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Participant Handbook

Sector
Electronics

Sub - Sector
Consumer Electronics &IT Hardware

Occupation
After sales service

Reference ID : **ELE/Q3101, Version 2.0**
NSQF Level 3

TV Repair 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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COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

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for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/Qualification Pack: **TV Repair Technician QP No. 'ELE/Q3101, Version 1.0 NSQF Level 4'**

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Acknowledgement

1. Standard books on Electricity, Electronics and Television Technology
2. Own experience and learning in the Television Industry
3. Own Skills
4. Websites

About this Guide

Skill India is a mission to skill the youth of India so that they are suitably employed and help to carry our great nation forward. This book aims to upgrade skills of Television technicians and engineers, supervisors and managers working in organized or unorganized sectors in After Sales service, production or quality control and can be used as a hand book.

This book has been especially written as per QP ELE/Q3101 and as per NOS prepared by ESSCI and NSDC under Ministry of Skill Development and Enterpreneurship.

Having worked in the Consumer Electronics field since long, I am aware of the difficulties faced by such technicians. So, Basic Electronics has been explained in a simple and easy to understand language.

This book has been divided into chapters. We take up the concepts of Physics, Basics of Electricity, Semi Conductors. We then take the student through signal transmission and reception.

After going through these chapters, one can easily understand working principles of TV and LCD / LED TVs, their installation and demonstration and finally their trouble shooting.

As per QP, we have also included chapters on Soft Skills and Communication Skills as in today's competitive environment, soft skills play a major role in After Sales Service.

As per QP, more emphasis in this book is on practical learning and doing along with the theory. We strongly warn that no attempt should be made by any one to try repair of any CRT or LCD / LED TV or any electronic gadget only by reading this book. This is only a guide book and the student should try repair only after doing a certified course from any authorized Training Partner with NSDC or any other certified Training Agency and under the watchful supervision of a certified Trainer

Author

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1. Introduction

Unit 1.1 – Introduction to the course

Unit 1.2 – What you will learn

Key Learning Outcomes

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

1. Explain scope of the course
2. Explain expected outcome from the course

UNIT 1.1: Introduction to the Course

Unit Objectives

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

1. Explain scope of the course

This Participant handbook is designed as a stand-alone reference manual for technicians working in the Television industry. It begins with basics of electrical and electronics theory and ends up in giving a overview and repairing techniques of CRT and Flat panel based Television system with the safety guidelines. As the industry is increasingly finding that Soft Skills and Communication skills are also very important along with hard skills, these have also been covered in this book. Tips on how to troubleshoot common problems are also provided. These lessons are primarily text-based with some illustrations.This handbook may be used either on its own or as an integral part of a classroom course including practical work to enable the student to progress to assessment and certification. We hope you and your career benefit greatly from this handbook and associated training course.

UNIT 1.2: What you will learn

Unit Objectives

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

1. Explain what should be expected for the course

You will learn after going through this course

1. Basic Electronics-Working of resistance, inductance, capacitance, diode, transistors, FET and MOSFET
2. Understand theory behind Television working.
3. Installation of Television at appropriate location
4. Servicing or Faultfinding and repair of CRT and Flat panel Television system
5. Understanding the safety requirements before installing
6. Interact with Customer in a friendly way-Soft and communication Skills
7. Interacting with superiors and understanding the company policies- Soft Skills and Communication Skills
8. Documentations and its importance

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2. Basics of Electrical and Electronics Theory

Key Learning Outcomes

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

1. Explain fundamentals of electricity
2. Explain series and parallel circuit
3. Calculate resistance, voltage and current in series and parallel circuit
4. Describe Ohm's and Kirchoff's law and understand its application
5. Explain various types of active components and its application
6. Explain various types of passive components and its application
7. Identify and Operate various tools and equipments

UNIT 2.1: Fundamentals of Electricity

Unit Objectives

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

1. Describe electricity
2. Explain how electricity works

What is electricity:
Electricity is the flow of moving electrons. When the electrons flow it is called anelectrical current. To understand why electrons flow you need to understand that atoms can lose electrons by rubbing against another material.

How does the electricity work:
A current of electricity is a steady flow of electrons. When electrons move from one place to another, round a circuit, they carry electrical energy from place to place like marching ants carrying leaves. Instead of carrying leaves, electrons carry a tiny amount of electric charge

How many electrons will flow in 1 amp?
Current flows from negatively charged material to positively charged material and is essentially the number of electrons per second that are carried through a conductor. Current is measured in units of amps. 1 amp = 1 coloumb/sec = 6.2 x 1018 electrons per second

UNIT 2.2: Current Voltage and Power

Unit Objectives

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

1. Explain what is current, voltage and power
2. Explain series and parallel circuit

2.2.1: Current, Voltage and Power:

- Electricity is the flow of electric charge. We can describe the flow of electric charge in several ways. These include the quantities Current,Voltage and Power.

- Current (I) is the rate of flow of Charge, such as electrons. Current is usually thought of as moving in the direction of positive charge, so from the positive power supply to the negative. However, since in metals it is electrons that carry electric charge, the actual flow is opposite to the way in which we think of it.
  I=dq/dt

- Current: It is the amount of Charge, Q that passes a point in a set time, t. So, we say it is the rate of flow of charge. Current is measured in Amps (A), and charge is measured in Coulombs (C).

- Voltage (V) or Potential Difference (P.D.) is a measure of the Energytransferred per Charge Carrier between two points.
  V=E/Q

- Voltage is the Energy E per Charge Q. Voltage is measured in Volts (V), which is defined as one Joule per Coulomb. Voltage can be defined in base units as Kgm2s-3A-1.

- Power (P) is the rate of Energy transfer. It is measured in watts (W), where one watt is defined as one Joule per Second. Hence watts can be expressed in base units as Kgm2s-3
  - Power P=Energy/Time
  - 1W=1 Joule/Second

- From this definition of Power, we can substitute the algebraic definitionsabove to produce a variety of other formulae, including 'Power = Current × Voltage'
  P=I*V

- Ohm's Law states that " Current flowing in a conductor is directly proportional to the voltage applied across the conductor subject to following conditions

1. Temperature remains constant
2. This equation applies to both Alternating and direct Currents
3. It does not apply to certain semiconductors like Tunnel diode which works on Negative Resistance.

- It is written as : Vα I
- When we remove the proportional sign, we get,
- V=I*R
- Voltage = Current × Resistance'. R is a constant.
- Here V is in Volts
- I is in Amperes
- R is in Ohms

Power: Its equation is :
P=V*I

- We can also write above equation as
- P=I*R*I
- Or P =I*I*R=I^2R
- We use this equation to find out power losses like :Heat losses in a circuit. We can also write this equationas

P=(V^2/R^2)*R=V^2/R
Example 1:
Find Resistance when V=220 Volts, I=2 Amperes
Solution 1: R=V/I
=220/2=110 Ohms
Example 2: Find Heat Loss in a light bulb where V=220V, I= 0.25 Amperes
Solution: Heat Loss=V*I=220*0.25=220*(¼)=55W

UNIT 2.3: Circuits in Series and Parellal

Unit Objectives

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

1. Calculate resistance and voltage in series and parallel circuit

2.3.1: Resistance in Series:

Resistance in Series:

R=R1+R2+R3+--------Where R1, R2, R3 are connected in Series

Example: R1 is 10 Ohms, R2 is 100 Ohms and R3 is 1000 Ohms

R=10+100+1000=1110 Ohms or 1.11K

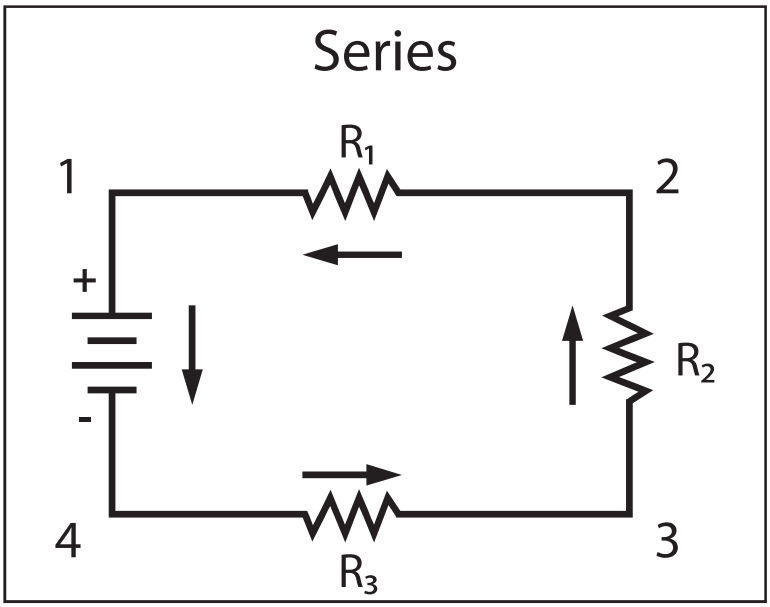


Fig: 2.3.1.1 Resistance in Series

Resistance in Parallel:

1/R=1/R1+1/R2+1/R3+--------

Example:

R1 is 100 Ohms and R2 is also 100 Ohms

I/R=1/100+1/100=2/100=1/50

So R=50 Ohms

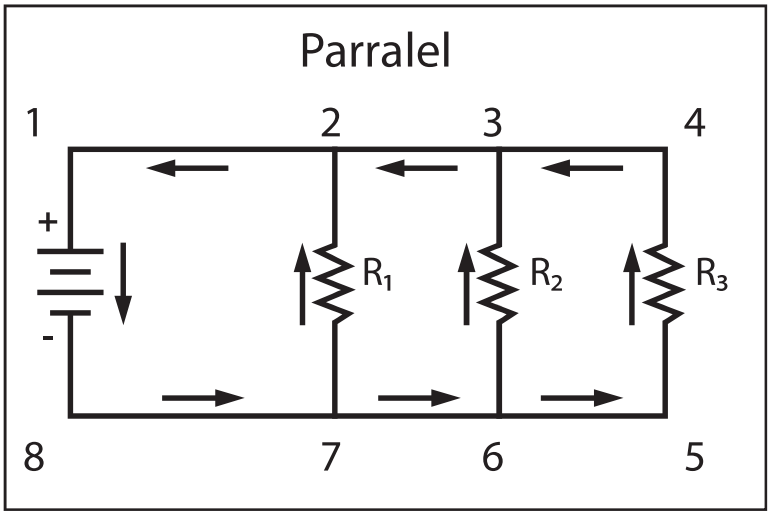


Fig: 2.3.1.2 Resistance in Parallel

Voltage in Series:

- The total voltage of several voltage sources or voltage drops in series is their sum.
- VT = V1 + V2 + V3 +...
- VT - the equivalent voltage source or voltage drop in volts (V).
- V1 - voltage source or voltage drop in volts (V).
- V2 - voltage source or voltage drop in volts (V).
- V3 - voltage source or voltage drop in volts (V).

Voltage in Parallel:

- Voltage sources or voltage drops in parallel have equal voltage.
- VT = V1 = V2 = V3 =...
- VT - the equivalent voltage source or voltage drop in volts (V).
- V1 - voltage source or voltage drop in volts (V).
- V2 - voltage source or voltage drop in volts (V).
- V3 - voltage source or voltage drop in volts (V).

- For electrical circuit with resistors (or other impedance) in series, the voltage drop Vi on resistor Ri is:

- Vi=Vt.Ri / (Ri+Rj+Rk), where Ri, Rj and Rk are three resistances in series in a circuit and Vt is the Total Voltage in the circuit.

Example:

- If Vt=12 V
- Ri=2 Ohm
- Rj=4Ohm
- Rk=6 Ohm
- Then Vi=(12*2)/ 12=2 Volts
- Vj=(12*4)/ 12=4 Volts
- Vk=12*6/12=6 Volts

UNIT 2.4: Ohms' Law and Kirchoff's Law

Unit Objectives

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

1. Explain Ohms law and its application in calculating Voltage, Resistance and Current
2. Explain Kirchoff's current law (KCL)
3. Explain Kirchoff's voltage law (KVL)

2.4.1: Ohm's Law:

GS Ohm discovered a law which tells us the relation between Voltage and current in a conductor. It applies equally to AC and DC subject to certain limitations.

It states that if there is a conductor with a potential difference of V Volts between its two terminals and a current I Amperes flows in the conductor, then the current is directly proportional to the potential difference and is shown as :

VαI , subject to the condition that temperature remains constant .
Thus V=I*R
Where R is a constant and is called Resistance and is depicted by ''R''. Its SI unit is Ohm while current I is in Ampere and potential difference V is in Volts.
resistance increases with increase in temperature such that Rt=R0(1+αt).

Example:
If Voltage=220 Volts and Current is 2 Amperes, Resistance R is R=V/I

R=220/2=110 Ohms

The other limitation to this law is that this law does not apply to certain semi conductors which show negative resistance charcterstics

2.4.2: Direct and Alternating Currents:

Current is also defined as Rate of flow of charge. It can be shown as I=Q/T

Or di=dq/dt

If the current flows in one direction only, it is called Direct Current. We get it from DC Generators, cells, batteries or we rectify AC to get DC and use in Electronic Circuits.

2.4.3: Alterating Current:

It is so called because in it flow of electrons changes directions.

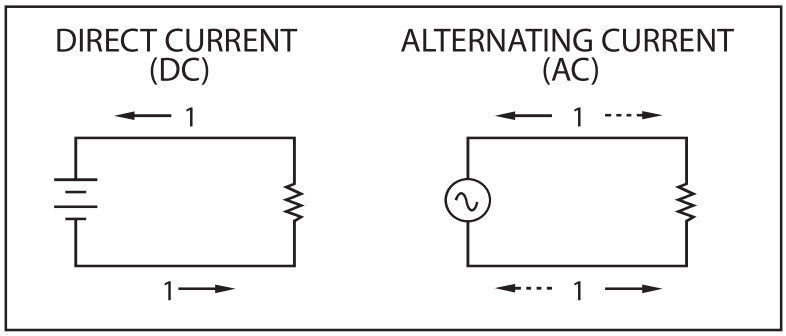


Fig: 2.4.3.1 Alterating Current

Kirchoffs Laws:

Current Law (KCL)

The total current entering a junction will be equal to the total current leaving the junction. So, the algebraic sum of all currents entering and leaving a node must be equal to zero, I outgoing +I incoming=0.

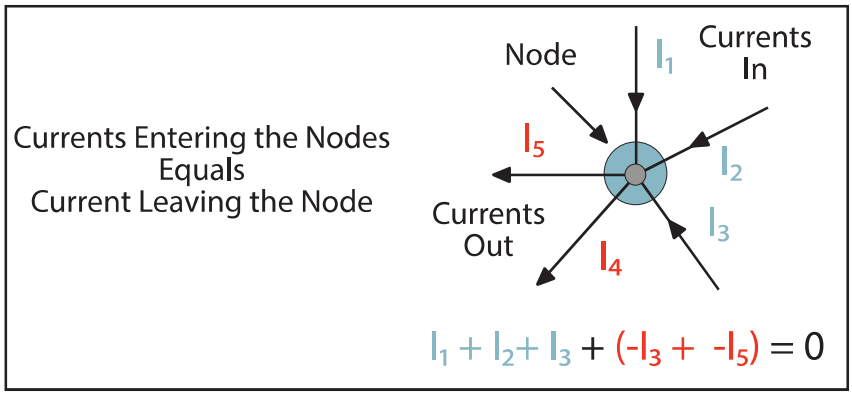


Fig: 2.4.3.2 Current Law (KCL)

It can be read as :

Total current entering a junction=Total current leaving a junction

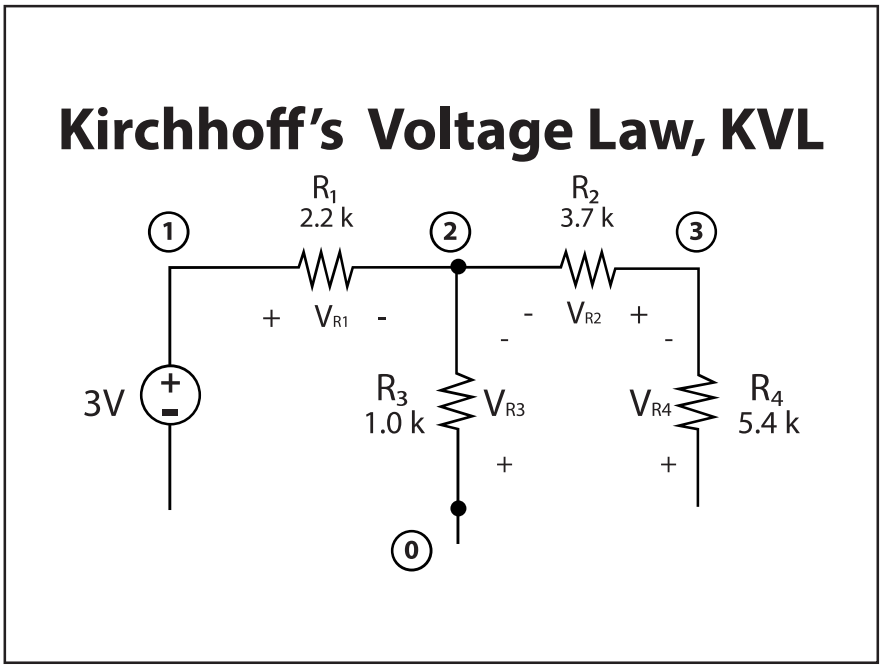


Fig: 2.4.3.3 Kirchhoff's voltage law, kvl

UNIT 2.5: Passive and Active Devices

Unit Objectives

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

1. Explain concept of Active components
2. Explain concept of passive components

2.5.1: Passsive Devices:

Passive devices are those devices or components which do not require external source for their operation.

Example:

For example, a Diode needs 0.3 0r 0.7 V to operate but resistances do not require any such voltage for operation. I.e., when we connect a resistor to the supply voltage, it starts work without any specific voltage. So, these are components which store or maintain energy in the form of Voltage or Current.

Active Components:

These devices or components require external source for their operation and these are called Active Components.

For Example: Diode, Transistors, SCR, IC, FET, MOSFET etc.

Example: As we know that Diode is an Active Component, so it requires an External Voltage for its operation.

The reason is that If we connect a Diode in a Circuit and then connect this circuit to the Supply voltage., then Diode will conduct the current only if the supply voltageis 0.3 V (In case of Germanium) or 0.7V(In case of Silicon). So, Active Components are :

Those devices or components which produce energy in the form of Voltage or Current are called as Active Components.

UNIT 2.6: Passive Devices-Resistor, Capacitor, Inductor

Unit Objectives

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

1. Explain concept of resister, capacitor and inductors
2. Calculate resistance of resister based on colour coding
3. Calculate inductance in series and parallel circuit
4. Calculate capacitance in series and parallel circuit
5. Explain various types of capacitor and its application

2.6.1: Resistor or Resistance:

Resistor or Resistance:

The resistance may be available from 1 Ohm or even less to several Meg Ohms. It is therefore important to have a code so that by seeing the code a technician may be able to find the value of the resistor. We have here given a Table for these codes:

Resistance Codes:

Colour First Letter	Colour	Code
B	Black	0
B	Brown	1
R	Red	2
O	Orange	3
Y	Yellow	4
G	Green	5
B	Blue	6
V	Violet	7
G	Grey	8
W	White	9

Tab: 2.6.1 Resistance Codes

The method to memorise the code is '' BB ROY of Great Britain had a Very Good Wife.'' If there are 5 bands on the resistor, its value can be found as follows:

Ist colour band from left: Value to be taken from the above table.

2nd colour band from left :Value to be taken from above table.

3rd colour band from left :Value to be taken from the above table.

