	Images
power circuit	This refers to any of the circuit that make use of electricity in order to make an operation on the industrial control panel. Closing the circuit causes the machine attached along with it for start of the operation, while the circuit stops the machine	

Key components	Description	Images
Control circuit	• This is a special type of circuit which is used to control the power circuits that are available on the panel. It is used to ensure safety from the short circuiting for the machines and workers	
Switches	• the most common type of circuit that is used for controlling the power circuits which is available on the panel, it also ensures that safety is assured from short circuit for the machines and workers	
terminal blocks	• this refers to modular, insulated block that is particularly used to connect more than one circuits on the ICP to one another	
contractors	• These are electrically controlled switch which acts as a relay circuitry for devices with high current rating. They might break power to the device being controlled	
Motor drives	• these consist of mechanical systems in which an electric motor has an inclusion, which is used to drive a machine or the device that is connected to the ICP	

Key components	Description	Images
transformers	• These are the static devices that are mainly used to transfer the electrical charges between more than two circuits. The action make use of primary and secondary windings that results in the transfer of power without changing the frequency of the current	
Over current power devices	• it is used to protect the machines that is connected to the ICP from the electric power surges through the use of the circuit breakers and electric fuse circuits	
Grounding panels	• to make a protection against electric noise and as well for keeping the workers safe from the electric shocks, grounding panel is connected to the industrial control boards are buried deep in the ground at locations where there is no danger of the people or animals coming in contact with them	

- An Electronic System is a physical interconnection of the components, or the parts that gathers various amounts of information together.
- It does with the help of input devices such as the sensors, that in some way respond in some other way to the information and it make use of electrical energy in the form of the output action to control the physical process or performance of some type of mathematical progression on the signal, electronic control systems can also be regarded as the process that transforms one signal to another so as to give response to the desired system

2.4.6 Plan and achieve the required quality and meet overall quality standards

A quality standard is the detail requirement, specifications the adherence to the various guidelines and the characteristics that can be met through the up standard quality of the product so that in order of these things the purpose, process and service is met through

The steps help and provide a guide in achieving and maintaining the quality standards

- **Defining the real requirements:** it always has to be seen that the real requirement is specified (specific outputs and the real targets) so that the objective of the process is acquired
- **Keeping it simple:** keeping the process simple is the key to success, the processes must be critically evaluated, and other unnecessary things must be kept at bay
- **Documentation:** documentation and recording is a very important process, this certainly ensures that the expectations are set and that they are kept same in the entire process
- **Checking must be done for understanding:** It must be ensured that each process in the workshop for assembling and other electrical wiring must be understood thoroughly by the technicians
- **Key performance Indicators (KPI's)** it must be critically examined what each process is trying to achieve, i.e. the input that is required and the results that is expected
- **Results must be measured:** the KPI's must be constantly measured for each of the process undergoing and corrections must be made along with it for 100% error free product
- **Simplify and then automate:** automation must be done to the high volume and complexities of the assembling and wiring process for these appropriate tools must be used for the same, so it must be made sure that things must be simplified before the process starts in the workshop
- **leverage of the technicians in the workshop:** spread the work accordingly that will involve process owners, it is important as this will result in maintaining the best of the quality as the process owners will be responsible for his/her product

2.4.7 Arrange and place the assembled system in bins assigned and ensure that it is moved to final assembly area

Before the electrical technician assembles all the sub-assemblies and the electrical sub systems to produce the final product, it is important that all the sub-assembled parts are thoroughly tested.

This initial testing are extremely important as it can reduce the chances of future malfunctioning.

Added to this, pre-testing of assembled system also gives the chance to the technicians to scrutinise and see for any fault or snag.

It is a necessity that before the assembled parts are sent for testing, they should be kept in separate bins.

The assembled sub assembly parts that need to be kept in bins are in the form of:

Packing Gland Assembly Unit

- Washer
- Hexagonal nut
- Packing gland packing
- Locking ring
- Packing gland press
- Housing cover

Bearing Block Assembly

- Key shaft
- Splash ring
- Corrugated spring
- Shaft
- Radial ball bearing
- Splash ring
- Nuts
- Bolts
- Bearing block
- Hexagonal head screw
- Feather key

2.4.8 Organize and coordinate with the PCB assembly team to ensure that production targets are met

- Each board is carefully inspected by a dedicated team of inspectors who make use of Automatic Optical inspection (AOI) machines and flying probe testers.
- The PCB's must be tested to the component level and all the wiring is fully inspected and tested. Flash testing and earth-bonding tests can also be undertaken whenever it is required, with the boundary scan testing when it is designed into the target assembly
- there must be a specialised team , that can build tailor made test solution so as to ensure that the product meets the exact functional specification, and within the company KPI's are used to drive improvements for the benefit of the customers and the PCB assembly must be very disciplined in order to improve the overall performance

2.4.9 Evaluate and ensure that the finished assembly meets specifications

- All the production and specifications for assembly and processes are mandatory, the specifications must be verified and documented, instructions of work are provided for all processes in which the variations might and can result into absolute failure of the finished devices to meet the specifications.
- Typical process examples being molding, welding, sterilization etc. Drawings are used for assembly, fabrication. Procedural changes and specification verification, new procedures and verifications are reviewed and approved by using a formal process and procedure. Changes in the work instructions, instructional procedures and drawings must be made according to the formal controls
- Computers, components of computer and software storage media might be sensitive to the environment especially in regards to humidity, electrostatic discharge (ESD), temperature, electromagnetic interference (EMI) dirt/dust.
- Other products or finished devices might need to be handled or is manufactured in a clean room environment to negate the bio burden. Written procedures are needed to assure that the environment is controlled as when it is required
- It must be verified that there inspections that have been documented of environmental controls that do demonstrate the environmental systems of control are functioning properly. Fluctuation results or periodical spikes might be an indicator of problems

2.4.10 Practice and Interact with the supervisor in order to receive clarity about the day's production requirement and collect the work instruction

It is imperative for a electrical technician to start their designated work with proper job instructions. Collecting work manual or job instruction in written format is important as it ensures that there are no confusions in the mind of the technician regarding their given work (production activities).

When the supervisor gives the production activities and the instruction related to it, the first step is to break down the activity for swift and effective completion.

This breakdown comprises 3 steps.

1. Planning before the beginning of the activity
2. Work to be done during the activity
3. Completing the activity

Planning for production activity depends on 6 principles:

- The first principle depends on customer demand. It is only on the basis of demand that the production amount can be assigned. The principle related to production planning revolves around the demand rate of the targeted customer niche.

- The second principle depends on the appropriate material. The target under the production activity can be fulfilled when the production in-charge ensures that the available material is as per the requirement to complete the job.
- The third principle depends on the tools that are used for the production activity. It comes under the responsibility of both the electrical technician as well as the production planner to select the equipment appropriate for the work. In addition, they also need to see if the equipment is functional and are capable of completing the work efficiently.
- The fourth principle depends on the workforce that is involved in the production activity. Prior planning regarding the number of employees to complete the work on time ensures that the work gets completed with the highest efficiency.
- The fifth principle depends on various processes. Effective planning ensures that the entire output operation is safe and efficient.
- The sixth principle depends on production activity control. This final production planning ensures that the entire procedure works under control. Any process out of line is an error that is detected by the production in-charge.

2.4.11 complete forms such as work orders, invoices, maintenance records

- **Work orders and invoices are** put into use when the company or the contractor performs services for the customers and also bills them for those services and that is offered.
- A work order is sometimes also called purchase order; this is also used when the customer wants to buy the products instead of services
- The work management process starts or begins with the work order being created, which is accomplished through a number of channels, such as the mobile device or the system in itself.
- The process of order management is thoroughly controlled by the workflow which is again based on the type of work that is performed

WORK ORDER

YOUR BUSINESS NAME HERE
000 Your Street
Your town, province, postal code
Phone 000-000-0000

DATE OF ORDER

CUSTOMER'S ORDER NO.	TELEPHONE	WORKER	HELPER	STARTING DATE

BILL TO — ORDER TAKEN BY

ADDRESS — ☐ DAY WORK ☐ CONTRACT ☐ EXTRA

CITY — PROVINCE — POSTAL CODE

JOB NAME AND LOCATION — TELEPHONE — JOB FAX

DESCRIPTION OF WORK

SPECIAL INSTRUCTIONS

TOTAL MATERIALS	
TOTAL LABOUR	
SUBTOTAL	
HST / GST	
PST	
TOTAL	

☐ NO ONE HOME ☐ TOTAL AMOUNT DUE FOR WORK OR ☐ TOTAL BILLING TO BE MAILED AFTER COMPLETION OF WORK

DATE COMPLETED — WORK ORDERED BY

SIGNATURE

Form 37101 123print.ca

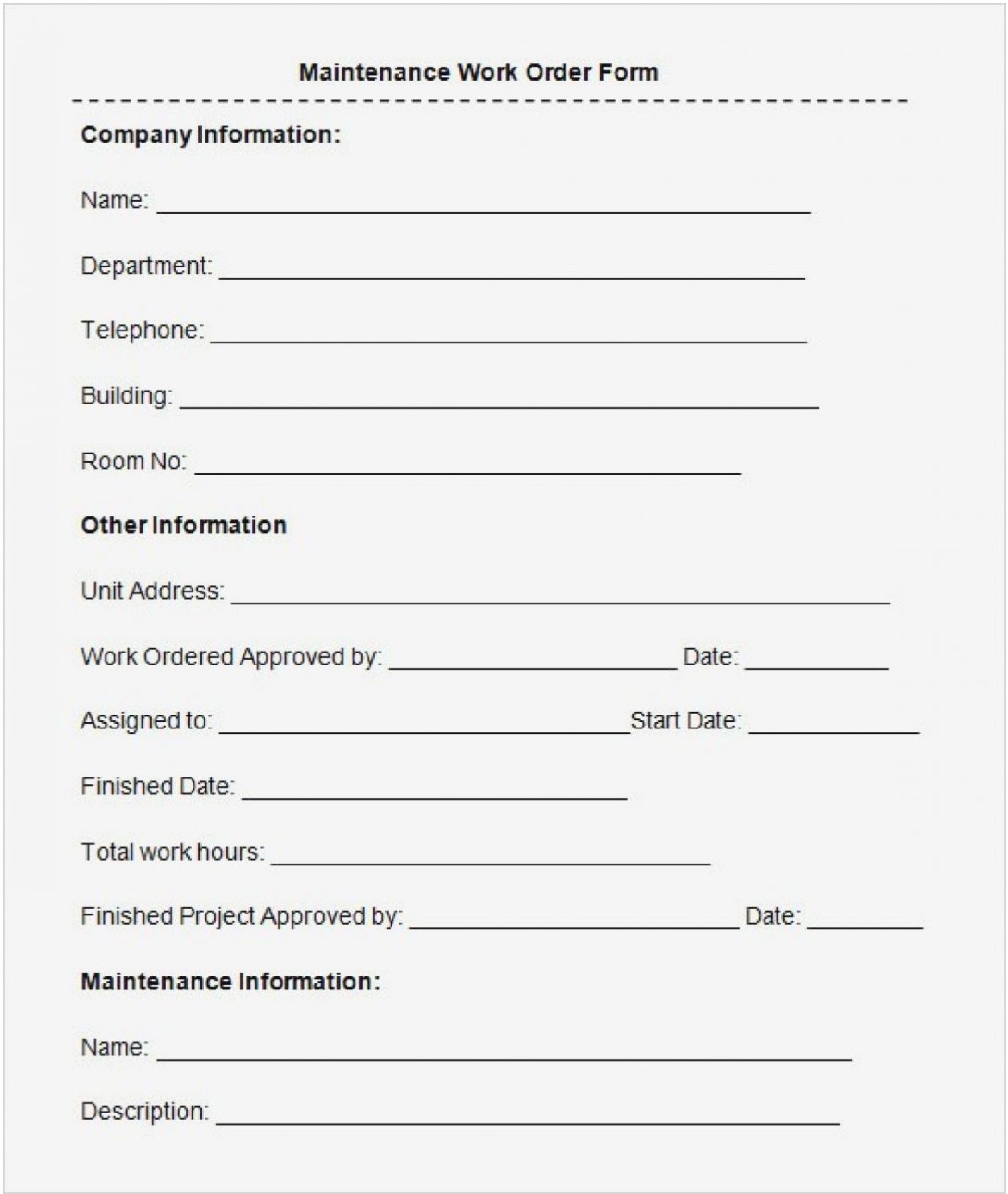
I hereby acknowledge the satisfactory completion of the above described work.

Fig 2.4.11.1: invoice and work order

Maintenance order

- Maintenance record of the work equipment is very essential and is a key to the part of the health and the safety management. Paperwork is sometimes kept for an extended period of time for health and safety or for compliance purposes
- if this is not managed well then it can cause issues to health and safety, non-compliance and also the production levels will be hampered
- Maintenance can be improved through digital documentation, record management and also through efficiency. Keeping of the record for each of the asset and information such as the

- maintenance dates and time
- asset number
- details of the equipment maintenance
- new parts that have been added
- manufacturer's recommendations for the maintenance
- amount of use
- equipment environment conditions
- user experience and knowledge
- risk assessment information



Maintenance Work Order Form

Company Information:

Name: _____

Department: _____

Telephone: _____

Building: _____

Room No: _____

Other Information

Unit Address: _____

Work Ordered Approved by: _____ Date: _____

Assigned to: _____Start Date: _____

Finished Date: _____

Total work hours: _____

Finished Project Approved by: _____ Date: _____

Maintenance Information:

Name: _____

Description: _____

Fig 2.4.11.2: sample maintenance order

Unit 2.5 State the Safety precautions while working in an electronic assembly unit, ESD precautions and protective gear such as gloves, rubber base shoes

Unit Objectives

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

1. Analyse the significance of using safety materials such as gloves, helmets, aprons etc.
2. Plan and interact with the supervisor in order to receive clarity about the day's production requirement and plan work
3. Collect the work manual/job instruction from the supervisor
4. Visually inspect the boards and components received for any physical damage, any loose or wrong connections
5. Explain ESD Precautions
6. Inspect and avoid damage of components due to negligence in ESD procedures
7. Discuss and Read warnings, instructions and other text material on product labels, components, etc.
8. Analyse and read job sheets or work orders

2.5.1 Analyse the significance of using safety materials such as gloves, helmets, aprons etc.

Protective Gear

To maintain safety standards as per company policy, the protective gears include:

Asbestos Gloves

Flame-proof Aprons

Safety Helmets

Trousers

Safety Shoes

Protective Goggles

Safety Mask

Respirator

Significance of using safety materials such as gloves, helmets, aprons etc.

Use of Safety Materials

Goggles

Safety glasses or goggles protect the eyes and the surrounding areas from various particulates. The particulates may be in the form of:

- Chemicals
- Heat
- Contaminated water
- Optical radiation
- Grease
- Dust
- Sudden accidental impact
- Metal particles, and much more

Fig 3.9.1: goggles

Gloves

Gloves are used to protect hands and in some cases portions of the arms from coming into contact with a hazard. Gloves selections are based on:

- Chemical and Physical hazards
- Potential contact time and splash hazard
- Dexterity

Types of gloves used within the work premises are:

- **Disposable:** Disposable gloves are thin and most commonly made from latex rubber, Nitrile rubber or Neoprene. These glove types offer protection from diluted chemicals or sharp tools. It is advisable that disposable gloves shouldn't be reused.
- **Reusable:** Reusable gloves are thicker and offered in a wider range of materials. The most common are latex rubber, nitrile rubber, Neoprene, Viton, or Butyl rubber.

Fig 3.9.2: gloves

Caps: The caps used in this industry are basically a protective gear that protects the wearer from any external injury in the head.

ESD pins: ESD is susceptible to output or input pins. These pins have the ability to withstand voltage of ±15kV.

Covers: These covers are useful in warehouses, processing plants, and factories. In simple words, the use of such covers is seen in industrial-zoned properties. They can be used as tarps to secure the inventories from environmental change.

Shoes: Safety shoes are a lifesaver in this industry. Good shoes not only save the foot from injuries but also help the individuals to work in a dynamic environment with ease. It protects the foot from sharp objects, electrical hazards, extreme weather and burns.