4th colour band from left: is the Multiplier (10 to the power)

5th colour band : It is for Tolerance as under:

Silver 5%

Gold 10%

No colour or body colour 20%

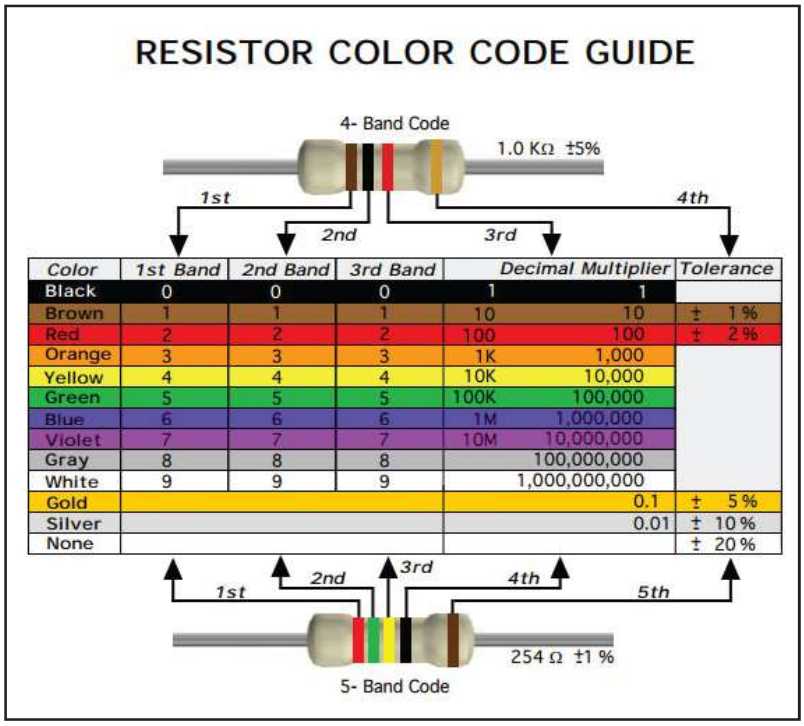


Fig: 2.6.1.1 Resistor Colour Code

Examples:

Example #1

A resistor colored Yellow-Violet-Orange-Gold would be 47 kΩ with a tolerance of +/- 5%.

Example #2

A resistor colored Green-Red-Gold-Silver would be 5.2 Ω with a tolerance of +/- 10%.

Example #3

A resistor colored White-Violet-Black would be 97 Ω with a tolerance of +/- 20%. When you see only three color bands on a resistor, you know that it is actually a 4-band code with a blank (20%) tolerance band.

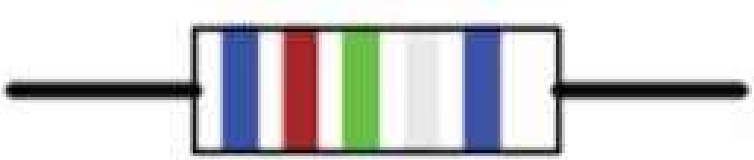
Example #4

A resistor colored Orange-Orange-Black-Brown-Violet would be 3.3 kΩ with a tolerance of +/- 0.1%.

Example #5

A resistor colored Brown-Green-Grey-Silver-Red would be 1.58 Ω with a tolerance of +/- 2%.

Example #6



A resistor colored Blue-Brown-Green-Silver-Blue would be 6.15 Ω with a tolerance of +/- 0.25%.

Thus, knowledge of colour code helps us in finding the value of the resistance and it is very useful in TV repair.

Domestic Wiring:

In a series circuit, if one component is open, the circuit breaks and there is no current flow. It is because in Series, same current flows while in Parallel, there are branches and so current is divided while Voltage remains same.

This principle is used in Domestic wiring. The wiring is done in Series so that if one appliance becomes defective (open circuit) because of any reason, the current in other house hold appliances is not interrupted.

Inductance:

Inductance is the characteristic of a device which resists change in the current through the device. Inductors work on the principle that when a current flows in a coil of wire, a magnetic field is produced, which collapses when the current is stopped. The collapsing magnetic field produces an electromotive force which tries to maintain the current. When the coil current is switched, the induced EMF would be produced in such a direction, so as to oppose the build-up of the current.

The unit of inductance is Henry. An inductance of one Henry will induce a counter emf (electromotive force) of one volt when the current through it is changing at the rate of one ampere per second. Inductances of several Henries are used in power supplies as smoothing chokes, whereas smaller values (in the milli-or micro- Henry ranges) are used in audio and radio frequency circuits.

It is a coil. The symbol is L and unit is Henry. But as this unit is very large for practical purposes, we use Milli and Micro Henry.

Coil in Series: If L1 and L2 are connected in series the equivalent inductance L is given as:

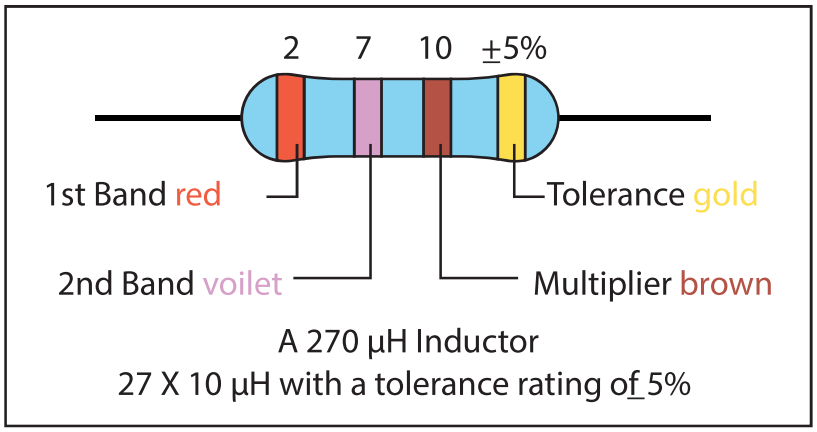


Fig: 2.6.1.2 Colour Coding

L=L1+L2

Coil in Parallel: If L1 and L2 are in parallel, L is given as

1/L=I/L1+1/L2

Fig: 2.6.1.3 Inductor Package

Capacitance:

A capacitor, like a resistor, is also a passive component, which can be used to store electrical charge. Capacitors find applications in electrical and electronics fields as:

- Ripple filters in power supplies;
- Tuning resonant circuits, oscillator circuits;
- Timing elements in multi-vibrators, delay circuits;
- Coupling in amplifiers;
- De-coupling in power supplies and amplifiers; and
- Spark suppression on contacts on thermostats and relays.

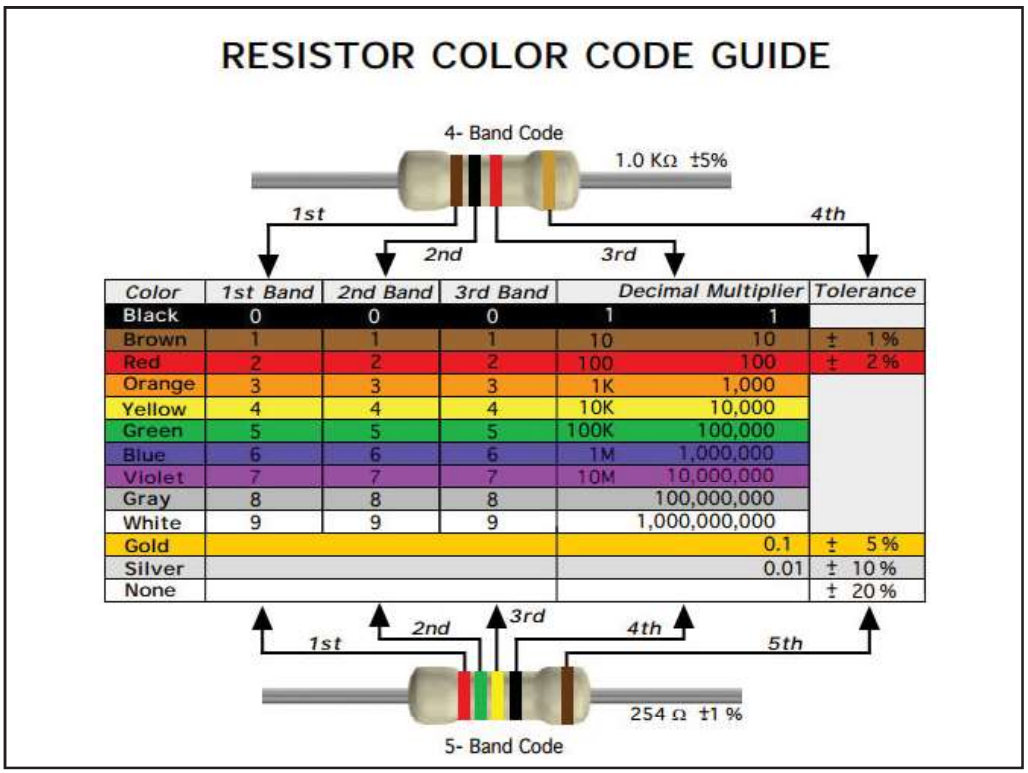


Fig: 2.6.1.4 Capacitor color code

A capacitor (also called a 'condenser') consists of two facing conductive plates called electrodes, which are separated by a dielectric or insulator. The dielectric can be made of paper, mica, ceramic, plastic film or foil. To make a practical capacitor, a lead is connected to each plate or electrode. The charge Q which can be stored in a capacitor, when connected to a voltage V across it, is given by: Q = CV

A capacitor has two conductors separated by an insulator. The conductors can be charged by conecting them to the two terminails of a cell or battery. If Q is the charge on one of the conductors (total cahrge being zero), Electric field in region between conductors is directly proportional to the charge Q. The relation is:

QαC

Or Q=CV

Or C=Q/V

Where C is a Constant and its unit is Farad. Unit of Charge Q is Coloumb and unit of Voltage V is Volts. Capacity C depends on the shape, size and distance of the two conductors. It also depends on the insulator or di electric used to separate the two conductors. Capacitors are very important in Electronics and depending on application various types of capacitors like Electrolytic, Paper etc are used

Types:

1. Polarised eg Electrolytic
2. Non Polarised eg ceramic, polyester, mica, teflon

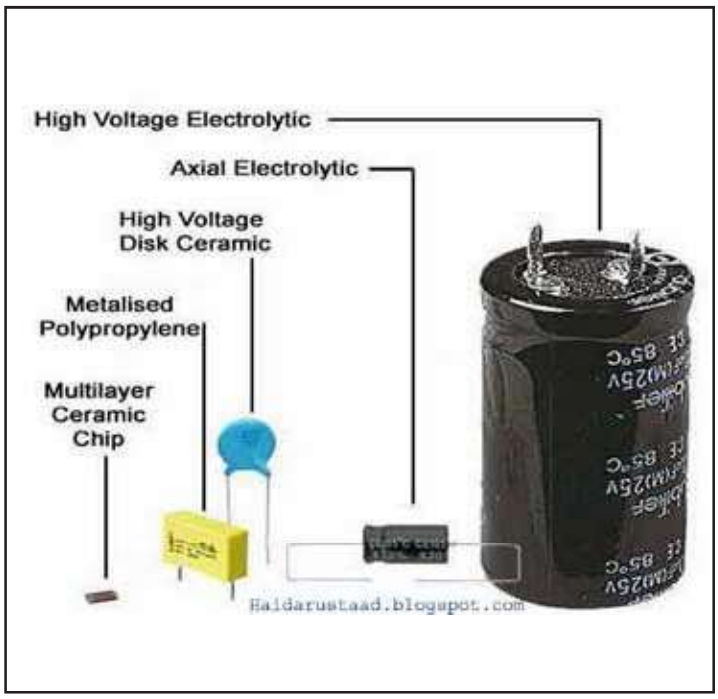


Fig: 2.6.1.5 Polarised Capacitor

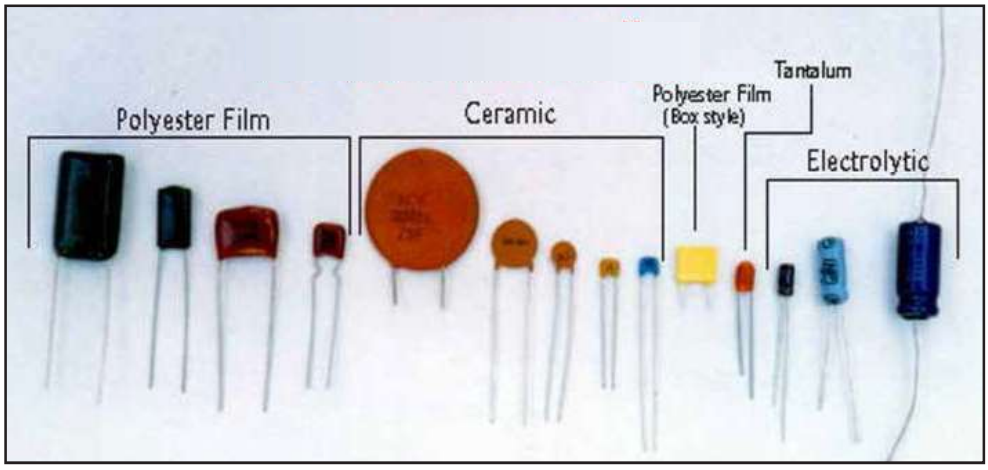


Fig: 2.6.1.6 Non Polarised Capacitor

Applications:

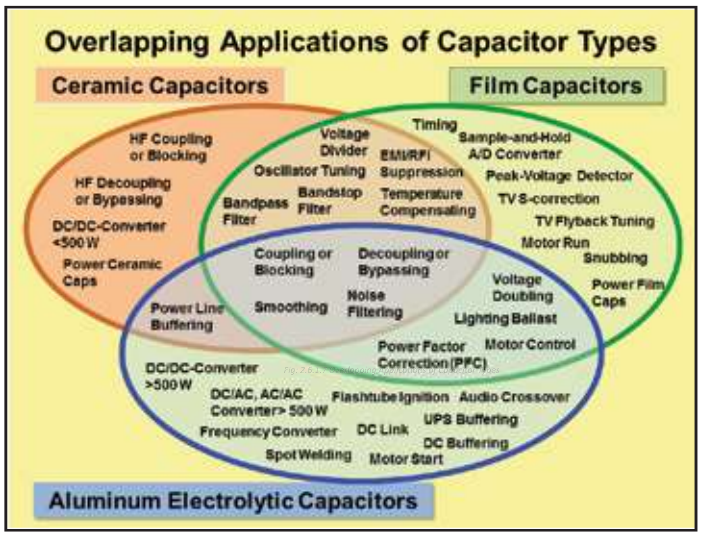


Fig: 2.6.1.7 Overlapping Applications of Capacitor Types

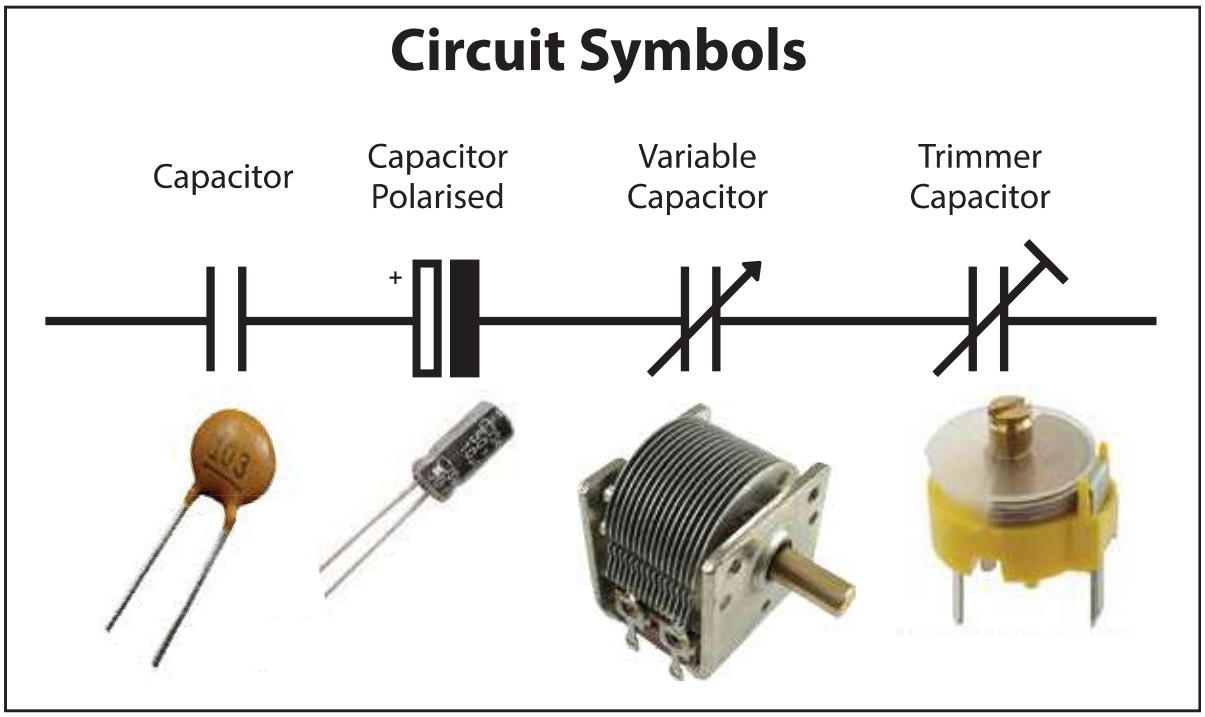


Fig: 2.6.1.8 Circuit Symbols

Fig: 2.6.1.9 SMD Capacitor

When in Parallel:

C=C1+C2

When in Series:

1/C=1/C1+1/C2

Its unit is Farad. But this being very large, smaller unit Micro Farad is used and its symbol is MF or µF

UNIT 2.7: Active devices: - Diodes, Zeners, Transistors and Integrated Circuits, CRT, LED or LCD display

Unit Objectives

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

1. Explain concept of Diodes, Transistors, Integrated Circuits, CRT, LED and LCD
2. Explain various types of diodes their symbol and application
3. Explain various types of Transistors and its application
4. Explain various types of integrated circuit and its characteristics

2.7.1: Active Devices:

Active Devices:

There are some elements which are insulators but when they are doped with some impurity, they start showing conduction. So, they are called Semi Conductors and these semiconductors have propelled the growth of Electronics. Eg Silicon, Germanium etc. When they are doped, there is excess of electrons or holes due to which conduction takes place. The characteristics of some semiconductors are shown in following table:

Semiconductor	Junction forward voltage	Electron mobility m/s@25degree C	Hole mobility m/s @25 degree C	Max junction temp. degree C
Ge	0.27	0.39	0.19	70 to 100
Si	0.71	0.14	0.05	150 to 200
GeAs	1.03	0.85	0.05	150 to 200
Al-Si junction	0.3			150 to 200

Tab: 2.7.1 Resistance Codes

Active Components:

These alter the behavior in a circuit eg they can rectify, detect, amplify a signal. Diode, Transistor, Integrated Circuits, FET and MOSFET are examples of Active Components.