HSE safety

HSE stands for health, safety and the Environment

- it recognises the highest standards of commitment towards the health and safety in the working environment for the employees, visitors and customers, as well as to protect the environment in the community where we live
- it majorly defines the principles through which the operations of safety and health is maintained by the management system
- the company's management applies the HSE policies very rigorously throughout the company
- for achieving the best of safety and health the HSE must be recognised, which includes:
- basic identification of the risks of HSE and the checking up of opportunities in the operation
- elimination of unsafe accidents or incidents, and also prevention of injuries and occupational illness in the workplace; this can be done by assessing and recognising the hazards which pertains to the operation on a periodic basis
- safety committees must be established at all locations for monitoring and controlling the health and safety of the employees
- a robust governance of management must be present , to investigate, review and strengthen the proactive actions of the management before the occurrence of the incident or accident
- environmental protection would mean to ensure the resource to be used in a sustainable manner
- newer and efficient technologies must be implemented for the reuse and recycling of the waste
- pollution prevention must also be seen to
- newer and efficient measures must be implemented for mitigating the operation carried on in the company for protection of the environment

Name and use	Image
Gloves- this is used in handling of hazardous chemicals or other hazardous substances for the safety of hands	

Name and use	Image
Goggles- it shields the eye against the liquid, irritating mists, vapours, fumes this is the primary function, the secondary function being it intends to provide protection against the exposures to electrical hazards while working with live wire	
Ear plugs- it provides protection from the hearing loss due to the noise in industrial areas such as the machinery, tools and traffic, this prevents the noise from penetrating the ear and helps to control workplace injuries	
ESD pins- to create the ESD protection it is used between the supply pins it is a voltage clamp	
Covers- it includes covers for shoes, face, masks, head respirators in order to avoid spills and a short circuit	
Shoes- this provide a barrier against the exposure which is possible within an environment that is contaminated	

2.5.2 Plan and interact with the supervisor in order to receive clarity about the day's production requirement and plan work

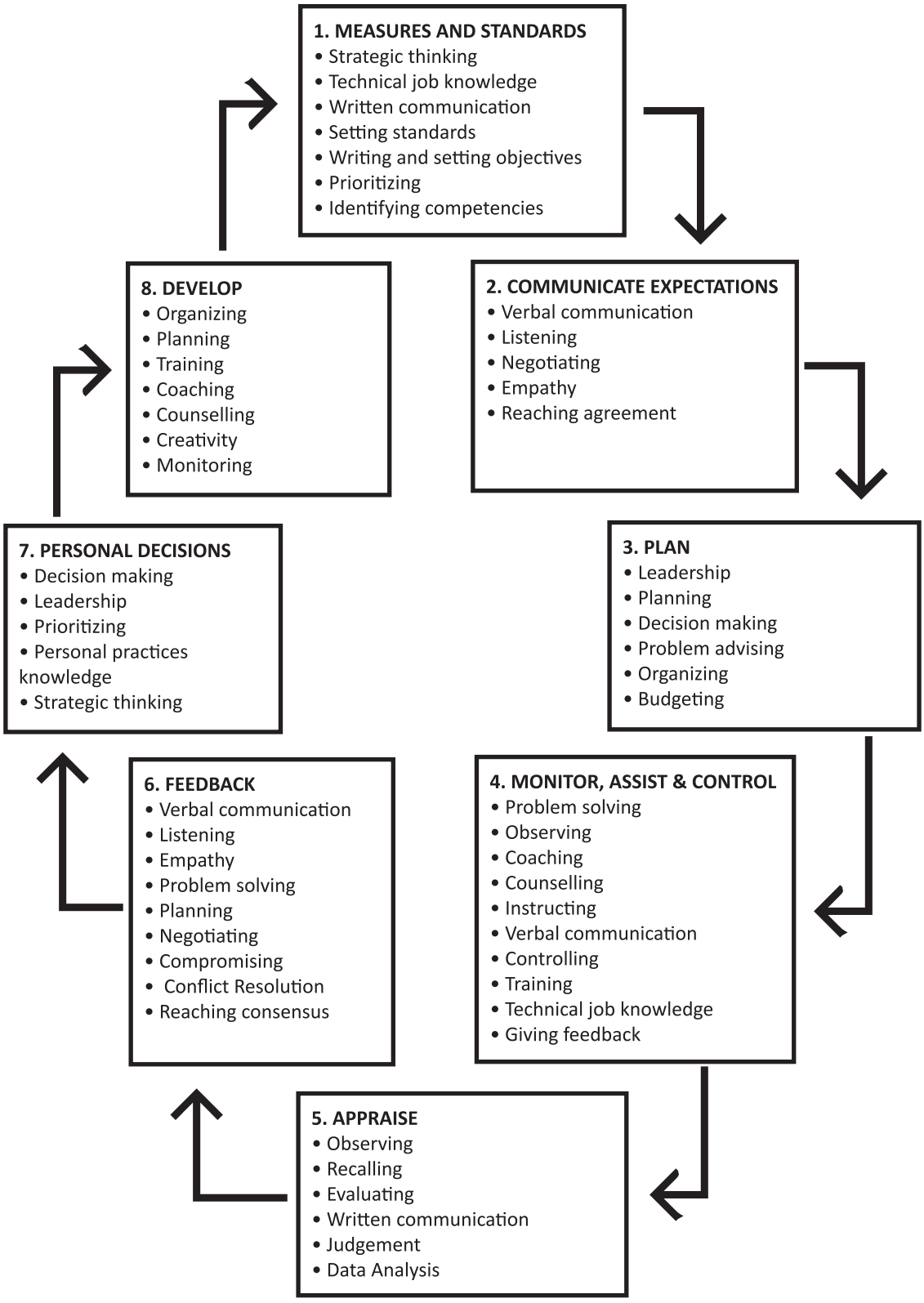


Fig 2.5.2.1: this is the performance appraisal process

This system can help by

- Promoting better understanding of the employee's role and clarity about the functions each technician performs
- It promotes better understanding of the personal strengths along with the weakness in view of the roles and functions of the technician
- Identification of the development needs of the employee
- Establishing the common ground between the supervisor and the employee
- Increase in communication
- Provide the employee with the opportunity for self-reflection and setting of individual goals

2.5.3 Collect the work manual/job instruction from the supervisor

- The job instruction technique is a step- by-step, simple technique that is used to train the employees on the job
- The job instruction sheet is used to train new operations. It makes a list of the steps of the job, that details the special knack that is required to perform the job safely and adhering to the utmost quality and efficiency.
- It can also prove to be useful for the operators who are experienced to reconfirmation of the appropriate operation
- The job instruction is specially designed for the study and discussion by the supervisors, who wish to become familiar with the job correctly to help someone to do the job correctly. If the working instructions are practical quality tools
- a clear work instruction is mandatory that can be quickly and easily understood by the workers with minimum of effort for accommodating the typical worker, to accommodate the typical worker, an ideal work instruction explains mostly with graphics and minimum of text

2.5.4 Identify and visually inspect the boards and components received for any physical damage, any loose or wrong connections

A thorough visual inspection of the circuit boards is important

- for the inspection of the board the cover of the equipment must be removed and set aside
- The circuit boards must be checked to see whether every circuit boards are plugged in properly. there might be only one but if it is more than one a thorough check of all is recommended
- check for the individual plug-in components some of the chips called "daughter boards “or the "piggy back “boards that fit properly into their own sockets properly can also have loose connection, pull them out gently and make a thorough inspection for the dirty or the corroded pins then place them properly again
- Inspect whether there is water of foreign objects on the circuit board. Even a paper clip dropped accidently on the circuit board can make it stop working

- Check for the secondary plugs wiring, look out for the blackened components or the molten or the broken parts. Components can often burn and when this happen, it can cause smoke. Finally look for either discoloured or swollen components
- Check whether there are broken leads on the components. Some of the components have very tiny leads of wire that can easily break apart next to the circuit board or which is close to the component itself
- Inspect for the cracks on the circuit board. a crack which is hairline might not look damaging but it might include traces of broken circuit

2.5.5 Explain ESD Precautions

Explain ESD Precautions

We experience occurrences of static electricity every day. For example, walking along a carpeted floor in a heated room during winter generates sufficient static electricity.

Although this sudden discharge of static electricity does not result in any harm to the human body, it can cause heavy damage to electronic devices as they are sensitive to electrostatic discharge (ESD). It is possible for electronic devices to be damaged by ESD that is imperceptible to the human body.

In order to prevent any component damage from to electrostatic discharge, it is better to adopt precautionary measures. The precautionary aspect to ensure zero damage can be achieved by two means

The basic principle of static control comes under six key elements of the ESD development of program and the implementation. Basic principles are as follows:

- **design in protection:** by designing the products and the assemblies it have to be as robust and reasonable from the side effects of ESD
- **dissipate and neutralize:** this process of neutralization can be carried on by grounding, ionization and by the use of the dissipative and conductive static control materials
- **the level of control must be defined:** This must be in relation to the environmental need
- **identification and defining the same:** the ESD areas must be protected as these are the areas where the handling of the sensitive parts of the ESDS will be carried on
- **reduction of the electrostatic charge generation:** by elimination and reduction of the processes of static generation, keeping the processes and the materials at the same electrostatic potential, and it happens by providing specific ground paths for the reduction of charge generation and the accumulation
- **and finally protection of the products from the ESD:** with proper amount of grounding or shunting and also making the use of the static control packaging and material handling products
    - **grounding:** The most important point for effectively controlling of the ESD is through grounding, it must be clearly defined and properly evaluated. The equipment that grounds the conductor simply provides a path by bringing the ESD protective materials and other person in charge under the same electrical potential. The protection can be provided by maintaining a charge or potential alone a "zero" voltage ground reference as long as all the items are at the same potential in the system

Fig 2.5.5.1: ESD common point ground (symbol)

- **controlling the static on the moving equipment and personnel:** people(it might be technician or any common man), can be the prime source of static electricity, if the static charge is not easily controlled then it might easily get discharged into the devices that is ESD sensitive
- **wrist wraps:** This has two major components that is attached to it, firstly that goes around the wrist of the technician and the cord on the ground that enables and connects the band to the common point ground. Most of the wrist wraps have a resistor that limit the current and is moulded into the ground cord on the end that provides a connection to the wristband. This resistor is most commonly one meg ohm, that is rated with at least of 1/4watt with a working voltage rate which is of 250 volts

Fig 2.5.5.2: wrist strap

- **floors, mats and floor finishes:** Flooring/footwear system is appropriately used in those areas where there is an increment of personal mobility and in addition to this floor materials can also minimize the charge on accumulation on the chairs, mobile equipment. When it is used as the personnel system of grounding, the resistance to the ground including the footwear, person, floor must be equal to the wrist wraps that is specified(<35megohms) and the accumulation of the body voltage in the standard voltage test of walking must be less than 100 volts

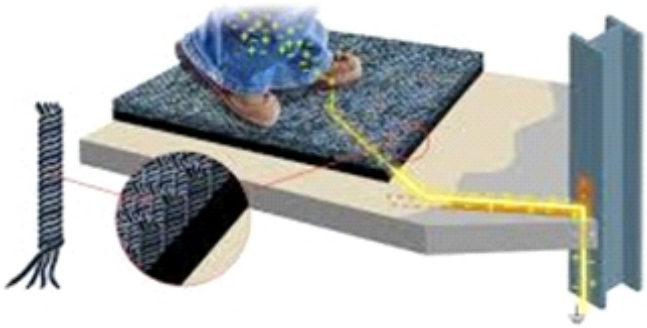


Fig 2.5.5.3: anti static flooring specification

- **shoes, casters and grounders:** this is used in combination with the flooring that is supposed to ESD, the foot grounders, casters, control shoes, casters and the wheels necessarily provides electrical contact between the object the person and the flooring. Insulate footwear's, wheels and casters provides prevention to the static charges that flow from the body or the mobile equipment to the ground and hence have to be avoided

Fig 2.5.5.4: shoes (ESD prevention)

- **clothing:** It is a consideration in some of the protective areas against ESD; there are three categories of ESD clothing:
  - **Category1 garment;** this garment is static control and is not attached to the ground. However without the grounding charge may get accumulated on conductive and dissipative elements in the garment and if it is present, that would lead to a charged source
  - **category2 garment:** this garment is a ground able static control garment, which when connected to the ground, it provides a level of suppression that is higher of the effects of an electric field from clothing worn underneath the garment
  - **Category 3 garment:** this is a ground able static control garment that forms a bond with the skin of the person to an identified ground path. The total system of resistance including the person, grounding cord and the garment shall always be less than 35megohm

Fig 3.8.4 ESD clothing

- **workstation:** this refers to the work area where an individual works and is constructed and always equipped with materials and the equipment to keep a constrainment of the ESD sensitive items

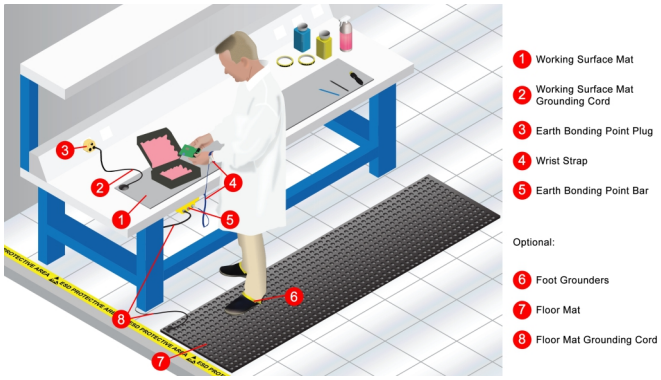
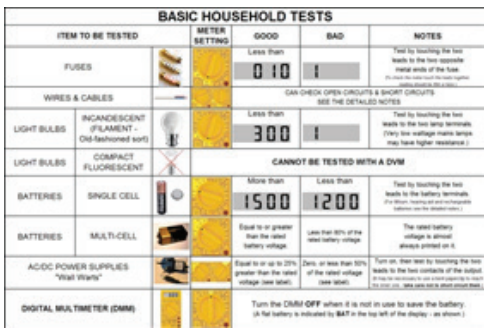
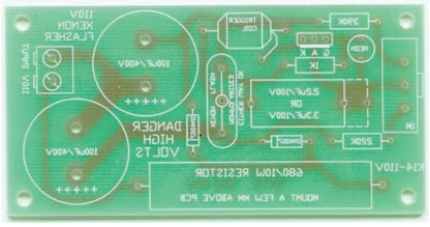


Fig 3.8.5: ESD Workstation

2.5.6 Inspect and avoid damage of components due to negligence in ESD procedures

- If the unit deals with heated component wait till the cooling of the components, the service manual have to be referred to for how long the components required to be cooled down
- The ESD wrist and shoe strap must be put on to avoid the damaging of any circuitry
- ESD mats must be placed on suitable grounded surface, and then the unit must be placed on the mat
- All the devices must be removed from the unit that is being serviced, such as tape cartridges, diskettes
- The unit must be power off and any peripheral devices that are connected to it
- The power cord must be disconnected from the electrical outlet and then it must be removed from the unit
- All the peripheral devices of the cables must be removed from the unit
- all the ESD- generating materials must be removed from the work area
- to avoid the hand contact all the electrostatic parts and assemblies must be stored in conductive or approved ESD packaging such as the ESD tubes, boxes or bags
- The electrostatic-sensitive parts must be kept in their containers until they arrive in the static-free stations. Before removing the items from the containers, these must be placed on the grounded surface
- the new component must not be taken out of it package or it must not be handled until ESD wrist strap or the shoe strap is worn and properly grounded to a suitable surface
- It must be seen that, ESD-protected work station must be used when servicing of the unit take place. If the workstation is not available then it has to be seen that the technician grounds himself properly to discharge anybody static by touching the metal chassis of the unit that the technician is servicing
- at all times contact with pins, circuitry or leads must be avoided
- the ESD package must be provided and used with the new part to return the old part

2.5.7 Discuss and Read warnings, instructions and other text material on product labels, components, etc.

Images	Instructions/ warnings
	• processor with hot sink • warning written is caution
	• lithium ion battery
	• caution on circuit breaker
	• instruction on capacitors
	• digital volt meter • daily household test • instructions given
	• instruction on PCB

Economy series (20+4 pin)

AC Input	DC Output (Max)				
230V-50Hz 6A	+3.3V	+5V	+12V	-12V	+5VSB
	25A	38A	15A	0.8A	2.0A

Caution

Do not remove this cover.

No user serviceable parts inside.

Table 2.5.7.1 instruction and warning on the processor

2.5.8 Analyse and read job sheets or work orders

- The job sheet must be read properly by the technician in order to aid him to perform the job properly
- Each unit of instructions must be analysed and the jobs must be listed, that are essential for performing the objectives of the unit
- Each of the job must be performed and records of the same must be kept, steps amd procedures that will best describe the assembling of the same
- A rough draft must be prepared, it must be brief but the technicians must understand the same
- The operations must be analysed for completing the steps of the procedure
- Illustrations/drawings must be used freely for clear understanding
- The job must be repeated following the first draft of the job operation sheet and the same must be evaluated for sequences and completeness
- The revised job operation sheet must be duplicated for the same
- The job sheet or the job operation sheet is a moving demonstration of the work that have to be performed by the workers/technicians

Unit 2.6 Demonstrate quality and 5S standards

Unit Objectives

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

1. Evaluate the concept of 5S in workplace
2. Recognize and meet 100% target for number of products to be manufactured per day
3. Arrange and achieve 100% of planned work as scheduled
4. Assess and achieve zero errors as per company's standards
5. Identify and achieve zero damage because of electrostatic discharge
6. Identify and keep work area clean and organised
7. Record and achieve clean work protocols
8. Recognize and learn about new product models, their features and functions

2.6.1 Evaluate the concept of 5S in workplace

Evaluate the concept of 5S in workplace

5S refers to 5 most vital practices to keep the work place safe and hazard-free. The 5 components of 5S are –

1. Sort
2. Store (Set in Order)
3. Shine
4. Standardize
5. Sustain

The concept of 5S was originated in Japan. In fact the 5Ss are the first letters of the Japanese words Seiri, Seiton, Seiso, Seiketsu and Shitsuke.

Fig 2.6.1.1: Sample 5S diagram

COMPONENT	MEANING	SIGNIFICANCE	PROBLEMS TAKEN CARE OF
Sort	• Remove all items not needed for current production operations. • Leave only the bare essentials: When in doubt, throw it out.	• Space, time, money, energy, and other resources can be managed and used most effectively. • Reduces problems and annoyances in the work flow. • Improves communication between workers. • Increases product quality. • Enhances productivity.	• The factory becomes increasingly crowded and hard to work in. • Storage of unneeded items gets in the way of communication. • Time wasted searching for parts/tools. • Unneeded inventory and machinery are costly to maintain. • Excess stock hides production problems. • Unneeded items and equipment make it harder to improve the process flow
Set in Order	• Arrange needed items so that they are easy to use. • Label items so that anyone can find them or put them away.	Eliminates many kinds of waste, including: • Searching waste. • Waste due to difficulty in using items. • Waste due to difficulty in returning items.	• Motion waste. • Searching waste. • Waste of human energy. • Waste of excess inventory. • Waste of defective products. • Waste of unsafe conditions.
Shine	• Keep everything, every day, swept and clean.	• Turn the workplace into a clean, bright place where everyone will enjoy working. • Keep things in a condition so it is ready to be used when needed.	• Lack of sunlight can lead to poor morale and inefficient work. • Defects are less obvious. • Puddles of oil and water cause slipping and injuries. • Machines that do not receive sufficient maintenance tend to break down and cause defects.

COMPONENT	MEANING	SIGNIFICANCE	PROBLEMS TAKEN CARE OF
Standardize	• Integrates Sort, Set in Order, and Shine into a unified whole.	• By ensuring conditions do not deteriorate to former state, facilitates implementation of the first three pillars.	• Conditions go back to their old undesirable levels. • Work areas are dirty and cluttered. • Tool storage sites become disorganized and time wasted searching for tools. • Clutter starts to accumulate over time. • Backsliding occurs.
Sustain	• Making a habit of properly maintaining correct procedures. • Instill discipline necessary to avoid backsliding.	• Consequences of not keeping to the course of action greater than consequences of keeping to it.	• Unneeded items begin piling up. • Tools and jigs do not get returned to their designated places. • No matter how dirty equipment becomes, nothing is done to clean it. • Items are left in a hazardous orientation. • Dark, dirty, disorganized workplace results in lower morale.

2.6.2 Recognize and meet 100% target for number of products to be manufactured per day

- any qualified electrical technician knows that texting and engaging on even casual type of conversation while work is in progress is damageable to the quality of the product that is being assembled
- distractions to be avoided is a quality of the electrical technician
- electrical safety adherence is a step closer in achieving the quality at the workplace
- quality control is the process through which a product that is manufactured is suitable to be released for sale and distribution
- the quality control department tests in every point along the process of manufacture and as well as during testing the final product the quality of the product that is either assembled or manufactured
- tests that shows that quality have been deviated for any product then the product is destroyed and further actions are taken to adjust the process of manufacturing to ensure that it is not repeated

- The standards and the test measurements are compared with the standards that are set internally, industry-wide standards and external regulations. proper documentation must be there to show that a vigilant and rigorous quality analysis have been assessed
- This work requires a great responsibility and the team or the individual who works on the quality must adhere to the fact that the highest levels in quality of the product is maintained
- Once the above requirements are adhered to properly, then the 100%target can be easily achieved
- Although the manufacturing time, time to make the changeovers, capital utilisation and Overall Equipment Effectiveness(OEE) is equally important

2.6.3 Arrange and achieve 100% of planned work as scheduled

- Plan ahead: the technicians must plan ahead and it must be seen that the tasks are balanced properly in order to set the plan right
- Defining the specific goals: the team must set the goals both as the team and as the individual to keep the process of production being moving forward
- A schedule must be created with the timeline: a list of activities must be created in view of the timeline and also for the production and delivery of the same
- Keeping an end-of- day performance record: this will serve as the productivity report that will help the supervisor and the technician at work

2.6.4 Assess and achieve zero errors as per company's standards

The theory of zero defects ensures that there is no waste that already exists in a particular project. In this waste refers to all the unproductive processes, employees, tools and so on. Anything that is unproductive and does not process value to the project must be eliminated and is called the process of elimination of waste

The zero defects theory is mainly based on four elements in the actual projects:

- Quality is the state of assurance to the requirements; which means that the project is fulfilling the requirements at that point in time
- Correct at the first time: quality must be integrated into the process from the very beginning of the production, rather than solving the problem at a later stage
- Quality is measured in budgetary terms; one needs to judge the production of waste and the revenue in terms of financial impact
- Finally performances must be judged by the standards that is accepted, as close to perfection as it is possible

2.6.5 Identify and achieve zero damage because of electrostatic discharge

- Device components that that are shipped in antistatic bags are very sensitive to damage from static electricity. Some components can be totally impaired by voltages as low as 30V
- It is advisable to wear ESD wrist strap, while handling components that are subject to ESD damage, and it has be sure that it is in direct contact with the skin
- When handling the component make sure that the end of the ESD wrist strap is attached to the point on the chassis
- Contact between the component and clothing must be avoided, ESD voltages emitted from clothing can damage components
- When removing and installing the component which is subject to ESD damage place it with component side up on the antistatic card rack in an antistatic bag

2.6.6 Identify and keep work area clean and organised

The floors must be clean and dry for preventing slips and falls:

- Maintaining the cleanliness of the floor is important, the floors are certainly to be kept dried so that it prevents the case of tripping and falling in the workplace. There are different kinds of floor cleaners that help to serve the purpose of cleaning
- There are alkaline cleaners that are mainly used in restaurants, whereas acidic cleaners help to remove the rust, scale and oxides from the floors.
- There are products that have to be used consciously as it can be very detrimental to the floors.so a cleaning expert must be contacted for the same. the floors must be kept dried by using absorbent materials, like floor mats, for the removal of moisture and dirt from the bottom of the shoes and

disinfectants must be used for the prevention of the spread of illness and germs:

- germs can be so easily spread throughout the workplace, particularly when flu is rampant, but through the process of disinfecting the surfaces and objects that are EPA-registered, disinfectants that carry the logos of hospital grade can definitely stop the spreading of germs

Proper air filtration is the workplace lowers the risk of exposure to hazardous substances:

- dusts and vapours tough invisible to naked eyes are hazardous substances, that has the capacity of creating an environment that is unsafe for the employees installation of the ventilator is important as it reduces the risk of transmission of germs that is airborne and also helps to maintain a clean and healthy environment for the employees
- regular cleaning of the HVAC system filters prevents the dust and dirt from getting saturated, and in this manner the health is maintained so that, there is no microbial growth and no odour is released
- there are vacuum cleaners, that are fitted with HEPA filters can also capture the fine particles
- dehumidifier can also be used to maintain the humidity around 30 to 50 %, and this is also important to upkeep the environment of the workplace, as it eliminates the air pollutants of the workplace

Clean light fixtures improve the efficiency of the light:

- the dirty light fixtures can definitely reduce the essential light levels, that makes it difficult and very unsafe for the employees while dealing with their daily work
- the clean light fixtures significantly improves the efficiency of lighting in the workplace .properly lit stairways and aisles are also very important so that accidents can be prevented and safe working environment is promoted

Proper disposal of waste and matters that are recyclable helps maintain a clutter-free work area

- appropriately placing the waste paper bins in areas allocated throughout the work area upkeeps the environment of the area
- Proper locations of the dustbins help to see that the materials are disposed of properly and also reduce the spread of germs. The recycling materials must be allocated to in waste bins that are labelled appropriately
- It is very important to prepare checklists
- These checklists should never be permanent it needs to be flexible in order to update the equipment, material and tools
- It is very important to record the observations found and categorise the information into groups of A,B and C
- Class A hazard would include the equipment, tools or other materials that would cause a permanent disability or loss of life or body part
- Class B hazard would include an equipment, tools or material that would cause serious wound or illness that would result in disability in temporary level or damage to the workplace in an extensive way
- Class C hazard would include an equipment, tools or material that will cause less or minor injury, illness that shall be not permanent or disabling
- There are four categories of hazardous wastes- combustible, caustic, reactive and toxic wastes
- Combustible wastes are those that can catch fire very easily if the flash point is less than 140 degree centigrade

Fig 2.6.6.1 workplace hazards

Fig 2.6.6.2 hazard of an electrical technician

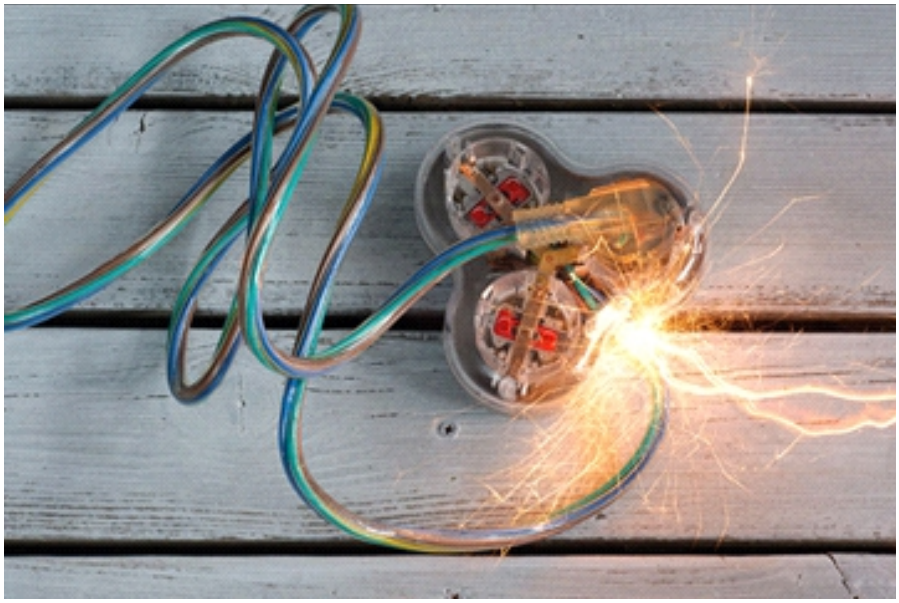


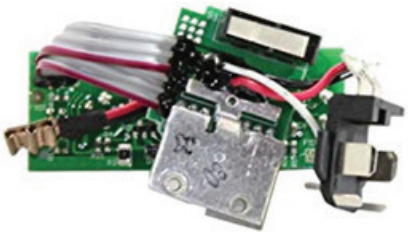
Fig 2.6.6.3 hazard faced by electrical technician

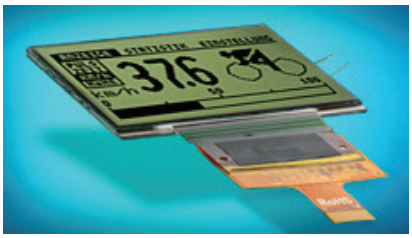
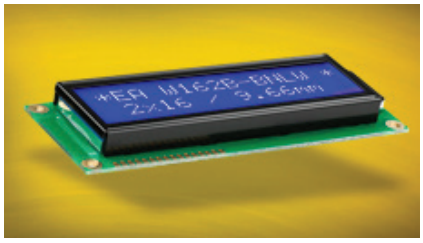
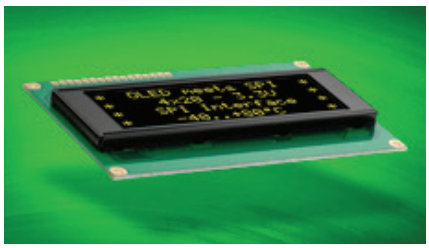
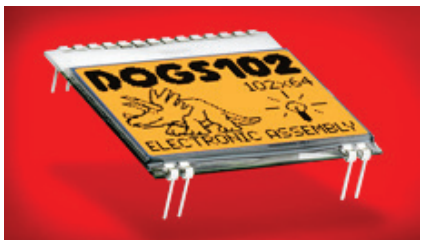
2.6.7 Record and achieve clean work protocols

HSE safety

- HSE stands for health, safety and the Environment
- it recognises the highest standards of commitment towards the health and safety in the working environment for the employees, visitors and customers, as well as to protect the environment in the community where we live
- it majorly defines the principles through which the operations of safety and health is maintained by the management system
- the company's management applies the HSE policies very rigorously throughout the company
- for achieving the best of safety and health the HSE must be recognised, which includes:
- basic identification of the risks of HSE and the checking up of opportunities in the operation
- elimination of unsafe accidents or incidents, and also prevention of injuries and occupational illness in the workplace; this can be done by assessing and recognising the hazards which pertains to the operation on a periodic basis
- safety committees must be established at all locations for monitoring and controlling the health and safety of the employees
- a robust governance of management must be present , to investigate, review and strengthen the proactive actions of the management before the occurrence of the incident or accident
- environmental protection would mean to ensure the resource to be used in a sustainable manner
- newer and efficient technologies must be implemented for the reuse and recycling of the waste
- pollution prevention must also be seen to
- newer and efficient measures must be implemented for mitigating the operation carried on in the company for protection of the environment

2.6.8 Recognize and learn about new product models, their features and functions

Images	Specifications/functions
	• multistage amplifier electronic production • circuit board assembly parts
	• electronic assembly • replacement parts
	• volt charger receptacle and fuse assembly
	• electric starter motor assembly parts
	• control panels • it is fully assembled control from 2,4” to 5,9” and the operating unit that consists of a variety of integrated functions

Images	Specifications/functions
	• standard graphic • the LCD graphics display in the variety of sizes and the resolution is up to 5.7”
	• they complete character set and is configured for operation on the 4-or 8-bit data bus of the processor system • character displays
	• O LED • it provides the technology OLED for its real black background and for its active technology
	• USB Data Logger • the electronic assembly can basically supply the data logger to the monitor and use it to monitor the moderate temperature, relative humidity and also the dew point
	• EA DOG series • This is the latest display that is specially designed and developed for power hand-held applications and also equally applicable for large quantities. This optional backlighting can be equally run with 3.3V or 5V depending on the connection system

Unit 2.7 Recognize the maintenance of tools used during the assembly process

Unit Objectives

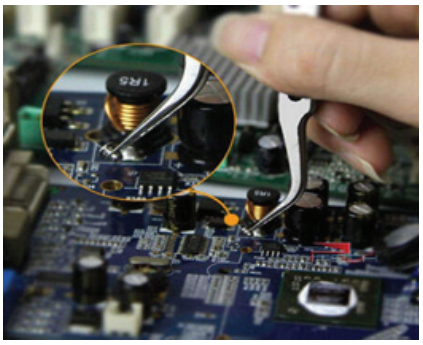
At the end of this unit, you will be able to:

1. Evaluate the various tools
2. Recognise the maintenance of tools

2.7.1 Evaluate the various tools

Tools:

Let us look at the various tools that can be used during assembling process by an electrical technician. These tools range from simple hand tolls to state-of-art power tools.

Tools	Uses
	Tweezers and Forceps: • Tweezers grip, move, hold, cut or strip wires, leads, components and just about anything that's too small. • It helps to grip hot, delicate or sterile products for the human hands to touch. • All of these tweezers can be equipped with ESD ergonomic cushioned grips.
	Wire Cutters: • They are made of the finest carbon tool steel, and induction hardened for long life and durability.
	Pliers: • Used for twisting wires • Others are designed for a combination of tasks including cutting wire.

Apart from these, there are some simple hand operated tools like:

- **Needle-Nose Pliers:** Needle-nose pliers for the electrician should always have the wire-cutter option.
- **Side-Cutting Pliers (Dikes):** Side-cutting pliers, or "dikes" are common to every electricians tool set. These are used to not only cut wire, but nails, staples, MC cable, and other items.
- **Wire Strippers:** Although not truly pliers, a pair of wire strippers is a necessary item in the electrician's tool belt. Used for stripping and cutting.
- **Screwdrivers:** Used in different forms and shapes based on size of screws.
- **Allen Wrenches (Hex Keys):** Used for making small sets of holes or perforations in the PCB.
- **Conduit Reamer:** Although not strictly a screwdriver, a conduit-reaming tool is necessary for fixing any conduits or joints that may happen during assembling.

2.7.2 Recognise the maintenance of tools

It must be ensured that the electrical tools must be cleaned ona regular basis and one must take proper care of the same. A thorough regime must be followed for the maintenance of the same

Cleaning the dust:

- It has to be made sure, that the electrical tools must be kept free of dust. Sometime must be dedicated for cleaning of the dust regularly from the tools

Checking the cords:

- inspect and check for the wear and tear of the electric cords, it might be that the insulation might get damaged and the technician must keep an eye on the loose wires, which in turn will ensure that the electric tool will get the power up without meeting with an accident, the cords need to be wiped regularly from keeping them damage free from oil and grease, the prongs must be checked and assessed well, and it have to be ensured that the casing is intact and the prongs are not at all loose

Storing the tools:

- the technicians must keep the electric tools stored in their original cases and this in return keep them free from dust and dirt when it is not being used
- proper care must be taken of the electrical tools to make sure that they last for years to come
- good quality of power tools must be purchased at the start, good brands come with guarantee that they would last for times to come, buy tools from brand names you trust
- Usage of tools must be done only for the purpose they are intended to. Using of the tool for the purpose that was not meant for ia sure way to spoil the tool. cutting tools are only designed to cut the materials they were designed specifically to cut, keep the blades sharp enough so that during the time of cutting you don't have to try hard to cut the material

Electric tools must be oiled:

- the electric tools in the toolbox that have a cutting surface must be lightly oiled for preventing the rust, a thorough examining of the cutting surface must be done to make sure that the tools are in their best condition

Fig 2.7.2.1: storing the tools in the tool box

Fig 2.7.2.2: a multimeter being used for checking the coax cable

Unit 2.8 Identify frequently occurring errors in the assembly process, causes and preventive measure

Unit Objectives

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

1. Analyse the faults occurring during assembling

2.8.1 Analyse the faults occurring during assembling

Analyse the faults occurring during assembling

Report any problems in the assembly line in time and record any defects

Equipment can malfunction for a variety of reasons. Electrical contacts and parts can wear out; wires can overheat and burn open or short out; parts can be damaged by impact or abrasion; etc. Equipment may operate in a manner far different than it was designed to, or not at all.

PCB Troubleshooting during assembling:

- Basic PCB troubleshooting can be done with just a few tools. The most versatile tool is a multimeter, but depending on the complexity of the PCBs and the problem, an LCR meter, oscilloscope, power supply and logic analyzer may also be needed.

Fig 2.8.1.1: PCB sample

- Visual inspection of PCBs can find several potential issues. Overlapped traces, burnt out components, signs of overheating, and missing components can be found easily through a thorough visual inspection. Bulging components is another good indicator of a source of a problem, especially for electrolytic capacitors.

Fig 2.8.1.2: Multi-meter

- One step beyond a visual inspection is a physical inspection with power applied to the circuit. By touching the surface of the PCB and the components on the board, hot spots can be detected without the use of expensive equipment.
- Often the most effective techniques for PCB troubleshooting is to test each individual component. Testing each resistor, capacitor, diode, transistor, inductor, MOSFET, LED, and discrete active components can be done with a multimeter or LCRmeter.

Fig 2.8.1. 3: LCR meter

- The most challenging components to check are ICs. Most ICs can be easily identified by their markings and many can be operationally tested using oscilloscopes and logic analyzers.

How to troubleshoot:

It is the process of analyzing the behaviour or operation of a faulty circuit to determine what is wrong. It then involves identifying the defective component(s) and repairing the circuit. Depending on the type of equipment, troubleshooting can be a very challenging task. In order to perform and record troubleshooting, an electrical technician needs to understand the key elements to be looked into.

Different modes of faults or failures during assembling:

1. Packaging failure
2. PCB failure
3. Relay failure
4. Semi-conductor failure
5. Passive element failure
6. MEMS failure

- Thermal expansion produces electrical stress that causes material fatigue. Humidity and aggressive chemicals can cause corrosion of the packaging materials and leads, potentially breaking them and damaging the inside parts, leading to electrical failure.
- PCBs are vulnerable to environmental influences; for example, the traces are corrosion-prone and may be improperly etched leaving partial shorts, while the vias may be insufficiently plated through or filled with solder. Residues of solder flux may facilitate corrosion; those of other materials on PCBs can cause electrical leaks. CAFs or metallic filaments may grow within the boards along the fibres of the composite material, which can damage the affectivity of the PCB, as shown in the diagram below.