Diode:

It is a one-way valve. It allows current in one direction only. These diodes are made from semiconductors like germanium, silicon etc. Many electronic devices are made using Si and Ge. The most basic device is diode. It is a two terminal P-N junction device. P-N junction is formed by bringing a P type material in contact with N type material. When a P-type material is brought in contact with N- type material electrons and holes start recombining near the junction. Due to this no charge carriers are left at the junction which is called depletion region

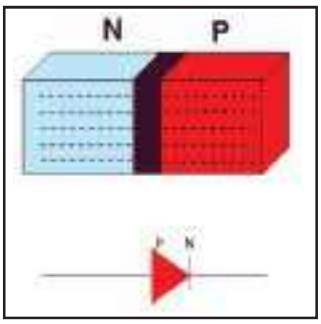


Fig: 2.7.1.1 Diode

Diode can operate as:

Forward Biased :

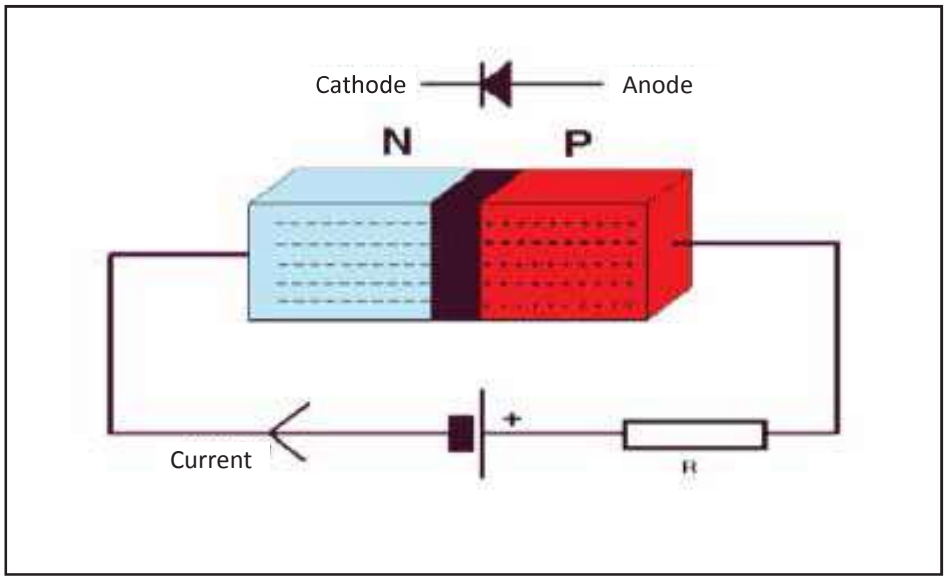


Fig: 2.7.1.2 Diode Operate Forward Biased

Here it allows current. Forward Voltage for Si is 0.7V and for Ge it is 0.3 V. In Si diodes there is a dark band on one corner which means it is cathode and the other side is anode.

Reverse Biased:

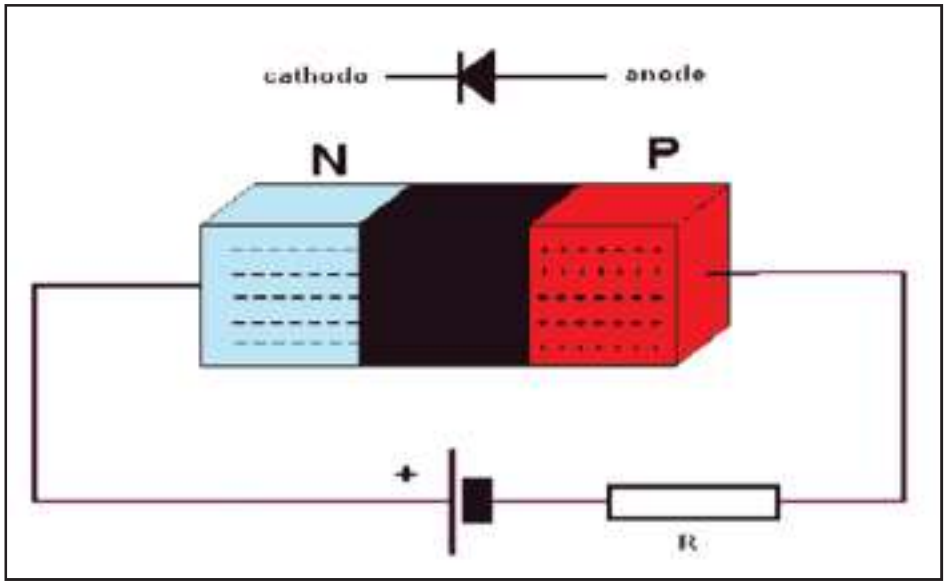


Fig: 2.7.1.3 Reverse Biased

It does not allow current. In silicon diode the dark band in a corner indicates the cathode terminal and the other terminal is anode. Generally diodes are used as reverse polarity protector and transient protector. Some of the diodes are as under

1. Small Signal Diode:

It is used in high frequency and very low current applications like as in radios and televisions etc. Cathode terminal edge is marked with black or red color. Current and power are very low. Maximum is nearly 150mA and 500mW.

2. Large Signal Diode:

This has large PN junction layer. It is mainly used in battery charging devices like inverters. In these diode's forward resistance is in Ohms and the reverse blocking resistance is in mega Ohms. Since it has high current and voltage performance it is used to suppress high peak voltages.

3. Zener Diode:

Zener diode is just like an ordinary PN junction diode but operated in reverse biased condition. But ordinary PN junction diode connected in reverse biased condition is not used as Zener diode practically. A Zener diode is a specially designed, highly doped PN junction diode.

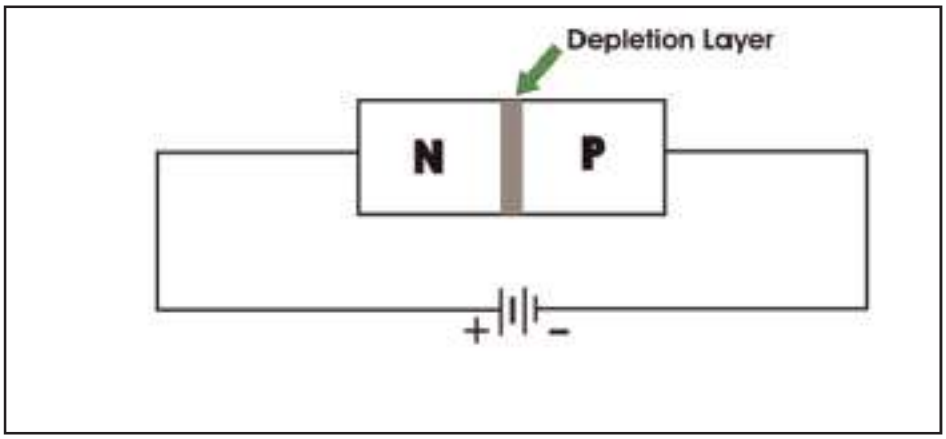


Fig: 2.7.1.4 Zener Diode

Shown above is a PN diode connected in Reverse Bias.

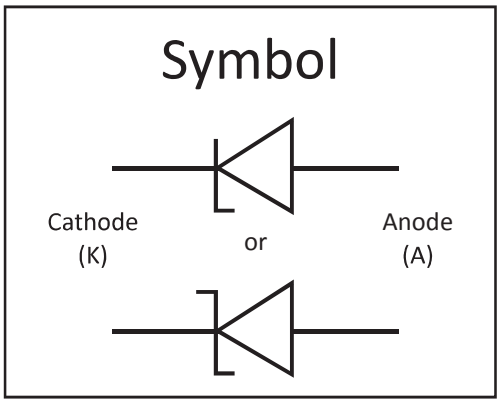


Fig: 2.7.1.5 Diode in Reverse Bias

When a zener diode is connected across a voltage source, and the source voltage is more than zener voltage, the voltage across a zener diode remains fixed irrespective of the source voltage. Although at that condition current through the diode can be of any value depending on the load connected with the diode. That is why zener diode is mainly used for controlling voltage in different circuits.

4. Light Emitting Diode (LED):

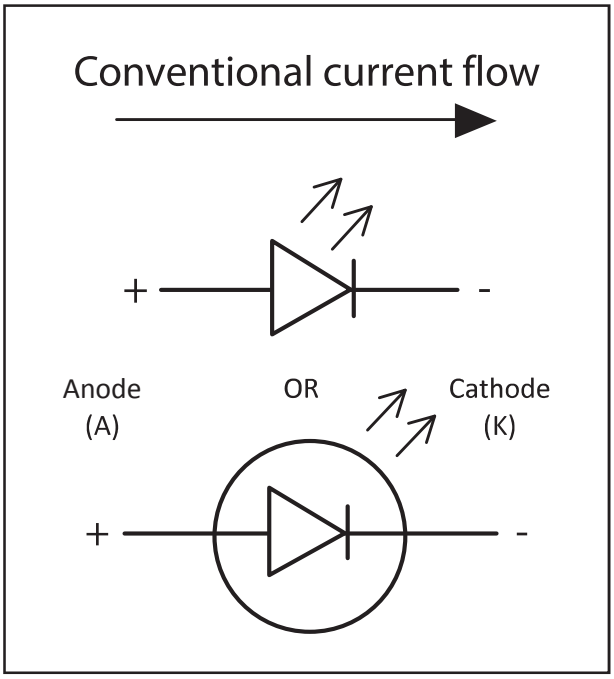


Fig: 2.7.1.6 Light Emitting Diode

It converts electrical energy to light energy. It is used in traffic signals, camera flashes.

Transformer:

- Transistor is made up of words “Transfer” and “Resistor”. It means input signal is transferred from a low resistance circuit to a high resistance circuit. This transistor is made up of semiconductors. Silicon (Si) and Germanium (Ge) are some examples of semiconductors. This is also called ‘’ BJT “ or Bipolar Junc-tion Transistor.Now, why this is called junction transistor? The answer lies behind the construction. We already know what is p - type and n - type semiconductors.

  In this type of transistor any one type of semiconductors is sandwiched between the other type of semi-conductor. For example, an n - type can be sandwiched between two p - type semiconductors or similar-ly one p - type can be sandwiched between two n - type semiconductors. These are called p - n - p and n - p - n transistors respectively. This is called junction transistor because there are two junctions of different types of semiconductors, . It’s called “bipolar” because the conduction takes place due to both electrons as well as holes.

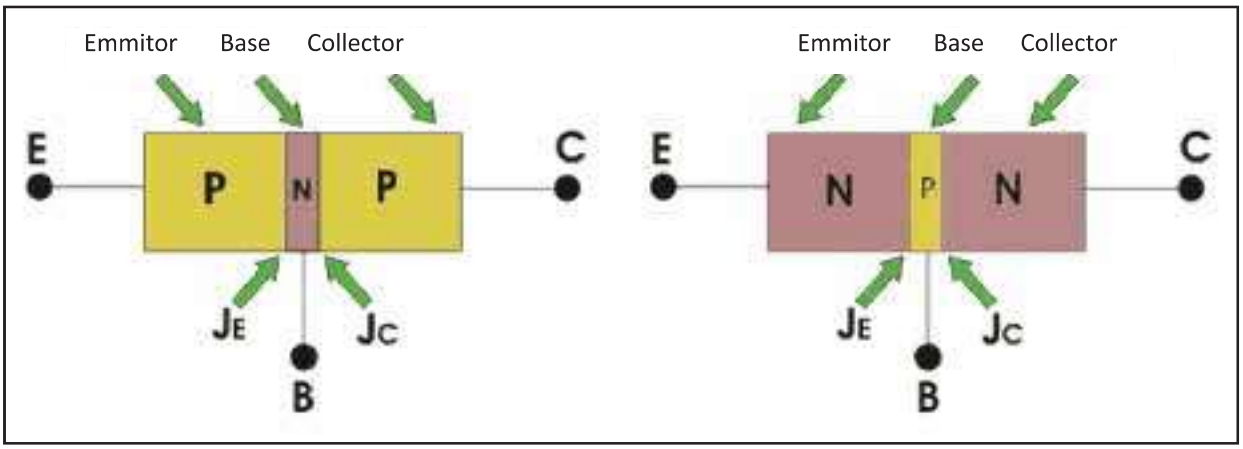


Fig: 2.7.1.7 Transistors

Bipolar junction transistor is a three terminal semiconductor device having two p-n junctions. It is able to amplify or "magnify" a signal and is a current controlled device. The three terminals of the BJT are the base, the collector and the emitter. When a signal of small amplitude is applied to the base, we get amplified signal at the collector of the transistor. This is the amplification provided by the BJT. Note that it does require an external source of DC power supply to carry out the amplification process. The basic diagrams of the two types of bipolar junction transistors mentioned have been shown in above figure.

Bipolar junction transistor is a three terminal semiconductor device having two p-n junctions. It is able to amplify or "magnify" a signal and is a current controlled device. The three terminals of the BJT are the base, the collector and the emitter. When a signal of small amplitude is applied to the base, we get amplified signal at the collector of the transistor. This is the amplification provided by the BJT. Note that it does require an external source of DC power supply to carry out the amplification process. The basic diagrams of the two types of bipolar junction transistors mentioned have been shown in above figure.

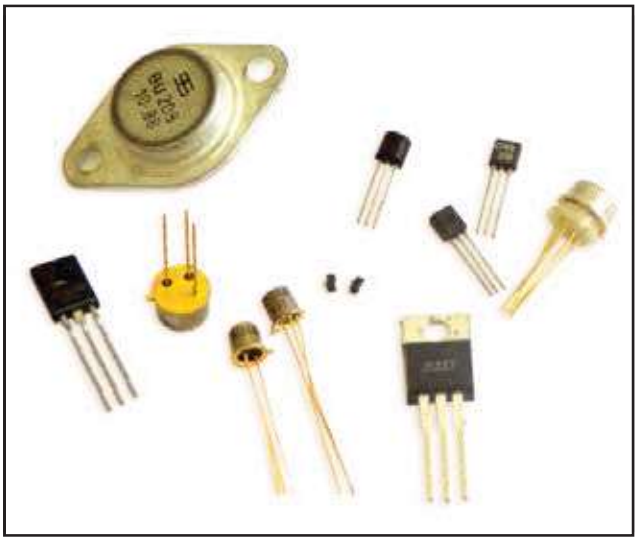
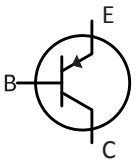


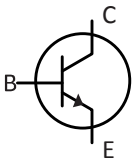
Fig: 2.7.1.8 Transistors Types

BJT

PNP Transistor

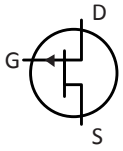


NPN Transistor



JFET

P Channel



N Channel

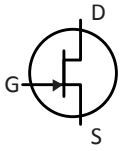


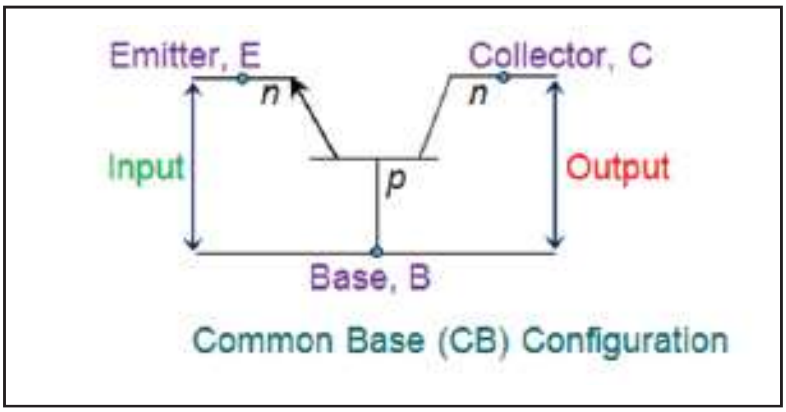
Fig: 2.7.1.9 Transistors

Transistors in a Circuit:

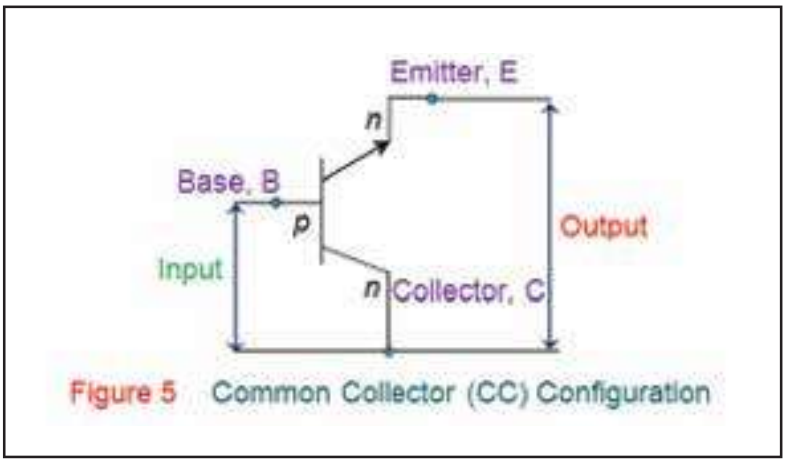
They can be used in following configurations in a circuit depending upon the design and circuit requirements:

Common Base:

They can be used in following configurations in a circuit depending upon the design and circuit requirements:



Common Collector:



Common Emitter:

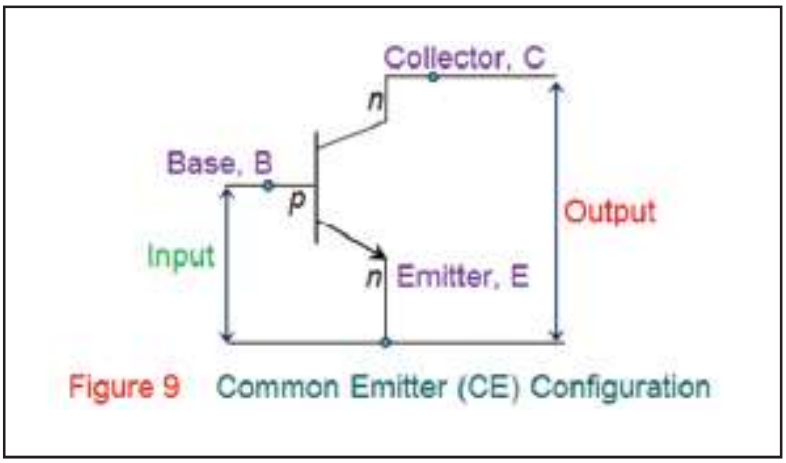


Fig: 2.7.1.10 Transistors Circuit

Power Transistors:

- The junctions of the power transistors have comparatively larger areas than small signal transistors and have the following characteristics:
- Forward resistance values are generally lower than those for small signal silicon transistors. Similarly, they have lower reverse resistance values.

  Power transistors are usually mounted on the heat sinks or heat radiators. They are sometimes mounted on the chassis using silicone grease to increase heat transfer

Darlington Transistors:

- A Darlington is a special type of configuration usually consisting of two transistors fabricated on the same chip or at least mounted in the same package. Darlington pairs are often used as amplifiers in input circuits to provide a high input impedance. Darlingtons are used where drive is limited and a high gain, typically over 1000, is needed. In this configuration the emitter base junctions are connected in series and the collector terminals are connected in parallel. A Darlington configuration behaves like a single transistor where-in the current gains (hfe) of the individual transistors it is composed of are multiplied together and the base-emitter voltage drops of the individual transistors are added together.

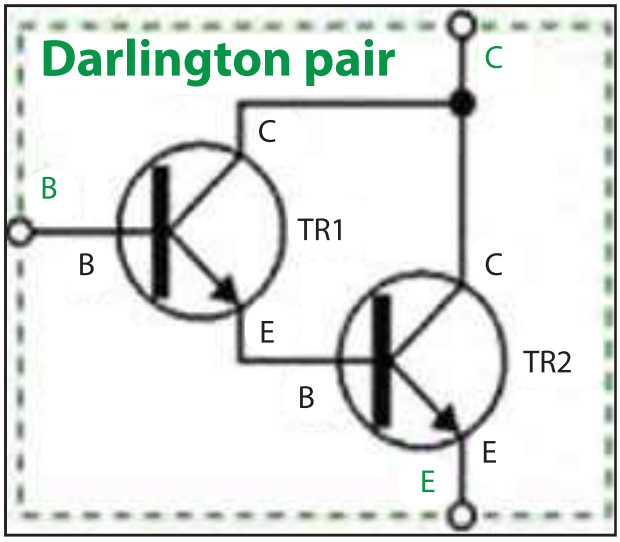


Fig: 2.7.1.11 DarlingtonTransistors

Field-effect Transistors:

- Field-effect transistors, like bipolar transistors, have three terminals. They are designated as:
- Source, drain and gate,
- Which correspond in function to
- The emitter, collector and base
- Of junction transistors.

Power Transistors:

- In normal junction FET operation, the gate source voltage reverse-biases the pn junction, causing an electric field that creates a depletion region in the source- drain channel. With the input (gate-source) circuit reverse biased, the FET presents a high impedance to its signal source. This is in contrast to the low impedance of the forward-biased junction bipolar transistor base-emitter circuit. Since there is no input current FETs emit less noise than junction transistors.

- MOSFET transistors, including those in the CMOS integrated circuits, are 'Enhancement Mode' type devices. With zero gate-to-source bias, these devices are off, and are increasingly turned on by the application of increasing gate-to- source bias (positive for n-channel, negative for p-channel).

Field Effect Transistor:

- FETs can be described as majority-charge-carrier devices, in which the current is carried predominantly by majority carriers, or minority-charge-carrier devices, in which the current is mainly due to a flow of minority carriers.[2] The device consists of an active channel through which charge carriers, electrons or holes, flow from the source to the drain. Source and drain terminal conductors are connected to the semiconductor through ohmic contacts. The conductivity of the channel is a function of the potential applied across the gate and source terminals.

The FET's three terminals are:[3]

- Source (S), through which the carriers enter the channel. Conventionally, current entering the channel at S is designated by IS.
- Drain (D), through which the carriers leave the channel. Conventionally, current entering the channel at D is designated by ID. Drain-to-source voltage is VDS.
- Gate (G), the terminal that modulates the channel conductivity. By applying voltage to G, one can control ID.

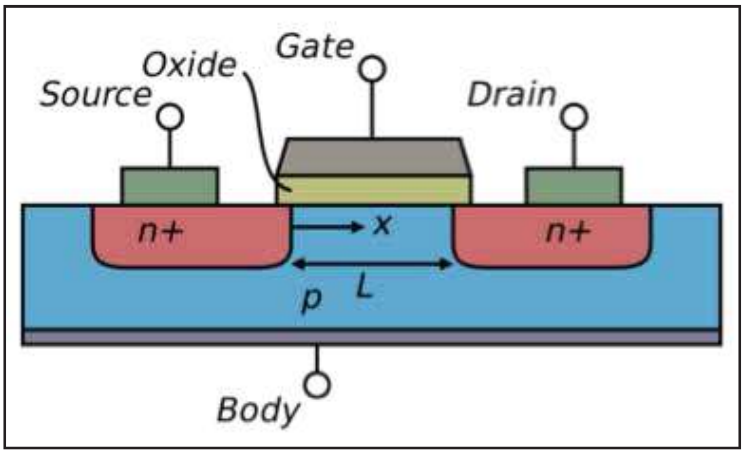


Fig: 2.7.1.12 An n-type MOSFET

All FETs have source, drain, and gate terminals that are like the emitter, collector, and base of BJTs. Most FETs have a fourth terminal called the body, base, bulk, or substrate. The names of the terminals refer to their functions. The gate terminal may be thought of as controlling the opening and closing of a physical gate. This gate permits electrons to flow through or blocks their passage by creating or eliminating a channel between the source and drain. Electron-flow from the source terminal towards the drain terminal is influenced by an applied voltage. The body simply refers to the bulk of the semiconductor in which the gate, source and drain lie. Usually the body terminal is connected to the highest or lowest voltage within the circuit, depending on the type of the FET.

Integrated Circuit:

Packages for digital ICs generally fall into three categories, which are delineated below:

Metal Case TO Type Packages:

In these, all the pins are in a circle and are numbered in counter clock-wise direction when viewed from the bottom. The pin closest to the orientation tab has the highest number. The most commonly used metal packages are TO-73 (12 leads), TO-99 (8 leads) and TO-101 (12 leads).

Dual-In-line Packages (DIL or DIP):

They have all leads arranged in two parallel lines. The most common package is T- 116, which has 14 pins. Another most common package is a 16-pins DIP, which has the same overall dimensions as that of 14- pin-DIP.

Flat Packages:

They are smaller than the TO-16 packages and therefore allow higher packing density. They can be assembled on both sides of a PCB. They are preferred for use in military equipment

Manufacturer's Codes:

Manufacturers often introduce their own types, for commercial reasons, or to emphasize that the range belongs to a special application. Some common brand specific prefixes are:

- TIS = Texas Instruments, small signal transistor (plastic case)
- TIP = Texas Instruments, power transistor (plastic case)
- MPS = Motorola, low power transistor (plastic case)
- MRF = Motorola, HF, VHF and microwave transistor
- RCA = RCA.

IC Protector

The IC Protector (ICP) is an overcurrent protection device having stable and high-speed circuit tripping characteristics which enable these devices to shut off the circuit quickly and safely. This quick shut-off response protects valuable semiconductor devices and circuits from common load short-circuit failures.

Features:

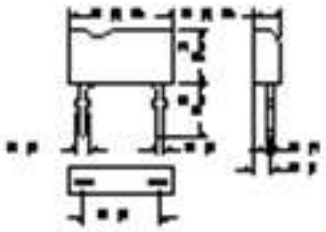
- Precise and Extremely Stable Cut-off Characteristics
- Small Internal Resistance with Low Voltage Drop
- Non-flammable
- Compact

Applications:

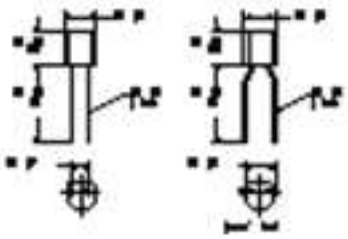
- Overcurrent Protection

NTE Type Number	Case Style	Maximum Rated Voltage (Volts	Maximum Rated Current (Amps)	Typical Internal Resistance (Ohms)	Operating Temperature (°C)	Storage Temperature (°C)
15005E	"F" Type	50	0.4	0.220	-55 to +125	-55 to +125
15006E	"F" Type	50	0.6	0.135	-55 to +125	-55 to +125
15007E	"F" Type	50	0.8	0.100	-55 to +125	-55 to +125
15008E	"F" Type	50	1.0	0.070	-55 to +125	-55 to +125
15009E	"F" Type	50	1.5	0.042	-55 to +125	-55 to +125
15019E	"N" Type	50	0.25	0.350	-55 to +125	-55 to +125
15020E	"N" Type	50	0.4	0.220	-55 to +125	-55 to +125
15021E	"N" Type	50	0.6	0.135	-55 to +125	-55 to +125
15022E	"N" Type	50	0.8	0.100	-55 to +125	-55 to +125
15023E	"N" Type	50	1.0	0.070	-55 to +125	-55 to +125

Tab: 2.7.1.2 Resistance Codes



"F" Type



"N" Type

TransistorType Numbers

Ø Overtheyears, manufacturers haveissued thousands ofseparate transistortypenumbers. Many are now not used. Someof thecommon numbers / types are :

Ø JointElectronDevice EngineeringCouncil(JEDEC)

Ø The transistor markings inthiscase takethe followingform:Digit,letter,serial number,(suffix),

Ø where theletteris always'N',theserial numberruns from100to 9999and tells nothing aboutthetransistorexceptits approximatetimeof introduction.The (optional)suffix indicatesthegain (hfe,orB). For example:

Ø A =lowgain B=medium gain

Ø C= highgain No suffix = ungrouped(anygain)

Ø Examples:2N904, 2N3819,2N2221A.

Ø Thedatasheetsgiveinformationon theactualgainspreadand groupings. The reasonfor gaingroupingis thatthe lowgain devicesare usually cheaperthan the high gaindevices

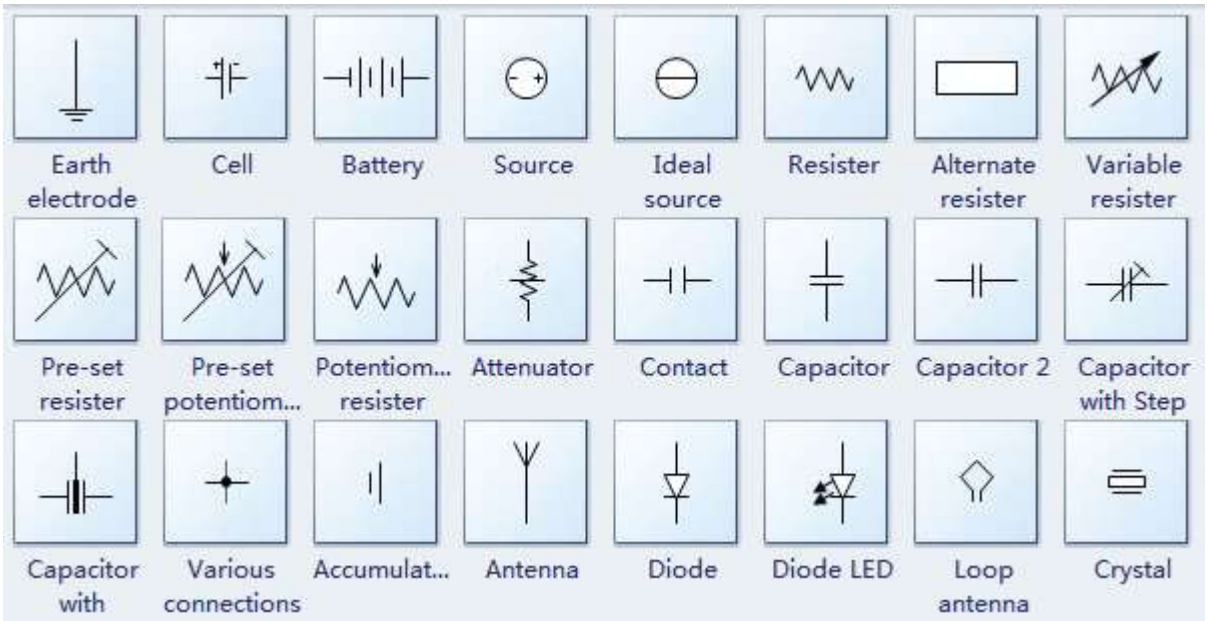


Fig: 2.7.1.13 Basic Electrical Symbols

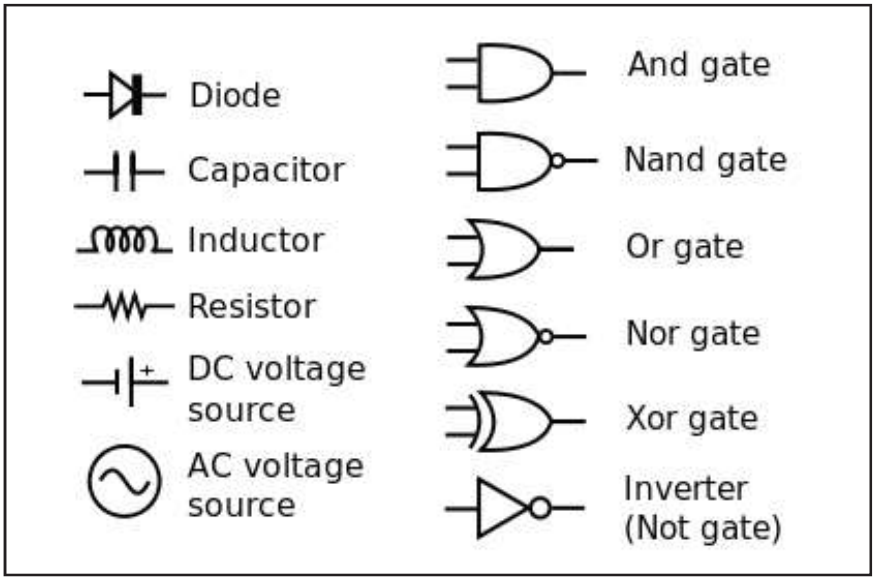


Fig: 2.7.1.14 Electric and Electronic Symbols

CRT, LCD or LED Display

To show the picture, we need a display. It is like if I write on a white board, I have to write with a marker of a dark colour. Also, there should be light either on the board or in the room because our eyes can not see in darkness. So, we have to first choose a screen which can either have its own brightness or which uses a external light for brightness.

CRT Display:

Here we use CRT as a Screen on which we can display the picture. A CRT OR Cathode Ray tube is used in TVs. Earlier B&W CRTs were used. Later, Colour CRTs were used. Colour CRTs have phosphors of Red, Green and Blue and when these phosphors are bombarded with electrons, they emit their colour e.g. red phosphor will emit red colour if it is bombarded with electrons.

LCD:

It means Liquid Crystal Display. In this Liquid crystals are used to guide the direction of light. But since these crystals do not have their own light, we use a back light. In LCD Display, CCFL back light was and is used. CCFL means ' Cold Cathode Fluorscent Light '

LED :

It means Light Emitting Diode. In this, for back light, LEDs are used in place of CCFL. This has certain advantages as we will see later.Such a TV which uses LEDs as back light uses Liquid Crystals also to guide the direction of light. It is called a LED TV as per the name used by a TV manufacturer though it is correctly a LED LCD TV because it is using LCD crystals for guiding light produced by LEDs.

OLED TVs:

They have their own light and so do not need a back light.

UNIT 2.8: Know Your Tools

Unit Objectives

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

1. Identify and Operate various tools and equipments required to carry out repair work of TV

2.8.1: Tools and equipment needed for Television Repair:

Replacement parts are available from the manufacturer, aftermarket suppliers, and local electronic stores. The tools you will need to fix a TV include:

- Digital / Analogue Multi Meter
- Soldering Iron with lead free solder wire
- Screwdrivers
- Pliers
- Lense
- Tweezer
- Cutter
- Desoldering Pump and desoldering wick
- Drill Machine and bits

Screw drivers: Philips and other screw drivers are used. Only the correct screw driver should be used to open the screws. After opening a screw, same should be placed safely as same has to be fixed back. When a TV is disassembled, its assembling is done in the reverse order.

Pliers, tweezers, Cutters:

These are used for various jobs while working on the TV.

Desoldering Pump

This should be of a standard make or as per the recommendation of your Company.

Multi Meter

Analogue Multi Meter:

Fig: 2.8.1.1 Analogue Multi Meter

In old times, this multi meter was used. It has a needle and it has – and + sockets in which –(Black colour) and + probe (Red Colour) are fixed before we take any reading.

Digital Multi Meter:

Fig: 2.8.1.2 Multi Meter 1

It is digital and is called Multi because one can take multi readings like: AC and DC Voltages, Resistance, Current, continuity etc and can also check diodes and transistors. This is a very useful instrument and engineers use it to repair a TV in field.

While using it, you should first put the probes in the proper sockets. Also, when measuring any voltage always connect the ground lead first. After this, select the parameter to be measured like:

AC or DC voltage

Current

Resistance

Diode and Transistor

Using a Multi Meter:

A multi Meter is used to check resistance, AC or DC Voltages and diodes. It can also be used to measure currents. Checking Resistance: For this, select a suitable resistance range. If the resistance is in circuit, switch off the set, take out one end of the resistance.Insert the red and black probes in the respective sockets in the multimeter. Now the other end of red probe is connected to one end of resistor. The other end of black probe is connected to the other end of the resistor. The value of the resistor will be displayed on the screen of multimeter as shown in the following figure:

Fig: 2.8.1.3 Multi Meter 2

Checking AC Voltage: Always select the highest range when measuring unknown voltage or current. Select the highest AC Voltage range in this case. Now insert the red probe into the red socket and the black probe into the black socket (common socket). As the voltage is measured in parallel, touch the black probe to the neutral point in the AC circuit and the red probe to the phase or live point. The AC Voltage will be displayed on the screen as shown:

Fig: 2.8.1.4 Multi Meter 3

Checking DC Voltage:

Select the correct DC Voltage range. Here also, the voltage will be measured in parallel. Connect red probe to the positive point and black probe to negative point.

Fig: 2.8.1.5 Multi Meter 4

Checking a diode: It is checked in continuity range.

Fig: 2.8.1.6 Multi Meter 5

Fig: 2.8.1.7 Multi Meter 6

Checking a fuse: It can be checked in continuity range:

Fig: 2.8.1.8 Multi Meter 7

Soldering Iron:

This is used to solder components on the chassis. It can be of 10/15 or 25W and should be ESD safe. Good quality and lead free solder must be used. After checking the set, it becomes clear if the set needs replacement of spares. If yes, connect the iron to AC 220 V so that it is heated by the time you open the back cover. It saves precious time.

When you have to solder, first take out the defective part using de soldering pump / soldering iron and wick. Do the tinning of the leads of the part that needs to be fixed. Now fix the leads into the holes and heat up a lead and apply slight solder. One learns this with practice. After soldering and component cooling, cut the extra leads with a cutter.

Precaution:

Keep the iron safely at customer's house so that no one touches it accidently and it is out of reach of children. Do not throw solder leftover on the floor.

Fig: 2.8.1.9 Soldering Iron, solder wire and paste

Fig: 2.8.1.10 Soldering Iron & Desolder pump

Fig: 2.8.1.11 Stud Finder

Fig: 2.8.1.12 Cable or wire finder

Shown below are some of the screws used these days;

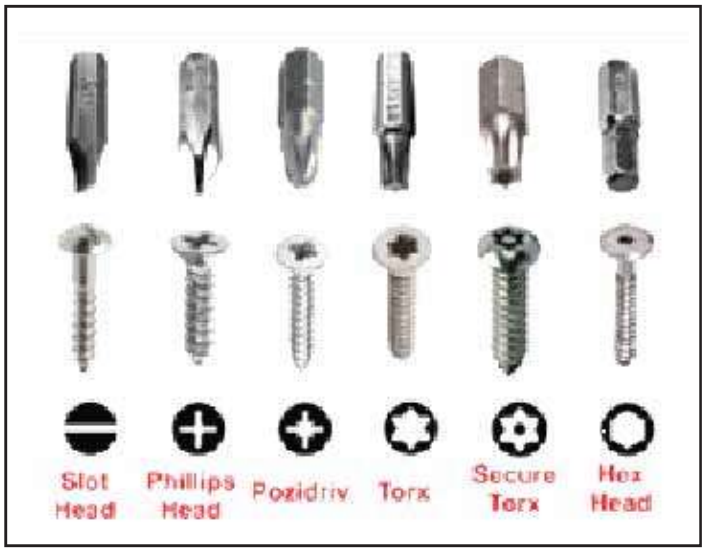


Fig: 2.8.1.13 Screws

Exercise:

1. What is colour code for a resistance of 120 Ohms 10% tolerance?
2. Find colour code for resistance of 10 Ohms 1% tolerance?
3. Draw symbols of NPN, PNP transistors, PN Diode

Notes

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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

ESSCI

3. Basic Television System

Unit 3.1 - Types of Television Set

Unit 3.2 - Block Diagram of Television

Unit 3.3 - Scanning Process

Unit 3.4 - Different Inputs of Television Sets

Unit 3.5 - Home Theatres and Connection to the TV sets

Key Learning Outcomes

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

1. Explain various types of television system and its characteristics
2. Identify circuit in block diagram of TV
3. Explain persistence of vision, Compatibility and characteristics of light
4. Connect various types of input system provided in TV
5. Connect setup box with TV

UNIT 3.1: Types of Television Set

Unit Objectives

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

1. Explain difference between CRT and Flat Panel TV
2. Describe various types of Flat Panel TV and their characteristics

3.1.1: There are generally two types available :

CRT TV or Cathode Ray Tube TV :

The CRT TVs were Black and White in the beginning as it was a monochrome TV which showed only B& W pictures. Later with technological advancement, Colour TVs were started which used a Colour Picture tube and these showed pictures with colours.In CTVs also there were different models like Flat TV, Full and Flat or FFST which used the so called '' full and flat square tube ". In Indian market we now hardly find any B&W TV being sold though some people may still be having very old B& W TVs, if they are still working. Even the Colour TVs (CRT TVs) are on their way out.