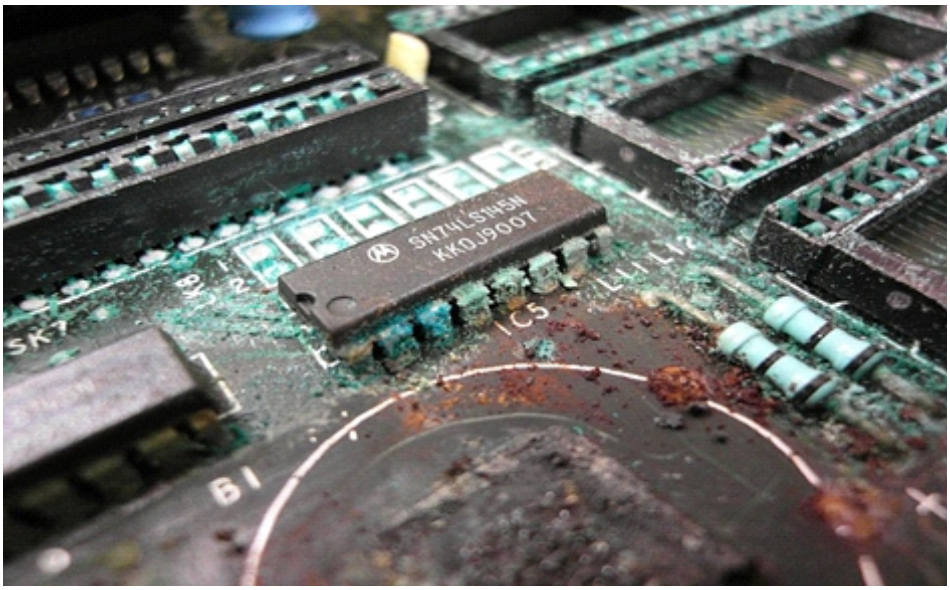


Fig 2.8.1. 4: Metallic filaments on a PCB

- An electric arc occurs between the contact points (electrodes) both during the transition from closed to open (break) or from open to closed (make). In addition to the physical contact damage, there appears also a coating of carbon and other matter.
- Corrosion is a source of delayed failures for semiconductors and metallic interconnects. The surface of semiconductors is subjected to moisture as they have an oxide layer, as shown below.

Fig 2.8.1.5: Moisture coating on a PCB

- Electrostatic discharge (ESD) is a subclass of electrical overstress and may cause immediate device failure, permanent parameter shifts and latent damage causing increased degradation rate. ESD in real circuits causes a damped wave with rapidly alternating polarity, affecting performance.
- Resistors can fail open or short, alongside their value changing under environmental conditions. Manufacturing defects causing recurrent problems. For example, improperly crimped caps on metal resistors can loosen and lose contact.

Fig 2.8.1.6: ESD discharge on a resistor

- Micro electro-mechanical systems suffer from various types of failures:
  - Particles migrating in the system and blocking their movements.
  - Fractures causing loss of electrical parts.
  - Dielectric charging leading to change of functionality.

Unit 2.9 Evaluate the documents and procedures used in the during the assembly process

Unit Objectives

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

1. Illustrate all the correct process for assembling
2. Analyse errors in components and report them

2.9.1 Illustrate all the correct process for assembling

Highlight any errors in previous step of the assembly process and report defective components

For every electrical fitting related work purpose, the process has to pass through proper documentation. The same is for receiving consumables too. In electrical fitting industry, the consumables are like:

- Wires
- Connectors
- Screws
- Nuts, etc.

While filling up the form to receive the consumables, these are the pointers that require to be filled.

- Name of Worker
- Designation
- Date of filling up the consumable requirement form
- Time
- Supervisor / Manager Name
- Names and types of the consumables
- The purpose for which it is needed

In case there are inadequate numbers of consumables from the requested number, the report has to be made to the supervisor.

Ensure that the finished assembly meets the specifications

After the technician receives the consumables from the company, the important step is to ensure that the materials are used appropriately. In addition to it, the electrical technician also needs to make sure that the assembling process meets the specification.

This can be done with the help of the blueprint that every technician has to create or obtain before they start the assembling process.

It is a known fact that the technicians continuously follow the blueprint side to side of their assembly work. Still, they have to take some time to compare their finished work with the blueprint.

2.9.2 Analyse errors in components and report them

Report about inadequate quantity of consumables such as wires, connectors, screws, nuts, etc.

There are instances when electrical technicians have to face certain equipment related problems during assembly line. The issues may be related to malfunctioned machinery, inadequate component or parts of the equipment, and even defective consumables.

Few defects in these areas are:

- Missing or damaged screw gauge
- broken Dial Test Indicators
- bent Escapement File or combination file
- defective thread or die tool
- blunt Tapered Tap
- Defaced markings
- Defective equipment

In all these scenarios, it is important to report the incident to his/her supervisor or reporting manager.

It is essential that in order to keep tools, equipment and consumables in good working condition; they must be subjected to periodic maintenance.

The frequency of maintenance depends upon the following factors:

- The manufacturer's instructions and recommendations
- The intensity and degree of use
- The physical working conditions like temperature, humidity, weathering, etc.
- The severity of potential risks and threats arising from unprecedented but likely malfunction

Receive spares from tool room or stores and deposit faulty tools

- Check if the threads of nuts and screws are intact and not rigged
- Check if the teeth of the saw blade or cutters are not blunt
- The springs of spanners and wrenches are intact or not loosened
- Make sure that the storage of fitting related components are stored a in dry area

For every organisation, there are few established norms and rules regarding the utilisation of spare tools. As an electrical technician, there are times when you need to use spare tools or equipment for fitting purpose. It is imperative that every technician should follow certain protocols to do so.

There are various registers that are maintained in the company. Similarly, a separate register is maintained in the store or tool room. This register has all the necessary details like:

- Fitting tools
- Spare tools
- Tools that are in use
- Tools in the inventory

- Name of the person who took a spare tools
- The spare that was taken
- Date and time when it was taken
- Signature of the person

Only after taking proper permission from the supervisor can a technician ask for spare or parts from the storeroom. Then the technician has to fill up the register. The technician also needs to write down the reason for taking spares.

Deposit Faulty Modules and Tools to Stores

The process of depositing faulty tools and modules back to the store is quite similar to the one stated above.

The first step that a technician should follow is reporting about the defective tool or the module to their supervisor or line manager.

After bringing to their notice, the technician should prepare a report related to that faulty equipment and write down these details:

- Date when the tool or module was taken
- Name of the staff member who was on duty at that time (to verify that the technician took the equipment after filling the register)
- Type of fault on the tool
- For what purpose did the technician take that module or tool?

Unit 2.10 Label the way of handling of different electrical and mechanical products

Unit Objectives

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

1. Practice handling of different electrical and mechanical products

2.10.1 Practice handling of different electrical and mechanical products

Practice handling of different electrical and mechanical products

According to Ministry of Electronics and Information Technology (government of India), the procedure for handling of electrical products are as follows:

- work must be carried on low and medium voltage apparatus and mains it must be carried only by the persons who are authorized and all the apparatus and mains to be worked upon must be isolated from all the sources of supply before the work starts
- warning boards must be attached to or kept in adjacent to the line apparatus and the limit of the zone, in which work is carried out must be specified
- it must be ensured that safety apparatus as rubber mats, stool, platforms and devices used for safety must be kept in good condition
- when any live mains is in the process of being earthed, the prescribed procedure must be followed as documented
- maintenance on High Tension(H.T)Breaker must be attempted to, only when it is isolated or completely withdrawn
- no work must be carried on the transformers unless, it have been disconnected from all the external electrical circuits and all the windings have been earthed properly and with proper safety precaution
- when there is a case of electrical shock, then it must be immediately brought to the attention of the supervisor
- The incoming power must be de-energized before the removal of the top and side access or the cover plates of any bus cove. The incoming power source must be locked. It must be seen by the technician that the main horizontal bus must be earthed before starting to work on the bus
- voltage must always be checked by the multi meter/ test lamp so as to be sure that circuit breakers or switches are open or the bus is de-energized
- all the remote control voltage source must be isolated when the technician is working on the board
- the breakers must be pad-locked with the isolated position and tested before working starts on the branch circuit
- proper electrical isolation procedures must be followed so as to avoid any in- advert ant activation of any of the electrical equipment, fuses etc., must be removed before working take place

The don'ts that need to be followed strictly by the technicians are as follows:

- no unauthorized person and also untrained person must be allowed to work on the electrical systems
- do not disconnect the plug of the handling tools by simply pulling out the cord
- in hazardous working areas it must be seen that direct contact between the explosive mixture and the means of ignition must be avoided
- the technicians must see that they must not inadvertently activate any electrical equipment, procedure of electrical isolation must be followed always so that inadvertent activation on any electrical equipment can be avoided
- Never panic if there is power failure. Emergency lighting is provided in all the working areas within the company through Diesel Generating Sets that start up automatically within a time of 10-15 seconds of the power failure. Stay calm
- do not work alone in the main switch or the feeder panel enclosure
- never touch the dangling wires, and bring it to the attention of your supervisor at once
- never come in direct contact with the electric wires while in use/working
- do not make an attempt to replace/repair the plugs that are faulty by yourself. A person who is well qualified or the maintenance personnel must do this
- never put in use any piece of the electrical equipment that gives a sensation of tingling when touched upon, this is defective and must be brought to the vigilance of the supervisor
- no live part must come within the unsafe distance of the person who is working on the live medium, high or low voltage mains, so that it does not come within the contact unless the technicians are properly protected

Summary

- Electrical wiring is the installation of cables and associated devices such as switches, distribution boards, sockets and light fittings in a structure.
- Control and distribution devices within a building's wiring system are subject to voltage
- Wiring systems in a single family home or duplex are simple, with relatively low power requirements
- Modern non-metallic sheathed cables, such as Types NMB and NMC, consist of two to four wires covered with thermoplastic insulation
- Insulated cables are rated by their allowable operating voltage and their maximum operating temperature
- Tweezers and Forceps, Wire Cutters, Pliers, Side-Cutting Pliers (Dikes), Needle-Nose Pliers, Allen Wrenches (Hex Keys) are some prominent tools
- The degree of maintenance depends on your company's program regarding equipment maintenance
- It is a known fact that the technicians continuously follow the blueprint side to side of their assembly work
- It is essential that in order to keep tools, equipment and consumables in good working condition; they must be subjected to periodic maintenance
- The current and voltage output in a circuit varies according to the type of connection
- Asbestos Gloves, Flame-proof Aprons, Safety Helmets, Safety Shoes, Trousers are some PPEs used by electrical technicians
- The standards and the test measurements are compared with the standards that are set internally, industry-wide standards and external regulations. proper documentation must be there to show that a vigilant and rigorous quality analysis have been assessed

Notes

Exercise

Choose the correct option:

1. Plenums are a form of _____.

   a) Air handling space b) Art work c) 3D image

2. Substrate Parameters are made of _____.

   a) Epoxy resin b) Poly-vinyl c) Wood

3. Holes that allow electricity to be carried in a PCB are called _____.

   a) Perforations b) Plating Voids c) Carrier

4. A solder mask is laid on top of the copper layer to _____.

   a) Insulate b) Corrode c) Produce electricity

5. _____ control the direction of current flow.

   a) Diode b) Main switch c) USB

6. Probes and Elements are two types of _____.

   a) Thermistor b) Transistor c) Wires

7. In Ohm's Law, R stands for _____.

   a) Record b) Resistance c) Reunion

8. ESD stands for _____.

   a) Essential Standard Deviation b) Electrostatic Discharge

   c) Efficiency Syndrome Development

9. Identify the image

10. Identify the image and its function

Activity

- This session will be in the form of “Video” activity.
- In this session, the Trainer will show videos based on the step by step process to use various tools.
- The YouTube link on how to use Pliers is: https://www.youtube.com/watch?v=VF3xOXZn8WU
- The YouTube link on how to use a screwdriver is: https://www.youtube.com/watch?v=lmzJCWTWmlU
- The Trainees will watch the videos carefully.

Activity

- This activity will be in the form of “Do it Yourself”.
- The trainer will share several tools among the trainees like:
- Wires
- Connectors
- Screws
- Nuts
- Also, the trainer will share sample PCBs, most of which will be defective
- The trainees would have to identify the fault and then name it, once it is corrected, the trainees will have to fix the fault.

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3. Communicate and coordinate effectively with others

Unit 3.1 – Communicate effectively with supervisor and colleagues
Unit 3.2 – Respect Gender and ability difference

ELE/N9972

Key Learning Outcomes

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

1. Trainee will be able to List and discuss potential hazards at the workplace
2. Trainee will came to know about the importance of following organizational guidelines for dress code, time schedules, language usage and other behavioural aspects.
3. Trainee will be able to maintain personal safety and hygiene at the workplace
4. Trainee will be came to know about the process of reporting grievances and unethical conduct such data breach, sexual harassment at the workplace, etc.
5. Trainee will be ale to coordinate with Pwd candidates effectively.

Hazards At Workplace

One of the essential factors to a positive work environment is establishing good working relationships with your co-workers and your supervisor. According to a recent workforce study, 84% of employees rated their relationship with their supervisor as good or excellent. The study also found that these strong relationships are based on trust from both employees and supervisors, and that it takes an open line of communication from both parties to create this type of environment. With that said, successful relationships are built upon the practice of effective communication skills. Effective communication with your supervisor is a key element of your eventual success in the workplace. Therefore, it is important that you feel comfortable and prepared to approach your supervisor in a timely manner to discuss concerns, request assistance, or report work progress.

TIPS FOR EFFECTIVE COMMUNICATION WITH YOUR SUPERVISOR

1. Before talking to your supervisor, make sure that you are clear about the goal of your conversation, whether it's to request guidance or assistance on something you are working on, or report your progress on a project. It is helpful to write down all the topics you hope to discuss and communicate before the conversation.
2. Choose a preferred method of communication. Some people are more effective communicating via email while some others prefer to have face-to-face time or a quick conversation. Tailor the communication method to the one your supervisor prefers. Schedule your conversation. Be considerate of your supervisor's time and schedule when you approach him/her. Don't try to communicate or pressure for an answer when he or she is under a deadline or resolving an urgent issue. If your supervisor prefers face-to-face meetings, schedule your conversation ahead of time so that you can prepare accordingly. Try not to wait until the last minute to ask for instructions and/or assistance on projects you are working on.
3. Be concise and straightforward. When speaking with your supervisor, you should concisely introduce your concerns or requests and explain why you are bringing them to his/her attention. It is also important to focus the communication on the issues at hand and how to find solutions to move forward.
4. Practice active listening. During a meeting with your supervisor, you should engage to be an active listener instead of worrying about what you are going to say. Practicing active listening skills will help you understand and anticipate your supervisor's needs and what actions need to be taken. Take notes as needed so that you will remember more of the conversation and action items.
5. Have a positive attitude and be open to feedback. The rule of thumb in effective communication and a successful relationship is to exhibit a positive attitude. It is also crucial to keep an open mind and be receptive to feedback that your supervisor may provide you.
6. Communicate regularly with your supervisor to develop and maintain a successful professional relationship. Establishing an effective communication channel with your supervisor on a regular basis when things are going smoothly will make it easier to approach him/her when a problem arises.

Potential Hazards At Workplace

- Electrical Accident. ...
- Exposure to Dangerous Chemicals. ...
- Machinery & Tools Hazard. ...
- Workplace Harassment. ...
- Fire Accidents. ...
- Workplace Theft. ...
- Workers Existing Health Conditions.

Importance Of Following Organizational Guidelines

When employees follow procedures, they perform tasks correctly and provide consistent customer service. This enhances the quality of your organization's products and services. And, in turn, improves your company's reputation. Employees can know they are fulfilling their roles and take pride in their work

Importance Of Maintaining Personal Safety & Hygiene At The Workplace

Spending more time at work makes us more responsible to follow proper hygiene as there are more people to spread germs and variety of infections. Employees and employers both can contribute towards maintaining good hygiene and sanitation.

Process Of Reporting Grievances and Unethical Conduct Such Data Breach, Sexual Harassment At The Workplace

Sexual harassment is unwelcome conduct of a sexual nature that is persistent or offensive and interferes with an employee's job performance or creates an intimidating, hostile or offensive work environment. Sexual harassment is defined by the federal Equal Employment Opportunity Commission as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when, for example:

(a) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment,

(b) submission to or rejection of such conduct by an individual is used as the basis for employment decisions affecting such individual, or

(c) such conduct has the purpose or effect of unreasonably interfering with an individual's work performance or creating an intimidating, hostile or offensive working environment.

Sexual harassment can be physical and psychological in nature. An aggregation of incidents can constitute sexual harassment even if one of the incidents considered on its own would not be harassing.

Examples of prohibited conduct

Though sexual harassment encompasses a wide range of conduct, some examples of specifically prohibited conduct include the following:

- Physical assaults of a sexual nature, such as rape, sexual battery, molestation or attempts to commit these assaults, and intentional physical conduct that is sexual in nature, such as touching, pinching, patting, grabbing, brushing against another employee's body or poking another employee's body.
- Unwelcome sexual advances, propositions or other sexual comments, such as sexually oriented gestures, noises, remarks, jokes, or comments about a person's sexuality or sexual experience.
- Preferential treatment or promises of preferential treatment to an employee for submitting to sexual conduct, including soliciting or attempting to solicit any employee to engage in sexual activity for compensation or reward.
- Subjecting, or threats of subjecting, an employee to unwelcome sexual attention or conduct or intentionally making performance of the employee's job more difficult because of that employee's sex.
- Sexual or discriminatory displays or publications anywhere in [Company Name]'s workplace by the [Company Name] employees.
- Retaliation for sexual harassment complaints.

Responding to Conduct in Violation of Policy

Employees

- If an employee feels that he or she is being subjected to sexual harassment he or she may immediately inform the harasser that the conduct is unwelcome and needs to stop. If the inappropriate conduct does not cease, or if the employee is unable to or uncomfortable with addressing the alleged harasser directly, he or she should report the incident to his or her own supervisor or to the human resource (HR) director. It is helpful, but not required, to provide a written record of the date, time and nature of the incident(s) and the names of any witnesses.
- It is important to report all concerns of sexual harassment or inappropriate sexual conduct to the HR director or a supervisor/manager as soon as possible. Management must be made aware of the situation so that it can conduct an immediate and impartial investigation and take appropriate action to remediate or prevent the prohibited conduct from continuing.