FPD or Flat Panel Display:

As the CPTs were curved on the front and there were certain other technical issue like colour patches, convergence etc. FPDs were introduced where the display screen was not a CRT but a flat panel and for lighting the screen different techniques were used which we will discuss now. Flat panel TVs are available only in colour.

Flat Panels can be of the following types;

Plasma

LCD

LED

OLED

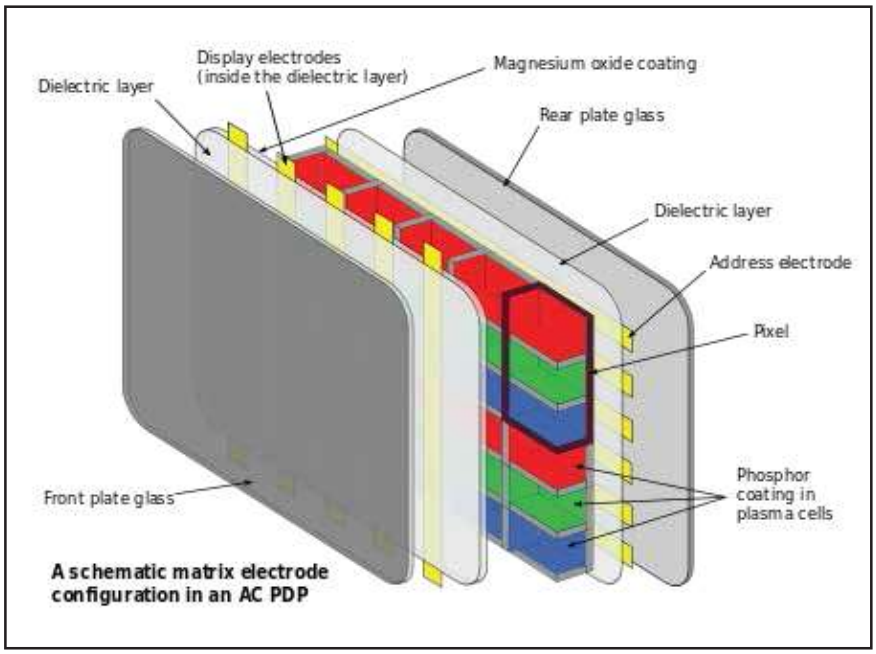


Fig: 3.1.1.1 Plasma Panel

Plasma panels are now not popular as there are several issues with them.First of all the power consumption is high as compared to LCD or LED TVs. Due to more poer consumption, they are also not eco friendly as compared to other Flat panel Screens.Secondly if any image remains on screen for a longer time, screen or pixel burn may occur due to which the static image is formed on that part of the screen and that effect can not be removed because the pixels in that part may have burnt. The life of the Plasma panel can also be said to be an issue as earlier models of LCDs had more life. Plasma panels also have an issue at heights as at these places the gas pressure reduces and since Plasmas use gas, problems of starting with a sound or late start etc. can occur in Plasmas when they are used at heights like hills and mountains

The advantages of Plasma are:

Their contrast is excellent as in a CRT TV because they have their own light in form of phosphors like in CRT TV and they do not use back light like LCD TV does.

Their brightness variation from minimum brightness or black to maximum brightness is good and due to this one can get good black colour which means good contrast.Because of this they give deeper black and rich colours.

They also do not show any ghost effect in fast moving pictures like in LCD TVs because they are using phosphors and not liquid crystals. In LCD TVs, the ghost images can be seen if response time is high. These days response time in LCD TVs is alos very low. Yet Plasmas still are better in that just like CRT TVs. There are several other points on which comparison can be made between a LCD TV and a Plasma TV.

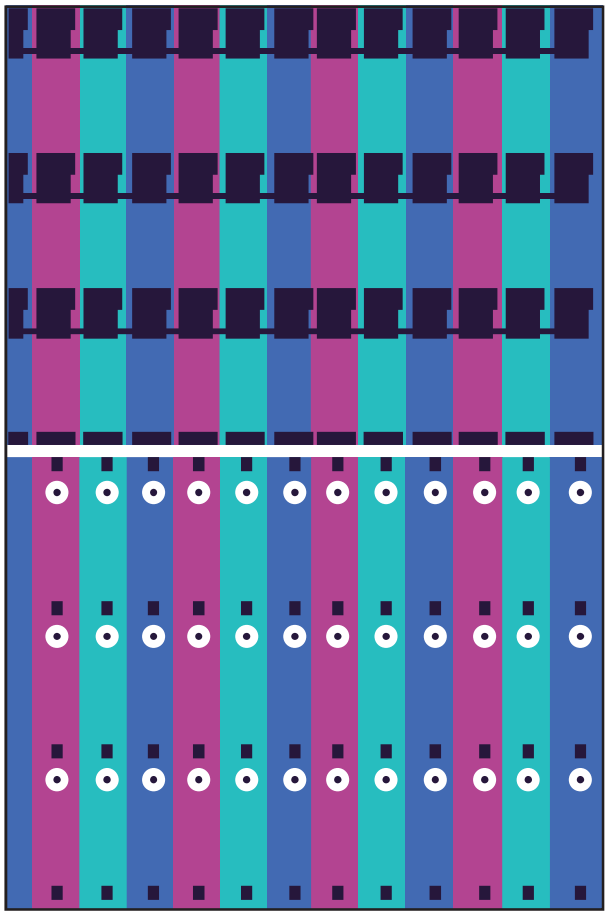


Fig: 3.1.1.2 Plasma Panel 1

LCD panels are the most commonly-used type of panel in flatscreen televisions today. They offer a lot of benefits, such as low heat generation, no static image burn (which can happen in a Plasma display), and a greater brightness over plasma. LCD panels are lighter in weight as compared to plasma. A customer can choose between active shutter and passive glasses when purchasing a 3D-capable model.

Further, older LCDs did not give perfect black due to which LCDs had issues with brightness and contrast. However, as comparedto this CRT TVs give excellent contrast as they give perfect black. Also for such LCDs the ghosting problem with fast-moving images also occurred.To improve this the 120Hz and 240Hz refresh rate modes were used and with this there was improvement. If customer does not mind switching between these modes when switching between sports and film, it is good. LCDs can also have dead pixels and a new LCD TV may have one or more dead pixels. If a customer finds any such dead pixel and is not comfortable with dead pixels, he should immediately contact the company and claim replacement so that he can get the replacement within warranty period as otherwise he may have to keep the same LCD TV with him.

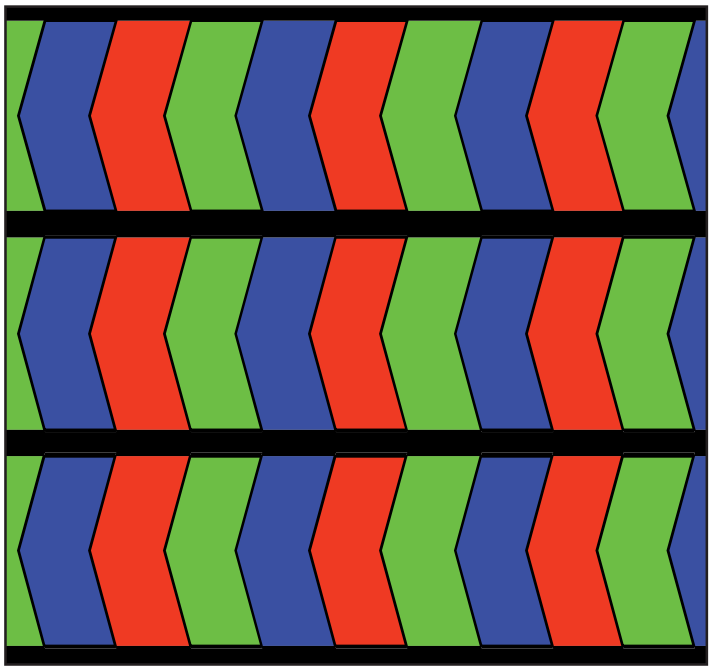


Fig: 3.1.1.3 LCD Panel

IPS LCD panels with In-Plane Switching (IPS) are better than standard LCDs and plasma panels. If one moves to a corner (from the central line of the screen) one can notice that the picture contrast reduces, colour also changes and picture may even become negative. This happens because normal LCD TVs do not have a wide viewing angle like IPS LCD TVs. This is because viewing angle is rather narrow on most TVs. IPS LCD panels offer viewing angle of up to 178 degrees which means they offer viewing angle of 79 degree on either side of the TV. Viewing angle is also shown in vertical terms in addition to Horizontal because some customers may like to mount the TV in a different way.Thus the customer can view the TV from any side of TV and enjoy as claimed by most manufacturers. However, it must be remembered that the '' soft spot '' to get the best picture will be for a person who is sitting just in front of the TV though if you see from a side there will be a slight difference but not as much as with a normal LCD TV. In Installation also, it is explained that engineer must ask the customer where he would like the LCD TV to be placed / mounted. But, if the place of customer's choice is not as per standard guidelines, you must educate the customer about it. If customer still wants LCD to be wall mounted at his choice location, you must put these remarks in job sheet. Some monitors of Apple monitor, iMac, or iPad have a LCD panel with IPS.

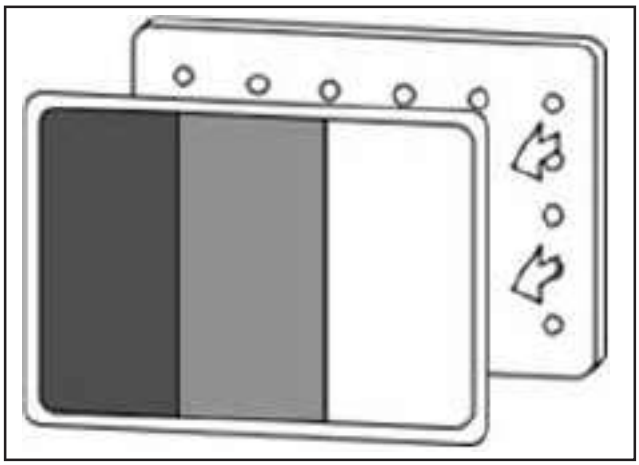


Fig: 3.1.1.4 LCD Panel with IPS

A simple LCD display uses CCFLs for its back light. CCFL stands for '' Cold Cathode Fluorscent Light ". This is not as efficient or effective as LEDs. All LED backlit displays are not and the evenness of the backlighting can vary, and that can be checked by displaying a pure black image on the television. This way we can check the evenness of the backlighting. Yet, LED-backlit displays offer quite a few advantages. The displays are thinner. These TVs consume less power, provide added brightness. Further they give better contrast as compared to normal LCD TVs. Their heat dissipation is also better. However because of the LED backlight, they are costlier as compared to LCD TVs.

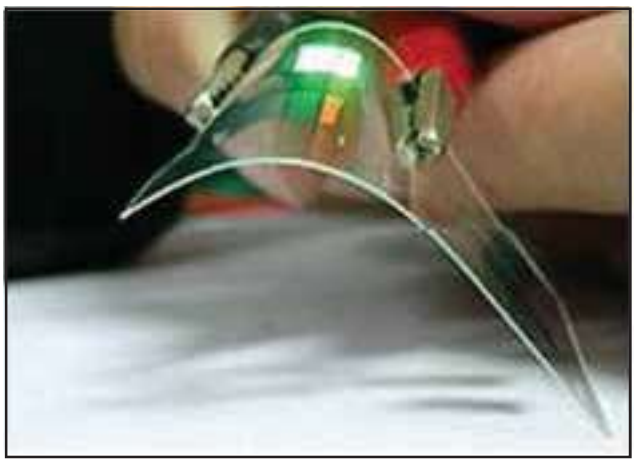


Fig: 3.1.1.5 LCD Display

OLEDs are organic LEDs. This is the latest technology and many Companies have also launched their OLED models in the market . They're thin, light, and don't require backlighting. It is because organic LED s produce their own backlight. So, they are in a position to give very deep blacks and they also give superior contrast ratio as compared to the LED TVs where LED backlight is used. Images from OLED displaysappear closer to reality because of their contrast capabilities. In a LCD panel displaying dark pictures may be an issue while this issue is not there in an OLED. But the cost of OLED panels are higher as compared to other FPDs and these have been recently launched.

UNIT 3.2: Block Diagram of Television

Unit Objectives

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

1. Explain block diagram of Television

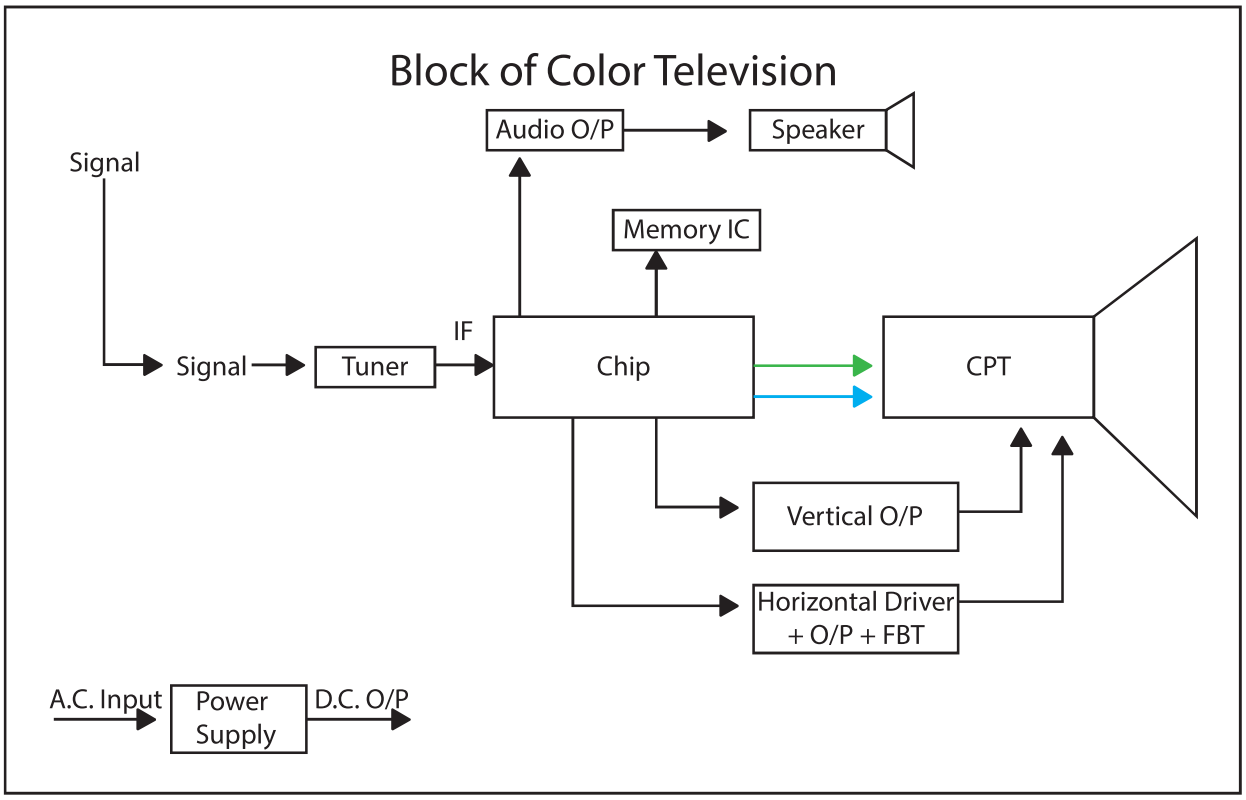


Fig: 3.2.1 Block Diagram of Television

UNIT 3.3: Scanning Process

Unit Objectives

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

1. Explain persistence of vision, Compatibility and characteristics of light

When we discuss Picture information, we find it is optical. There are infinite number of small areas which have bright and dark information. These small areas can also be called Elements. The smallest Picture element is also called 'Pixel ". When all these picture elements are seen in totality, we view the scene. To transmit this information, the scene details have to be captured first. Scanning is used to do this. AlL picture elements are scanned element by element in a sequential manner at a very fast rate. Then this optical information is converted to Electrical information for being transmitted with sound signal. In CCIRB Standard, there are 625 scanning lines. Thus a camera scans each line element by element from left to right. This is called TRACE. After reaching the extreme right of a line,the camera returns to extreme left just like we read a page in Hindi or English. This is called RETRACE. In CRT TV technology this time of retrace is used in Fly Back Pulses. Thus the camera not only moves from left to right, it also moves down to read the next line. In this way, all 625 lies are scanned. Once this scanning is over, it means the scanning of that particular scene is over.

Persistence of Vision:

Human eye has a limitation which is used as an advantage in movies and TV Transmission and reception. If a scene is shown 25 times in a second to human eye, the eye integrates the information and sees movement in that. So, to show a movement a frame is filmed / recorded in 25 different frames, each frame slightly differing from the first. These 25 frames are then shown to the eye one after the other in one second and eyes get sensation of movement

Compatibility:

In B&W TV, brightness information of a scene is done by Scanning. In colour TV, information of colour has also to be collected. There are 3 systems for transmission and reception his information this:

PAL B/G: Phase Alteration by Line

NTSC: National Television System Committee

SECAM: Sequential Error a Memoir

But for Colour TV Transmission, there are certain other requirements also so that colour system can generate a B&W picture on a B&W TV.

Also, if colour tv receives a B&W signal, it should generate a B&W picture. Both these are called Compatibility and Reverse Compatibility.

To ensure that these conditions are met, colour information is encoded in a manner that it can be transmitted in the same channel bandwidth of 7 MHz. At the TV receiver, a colour decoder is used to decode the encoded colour signal.

Characteristics of Light:

From the Electromagnetic spectrum, we see that visible spectrum is around a frequency of 5*10^14 Hz. Human eye sees light when radiation from sun reaches the eye in correct proportion. As per Helmholtz, human eye has rods and cones. While rods see brightness, cones see colour. In color theory there are three primary colors: red green and blue, or its printed complements,cyan, magenta, and yellow A fourth "primary," black, is used for printed color.

Additive color:

The additive primaries red green and blue generate colors. The three colors are projected onto a screen in various intensities to produce all colors. Color on television and monitors is produced by three color "guns" corresponding to each additive primary. These produce color intensity based on a voltage level, from 0 to 255. Obviously, 0, 0, and 0 will produce black, or absence of color, and 255, 255 and 255 will produce white

This calculation can be done for colours which can be reproduced in a FPD. If the micro computer is of 8 bits, colours produced for Red=2^8=256 (2*2*2*2*2*2*2*2)

Colours produced for Green=2^8=256

Colours produced for Blue=2^8=256

Total Colour shades which can be reproduced=256*256*256=16.77 Million

But for CRT TV, we can not check the colours produced in this manner

UNIT 3.4: Different Inputs of Television Sets

Unit Objectives

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

1. Explain various types of input system used in Television sets

3.4.1: RF Connector:

RF Connector

There were two ways to get a signal into a TV: an RF connector for antenna or cable and an A/V for composite video withMono or Stereo sound. These were available in CRT TVs. With introduction of High Definition signal, inputsignals to TV were increased with different options of signal being available.

Digital cameras with a TV output are connected to the TV's composite video (yellow coloured Jack and yellow coloured socket)) input. Many consumer camcorders also use Composite Video signal. But resolution of Composite video is not compatible to high-definition. Resolutions of Component video and S-Video compatible are also not compatible to High Definition.

Compatibility: It means that when a signal like composite video is given to a HD panel whose native resolution is , say, 2 Mega Pixels, picture may not be displayed on the screen or if at all it is displayed, it may be distorted. Moreover these are analogue signals.

Fig: 3.4.1.1 RF Connector

Composite Video/Audio

The resolution of a S-Video signal is better in comparison to RF or AV analogue signals and nowpanels with high native resolution are available due to which the picture clarity improves as even a very small point on the screen can be visible. However, to show that the signal should also be of High Definition. While TV manufacturers still include composite video, S-Video ports are now not found on LCD / LED TVs.