Managers and supervisors

- Managers and supervisors must deal expeditiously and fairly when they have any knowledge of sexual harassment within their departments, whether or not there has been a written or formal complaint. They must:
- Take all complaints or concerns of alleged or possible harassment seriously no matter how minor or who is involved.
- Report all incidents to HR immediately so that a prompt investigation can occur.
- Take any appropriate action to prevent retaliation or prohibited conduct from recurring during and after any investigations or complaints.
- Managers and supervisors who knowingly allow or tolerate sexual harassment or retaliation, including the failure to immediately report such misconduct to HR, are in violation of this policy and subject to discipline.

Human resources

The HR director is responsible for:

- Ensuring that both the individual filing the complaint (complainant) and the accused individual (respondent) are aware of the seriousness of a sexual harassment complaint.
- Explaining [Company Name]'s sexual harassment policy and investigation procedures to all parties involved.
- Exploring informal means of resolving sexual harassment complaints.
- Notifying the police if criminal activities are alleged.
- Arranging for an investigation of the alleged harassment and the preparation of a written report.
- Submitting a written report summarizing the results of the investigation and making recommendations to designated company officials.
- Notifying the complainant and the respondent of the corrective actions to be taken, if any, and administering those actions.

The HR director will determine if an in-house investigation will be conducted or if a third party will be contracted to complete the investigation. All complaints involving senior management at the vice-president level or above will be handled by an external third party.

Complaint Resolution Procedures

Complaints should be submitted as soon as possible after an incident has occurred, preferably in writing. The HR director may assist the complainant in completing a written statement or, in the event an employee refuses to provide information in writing, the HR director will dictate the verbal complaint.

To ensure the prompt and thorough investigation of a sexual harassment complaint, the complainant should provide as much of the following information as is possible:

1. The name, department and position of the person or persons allegedly committing harassment.
2. A description of the incident(s), including the date(s), location(s) and the presence of any witnesses.
3. The effect of the incident(s) on the complainant's ability to perform his or her job, or on other terms or conditions of his or her employment.
4. The names of other individuals who might have been subject to the same or similar harassment.
5. What, if any, steps the complainant has taken to try to stop the harassment.
6. Any other information the complainant believes to be relevant to the harassment complaint.

Discipline

Employees who violate this policy are subject to appropriate discipline. If an investigation results in a finding that this policy has been violated, the mandatory minimum discipline is a written reprimand. The discipline for very serious or repeat violations is termination of employment. Persons who violate this policy may also be subject to civil damages or criminal penalties.

Confidentiality

All complaints and investigations are treated confidentially to the extent possible and information is disclosed strictly on a need-to-know basis. The identity of the complainant is usually revealed to the parties involved during the investigation and the HR director takes adequate steps to ensure that the complainant is protected from retaliation during and after the investigation. All information pertaining to a sexual harassment complaint or investigation is maintained in secure files within the HR department.

Other Available Procedures

The procedures available under this policy do not preempt or supersede any legal procedures or remedies otherwise available to a victim of sexual harassment under local, state or federal law.

Discuss Ways To Create Sensitivity For Different Genders And Persons With Disabilities

A disability is an impairment that can be mental, physical, developmental, cognitive, or emotional. A person can become disabled at birth or over the course of a lifetime. Some disabilities are birth defects, others are revealed as a person ages, and some are caused by accidents and/or other events.

Disability Diversity

Part of the diversity present in today's workforce are disabled workers. However, disabled does not mean someone with a disability is incompetent or unable to do their job. Disabled simply means the disabled person has an impairment. It also doesn't mean that the person lives off entitlement programs or gets any "breaks" that a person who is not disabled can't receive.

There are all types of disabilities covered by the word "disability." It does not mean, as we said, that the person with a disability is unable to work or complete their job as well as anyone else. Just as with race, gender, culture, a disability may mean that someone does things a little differently than you. A person with a hearing disability might need special accommodations related to communication. A person with a physical disability may require a different type of entrance into the place of work, or a desk in a location that accommodates a wheelchair.

As with any other person or group of people we've discussed thus far in this course, people with disabilities should be treated the same as everyone else. They should be treated equally. Understanding your own feelings, beliefs, and values related to disabilities, then understanding theirs, will go a long way toward promoting a harmonious, productive workplace environment.

Common Stereotypes

Stereotypes are common to the disabled. The reason for this is we make assumptions based on the disability instead of the capability of the disabled person. For example, it's a stereotype that people with cerebral palsy have a lowered intelligence level, when the truth is they don't. It's also a stereotype that they are unable to walk and cannot talk. These are both false as well. However, they are stereotypes that people believe, based on misconceptions, past experiences, and the absence of fact.

The same holds true of those with mental illnesses. The common stereotypes are that they're dangerous, unstable, and face periods of hospitalization. These stereotypes are completely wrong and based on the picture some movies in Hollywood give to us of those with mental illness. But think of it this way: Clinical depression is a form of a mental illness. Anxiety issues can be considered a form of mental illness. Stereotyping someone because they suffer from a disability is taking the individual out of the equation and labeling someone as less than you, or others like you, who don't have a disability.

Whenever you see a person with disability, you should presume they are just as competent as you are in the job they've been assigned. Never assume they aren't capable, or that you need to step in and help. Pity is not the same as compassion. Pity stems from stereotypes and biases. Compassion stems from an awareness of the differences in others and a willingness to work as a team to accomplish goals and meet deadlines.

Using the Correct Terminology

Words can be as powerful as any weapon. Just one word that you use can degrade someone, hurt their feelings, insult them, or even imply that you are discriminating against them. It used to be acceptable to refer to a person with a disability by naming their disability. If a woman was blind, you could say, "the blind woman."

However, labeling someone by a disability takes away from their abilities and individuality. Just as you don't want to be labeled by features you're not proud of (perhaps you have a big nose or ears), people with disabilities don't want their disability to be their name tag, so to speak.

In the early 20th century, the word "handicapped" was popular to describe people with disabilities. It didn't matter what type of disability they had. People with disabilities do not like this term applied to them, though. It suggests they have something that holds them back from doing things people without disabilities can do. It suggests they are somehow less than.

It's always best to use first person when referring to, or talking to, anyone. Address the person. Refer to the person. Do not refer to the disability, just the same as you shouldn't refer to the race, economic circumstance, or religion. Whenever possible, refer to a disabled person by their name. If you don't know their name, use a distinguishing feature, such as the color of their shirt, their location (the woman next to the copier), etc.

Disability Etiquette

Your disabled co-workers and employees are not any different than you, in that they are there to earn a living, advance their career, and better the organization through their contributions. You don't have to "baby" someone with a disability, and you don't have to watch what you say out of fear of offending them.

Here is an example:

A colleague has a form of mental illness. One day, you remark to another co-worker that your son is "driving you crazy." Suddenly, you realize the person with a mental illness has heard you, and you quickly apologize.

Relax! There's no need to worry. If you're worried that you offended someone, ask. Sometimes you won't have to ask.The person will politely tell you they find your words offensive. However, you don't have to tip-toe around people with disabilities. They can use the same slang and jargon that everyone else does.

You'll find that you'll be more relaxed if you just see the person – the individual – instead of seeing them as their disability. Maybe they have a great sense of humor. Perhaps they're a sharp dresser. Maybe they're a hard worker. See them for the things they are.They are not defined by their impairment any more than you are defined by the color of your hair. If you are afraid of them, or uncomfortable around them, because of their disability, then do some research to learn more.

Listed below are some other tips for interacting with people with disabilities.

- Treat people with disabilities as you would anyone else. Offer your hand as you would any other co-worker.
- If someone is deaf, maintain eye contact with them, not an interpreter, when you are communicating. They are the person you are talking to, not the interpreter.
- If you think someone needs assistance, you can offer it. The person may accept it or not. Either way is okay. Don't give your assistance without their permission. That is assuming they can't do something on their own. Let them make that call.
- Sometimes people may have impairments that affect the way they speak. If you're having problems understanding what someone says, ask them to repeat what they said. Be honest. Be polite.
- If someone is in a wheelchair, you want to make sure you converse with them at eye level. This may mean pulling up a chair. Don't bend over, kneel, or lean to talk to them. Also, don't lean on the wheelchair as support. If you can't sit down, it's okay to stand. Just look them in the eye.
- If someone has a visual disability, identify yourself and anyone else who is with you. If talking to someone else other than the blind person in a group, make it clear who you are speaking to by addressing them by name.
- Never pat people in wheelchairs on the head or on the shoulders. That is how you would treat kids or pets. Always treat adults as adults.
- To get the attention of a person who has a hearing disability, tap them on the shoulder. Speak slowly and clearly so the person can read your lips. Don't block the view of your mouth. Speak in normal tones. Don't shout.

In today's workplace, you need to be able to effectively communicate with anyone, regardless of their generation. To do that, you must also recognize and respect the differences in the three generations and how they view work, communication, and life -- then be flexible to find an effective middle ground. Most of all, you must be willing to listen and learn.

Intergenerational Communication in the Workplace

Communication is a critical part of being successful in business. But since American organizations have not fully recognized the importance of generational diversity in the workplace and how it affects business, miscommunication exists, instead. This creates discord and becomes harmful to the organization's bottom line.

In short, the three generations in the workplace today are misunderstanding each other. The misunderstandings cause loss of productivity, employee disenchantment.

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4. Work effectively, sustainably and safely

Unit 4.1 – Achieve optimum productivity and quality

Unit 4.2 – Implement health and safety procedures

Unit 4.3 – Organise waste management and recycling

Unit 4.4- Conserve resources

ELE/N1003

Key Learning Outcomes

1. Learner will be able to maintain good housekeeping in their surroundings.
2. Learner will be able to maintain work quality standards
3. Learner will be able to know about state organizational safety procedure
4. Learner will be able to bifurcate waste product & useful product & disposal of waste product
5. Learner will be able to know about different types of waste & their disposal procedure
6. Learner will be able to know about importance of efficient utilisation of water, electricity and other resources

Importance of Good Housekeeping At Workplace

Effective housekeeping can help control or eliminate workplace hazards. Poor housekeeping practices frequently contribute to incidents. If the sight of paper, debris, clutter and spills is accepted as normal, then other more serious hazards may be taken for granted. Housekeeping is not just cleanliness.

Housekeeping and cleanliness not only make the organization a safer place to work in but also provide a big boost to the image of the organization. These activities also

(i) improve efficiency and productivity,

(ii) helps in maintaining good control over the processes, and (iii) assist in maintaining the quality of the product.

IMPORTANT ASPECTS OF HOUSEKEEPING CLEANLINESS

Elements of housekeeping and cleanliness at workplace

The major elements which are normally included in the housekeeping and cleanliness practices at the work-place are described below.

- Dust and dirt removal – Working in a dusty and dirty area is unhygienic as well unhealthy for the employees since there can be respiratory type irritations. Also, if dust and dirt are allowed to accumulate on surfaces, there is a potential for a slip hazard. Hence, regular sweeping the workplace for the removal of dust and dirt is an essential housekeeping and cleanliness practice. Further, compressed air is not to be used for removing dust or dirt off employees or equipment. Compressed air can cause dirt and dust particles to be embedded under the skin or in the eye.
- Employee facilities – Adequate employees' facilities such as drinking water, wash rooms, toilet blocks, and rest rooms etc. are to be provided for the employees at the workplace so that employees can use them when there is a need. Cleanliness at the place of these facilities is an important aspect of the facilities.
- Flooring – Floors are to be cleaned regularly and immediately if liquids or other materials are spilled. Poor floor conditions are a leading cause of accidents in the workplace. Areas such as entranceways which cannot be cleaned continuously are to have mats or some type of anti-slip flooring. It is also important to replace worn, ripped or damaged flooring that poses a trip hazard.
- Lighting – Adequate lighting reduces the potential for accidents. It is to be ensured that inoperative light fixtures are repaired and dirty light fixtures are cleaned regularly so that the light intensity levels are maintained at the workplace.
- Aisles and stairways – Aisles and stairways are to be kept clear and not to be used for storage. Warning signs and mirrors can improve sight lines in blind corners and help prevent accidents. It is also important to maintain adequate lighting in stairways. Further stairways need to have railings preferably round railings for adequate grip.
- Spill control – The best method to control spills is to prevent them from happening. Regular cleaning and maintenance on machines and equipment is an essential practice. Also, the use of drip pans where spills might occur is a good preventative measure. When spills do occur, it is important to clean them up immediately. When cleaning a spill, it is required to use the proper cleaning agents or absorbent materials. It is also to be ensured that the waste products are disposed of properly.

- Waste disposal – The regular collection of the waste materials contribute to good housekeeping and cleanliness practices. It also makes it possible to separate materials that can be recycled from those going to waste disposal facilities. Allowing material to build up on the floor wastes time and energy since additional time is required for cleaning it up. Placing containers for wastes near the place where the waste is produced encourages orderly waste disposal and makes collection easier. All recyclable wastes after their collection are to be transferred to their designated places so that the waste materials can be dispatched to the point of use or sold.
- Tools and equipment – Tools and equipment are required to be inspected prior to their use. Damaged or worn tools are to be taken out of service immediately. Tools are to be cleaned and returned to their storage place after use.
- Maintenance – One of the most important elements of good housekeeping and cleanliness practices is the maintenance of the equipment and the buildings housing them. This means keeping buildings, equipment and machinery in safe and efficient working condition. When a workplace looks neglected then there are broken windows, defective plumbing, broken floor surfaces and dirty walls etc. These conditions can cause accidents and affect work practices. It is important to have a replacement program for replacing or fixing broken and damaged items as quickly as possible.
- Storage – Proper storage of materials is essential in a good housekeeping and cleanliness practice. All storage areas need to be clearly marked. Flammable, combustible, toxic and other hazardous materials are to be stored in approved containers in designated areas which are appropriate for the different hazards that they pose. The stored materials are not to obstruct aisles, stairs, exits, fire equipment, emergency eyewash fountains, emergency showers, or first aid stations. Also it is important that all containers be labelled properly. If materials are being stored correctly, then the incidents of strain injuries, chemical exposures and fires get reduced drastically.

Ways to Achieve Quality Standards

- Clutter control – Cluttered workplaces typically happen because of poor housekeeping practices. This type of workplace can lead to a number of issues which include ergonomic as well as injuries. It is important to develop practices where items like tools, chemicals, cords, and containers are returned to their appropriate storage location when not in use. Clutter is not only unattractive but, in a work area, it is also a serious threat to safety. Danger to the employees increases if the established exit routes and doors are blocked. For this reason, as well as to prevent slips and trips, assorted waste materials need to be disposed of promptly in the appropriate waste containers. Aisles are to be kept clear of obstructions for obvious reasons.
- Individual workspace – Individual workspace need to be kept neat, cleared of everything not needed for work. Many workplace injuries occur right in the employee's workspace. This space is often overlooked when conducting general housekeeping and cleanliness inspections. It is necessary to make a checklist which is to be used by the employees to evaluate their workspace.

What is quality work?

Quality work is the service/task one completes successfully within the estimated time, with the end output satisfying the expectations of everyone involved, including oneself.

Following are some of the ways to produce quality work.

1. Hold yourself to the highest standard

   Quality work starts from commitment and determination to do the job to the best of your abilities. When you hold yourself to the highest standard, you will get the motivation to compete with yourself and raise the bar. This constant quest for perfection can help you produce quality work consistently. Further, when you make yourself accountable for the quality of your work, you will gain the ability to work unsupervised without the necessity to be guided by someone constantly, which is an essential quality in the post-pandemic world.

2. Walk the extra mile

   You can ensure the quality of the work you do as an individual. But when your work contributes only a part to a bigger task or goal that your team/organization has undertaken, you have to take up additional responsibilities, help your colleagues to do their part better and inspire the team to produce quality work together. When you take up additional tasks and do more work than what is assigned to you, you can improve the overall quality of your team's output.

3. Recognize mistakes and take corrective action

   Quality of work is ensured when you constantly put your work under rigorous scrutiny. Analyzing your own work, identifying mistakes and correcting them at the early stage are important to producing quality work. In contrast, if mistakes remain undetected or swept under the carpet, then they will come back to you and massively impact your productivity.

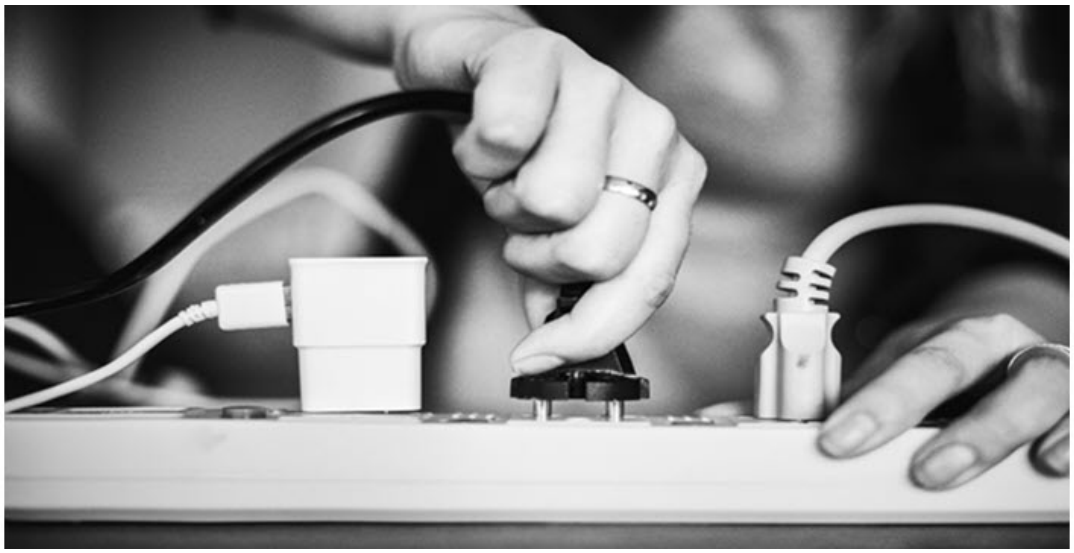
4 Work with your team

   Team work ensures quality. You cannot meet the organizational goals and targets single-handedly; for that, you need your team. Moreover, at times, you may need some expertise outside your skillset to complete a task; you may need a helping hand to complete a complicated task; or you may even be packed with too much workload that you may need to delegate some of your own work to someone else in order to meet the deadline. So, it is extremely important to develop cohesiveness with your team and motivate them to constantly meet your quality standards. This will help you do quality work and increase productivity.

5. Stay focused and follow your schedule

   You can produce quality work when you stay focused on your work, avoiding distractions and digressions. If you lose focus, then there are more chances of making mistakes. So, you have to focus on the work in hand and stick to your plan and schedule. When you delay your work and do not stick to your plan of the day, you may miss your deadlines. This will reduce the amount of time you have to do your work. When you do not have enough time, the quality of work takes a hit. So, it is crucial to plan the day, make a schedule, stay focused and meet all the deadlines, if you strive to do quality work.

State the organizational safety procedures for maintaining electrical safety (ESD), handling tools and hazardous materials.



Every workplace today operates on electricity, so workplace electrical injuries are a real threat in any location. All electrical systems used in offices have the potential to cause serious harm, especially if improperly used or maintained.

Humans are good conductors of electricity. This means if the open electric circuit comes in contact with our body, we'll get a shock. The electric current will pass through our body from one point to another causing great pain, burns, damage to the tissues, nerves and muscles. This could even lead to death.

Types of Workplace Electrical Injuries

There are different ways workers can be hurt by electric equipment, which is why electrical safety must be a top focus in every workplace. The four types of injuries that can occur due to electricity are:

- Electric shock
- Burns
- Falls
- Electrocution

Each type of injury can be guarded against with proper planning in the work environment.

How Injuries Can Happen

Often, injuries related to electricity can be prevented. They happen due to improper maintenance or when someone is not following protocol. Teaching staff the different ways these injuries can impact a person can help impart the seriousness of electrical safety in the workplace. There are various ways people can get hurt:

- Direct contact with exposed electrical circuits or energized conductors.
- Electricity arcs (due to exposed energized conductors or circuit) circulating in the air can pass through a person who is grounded.
- If the skin gets in touch with the heat generated from electric arcs, it burns the internal tissues.
- The light emitted from an electric arc flash (UV and IR) can cause damage to the eyes.
- When the potential pressure is released from an arc flash, there is an arc blast, which can collapse your lungs, cause physical injuries, or create noise that can damage hearing.

Proper employee training plays a crucial role in avoiding electrical injuries at work. Make sure rules for electrical safety in the workplace are presented to every new employee during the onboarding process. Revisit the guidance regularly, and make sure managers consistently enforce the rules. Fortunately, most of the electrical hazards can be easily prevented and controlled with a little caution and regular checks, keeping the office safer for everyone.

Common Electrical Hazards

- To see if an environment could become the site of an electricity-related injury, evaluate the status of electrical equipment in the area. Consider the maintenance status of the building's electrical system and the habits of workers. Most injuries are a result of the following:
- Poorly installed, faulty and/or ill-maintained electrical equipment.
- Faulty wiring.
- Overloaded or overheated outlets.
- Use of flexible leads and extension cables.
- Incorrect use of replacement fuses.
- Use of electrical equipment with wet hands or near the source of water.

Tips to Prevent Workplace Electrical Incidents

Create a full list of electrical safety tips and rules for everyone in your office. This guidance should cover a wide range of potential hazards and risks. Start with these rules, and add specific ones that apply to your workplace:

- Unplug or switch off electrical appliances when not in use or while cleaning, repairing or servicing.
- Ensure that all electrical appliances are turned off at the end of the day.
- Don't forcefully plug into an outlet if it doesn't fit.
- Refrain from running electrical cords across doorways, under the carpets, or in areas that witness regular activities.
- Maintain a clearance of at least 3 feet from all electrical panels.
- Use only equipment that is double-insulated and properly grounded.
- Don't overload the outlets.
- Limit the use of personal appliances such as heaters and fans at desks.
- Ensure that two extension cords are not plugged together.
- Only use electrical equipment that is approved by a national testing laboratory. Buy electrical equipment from trusted electrical liquidators who sell good quality electrical surplus materials.
- Pay attention to the warning signs. Equipment may heat up, spark, smoke or make weird noise; Identify the signs and immediately take it out of service.
- Regularly check for defects in cords and equipment. Report immediately if any.
- Place a cover or guard to exposed electrical components or wires.
- While unplugging, grip the plug and pull. Don't pull the cord from a distance.
- Do not use electrical equipment or appliances with wet hands or near water and wet surfaces.
- Clearly identify potential electrical hazards, such as electrical panels, with appropriate safety signs.

Proper employee training plays a crucial role in avoiding electrical injuries at work. Make sure rules for electrical safety in the workplace are presented to every new employee during the onboarding process. Revisit the guidance regularly, and make sure managers consistently enforce the rules. Fortunately, most of the electrical hazards can be easily prevented and controlled with a little caution and regular checks, keeping the office safer for everyone.

Identify Workplace Electrical Hazards

Proper employee training plays a crucial role in avoiding electrical injuries at work. Electrical safety signs and labels provide key information for employees and visitors to help keep everyone safe and prevent workplace electrical injuries.

Add signage in a variety of places in the office to reinforce the concept of electrical safety. Signs should be posted in work areas where electrical equipment is used, as well as social spaces where people gather. The reminders will help people understand the office takes safety seriously at all times.

Different Types of Waste And Their Disposal Procedure

What is waste Management ?

Waste control or waste disposal is all the behaviours and acts necessary to handle the waste from its inception to its final disposal. This involves, but is not limited to, storage, transport, management and recycling of waste along with control and enforcement. It also covers the legislative and regulatory system for waste control, including recycling guidelines, etc."

Types Of Waste management

- Recycling
- Incineration
- Landfill
- Biological Reprocessing
- Animal Feed

1. **Recycling :**

   Recycling makes a huge difference in protecting the environment. Amongst the various types of waste management, recycling means that garbage is not disposed of in landfills or water sources by making usable litter components. Many entities/communities have made it easier to recycle goods by introducing labelling to show whether or not a material is recyclable.

   The great thing about this waste management system is that it has economic and environmental advantages. It saves the government resources needed for waste projects, provides thousands of jobs, and will make a decent deal of money. Only bring recyclable waste to the closest recycling centre to get money from recycling.

2. **Incineration :**

   This type of waste management includes the disposal of waste materials by means of burning. The thermal treatment is another name for this disposal method. You may incinerate on a commercial or human scale and dispose of a broad variety of waste materials. Most countries with limited land consider the incineration process. You may use the power produced by burning waste materials to produce heat, energy or steam. One of the drawbacks of this disposal process is that it can be a source of air pollution

3. **Landfill :**

   It is one of the most popular types of waste management systems in the world. It includes the collection, transportation, disposal and burying of waste in designated property. Many towns are planning deserted and barren areas to cope with waste.

   Authorities are committed to ensuring that the construction of each landfill is successful in terms of sanitation and economic land use. However, landfill sites are a significant cause of health and environmental problems that concern many communities. For instance, gas from these landfills is often incredibly dangerous.

4. **Biological Reprocessing :**

   Chemical waste materials, such as kitchen waste and paper goods, can be reused after a procedure called biological reprocessing which is another popular system amongst the varied types of waste management. Multiple physiological systems, including recycling and biomass gasification, are used in biological reprocessing. Composing is a normal biological mechanism that is carried out under control conditions. One of the ends of the stock is natural gas, which is used to produce heat and electricity. Biological reprocessing is commonly used for the disposal of industrial waste.

5. Animal feed :

   Food waste is a serious issue and needs serious consideration. According to the United States Department of Agriculture, between 30 and 40 percent of all food created by the United States is spent on food by retailers and customers. This is a major problem as the food value is estimated to be $161 billion. The nation is leading the world in terms of food waste, and the cause is self-explanatory. Food can be preserved by manure and livestock feed and this is also one of the ecological types of waste management methods.

Waste disposal process as per the organizational procedures

Waste Management & Disposal

There are three steps necessary to properly manage waste:

- Identify Waste
- Evaluate Waste
- Manage Waste

1. **Identify Waste :**

   First step of waste management is to identify the waste in which we need identify that whether waste is non-hazardous solid waste, recycle waste or hazardous waste

2. **Evaluate Waste :**

   Second step in waste management is Evaluate Waste . Waste may be evaluate by following manner

   - Recyclable material (e.g., paper, soda cans)
   - Compostable organic waste (e.g. food, animal bedding, biodegradable plastics)
   - Non-hazardous solid waste
   - Hazardous radioactive waste: containing or contaminated with a radioactive isotope
   - Hazardous biological waste: containing or contaminated with an infectious or potentially infectious agent, a biological toxin, animal carcasses, genetically modified organisms, recombinant DNA, etc.
   - Hazardous chemical waste: waste chemicals, products which are chemical in nature (cleaning agents, paint, motor oil, and pharmaceutics), products that contain chemicals (fluorescent lamps, thermometers), or materials contaminated with chemicals (contaminated soil or rags)
   - Otherwise, Regulated Material: asbestos, car batteries, contaminated soil, and construction debris

3. **Manage Waste :**

   Once the waste is evaluated it should be managed according to guidelines of Management

Importance Of Efficient Utilisation Of Water, Electricity And Other Resources

Water use efficiency, the ratio of yield to water used to raise crop also indicates that **India uses 2-3 times more water than China, Brazil and the US to produce one unit of food crop**. This clearly shows that India spends more water for irrigation and that could also be very well reduced as like other countries.

Use these 6 steps to analyse water efficiency and reduce water use in your workplace:

1. get management on side
2. collect information
3. list end uses
4. assess water uses
5. identify and implement water saving ideas
6. review and report.

The following areas are common to small and large enterprises and are the easiest places to start making water and cost savings.

Make your staff water wise

- Talk to staff about your water savings initiatives. Include water savings policies and procedures in staff inductions.
- Encourage staff to contribute to water saving ideas.
- Discuss water efficiency at team meetings and provide regular reports on water use figures.
- Appoint a 'water champion' to check meters and monitor water use.
- Establish a baseline for water use and set achievable targets for saving water.

Taps

- Install water-efficient taps with an aerator or flow restrictor to use less water.
- Install lever or mixer taps, these save water by quickly reaching a desired temperature.
- Fix leaking taps and replace washers - even a slowly dripping tap can waste 10,000 litres of water over a year.
- Avoid washing up under running taps.

Dishwashers

- Install water-efficient dishwashers to use 50% less water than average models.
- Wait until you have a full load before washing.
- Scrape, rather than rinse, dishes prior to washing.

Toilets

- Replace single-flush toilets with dual-flush toilets.
- Regularly check for leaks and fix immediately.
- Install water-efficient urinals with smart controls to reduce unnecessary flushing.

Showers

- Encourage staff and customers to limit showers to 4 minutes or less.
- Install water-efficient shower heads, which can use up to 40% less water.
- Fix leaking showers.

Air conditioning

- If you use evaporative air conditioners, set your thermostat to 24°C.
- Where possible, use fans and natural ventilation.
- Switch off heating and cooling after hours.

Gardens

- Install rainwater tanks.
- Use drought-tolerant plants.
- Use mulch to keep moisture in the soil.
- Water plants early in the morning or in the evening.

Water-efficient products

You can cut water consumption by using white goods with a high water-efficiency rating

Skill India
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Transforming the skill landscape

ESSCI

5. Employability & Entrepreneurship Skills

Unit 5.1 – Personal Strengths & Value Systems

Unit 5.2 – Digital Literacy: A Recap

Unit 5.3 – Money Matters

Unit 5.4 – Preparing for Employment & Self-Employment

Unit 5.5 – Understanding Entrepreneurship

Unit 5.6 – Preparing to be an Entrepreneur

Key Learning Outcomes

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

1. Explain the meaning of health
2. List common health issues
3. Discuss tips to prevent common health issues
4. Explain the meaning of hygiene
5. Discuss the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
7. Discuss ways to set up a safe work environment
8. Discuss critical safety habits to be followed by employees
9. Explain the importance of self-analysis
10. Discuss motivation with the help of Maslow's Hierarchy of Needs
11. Discuss the meaning of achievement motivation
12. List the characteristics of entrepreneurs with achievement motivation
13. List the different factors that motivate you
14. Discuss the role of attitude in self-analysis
15. Discuss how to maintain a positive attitude
16. List your strengths and weaknesses
17. Discuss the qualities of honest people
18. Describe the importance of honesty in entrepreneurs
19. Discuss the elements of a strong work ethic
20. Discuss how to foster a good work ethic
21. List the characteristics of highly creative people
22. List the characteristics of highly innovative people
23. Discuss the benefits of time management
24. List the traits of effective time managers
25. Describe effective time management technique
26. Discuss the importance of anger management
27. Describe anger management strategies
28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management
32. Identify the basic parts of a computer
33. Identify the basic parts of a keyboard
34. Recall basic computer terminology
35. Recall the functions of basic computer keys
36. Discuss the main applications of MS Office
37. Discuss the benefits of Microsoft Outlook
38. Discuss the different types of e-commerce
39. List the benefits of e-commerce for retailers and customers
40. Discuss how the Digital India campaign will help boost e-commerce in India
41. Describe how you will sell a product or service on an e-commerce platform
42. Discuss the importance of saving money

43. Discuss the benefits of saving money
44. Discuss the main types of bank accounts
45. Describe the process of opening a bank account
46. Differentiate between fixed and variable costs
47. Describe the main types of investment options
48. Describe the different types of insurance products
49. Describe the different types of taxes
50. Discuss the uses of online banking
51. Discuss the main types of electronic funds transfers
52. Discuss the steps to prepare for an interview
53. Discuss the steps to create an effective Resume
54. Discuss the most frequently asked interview questions
55. Discuss how to answer the most frequently asked interview questions
56. Discuss basic workplace terminology
57. Discuss the concept of entrepreneurship
58. Discuss the importance of entrepreneurship
59. Describe the characteristics of an entrepreneur
60. Describe the different types of enterprises
61. List the qualities of an effective leader
62. Discuss the benefits of effective leadership
63. List the traits of an effective team
64. Discuss the importance of listening effectively
65. Discuss how to listen effectively
66. Discuss the importance of speaking effectively
67. Discuss how to speak effectively
68. Discuss how to solve problems
69. List important problem solving traits
70. Discuss ways to assess problem solving skills
71. Discuss the importance of negotiation
72. Discuss how to negotiate
73. Discuss how to identify new business opportunities
74. Discuss how to identify business opportunities within your business
75. Explain the meaning of entrepreneur
76. Describe the different types of entrepreneurs
77. List the characteristics of entrepreneurs
78. Recall entrepreneur success stories
79. Discuss the entrepreneurial process
80. Describe the entrepreneurship ecosystem
81. Discuss the purpose of the Make in India campaign
82. Discuss key schemes to promote entrepreneurs
83. Discuss the relationship between entrepreneurship and risk appetite
84. Discuss the relationship between entrepreneurship and resilience
85. Describe the characteristics of a resilient entrepreneur
86. Discuss how to deal with failure

87. Discuss how market research is carried out
88. Describe the 4 Ps of marketing
89. Discuss the importance of idea generation
90. Recall basic business terminology
91. Discuss the need for CRM
92. Discuss the benefits of CRM
93. Discuss the need for networking
94. Discuss the benefits of networking
95. Discuss the importance of setting goals
96. Differentiate between short-term, medium-term and long-term goals
97. Discuss how to write a business plan
98. Explain the financial planning process
99. Discuss ways to manage your risk
100. Describe the procedure and formalities for applying for bank finance
101. Discuss how to manage your own enterprise
102. List important questions that every entrepreneur should ask before starting an enterprise

UNIT 5.1: 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
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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

5.1.1 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

Tips

- Following healthy and hygienic practices every day will make you feel good mentally and physically.
- Hygiene is two-thirds of health – so good hygiene will help you stay strong and healthy

5.1.2: 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

Tips

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

5.1.3 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.

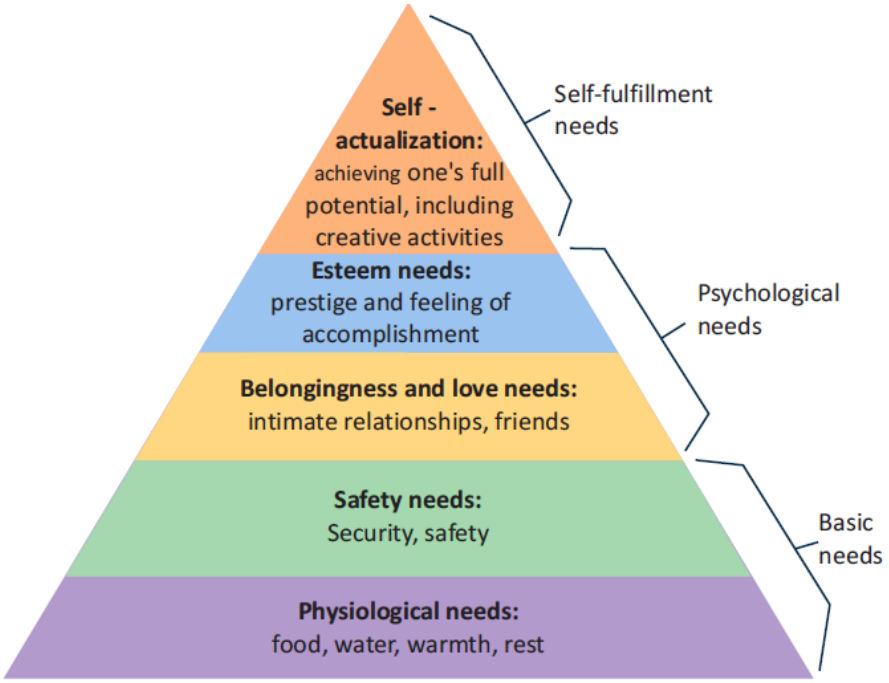

Fig. 5.1.1: Maslow's Hierarchy of Needs

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 motived 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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tendency (positive or negative), to think and feel about someone or something. Attitude is the foundation for success in every aspect of life. Our attitude can be our best friend or our worst enemy. In other words:

"The only disability in life is a bad attitude."

When you start a business, you are sure to encounter a wide variety of emotions, from difficult times and failures to good times and successes. Your attitude is what will see you through the tough times and guide you towards success. Attitude is also infectious. It affects everyone around you, from your customers to your employees to your investors. A positive attitude helps build confidence in the workplace while a negative attitude is likely to result in the demotivation of your people.