Fig: 3.4.1.2 Composite Video/Audio Cable

S V G A Connector

Component video which transmits analog signals but now all-digital HDMI connections, which also carries the audio are also available.It is better if a TV has more HDMI ports because HDMI is now on all types of source components. However, if you've set up a home theater sound system, the receiver is likely to have multiple HDMI inputs, and by switching your source in the receiver, one HDMI input on your TV is sufficient.

Fig: 3.4.1.3 HDMI Cable

For connecting a PC or Laptop to a FPD TV (CTVs do not have a VGA port as they are not compatible to the VGA resolution), we use a VGA cable as shown in the figure and connect it to the VGA Port in the FPD. This VGA Port is also called a PC input or 15-pin D-Sub. This is an analog signal without sound, but one gets high-definition image quality. For taking sound from PC or laptop, we have to use the Auxiliary and separate cables

Fig: 3.4.1.4 VGA Cable

UNIT 3.5: Home Theatre and connection to the Television Set

Unit Objectives

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

1. Connectivity of setup box with TV sets

3.5.1: Home Theatre and connection to the Television Set:

- Connect the Cable/ Satellite Box to the TV as shown.

  Connect the home theater system's AUDIO IN-AUX jacks to the AUDIO OUT jacks on the cable/satellite box using an audio cable (red/white –Some manufacturers supply some cables as accessories with some of their TV Models).
- Do the proper selection in Auxiliary and connect the speakers properly ie. If it is 5.1 system, you have to select the switch for 5.1.
- It should be clear that if speakers are not connected to the proper ports or if selection is not done correctly, there may not be any sound at all or it may be a case of sound distortion or less sound out put.

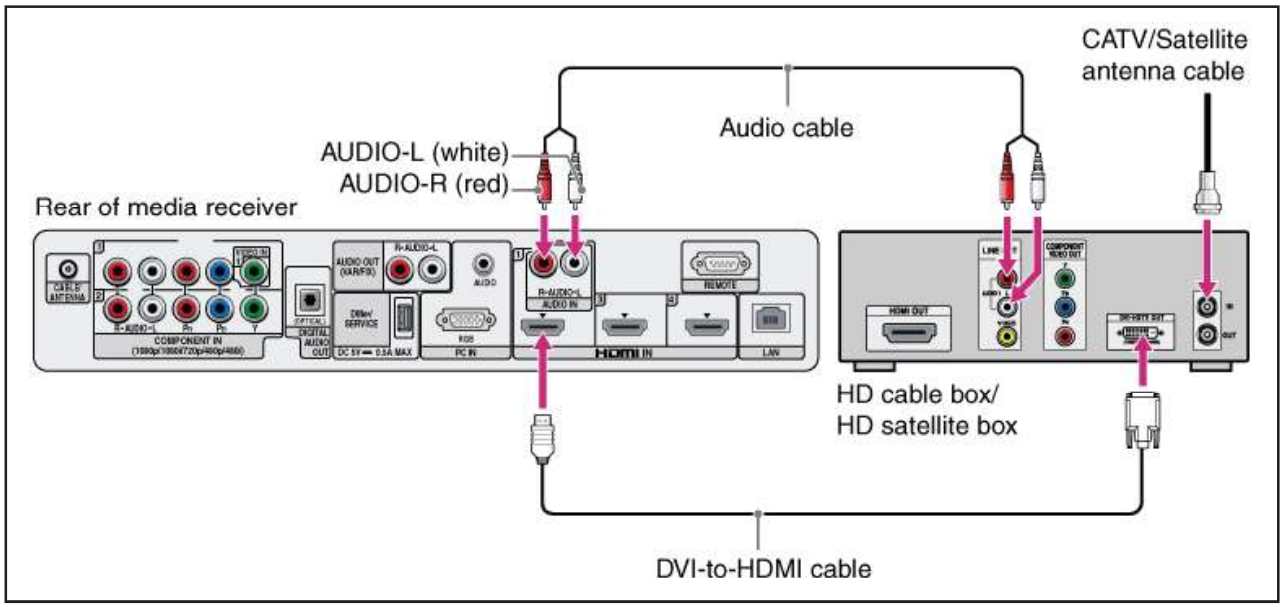


Fig: 3.5.1 Cable satellite box

Exercise:

1.What is the difference between a CRT TV and a LCD TV?

2.What do you understand by '' Response Time" ?

3. Which ports can be used to connect a Laptop?

4. How many speakers are there in 5.1 sound system?

Notes

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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

ESSCI

4. Installing of TV

Unit 4.1 – Installation Criteria

Unit 4.2 –Safety Requirements

Unit 4.3 – Remote Control of Television Set

Unit 4.4 – Installing a Television Set

Unit 4.5 - Check TV set's functioning

Key Learning Outcomes

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

1. Collect requirements for installation
2. Take necessary steps to avoid safety hazard
3. Explain concept and functioning of remote control device
4. Apply standard procedure for installation of TV
5. Perform testing procedure after installation

UNIT 4.1: Installation Criteria

Unit Objectives

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

1. Apply procedure for the installation criteria

In planning installation at customer's house for flat-panel television, you have to seek inputs from customer. Once you get these, you can begin the installation:

Seating area:

- Where will the customer sit and where will other members of the family sit? This helps in deciding the soft spot where the customer will get the best view and best sound.Furniture
- You will need Space is needed to fit the equipment — most home theater components require a space 18-20 inches wide by 22-24 inches deep to fit properly.
- What kind of seating does the customer want ? Is the room mainly to be a home theater entertainment area, or will music be part of what it's used for as well?

Aesthetics:

- The customer should be informed that it looks better if the equipment does not overwhelm the room. Wire access
- Ask the customer how he wants you to run wires to speaker locations? Will the equipment be next to the TV, or will it be hidden in another room or area?
- Is there enough wire to complete the project? It is better to have more wire.

Mounting:

- Generally manufacturers provide mounts as per their specifications for their TVs.
- What is the size and weight of the TV? All brackets have weight and size restrictions. It is necessary to make sure the TV will fit within the limitations of the mount.
- Will the mount be fitted into a tight space or cabinet? It may be impossible to use some brackets if the space does not allow the proper leverage.
- Does customer want to tilt or move the TV from time to time? There are mounts available. .
- Will the TV be positioned at an angle? Special mounts and techniques will be required to keep the TV mounted at or into an angle.
- What will the TV be mounted to? It is necessary to have proper support for TV.

UNIT 4.2: Safety Requirement

Unit Objectives

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

1. Explain safety requirements for installation of TV
2. Apply precaution for safety hazards

An engineer must take care of the following safety hazards:

Electricity Hazard

Hazard due to fire

Electro Static Discharge

- The first requirement of an engineer is to protect himself and to ensure that while he is working, people, if any, in the surroundings are also safe. So, a field engineer has to protect himself and ensure safety of the customer and the surroundings. For this he should ensure that
- He has the correct prescribed equipment i.e. Proper rubber shoes so that he does not get an electric shock while repairing TV at customer's house.
- He should have the right tools.
- He should take care of ESD Safety.
- His soldering iron should be ESD safe .
- He should wear cotton shirt to ensure that there is no ESD.
- PCBs, if any, and certain ICs should be in proper anti static packing.

Fig 4.2.1: Safety Signs

- He should take care of any loose wiring in customer's house.
- He has also to ensure that there is no liquid spillage at the floor in the workplace.
- He should also ensure that there are no obstructions around at the work place.
- He must also ensure that the soldering iron etc. are out of reach of kids and kids are either not allowed in the work area or not allowed alone to ensure their safety.
- Some safety symbols and the engineer has to take care of those:

4.2.1: More on ESD / Static Charge

If due to any reason, only one type of charge carrier is added or removed from an object , it can create an electrical imbalance and a charge may be developed on the object.This is static charge. It can be neutralised only when itis given a discharge path.

Static charge is generated due to:

- Friction
- Conduction
- Induction

4.2.2: Where from Static Electricity is generated

Insulation Material like polythene or polypacks

Insulation mats, shoes, chappals etc, carpets

Clothes

Masking Tape

Failure due to ESD can be very high and can cause:

- Failure of product during Production
- Failure of product at customer's place at time of installation
- Intermittent Part Failure

Such failures can be very harmful as they also damage Company's reputation and credibility.

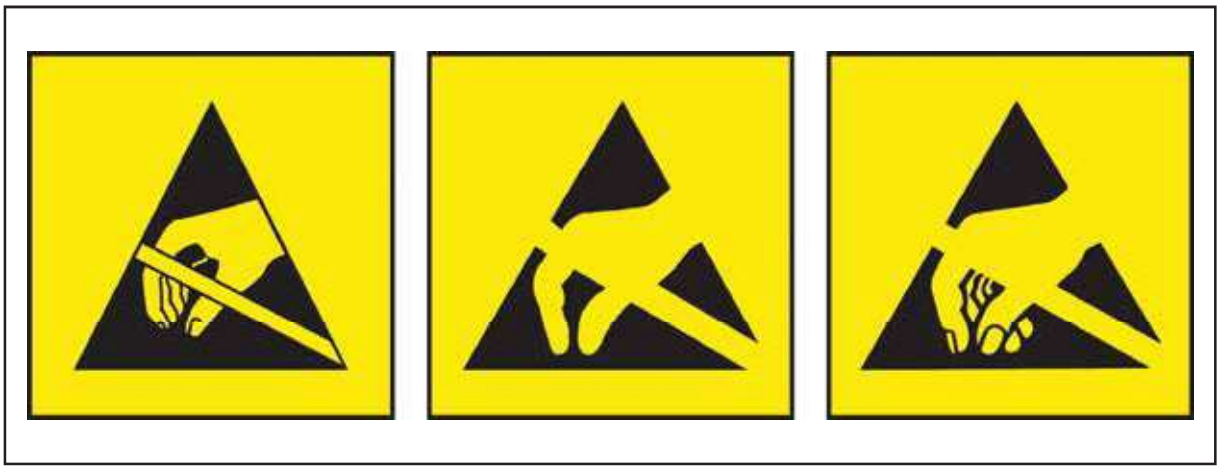


Fig 4.2.2.1: ESD Warning label

Wrist Strap for ESD Safety:

Fig 4.2.2.2: Anti Static Wrist Strap

Fig 4.2.2.3: Anti Static Wrist Strap 1

ESD Safety Gloves:

Fig 4.2.2.4: ESD Safety Gloves

ESD Safe work Table:

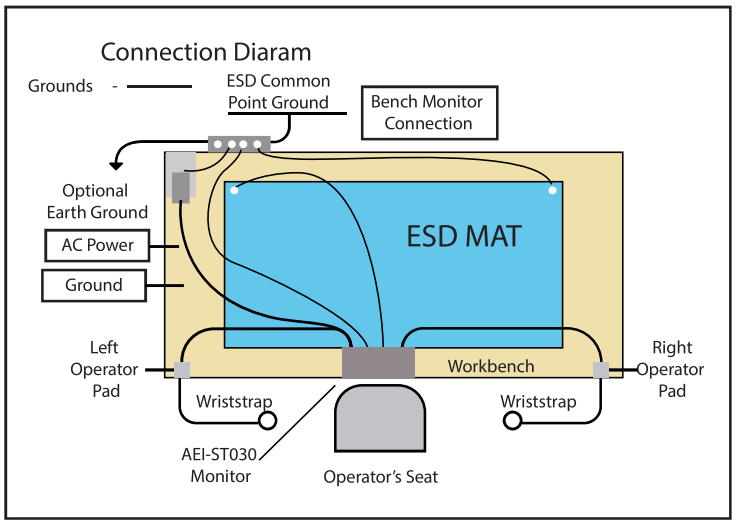


Fig 4.2.2.5: ESD Safe work Table

ESD Safe Tweezers:

Fig 4.2.2.6: ESD Safe Tweezers

ESD Safe Packing:

Fig 4.2.2.7: ESD Safe Packing 1

Fig 4.2.2.8: ESD Safe Packing 2

UNIT 4.3: Remote Control of Television Set

Unit Objectives

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

1. Explain concept of remote control device
2. Explain functioning of remote control device

The first remote intended to control a television was developed by Zenith Radio Corporation in 1950. The remote, called "Lazy Bones", was connected to the television by a wire. A wireless remote control, the "Flashmatic", was developed in 1955 by Eugene Polley.

How does a television remote control work?:

The main technology used in home remote controls is infrared (IR) light. The signal between a remote control handset and the device it controls consists of pulses of infrared light, which is invisible to the human eye, but can be seen through a digital camera, video camera or a phone camera. The Remote sends a pulse signal which is received by the Infra Red receiver which is fixed behind the transparent glass screen on the panel of the TV. This pulse is then sent to the micro computer or micro processor in the TV. The Micro processor then works as per the command received and further directs the relevant pin on the micro processor which then does the action as per the command. For example, if we press the power button on the remote and the set is already in stand by mode, the micro processor receives the command from the IR receiver and gives command to a particular pin which either goes high or low as per the circuit thus activating the power supply and the voltages are released thus switching on the set.

Installing a TV Set:

Fig 4.3: TV Remote Control

4.3.1: Needed Tools

Some tools used in the installation profession are very costly. But the Companies provide these to their technicians. However, those who intend to start their own shops will have to purchase these tools on their own. But, this will be initial investment only.These tools can save time and help in proper installation as it is also important to ensure that walls of customer's house are not defaced or damaged during installation. The wiring may also need to be concealed so that it does not look clumsy. While drilling one has to ensure that wiring , if any, within the wall, is not damaged. We here give a list of tools needed for LCD

TV installation:

- Stud finder
- Tape measure
- Spirit Level
- Pencil
- Power drill and drill bits
- Socket wrench
- Allen wrench
- Wall probe — piano wire, etc
- Wire running tools — fish/carpet tape, flex rods, electrical tape
- Drill bit — appropriate size to drill a pilot hole for the fastener you are using

The following steps are needed to carry this out:

1. Ask the customer where he wants the CTV to be installed. Check if the location is O.K. as per safety and viewing requirements. If not, guide the customer into choosing another location / wall (in case FPD TV is to be hanged).

2. Carry the carton to that place / room with customer's permission. Do not push or pull it.

3. Cut the packing tape with a cutting knife.

4. Take out the thermocol and the plastic cover and the accessories pack. Ensure that thermocol does not break.

5. Check and show to customer all the accessories. If there is any discrepancy, call your supervisor and inform him and then inform the customer that the discrepancy will be corrected as per your discussion with your supervisor.

6. Put the CTV on the table or at the customer's desired place but ensure the directions in Point 7.

7. Ensure that there is sufficient space behind the set and and on its sides. If it is inserted inside a cabinet or any space in a wall, ensure that there is sufficient ventilation so that the heat generated in the TV is properly dissipated. Inform the customer that when set is on, it should not be covered with any cloth etc as the heat generated inside will not be dissipated and there can be a mishap.

8. When the TV is on, there should not be any cover / cloth on its top / sides.

9. CRT TV Top should not be used as a table top and no magnetic or paramagnetic (iron) things should be put on top of it or near it .

10. Fix all the cables, wires properly and tie them with a tie so that they do not occupy useful space and do not create any hindrance.

11. There should not be any heat source near a TV and also no source from which TV may get moisture.

12. Use a 5 Ampere socket for TV and it should be near TV so that no extension cord is required for switching on the TV.

13. No Multi socket should be used for TV i.e. except TV no other device is to be run on that socket.

14. Ensure that there is no sparking in the socket.

15. Connect the signal cables to the ports i.e: RF, AV, RGB / Component Video or USB.

16. Switch on the set and check all functions and tune channels if signal is RF.

17. If signal is from dish, it will receive signals once you have connected dish output to the respective AV Port of set top box.

18. In case of RGB, signal may be from DVD Player. Connect the output from DVD to the respective Video Ports i.e. R,G,B. Connect the sound also. If customer is using a Home Theatre, do connections through Auxiliary. For 5.1, you have to connect the respective speakers with the sound o/p ports. You have also to do the selection of switch ie. 2.1 or 5.1.

19. Adjust contrast, brightness, colour, volume as per customer's choice.

20. Check Volume settings and adjust as per customer's choice.

21. Depending on the signal available check picture and sound performance on those signals.

22. Check working of remote control, its range, viewing angle, and functions.

23. Check working of panel keys.

24. Check and ensure that there is no switch off spot.

25. Check and ensure that no patches are formed

Fig 4.3.1: TV Sets

Quick view:

- This facility allows toggling between two channels (last viewed and current programs)
- Benefit: If viewer is watching programs on 2 different channels, he can switch channels without pressing channel number

Channel scan:

- This feature enables scanning all tuned channels with a single key on remote
- Benefit: If viewer forgets channel number of a program, he can use scan to locate that channel instead of searching through all the channels

Blue Back with Audio Mute:

- This feature is activated on no signal or very weak signal at RF terminals. The screen turns blue and sound is muted
- Benefit: The viewer is spared of the noise when a loss of signal occurs

Auto switch off on no signal:

- This signal is activated when in case of no signal for 15 minutes. The TV goes to stand-by mode automatically.

  Benefit: The viewer is saved trouble of switching of TV if there is no signal for a long time.

Channelskip:

This skips channels while in channel scan or in Up/ Down mode. Benefit: For example, if viewer does not watch all regional language channels, he can skip all these channels so that when he is surfing channels, these channels are automatically skipped

Soft Start (Curtain Effect):

- This is a safety feature in advanced TVs to turn TV on gradually when the power is switched On.
- By switching On TV gradually, the life of the picture tube is increased

Zoom:

Soft Start (Curtain Effect):

- This is a safety feature in advanced TVs to turn TV on gradually when the power is switched On.
- By switching On TV gradually, the life of the picture tube is increased

Self-demonstration: (Dynamic):

- The TV gives demonstration of all features one by one in sequence.
- The function shows features to user by varying the levels so that user can see the difference

Benefit: It helps user to get familiarized with various features in TV by pressing a single button

Clock:

- This helps to set time in the tv and helps execution of ON/OFF TIMER features. The clock settings are lost whenever TV is switched OFF
- Benefit: The display shows time. The clock is used to set alarm , On /OFF /Sleep timer and Scheduler.

Alarm:

- This allows switching ON/OFF the TV set everyday at predetermined time.
- Benefit: Viewer can use TV as alarm clock. Time and channel can be set TV automatically switchs ON/OFF at

ON /OFF/ Sleep timer:

- These features allow switching On or Off TV set at desired time. Sleep timer helps switching off TV at set time.
- Benefit: The user does not need to switch On/Off TV at particular time, especially when he is busy

Digital Super Scene Control:

- It ensures vibrant and true colours on TV screen.
- Benefit: The viewer sees pictures closer to natural skin colours.

Digital Black Stretch Circuit:

- Improves black level of signal.
- Benefit: This results in enhancement of contrast of picture making picture more live.

Digital Noise Reducer:

- This feature helps in reducing noise content in picture
- Benefit: This feature is especially useful in far off or hilly areas having weak signals.

Volume PP ON/OFF:

- A global volume setting is assigned to all channels
- Benefit: The volume fluctuations that happen while changing channels is taken care of. The viewer can surf channels late into night without disturbing others.

Volume Fix:

- With this viewer can set upper limit for Volume level beyond which increase in volume level is not possible.
- Benefit: This feature is useful when user wants to prevent others from increasing volume above a certain level

4.3.2: Check the Voltage available at supply point:

Voltage:

Phase to Neutral= 230V as per current Indian standards

Please note that

Voltage between Phase and Neutral=Voltage between Phase and Earth + Voltage between Neutral and Earth.It is also important to understand that a only maximum of upto 10 Volts can be between Neutral and Earth.

Also, Phase should be controlled through a switch. As per Indian standards, phase should be on the right side in a socket and as stated above, needs to be through a switch only. The socket should be of the correct rating as per the specifications provided in the product manual and should be BSI compliant. BSI means '' Bureau of Indian Standards '' and it is mandatory for the manufacturer of the electrical socket to get certified by BSI because if the quality of the electrical socket is not as per standard, it can cause an electrical shock and can result into a mishap.

But there should not be any shorting between Neutral and Earth

UNIT 4.4: Installing a Television Set

Unit Objectives

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

1. Apply standard procedure for the installation of various types of TV

Check the Voltage available at supply point.

Voltage:

Phase to Neutral= 230V as per current Indian standards

Please note that

Voltage between Phase and Neutral=Voltage between Phase and Earth + Voltage between Neutral and Earth.It is also important to understand that a only maximum of upto 10 Volts can be between Neutral and Earth.

Also, Phase should be controlled through a switch. As per Indian standards, phase should be on the right side in a socket and as stated above, needs to be through a switch only. The socket should be of the correct rating as per the specifications provided in the product manual and should be BSI compliant. BSI means '' Bureau of Indian Standards " and it is mandatory for the manufacturer of the electrical socket to get certified by BSI because if the quality of the electrical socket is not as per standard, it can cause an electrical shock and can result into a mishap.

But there should not be any shorting between Neutral and Earth

The following steps are needed to carry this out:

1. Ask the customer where he wants the LCD TV to be installed.
2. If it is on a wall, check its strength. The wall should be strong enough to hold the load of a hanging LCD TV. The LCD should not be hanged on a cracked wall or on a wooden / ply partition as these may collapse leading to a mishap.
3. Ask the customer who will sit in front of the LCD TV. The height of the tv is decided on various factors like this and distance from the TV, Viewing angle etc .
4. Check and see the location of AC socket.
5. Sun light should not fall directly on thescreen
6. There should be sufficient space in the front of LCD TV so that there is no blockage.
7. LCD TV will not be hanged below indoor unit of an Air Conditioner.
8. Carry the carton to that place / room with customer's permission. Do not push or pull it.
9. Cut the packing tape with a cutting knife.
10. Take out the thermocol and the plastic cover and the accessories pack. Ensure that thermocol does not break.
11. Check and show to customer all the accessories. If there is any discrepancy, call your supervisor and inform him and then inform the customer that the discrepancy will be corrected as per your discussion with your supervisor.
12. Check to see if there are any breakages, scratches, dents etc. If no, show to the customer that product is in OK condition. If not, call your supervisor and inform him and ask him for the solution so that you can also inform customer about it.
13. Put the LCD TV with its panel facing downwards on a cushion to ensure no scratches develop on the panel of the LCD TV.
14. Take out the wall stand. If the customer wants the LCD to be put on a table etc. you will have to fix the table stand.
15. Take the measurements on the wall as per your discussions with the customer.
16. Do the markings on the wall.

17. Lay some paper on the floor adjacent to the wall where LCD is to be hanged to ensure that the debris falls on paper after drilling.

18. Drill the holes and fix the fastners in them.

19. Check the levelling with spirit leveller.

20. Note down the Model number, set s.n. on your job card.

21. Fix the LCD on to the stand.

22. Ensure that there is some space on sides. Inform the customer that when set is on, it should not be covered with any cloth etc. as the heat generated inside will not be dissipated and there can be a mishap.

23. Fix all the cables, wires properly and tie them with a tie so that they do not occupy useful space and do not create any hindrance or if possible check with customer so that concealed wiring can be done as shown in figures shown below.For this one method is to use a channel from the back side of the LCD.This channel goes down near then power point and the signal source from where the power wires and signal cables go inside the channel. The channel can be got painted by the customer to match with the wall colour.

24. There should not be any heat source near the LCD TV and also no source from which TV may get moisture.

25. If LCD has to be installed in a kitchen, ensure that above points are taken care of.

26. Use a 5 Ampere socket for TV and it should be near TV so that no extension cord is required for switching on the TV.

27. No Multi socket should be used for TV i.e. except TV no other device is to be run on that socket.

28. Connect the signal cables to the ports i.e: RF, AV, RGB / Component Video or USB, VGA, HDMI

29. Switch on the set and check all functions and tune channels if signal is RF.

30. If signal is from dish, it will receive signals once you have switched on the set top box and connected dish output to the respective AV Port.

31. In case of RGB, signal may be from DVD Player. Connect the output from DVD to the respective Video Ports i.e. R,G,B. Connect the sound also. If customer is using a Home Theatre, do connections through Auxiliary. For 5.1, you have to connect the respective speakers with the sound o/p ports.

32. If customer wants to see some pictures or videos through USB, insert the pen drive into the USB Port. Now, select USB in TV /AV or Source. The video /picture or audio files will be detected. Same can be selected and viewed. It is important that now there are various video, audio and picture formats and customer may have downloaded some files from some sites on net. The manufacturer clearly informs in customer manual as to which formats will be supported and engineer must be aware of it. In some cases, if the video format is not being supported, engineer can get the file from the customer and get same converted to MPEG 4 at his workshop using a video converter (or he can covert it at customer's house if he has a laptop and video converter in it. Once converted to MPEG 4, the video can be viewed.

33. Adjust contrast, brightness, colour, volume as per customer's choice.

34. Check Volume settings and adjust as per customer's choice.

35. Depending on the signal available ask the customer and connect the signals if he so desires and inform him about it.

36. Check working of remote control, its range, viewing angle, and functions.

37. Check working of panel keys.

38. Adjust contrast, brightness, colour, volume as per customer's choice.

39. Check Volume settings and adjust as per customer's choice.

40. Depending on the signal available ask the customer and connect the signals if he so desires and inform him about it.

41. Check working of remote control, its range, viewing angle, and functions.

42. Check working of panel keys.

Height of LCD TV can be at 100 to 120 cm above the Ground Level and

The middle of LCD TV should be at viewer's eye level so that viewer can comfortably watch the TV.

Note: - If LCD TV is installed above or below the eye level, viewer may have to change his neck position to watch the picture causing strain in neck. Also, this will not be the best position for viewing as viewing angle will be changed and viewer will not get best picture and may later make a complaint for same. If viewer insists installation in such a manner, first educate him about disadvantages of doing so and if he does not agree, install it but inform him also that if he wants reinstallation at a later date, he may have to pay for same as per your company policy because normally companies give first time installation free. Request him to write his request on the job card and get his signatures on it.

The following figures show the method of a LCD TV. It also shows the method of concealing the wires and cables. It should be noted that concealing the wiring also depends on the kind of wall on which the LCD is to be hanged Depending on that the wires and cables are concealed.

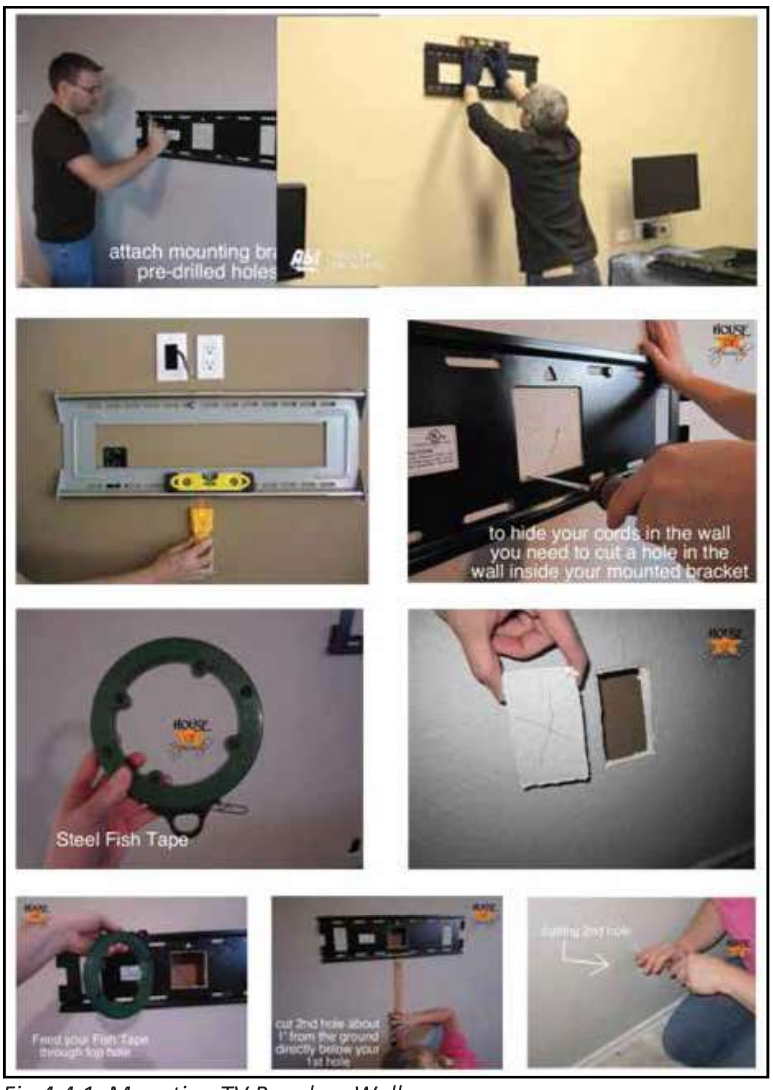


Fig 4.4.1: Mounting TV Panel on Wall

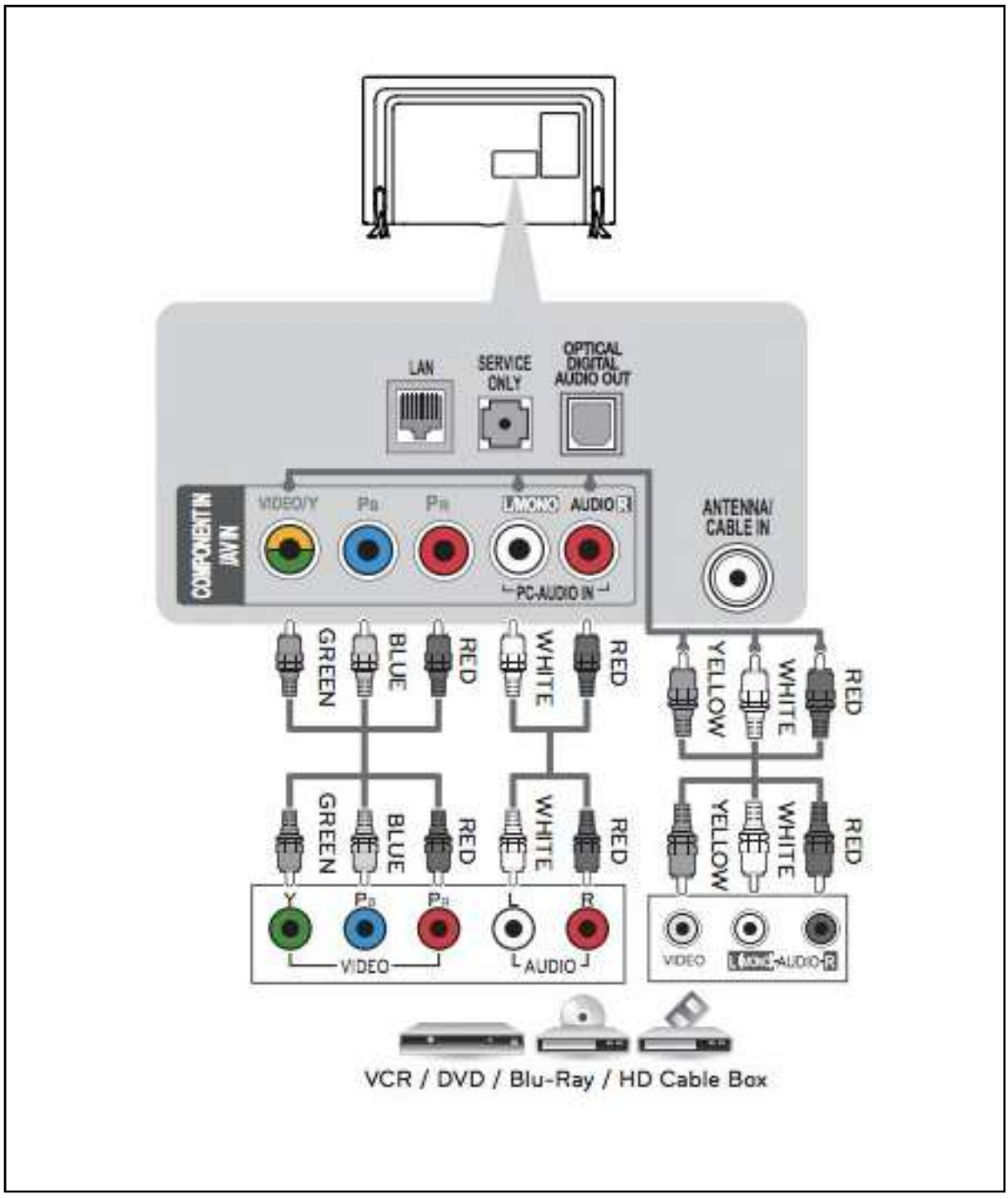


Fig 4.4.2: Back Panel of TV Set

UNIT 4.5: Check TV set's functioning

Unit Objectives

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

1. Apply brand SOPs to check functioning of TV after installation process

In any situation where your television is connected via digital cable or satellite box it is highly recommended that you follow the below mentioned procedures

- Check cable connections both from the outlet and to the television.
- Connect the equipment to an alternate signal source. If issues persist with your digital cable or satellite issues persist when connected to other sources, please contact your service provider.
- Reset the cable/satellite box or other input devices by unplugging them from the power source, wait for 15 seconds, and then plug again.
- Press the 'Menu' button. If the menu displays correctly, the picture problem may be a source issue and you should check all of the connections and cables from your devices to the TV.
- If audio is O.K. on selected source but no video, check the video cable.
- Adjust the television controls. Try resetting all video and audio options to default as incorrectly set controls can cause problems with television. But do not reset or factory set without customer's consent as it will erase all customer's previous settings
- Select correct source to get the picture.
- Use the Channel select or Input select to switch the source.
  Tell the customer that his television may require service if...
- The set does not switch on when set is in standby and command is given from remote or panel to switch it on.
- He gets audio on the selected source but no brightness and no On-screen menu display (press 'Menu' or 'Volume').

- Check outlets by plugging in a different device.
- Check power cord connection at the back of the unit to ensure it’s properly connected. • Check power cord to ensure it’s not broken or cut.
- Check the owner's manual before calling for service.
- Check the remote control and replace its batteries if necessary.
- The images on all channels are fuzzy or the picture is snowy but visible and audio distorted.
- An external device cable or cable connected to TV may be loose.
- Connect the cable directly to the TV set, if still distorted please call your cable/satellite provider. A black border frames the top, bottom or sides of the screen.
- The program is being shown in "letterbox" format, consult TV user manual or input device user manual.
- No service may be required if there is no sound or the volume is too low. In such a case the volume may be turned down or muted.
- Turn the volume up on the TV set.
- Turn off the ‘Mute’ function via the remote control or on your television. The audio has a distinct buzz or hum.
- The TV set's volume is adjusted to the top of its range. • Input cables may be loose or improperly connected, ensure they are firmly connected.

Exercise:

1. What is ESD?
2. Why is it necessary to control ESD discharge?
3. What do you understand by Auto tuning?
4. What is the best place to install a LCD TV?
5. What tools are required to install a LCD TV on a wall?

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5. Repairing Dysfunctional CRT TV Set

Unit5.1 – Block Diagram of CRT Based Television System

Unit5.2 – Power Section SMPS

Unit5.3 – Tuner Section

Unit 5.4 – IF Section

Unit 5.5 – Video Section

Unit 5.6 – Audio Section

Unit 5.7 – Common Faults

Unit 5.8 – Faults specific to different TV sets

Unit 5.9 – Safety Standards to follow

Key Learning Outcomes

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

1. Explain various sections of CRT TV as per block diagram
2. Identify circuits used in SMPS and their functionality
3. Explains functions of R.F. Amplifier, Local Oscillator & Mixer in tuner section
4. Explain video decoder functionality of IF section
5. Identify and explain functioning of various components in video section
6. Identify and explain functioning of various components in audio section
7. Diagnose fault root cause and their repair requirements
8. Carryout repair procedure of faulty section of CRT TV
9. Use industry best practices to maintain safety

UNIT 5.1: Block Diagram of CRT based Television system

Unit Objectives

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

1. Explain various sections of CRT TV as per block diagram

Fig 5.1.1: Block Diagram of Colour TV

UNIT 5.2: Power Section SMPS

Unit Objectives

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

- Explain the working principle of SMPS
- Explain the circuit diagram of SMPS

Power Supply:There are different kinds of power supplies. A Power supply is required to supply different d.c. voltages to the electronic circuit.

These can be classified as under

- Unregulated
- Regulated: In this we have series and shunt regulated.
- SMPS or Switch Mode Power Supply

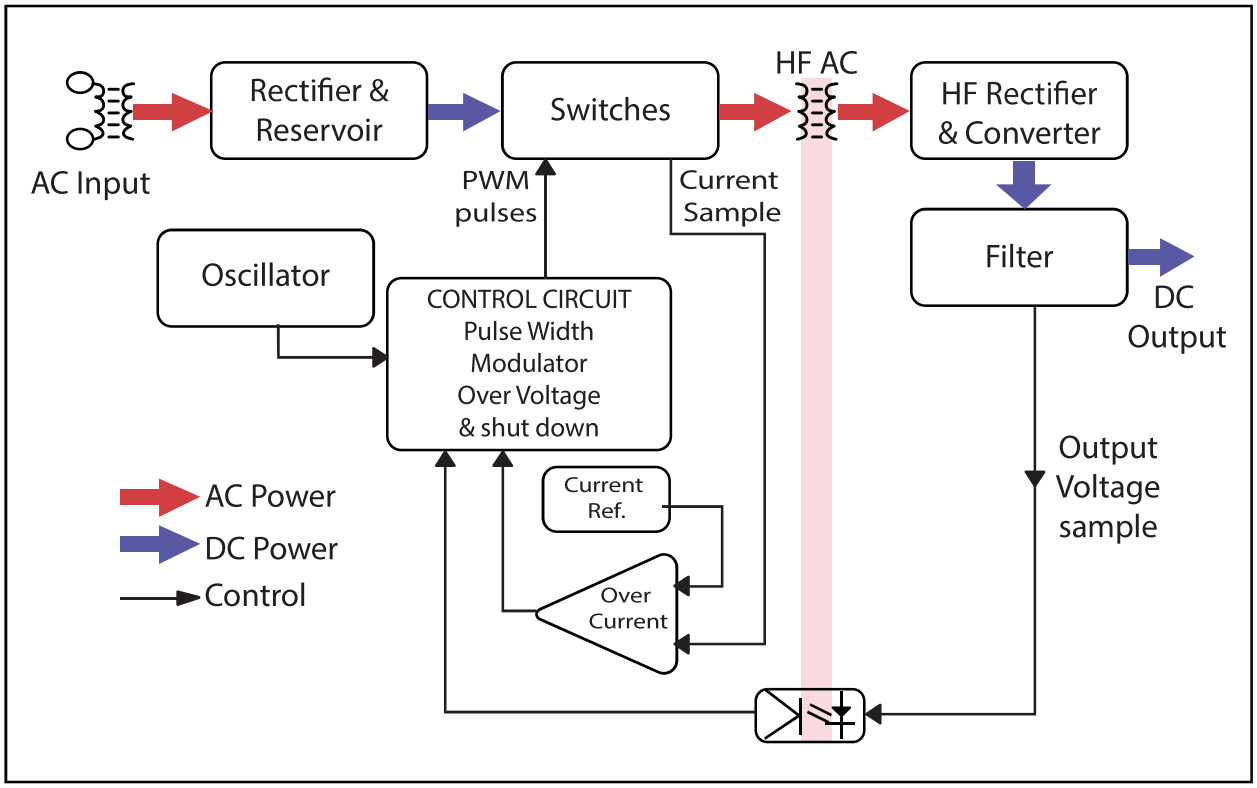

Fig 5.2.1: Block Diagram of SMPS

SMPS Circuit explanation:

- Block diagram a typical SMPS is shown . It has:
- An AC Mains (line) input and
- a regulated DC output.
- The output rectification and filter capacitor.
- A High Frequency switching section and
- A high frequency transformer, and
- Voltage control feedback via
- An opto isolator.
- The control circuit block has ICs / transistors containing the high frequency oscillator, pulse width modulation, voltage and current control and output shut down sections.