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

Tips

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

5.1.4 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 think 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 had 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.

Tips 

- Don't get angry when someone tells you the truth and you don't like what you hear.
- Always be willing to accept responsibility for your mistakes.

5.1.5 Creativity & Innovation: What is Creativity?

Creativity means thinking outside the box. It means viewing things in new ways or from different perspectives, and then converting these ideas into reality. Creativity involves two parts: thinking and producing. Simply having an idea makes you imaginative, not creative. However, having an idea and acting on it makes you creative.

Characteristics of Highly Creative People

Some characteristics of creative people are:

- They are imaginative and playful
- They see issues from different angles
- They notice small details
- They have very little tolerance for boredom
- They detest rules and routine
- They love to daydream
- They are very curious

What is Innovation?

There are many different definitions of innovation. In simple terms, innovation means turning an idea into a solution that adds value. It can also mean adding value by implementing a new product, service or process, or significantly improving on an existing product, service or process.

Characteristics of Highly Innovative People

Some characteristics of highly innovative people are:

- They embrace doing things differently
- They don't believe in taking shortcuts
- They are not afraid to be unconventional
- They are highly proactive and persistent
- They are organized, cautious and risk-averse

Tips

- Take regular breaks from your creative work to recharge yourself and gain fresh perspective.
- Build prototypes frequently, test them out, get feedback, and make the required changes.

5.1.6 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
- Higher efficiency
- Better professional reputation
- Reduced stress
- Higher chances for career advancement
- Greater opportunities to achieve goals

Not managing time effectively can result in undesirable consequences like:

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

Traits of Effective Time Managers

Some traits of effective time managers are:

- They begin projects early
- They break tasks into steps with specific deadlines
- They set daily objectives
- They continually review long term goals
- They modify plans if required, to achieve better results
- They think of alternate solutions if and when required
- They are flexible and open-minded
- They ask for help when required
- They inform people in advance if their help will be required
- They create backup plans
- They know how to say no

Effective Time Management Techniques

You can manage your time better by putting into practice certain time management techniques. Some helpful tips are:

- Plan out your day as well as plan for interruptions. Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- Put up a “Do Not Disturb” sign when you absolutely have to complete a certain amount of work.

- Close your mind to all distractions. Train yourself to ignore ringing phones, don't reply to chat messages and disconnect from social media sites.
- Delegate your work. This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- Stop procrastinating. Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- Prioritize. List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- Maintain a log of your work activities. Analyse the log to help you understand how efficient you are, and how much time is wasted every day.
- Create time management goals to reduce time wastage.

Tips

- Always complete the most important tasks first.
- Get at least 7 – 8 hours of sleep every day.
- Start your day early.
- Don't waste too much time on small, unimportant details.
- Set a time limit for every task that you will undertake.
- Give yourself some time to unwind between tasks.

5.1.7 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
4. 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.

Tips

- 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.

5.1.8 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

- Aches and pain
- Diarrhoea or constipation
- Nausea
- Dizziness
- Chest pain and/or rapid heartbeat
- Frequent cold or flu like feelings

Behavioural Symptoms

- 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.

Tips 

- 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 5.2: 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

5.2.1 Computer and Internet basics: Basic Parts of a Computer

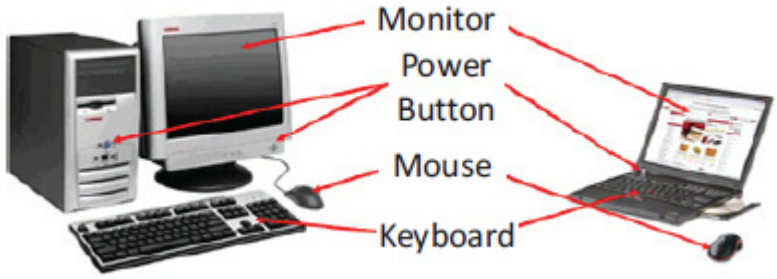

Fig.7.2.1. Parts of a Computer

- **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

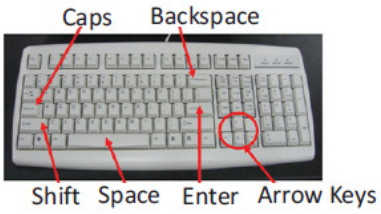

Fig.7.2.2. Parts of a Keyboard

- **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.

Tips

- When visiting a .com address, there no need to type http:// or even www. Just type the name of the website and then press Ctrl + Enter. (Example: Type 'apple' and press Ctrl + Enter to go to www.apple.com)
- Press the Ctrl key and press the + or - to increase and decrease the size of text.
- Press F5 or Ctrl + R to refresh or reload a web page.

5.2.2 MS Office and Email: About MS Office

MS Office or Microsoft Office is a suite of computer programs developed by Microsoft. Although meant for all users, it offers different versions that cater specifically to students, home users and business users. All the programs are compatible with both, Windows and Macintosh.

Most Popular Office Products

Some of the most popular and universally used MS Office applications are:

- **Microsoft Word**: Allows users to type text and add images to a document.
- **Microsoft Excel**: Allows users to enter data into a spreadsheet and create calculations and graphs.
- **Microsoft PowerPoint**: Allows users to add text, pictures and media and create slideshows and presentations.
- **Microsoft Outlook**: Allows users to send and receive email.
- **Microsoft OneNote**: Allows users to make drawings and notes with the feel of a pen on paper.
- **Microsoft Access**: Allows users to store data over many tables.

Why Choose Microsoft Outlook?

A popular email management choice especially in the workplace, Microsoft Outlook also includes an address book, notebook, web browser and calendar. Some major benefits of this program are:

- **Integrated search function**: You can use keywords to search for data across all Outlook programs.
- **Enhanced security**: Your email is safe from hackers, junk mail and phishing website email.
- **Email syncing**: Sync your mail with your calendar, contact list, notes in One Note and…your phone!
- **Offline access to email:** No Internet? No problem! Write emails offline and send them when you're connected again.

Tips

- Press Ctrl+R as a shortcut method to reply to email.
- Set your desktop notifications only for very important emails.
- Flag messages quickly by selecting messages and hitting the Insert key.
- Save frequently sent emails as a template to reuse again and again.
- Conveniently save important emails as files.

5.2.3 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.

Tips

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

UNIT 5.3: 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

5.3.1 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.

Tips

- Break your spending habit. Try not spending on one expensive item per week, and put the money that you would have spent into your savings.
- Decide that you will not buy anything on certain days or weeks and stick to your word.

5.3.2 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!

Tips

- Select the right type of account.
- Fill in complete nomination details.
- Ask about fees.
- Understand the rules.
- Check for online banking – it's convenient!
- Keep an eye on your bank balance.

5.3.3 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

Fig 5.3.1: Differences between fixed and variable costs

Tips

When trying to determine whether a cost is fixed or variable, simply ask the following question: Will the particular cost change if the company stopped its production activities? If the answer is no, then it is a fixed cost. If the answer is yes, then it is probably a variable cost.

5.3.4 Investment, Insurance and Taxes: Investment

Investment means that money is spent today with the aim of reaping financial gains at a future time. The main types of investment options are as follows:

- **Bonds:** Bonds are instruments used by public and private companies to raise large sums of money – too large to be borrowed from a bank. These bonds are then issued in the public market and are bought by lenders.
- **Stocks:** Stocks or equity are shares that are issued by companies and are bought by the general public.
- **Small Savings Schemes:** Small Savings Schemes are tools meant to save money in small amounts. Some popular schemes are the Employees Provident Fund, Sukanya Samriddhi Scheme and National Pension Scheme.
- **Mutual Funds:** Mutual Funds are professionally managed financial instruments that invest money in different securities on behalf of investors.
- **Fixed Deposits:** A fixed amount of money is kept aside with a financial institution for a fixed amount of time in return for interest on the money.
- **Real Estate:** Loans are taken from banks to purchase real estate, which is then leased or sold with the aim of making a profit on the appreciated property price.
- **Hedge Funds:** Hedge funds invest in both financial derivatives and/or publicly traded securities.
- **Private Equity:** Private Equity is trading in the shares of an operating company that is not publicly listed and whose shares are not available on the stock market.

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 categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- **Home Insurance:** This protects the house and its contents from risk.
- **Marine Insurance:** This insurance covers goods, freight and cargo against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes – 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 is on perks that have been acquired by a company or used by an employee.
- **Corporate Tax:** Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

Indirect taxes are levied on goods or services. Some examples of Indirect Taxes are:

- **Sales Tax:** Sales Tax is levied on the sale of a product.
- **Service Tax:** Service Tax is added to services provided in India.
- **Value Added Tax:** Value Added Tax is levied at the discretion of the state government. The tax is levied on goods sold in the state. The tax amount is decided by the state.
- **Customs Duty & Octroi:** Customs Duty is a charge that is applied on purchases that are imported from another country. Octroi is levied on goods that cross state borders within India.
- **Excise Duty:** Excise Duty is levied on all goods manufactured or produced in India

Tips

- Think about how quickly you need your money back and pick an investment option accordingly.
- Ensure that you are buying the right type of insurance policy for yourself.
- Remember, not paying taxes can result in penalties ranging from fines to imprisonment.

5.3.5 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 account number
- Recipient's bank's name
- Recipient's bank's IFSC code

RTGS

RTGS stands for Real Time Gross Settlement. This is a real-time fund transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. Th e 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

Fig 5.3.2 : Differences between NEFT, RTGS & IMPS

Tips

- Never click on any links in any e-mail message to access your online banking website.
- You will never be asked for your credit or debit card details while using online banking.
- Change your online banking password regularly.

UNIT 5.4: 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

5.4.1 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. Ty and find an overview of the company and its industry profile.
   - Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.
   - Note down any questions that you have after your research has been completed.
2. **Think about whether your skills and qualifications match the job requirements.**
   - Carefully read through and analyse the job description.
   - Make a note of the knowledge, skills and abilities required to fulfil the job requirements.
   - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.
3. **Go through the most typical interview questions asked, and prepare your responses.**
   - Remember, in most interviews a mix of resume-based, behavioural and case study questions are asked.
   - Think about the kind of answers you would like to provide to typical questions asked in these three areas.
   - Practice these answers until you can express them confidently and clearly.

4. **Plan your attire for the interview.**
   - It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement)
   - Ensure that your clothes are clean and well-ironed. Pick neutral colours – nothing too bright or flashy.
   - The shoes you wear should match your clothes, and should be clean and suitable for a n 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.

Tips

- Ask insightful and probing questions.
- When communicating, use effective forms of body language like smiling, making eye contact, and actively listening and nodding. Don't slouch, play with nearby items, fidget, chew gum, or mumble.

5.4.2 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 a s long as 8-10 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

Tips

- Keep your resume file name short, simple and informational.
- Make sure the resume is neat and free from typing errors.
- Always create your resume on plain white paper.

5.4.3 Interview FAQs

Take a look at some of the most frequently asked interview questions, and some helpful tips on how to answer them.

Q1. Can you tell me a little about yourself?

Tips to answer:

- Don't provide your full employment or personal history.
- Offer 2-3 specific experiences that you feel are most valuable and relevant.
- Conclude with how those experiences have made you perfect for this specific role.

Q2. How did you hear about the position?

Tips to answer:

- Tell the interviewer how you heard about the job – whether it was through a friend (name the friend), event or article (name them) or a job portal (say which one).
- Explain what excites you about the position and what in particular caught your eye about this role.

Q3. What do you know about the company?

Tips to answer:

- Don't recite the company's About Us page.
- Show that you understand and care about the company's goals.
- Explain why you believe in the company's mission and values.

Q4. Why do you want this job?

Tips to answer:

- Show that you are passionate about the job.
- Identify why the role is a great fit for you.
- Explain why you love the company.

Q5. Why should we hire you?

Tips to answer:

- Prove through your words that you can not only do the work, but can definitely deliver excellent results.
- Explain why you would be a great fit with the team and work culture.
- Explain why you should be chosen over any other candidate.

Q6. What are your greatest professional strengths?

Tips to answer:

- Be honest – share some of your real strengths, rather than give answers that you think sound good.
- Offer examples of specific strengths that are relevant to the position you are applying for.
- Provide examples of how you've demonstrated these strengths.

Q7. What do you consider to be your weaknesses?

Tips to answer:

- The purpose of this question is to gauge your self-awareness and honesty.
- Give an example of a trait that you struggle with, but that you're working on to improve.

Q8. What are your salary requirements?

Tips to answer:

- Do your research beforehand and find out the typical salary range for the job you are applying for.
- Figure out where you lie on the pay scale based on your experience, education, and skills.
- Be flexible. Tell the interviewer that you know your skills are valuable, but that you want the job and are willing to negotiate.

Q9. What do you like to do outside of work?

Tips to answer:

- The purpose of this question is to see if you will fit in with the company culture.
- Be honest – open up and share activities and hobbies that interest and excite you.

Q10. If you were an animal, which one would you want to be?

Tips to answer:

- The purpose of this question is to see if you are able to think on your feet.
- There's no wrong answer – but to make a great impression try to bring out your strengths or personality traits through your answer.

Q11: What do you think we could do better or differently?

Tips to answer:

- The purpose of this question is to see if you have done your research on the company, and to test whether you can think critically and come up with new ideas.
- Suggest new ideas. Show how your interests and expertise would help you execute these ideas.

Q12: Do you have any questions for us?

Tips to answer:

- Do not ask questions to which the answers can be easily found on the company website or through a quick online search.
- Ask intelligent questions that show your ability to think critically.

Tips

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

5.4.4 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 o f 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 5.5: 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

5.5.1 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 a n 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.

Tips

- Learn from others' failures.
- Be certain that this is what you want.
- Search for a problem to solve, rather than look for a problem to attach to your idea.

5.5.2 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.

Tips

- Don't get too attached to your original idea. Allow it to evolve and change.
- Be aware of your weaknesses and build a team that will complement your shortfalls.
- Hiring the right people is not enough. You need to promote or incentivize your most
- Talented people to keep them motivated.
- Earn your team's respect.

5.5.3 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.

Tips

- If you're finding it difficult to focus on what someone is saying, try repeating their words in your head.
- Always maintain eye contact with the person that you are communicating with, when speaking as well as listening. This conveys and also encourages interest in the conversation.

5.5.4 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
- Asking the right questions
- Being proactive
- Not panicking
- Having a positive attitude
- 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 know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate? 

Take a look at some steps to help you negotiate:

Step 1: Pre-Negotiation Preparation	Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.
Step 2: Discuss the problem	This involves asking questions, listening to the other side, puttingyour 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

Tips

- Know exactly what you want before you work towards getting it
- Give more importance to listening and thinking, than speaking
- Focus on building a relationship rather than winning
- Remember that your people skills will affect the outcome
- Know when to walk away – sometimes reaching an agreement may not be possible

5.5.5 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
- Market trends

- Changes in funding
- Changing relationships between vendors, partners and suppliers
- 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:

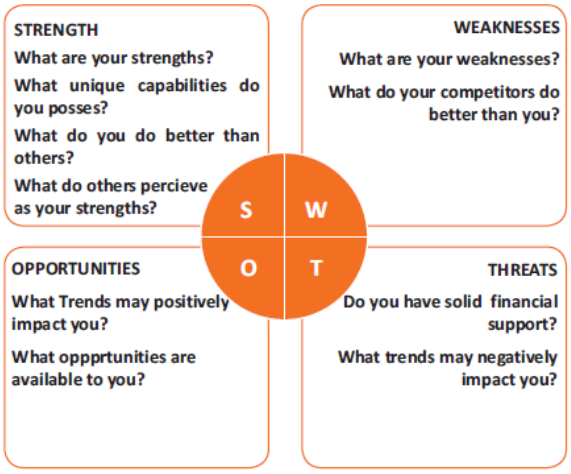

Fig.5.5.1. SWOT Analysis

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.

5.5.6 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 useful.

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

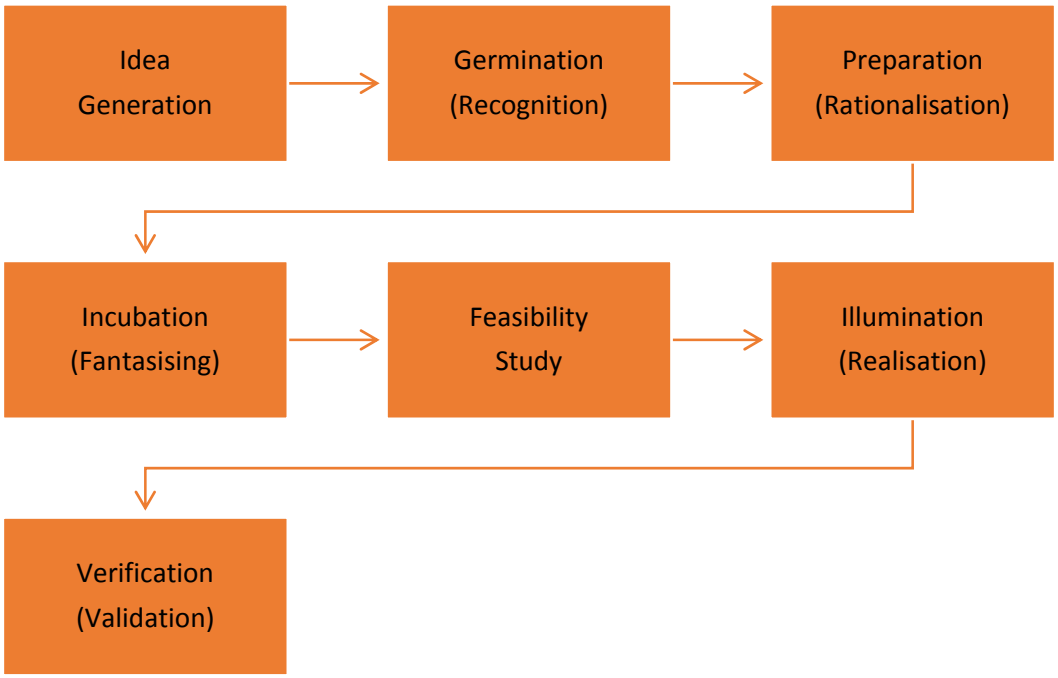

Fig.5.5.2. Entrepreneurship process

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.

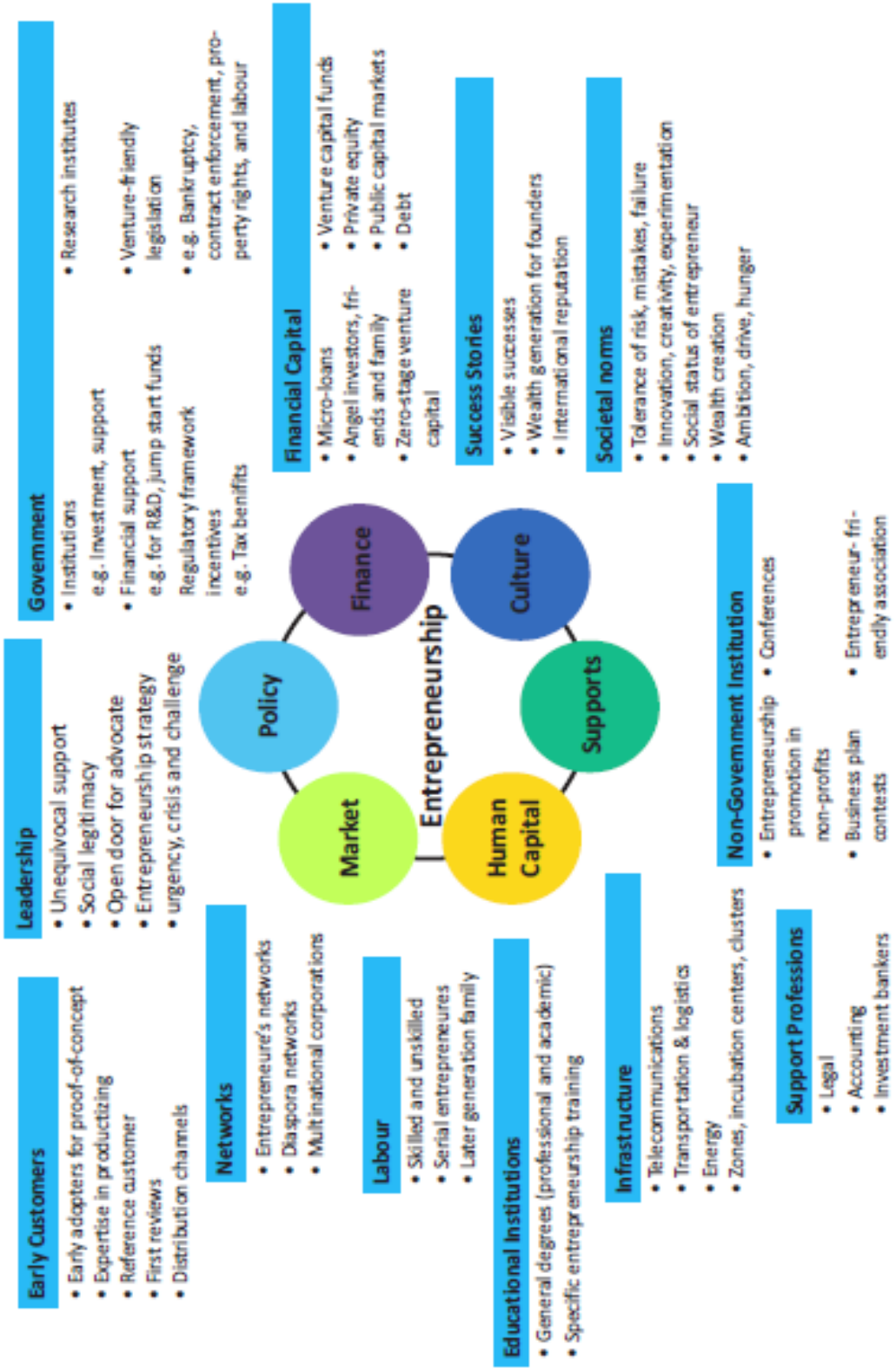

Fig.5.5.3. Entrepreneurship at a Glance

Every entrepreneurship support ecosystem is unique and all the elements of the ecosystem are interdependent. Although every region's entrepreneurship ecosystem can be broadly described by the above features, each ecosystem is the result of the hundred elements interacting in highly complex and particular ways.

Entrepreneurship ecosystems eventually become (largely) self-sustaining. When the six domains are resilient enough, they are mutually beneficial. At this point, government involvement can and should be significantly minimized. Public leaders do not need to invest a lot to sustain the ecosystem. It is imperative that the entrepreneurship ecosystem incentives are formulated to be self-liquidating, hence 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 be 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)
rea (location of project/unit)		rban Rural
eneral Category	0%	15% 5%
pecial (including SC / ST / OBC / Minorities / Women, Ex-servicemen, hysically handicapped, NER, Hill and Border reas, etc.	5%	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:

a. 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.
b. 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.
c. 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 Organisations;
b. Industry/Enterprise Associations; and
c. Registered Societies/Trusts and Organisations 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 agri-preneurs.

Farmers' Agriculture Business Consortium

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

Nature of assistance

Financial assistance with a ceiling of Rs.5 lakh.

Who can apply?

Individuals, farmers, producer groups, partnership/propriety firms, SGHs, agri-preneurs, 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.

Tips

- Research the existing market, network with other entrepreneurs, venture capitalists, angel investors, and thoroughly review the policies in place to enable your entrepreneurship.
- Failure is a stepping stone and not the end of the road. Review yours and your peers' errors and correct them in your future venture.
- Be proactive in your ecosystem. Identify the key features of your ecosystem and enrich them to ensure self-sustainability of your entrepreneurship support ecosystem.

5.5.7 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

Tips

- Cultivate a great network of clients, suppliers, peers, friends and family. This will not only help you promote your business, but will also help you learn, identify new opportunities and stay tuned to changes in the market.
- Don’t dwell on setbacks. Focus on what you need to do next to get moving again.
- While you should try, and curtail expenses, ensure that it is not at the cost of your growth.

5.5.8 Success & Failures: Understanding Successes and Failures in Entrepreneurship

Shyam is a famous entrepreneur, known for his success story. But what most people don’t know, is that Shyam failed numerous times before his enterprise became a success. Read his interview to get an idea of what entrepreneurship is really about, straight from an entrepreneur who has both, failed and succeeded.

Interviewer: Shyam, I have heard that entrepreneurs are great risk-takers who are never afraid of failing. Is this true?

Shyam: Ha ha, no of course it's not true! Most people believe that entrepreneurs need to be fearlessly enthusiastic. But the truth is, fear is a very normal and valid human reaction, especially when you are planning to start your own business! In fact, my biggest fear was the fear of failing. The reality is, entrepreneurs fail as much as they succeed. The trick is to not allow the fear of failing to stop you from going ahead with your plans. Remember, failures are lessons for future success!

Interviewer: What, according to you, is the reason that entrepreneurs fail?

Shyam: Well, there is no one single reason why entrepreneurs fail. An entrepreneur can fail due to numerous reasons. You could fail because you have allowed your fear of failure to defeat you. You could fail because you are unwilling to delegate (distribute) work. As the saying goes, "You can do anything, but not everything!" You could fail because you gave up too easily – maybe you were not persistent enough. You could fail because you were focusing your energy on small, insignificant tasks and ignoring the tasks that were most important. Other reasons for failing are partnering with the wrong people, not being able to sell your product to the right customers at the right time at the right price… and many more reasons!

Interviewer: As an entrepreneur, how do you feel failure should be looked at?

Shyam: I believe we should all look at failure as an asset, rather than as something negative. The way I see it, if you have an idea, you should try to make it work, even if there is a chance that you will fail. That's because not trying is failure right there, anyway! And failure is not the worst thing that can happen. I think having regrets because of not trying, and wondering 'what if' is far worse than trying and actually failing.

Interviewer: How did you feel when you failed for the first time?

Shyam: I was completely heartbroken! It was a very painful experience. But the good news is, you do recover from the failure. And with every subsequent failure, the recovery process gets a lot easier. That's because you start to see each failure more as a lesson that will eventually help you succeed, rather than as an obstacle that you cannot overcome. You will start to realize that failure has many benefits.

Interviewer: Can you tell us about some of the benefits of failing?

Shyam: One of the benefits that I have experienced personally from failing is that the failure made me see things in a new light. It gave me answers that I didn't have before. Failure can make you a lot stronger. It also helps keep your ego in control.

Interviewer: What advice would you give entrepreneurs who are about to start their own enterprises?

Shyam: I would tell them to do their research and ensure that their product is something that is actually wanted by customers. I'd tell them to pick their partners and employees very wisely and cautiously. I'd tell them that it's very important to be aggressive – push and market your product as aggressively as possible. I would warn them that starting an enterprise is very expensive and that they should be prepared for a situation where they run out of money. I would tell them to create long term goals and put a plan in action to achieve that goal. I would tell them to build a product that is truly unique. Be very careful and ensure that you are not copying another start-up. Lastly, I'd tell them that it's very important that they find the right investors.

Interviewer: That's some really helpful advice, Shyam! I'm sure this will help all entrepreneurs to be more prepared before they begin their journey! Thank you for all your insight!

Tips

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

UNIT 5.6: 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

5.6.1 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?
- What needs does it satisfy?
- Are there any more features that can be added?
- Does it have any expensive and unnecessary features?
- How will customers use it?
- What should it be called?
- How is it different from similar products?
- How much will it cost to produce?

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?
- Do local products/services have established price points?
- Is the customer price sensitive?
- Should discounts be offered?
- How is your price compared to that of your competitors?

Promotion

Once you are certain about your Product and your Price, the next step is to look at ways to promote it. Some key elements of promotion are advertising, public relations, social media marketing, email marketing, search engine marketing, video marketing and more.
Some questions to ask yourself are:

- Where should you promote your product or service?
- When would be the best time to promote your product?
- What is the best medium to use to reach your target audience
- 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?
- Where are your competitors offering their products or services?
- What should you do to access the most appropriate distribution channels?
- Should you follow in your competitors' footsteps?
- Will you require a sales force?
- 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.

Tips

- Keep in mind that good ideas do not always have to be unique.
- Remember that timing plays a huge role in determining the success of your idea.
- Situations and circumstances will always change, so be flexible and adapt your idea accordingly.

5.6.2 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: Assets = Liability + Owner's Equity

2. **Net Income**: This is the profit of the company.

Formula: Net Income = Revenues – 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: Break-Even = Fixed Costs/Sales Price – Variable Cost per Unit

4. **Cash Ratio**: This tells us about the liquidity of a company.

Formula: Cash Ratio = Cash/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: Profit Margin = Net Income/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: Debt-to-Equity Ratio = Total Liabilities/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: Cost of Goods Sold = Cost of Materials/Inventory – 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: ROI = Net Profit/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

5.6.3 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
- Increased business opportunities
- Good source of relevant connections
- Advice from like-minded entrepreneurs
- Gaining visibility and raising your profile
- Meeting positive and enthusiastic people
- Increased self-confidence
- Satisfaction from helping others
- Building strong and lasting friendships

Tips

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

5.6.4 Business Plan: Why Set Goals?

Setting goals is important because it gives you long-term vision and short-term motivation. Goals can be short term, medium term and long term.

Short-Term Goals

- These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

- These goals are built on your short-term goals.
- They do not need to be as specific as your short-term goals.

Example: Arranging for a service contract to ensure that your machines don't fail again.

Long-Term Goals

These goals require time and planning.
They usually take a year or more to achieve.

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan?

A business plan is a tool for understanding how your business is put together. It can be used to monitor progress, foster accountable and control the fate of the business. It usually offers a 3-5year projection and outlines the plan that the company intends to follow to grow its revenues. A business plan is also a very important tool for getting the interest of key employees or future investors.
A business plan typically comprises of eight elements.

Executive Summary

The executive summary follows the title page. The summary should clearly state your desires as the business owner in a short and business like way. It is an overview of your business and your plans. Ideally this should not be more than 1-2 pages.
Your Executive Summary should include:

- The Mission Statement: Explain what your business is all about.

Example: Nike's Mission Statement

Nike's mission statement is "To bring inspiration and innovation to every athlete in the world."

- Company Information: Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.
- Growth Highlights: Mention examples of company growth. Use graphs and charts where possible.

- Your Products/Services: Describe the products or services provided.
- Financial Information: Provide details on current bank and investors.
- Summarize future plans: Describe where you see your business in the future.

Business Description

The second section of your business plan needs to provide a detailed review of the different elements of your business. This will help potential investors to correctly understand your business goal and the uniqueness of your offering.

Your Business Description should include:

- A description of the nature of your business
- The market needs that you are aiming to satisfy
- The ways in which your products and services meet these needs
- The specific consumers and organizations that you intend to serve
- Your specific competitive advantages

Market Analysis

The market analysis section usually follows the business description. The aim of this section is to showcase your industry and market knowledge. This is also the section where you should lay down your research findings and conclusions.

Your Market Analysis should include:

- Your industry description and outlook
- Information on your target market
- The needs and demographics of your target audience
- The size of your target market
- The amount of market share you want to capture
- Your pricing structure
- Your competitive analysis
- Any regulatory requirements

Organization & Management

This section should come immediately after the Market Analysis.

Your Organization & Management section should include:

- Your company's organizational structure
- Details of your company's ownership
- Details of your management team
- Qualifications of your board of directors
- Detailed descriptions of each division/department and its function
- The salary and benefits package that you offer your people

Service or Product Line

The next section is the service or product line section. This is where you describe your service or product, and stress on their benefits to potential and current customers. Explain in detail why your product of choice will fulfil the needs of your target audience.

Your Service or Product Line section should include:

- A description of your product/service
- A description of your product or service's life cycle
- A list of any copyright or patent filings
- A description of any R&D activities that you are involved in or planning

Marketing & Sales

Once the Service or Product Line section of your plan has been completed, you should start on the description of the marketing and sales management strategy for your business.

Your Marketing section should include the following strategies:

- **Market penetration strategy:** This strategy focuses on selling your existing products or services in existing markets, in order to increase your market share.
- **Growth strategy:** This strategy focuses on increasing the amount of market share, even if it reduces earnings in the short-term.
- **Channels of distribution strategy:** These can be wholesalers, retailers, distributers and even the internet.
- **Communication strategy:** These can be written strategies (e-mail, text, chat), oral strategies (phone calls, video chats, face-to-face conversations), non-verbal strategies (body language, facial expressions, tone of voice) and visual strategies (signs, webpages, illustrations).

Your Sales section should include the following information:

- **A salesforce strategy:** This strategy focuses on increasing the revenue of the enterprise.
- **A breakdown of your sales activities:** This means detailing out how you intend to sell your products or services – will you sell it offline or online, how many units do you intend to sell, what price do you plan to sell each unit at, etc.

Funding Request

This section is specifically for those who require funding for their venture.

The Funding Request section should include the following information:

- How much funding you currently require.
- How much funding you will require over the next five years. This will depend on your long-term goals.
- The type of funding you want and how you plan to use it. Do you want funding that can be used only for a specific purpose, or funding that can be used for any kind of requirement?
- Strategic plans for the future. This will involve detailing out your long-term plans – what these plans are and how much money you will require to put these plans in motions.
- Historical and prospective financial information. This can be done by creating and maintaining all your financial records, right from the moment your enterprise started, to the present day. Documents required for this are your balance sheet which contains details of your company's assets and liabilities, your income statement which lists your company's revenues, expenses and net income for the year, your tax returns (usually for the last three years) and your cash flow budget which lists the cash that came in, the cash that went out and states whether you had a cash deficit (negative balance) or surplus (positive balance) at the end of each month.

Financial Planning

Before you begin building your enterprise, you need to plan your finances. Take a look at the steps for financial planning:

Step 1: Create a financial plan. This should include your goals, strategies and timelines for accomplishing these goals.

Step 2: Organize all your important financial documents. Maintain a file to hold your investment details, bank statements, tax papers, credit card bills, insurance papers and any other financial records.

Step 3: Calculate your net worth. This means figure out what you own (assets like your house, bank accounts, investments etc.), and then subtract what you owe (liabilities like loans, pending credit card amounts etc.) the amount you are left with is your net worth.

Step 4: Make a spending plan. This means write down in detail where your money will come from, and where it will go.

Step 5: Build an emergency fund. A good emergency fund contains enough money to cover at least 6 months' worth of expenses.

Step 6: Set up your insurance. Insurance provides long term financial security and protects you against risk.

Risk Management

As an entrepreneur, it is critical that you evaluate the risks involved with the type of enterprise that you want to start, before you begin setting up your company. Once you have identified potential risks, you can take steps to reduce them. Some ways to manage risks are:

- Research similar business and find out about their risks and how they were minimized.
- Evaluate current market trends and find out if similar products or services that launched a while ago are still being well received by the public.
- Think about whether you really have the required expertise to launch your product or service.
- Examine your finances and see if you have enough income to start your enterprise.
- Be aware of the current state of the economy, consider how the economy may change over time, and think about how your enterprise will be affected by any of those changes.
- Create a detailed business plan.

Tips

- Ensure all the important elements are covered in your plan.
- Scrutinize the numbers thoroughly.
- Be conservative in your approach and your projections.
- Use visuals like charts, graphs and images wherever possible.

5.6.5 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.

Tips 

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

5.6.6 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!

Tips

- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

5.6.7 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?

Tips

- It is very important to validate your business ideas before you invest significant time, money and resources into it.
- The more questions you ask yourself, the more prepared you will be to handle to highs and lows of starting an enterprise.

Footnotes:

1. A mentor is a trusted and experienced person who is willing to coach and guide you.
2. A customer is someone who buys goods and/or services.
3. A competitor is a person or company that sells products and/or services similar to your products and/or services.
4. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. To conduct a SWOT analysis of your company, you need to list down all the strengths and weaknesses of your company, the opportunities that are present for your company and the threats faced by your company.
5. A minimum viable product is a product that has the fewest possible features, that can be sold to customers, for the purpose of getting feedback from customers on the product.
6. A company is said to break even when the profits of the company are equal to the costs.
7. The legal structure could be a sole proprietorship, partnership or limited liability partnership.
8. There are two types of taxes – direct taxes payable by a person or a company, or indirect taxes charged on goods and/or services.
9. There are two types of insurance – life insurance and general insurance. Life insurance overs human.

- Life while general insurance covers assets like animals, goods, cars etc

Notes