Working Principle of SMPS :

Here a high frequency square wave is generated to drive an electronic power switching circuit. This circuit converts the DC supply into high frequency, high current Pulsating D.C which is like AC. This pulsating D.C. or A.C. is converted into a DC output.

But this needs to be regulated. The high frequency AC produced during the conversion process is a square wave, using which, we can control the output voltage by means of pulse width modulation. The regulation of the output is much more efficient than in linear regulated supplies.

Advantages of SMPS:

- Power consumption is low as heat losses are minimum
- As high frequency is used, transformer size is low. Disadvantage of SMPS:
- Failure is less but circuit is complex and fault finding may be difficult.

5.2.1: Working Principle of Television

TV means Tele Vision ie seeing from a distance. It means TV signal transmission is happening at some place and TV signal reception and viewing is at another place which is distant from the place of transmission.

The picture data is very complex and optical. In a scene there are infinite small number of picture elements also called ''pixels ''. When this scene is to be transmitted, scanning of the scene has to be done. The optical data is converted to electrical signal and then transmitted element by element sequentially to cover a complete scene. Scanning is done very fast and the signal is then transmitted at the same time. For capturing a scene, a television camera is used which picks up the picture information and uses a photo

conductive material whose resistance varies according to the brightness of the scene. An electron beam then falls on this material and picks up the picture information on the photo conductive material and converts it into an electrical video signal. This signal then is amplified and then its modulation is done with the picture carrier (Amplitude Modulation).

The sound of the scene (whose video signal is captured) is converted into electrical signal using a micro-phone. This Audio Signal is amplified and then modulated (frequency modulation).

The amplitude modulated picture and frequency modulated sound signal are fed to a combining system from where the combined signal is fed to the transmitting antenna

Antenna:

First of all we have to receive this signal which is in atmosphere. The transmitted signal is sent into the atmosphere through electro magnetic waves. In old days this electromagnetic signal was trapped using signal receptors called Antenna. The antenna used to trap such a signal is called Yagi Antenna. Its diagram is shown below:

It is made of Aluminium pipes and shaped as shown in the diagram. The front rod is called " Director ". Its job is to direct the incoming signal to the '' Dipole '' which is the second rod. The third rod and / or all other rods after this are called '' Reflector/s". Its / their job is to collect the signal which does not go to the dipole and reflect it back to '' director "' from where signal will again go to Dipole. The impedance of Dipole is 300 Ohm.

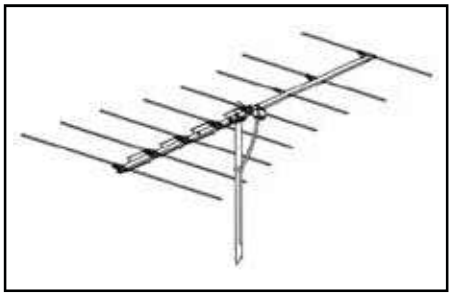

Fig 5.2.1.1: Antenna

It may be clarified that there is a difference between impedance and resistance. 300 Ohm impedance of dipole is the resistance given by the dipole to the electromagnetic signal current. But if you remove the cable from the two ends of the dipole and check the resistance, it may show continuity. If we remove the cable or flat twin lead from balun and check continuity, we should get 3 to 4 Ohms for a wire of approx. 10 Meters because copper wire is used there which is a very good conductor of electricity.

From Dipole the signal is sent to Balun using a 2 parallel cable or coaxial cable. The impedance of this 2 wire flat twin lead is 300 Ohms. But the impedance of Coaxial cable is 75 Ohms.

Balun:

It is also called the '' Balancing Unit ". The impedance of Tuner where signal from Balun is fed is 75 Ohms. But if we are using flat twin lead whose impedance is 300 Ohms, we need to use a Balun just before tuner. So, the signal from parallel wires is given to one side of Balun. It has an iron core on which there are bifilar windings.

One side of Balun is at 300:75 so it balances incoming signal and other side of Balun is at 75:75 so it is again balanced while giving output to Tuner.

Fig 5.2.1.2: Inside of a Balun

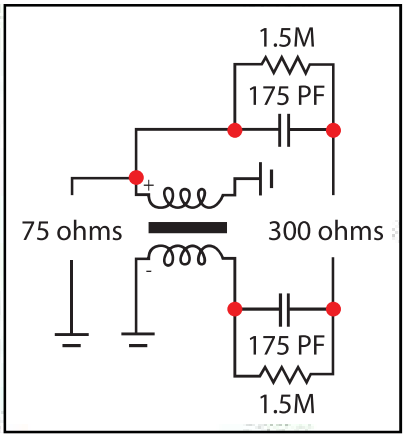

Fig 5.2.1.3: Impedance Matching

Fig 5.2.1.4: A Balun

UNIT 5.3: Tuner Section

Unit Objectives

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

1. Explain functions of R.F. Amplifier, Local Oscillator & Mixer

It has following three parts

A. R.F. Amplifier

B. Local Oscillator

C. Mixer

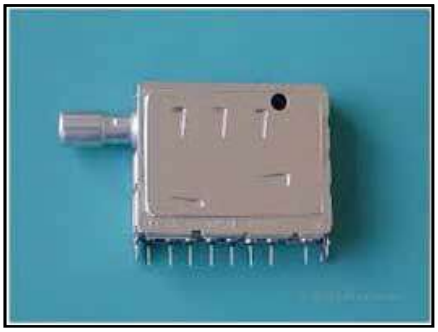

Fig 5.3.1: An Electronic Tuner

R.F. Amplifier:

It is Radio Frequency amplifier. The RF waves are intercepted by the antenna. This signal after travelling in atmosphere through disturbances and external noise is very weak and is in Milli volts while signal required at CRT is of the order of 80 Volts. Thus the actual amplification of signal from Antenna to CRT is of the order of 80 K. After balancing in Balun, this signal has to be amplified so before further processing, it is amplified in R.F. Amplifier of Tuner

Local Ocsillator:

Here a frequency compatible to the signal required is generated. As shown in the table below,local oscillator frequency for Channel 4 in Delhi is 101.15 MHz. For each channel, frequency of local oscillator is different.

Mixer:

The amplified RF amplified signal and local oscillator frequency are fed to a Mixer where these beat together and we get Intermediate frequencies for Picture and Sound.

Picture and Sound IF for Channel 4 of Delhi

Picture R.F. 62.25 MHz	Local Oscillator 101.15 MHz	Picture I.F. 38.9 MHz
Sound R.F. 67.75 MHz	Local Oscillator 101.15 MHz	Sound I.F. 33.4 MHz

Tab 5.3.1: Picture and Sound IF for Channel 4 of Delhi

The output frequencies of Tuner will always be as shown above i.e.
Picture IF=38.9 MHz
Sound IF =33.4 MHz

The frequency will be changed as per the channel one wants to see so that IF frequencies always remain same. If this is not done, we will have to design separate amplifiers and circuit for each channel which will be very cumbersome. To avoid this, local oscillator is used.

Compatibility:

In B &W TV, brightness information of a scene is done by Scanning. In colour TV, information of colour has also to be collected. There are 3 systems for this:
PAL B/G: Phase Alteration by Line
NTSC: National Television System Committee
SECAM: Sequential Error a Memoir
But for Colour TV Transmission, there are certain other requirements such that colour system can generate a B&W picture on a B&W TV.
Also, if colour tv receives a B&W signal, it should generate a B&W picture.
To ensure that these conditions are met,colour information is encoded in a manner that it can be transmitted in the same channel bandwidth of 7 MHz. At the TV receiver, a colour decoder is used to decode the encoded colour signal.
Characteristics of Light:
From the Electromagnetic spectrum, we see that visible spectrum is around a frequency of 5*10^14 Hz. Human eye sees light when radiation from sun reaches the eye in correct proportion. As per Helmholtz, human eye has rods and cones. While rods see brightness, cones see colour. In color theory there are three primary colors: red green and blue, or its printed complements, cyan, magenta, and yellow A fourth "primary," black, is used for printed color.

Additive color:

The additive primaries red green and blue generate colors. The three colors are projected onto a screen in various intensities to produce all colors. Color on television and monitors is produced by three color "guns" corresponding to each additive primary. These produce color intensity based on a voltage level, from 0 to 255. Obviously, 0, 0, and 0 will produce black, or absence of color, and 255, 255 and 255 will produce white

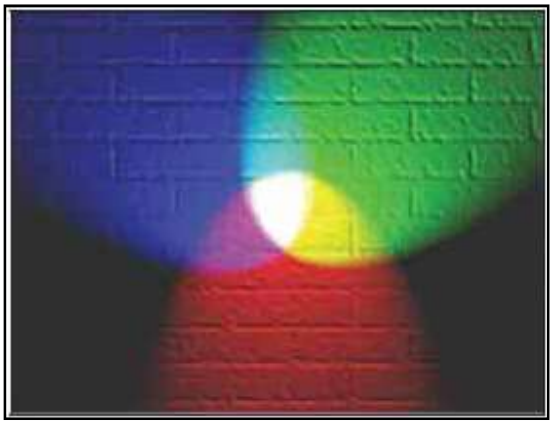

Fig 5.3.2: Additive Color 1

This calculation can be done for colours which can be reproduced in a FPD. If the micro computer is of 8 bits, colours produced for Red=2^8=256 (2*2*2*2*2*2*2*2)
Colours produced for Green=2^8=256
Colours produced for Blue=2^8=256
Colour shades which can be reproduced=256*256*256=16.77 Million
But for CRT TV, we do not check the colours produced in this manner.

Note that if you project the additive primaries, say, from a spotlight onto a stage, a combination of two will produce a subtractive primary (illustration at right).

Red + green=magenta. Green + blue=cyan. Red + green=yellow.
Red + green + blue=white, the whole spectrum.

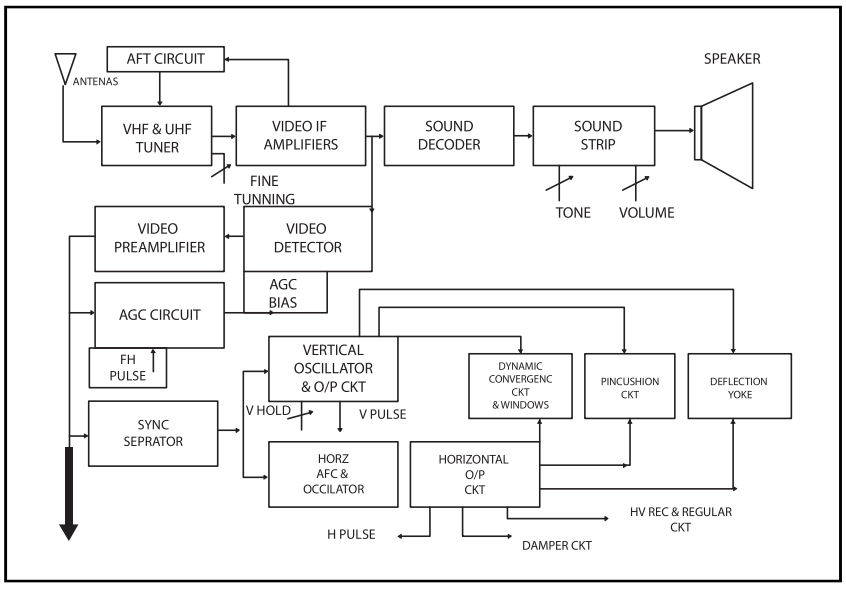

Fig 5.3.3: Block Diagram TV Set 1

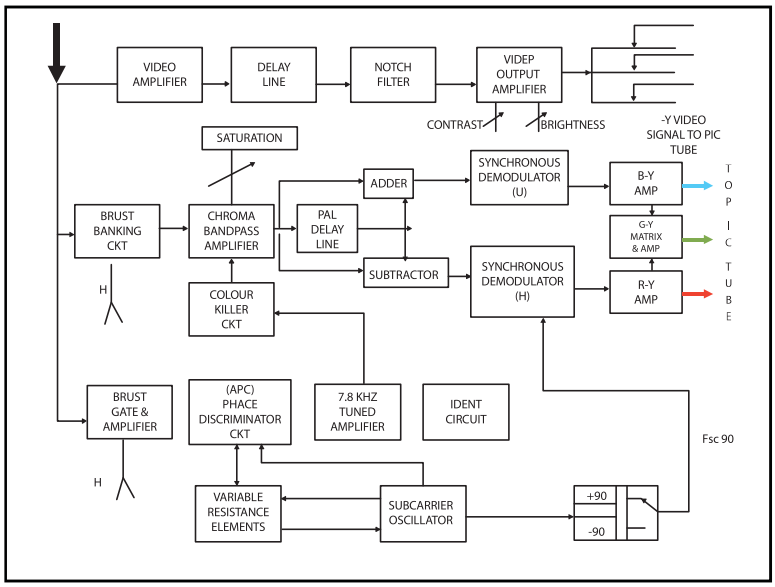

Fig 5.3.4: Additive Color 2

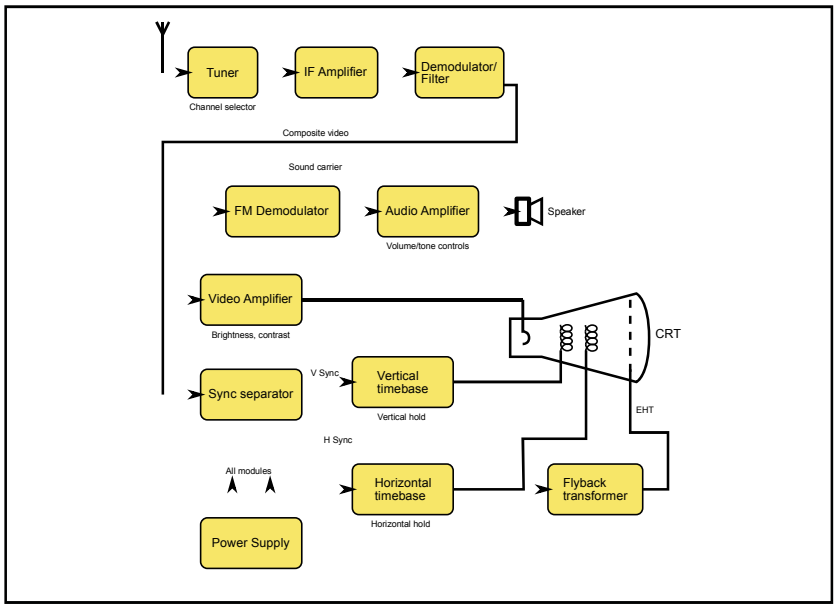

Fig 5.3.5: PAL-CTV General Block Diagram

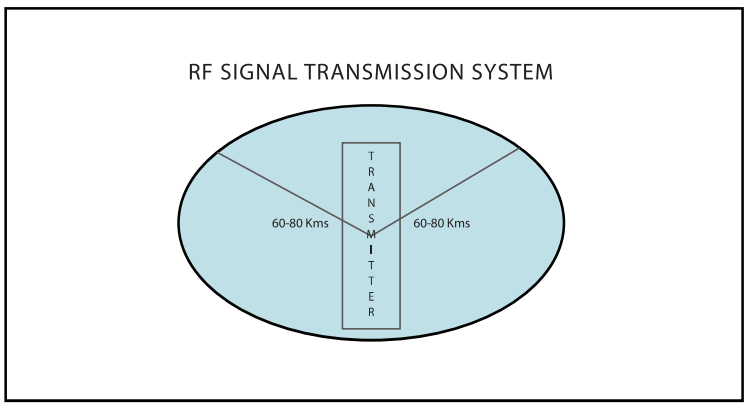

Fig 5.3.6: RF Signal Transmission System

UNIT 5.4: IF Section

Unit Objectives

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

1. Explain function of IF amplifier
2. Explain Video detector functionality

The signal received from tuner is still very weak so before further processing, it needs more amplification. For this, the signal is passed through 2 or 3 I.F. Amplifier stages for amplification. The PIF and SIF have been shown above.As already stated, the IF frequency is same for all channels.

Picture IF=38.9 MHz

Sound IF=33.4 MHz

Difference in these =38.9-33.4=5.5 MHz

It is also called Intercarrier sound and this carries the sound signal.

Video Detector:

The signal from IF is now fed to a Video Detector which is a diode. It detects the video signal and feeds it to a Video preamplifier where the video signal is amplified. Part of this signal also goes to the sound stage which is explained after explanation of Video stage.

UNIT 5.5: Video Section

Unit Objectives

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

1. Explain functions of chroma section
2. Explain function of Micro Processor
3. Identify various circuits used in Video Section
4. Explain architecture and functioning of CRT
5. Explain functionality of Internal Degaussing and External Degaussing Coil
6. Feeding service data in TV

The signal from Video Preamplifier is now fed to Video Out Put Transistor. Here the signal is again amplified before being fed to CRT.

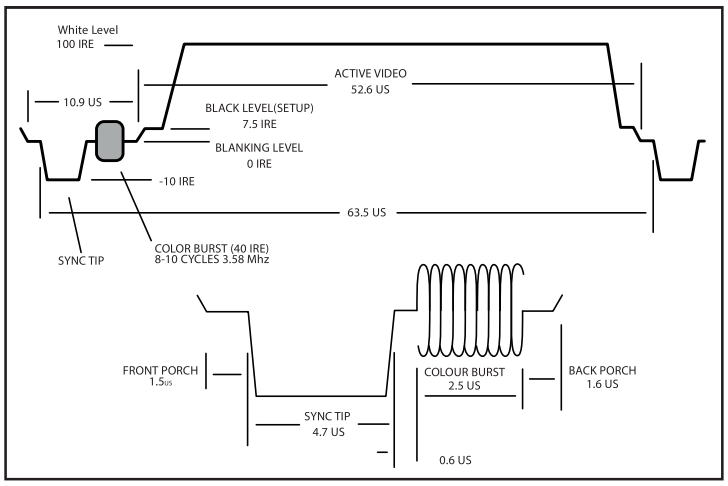

Fig 5.5.1: Signal Amplification

Chroma Section:

We get Y or Luminance Signal or black and white signal from Video output. This signal is then mixed with B-Y and R-Y Signals to get colours. It happens as under:

B-Y+Y=B

R-Y+Y=R

The colour equation is

Y=.39R+.59G+.11B

When we get B and R, we can get G from Matrix.

Green is also not transmitted from transmitter. Also, in PAL, The complete Chroma signal is not transmitted. Only its sample 8-11 cycles called BURST is transmitted. At the receiver there is an oscillaitor of same frequency. This generates the PAL Subcarrier frequency 4.43 MHz to extract the burst and the colour information. From this, we get R-Y and B-Y. Green as already explained is then generated from Matrix as per the equation shown above.

Micro Processor:

CTVs use Micro processors which have many ICs built in eg. IF Amplifiers, Video detector, Sound Demodulator, Chroma section etc.

Memory IC:

A memory I.C. is used so that the selections made by the customer can be memorized.

Inter Connected I.C.s:

In this Microprocessor or chip, Tuner and Memory IC are interconnected through serial bus and serial data. These ICs and tuner keep communicating with each other as shown:

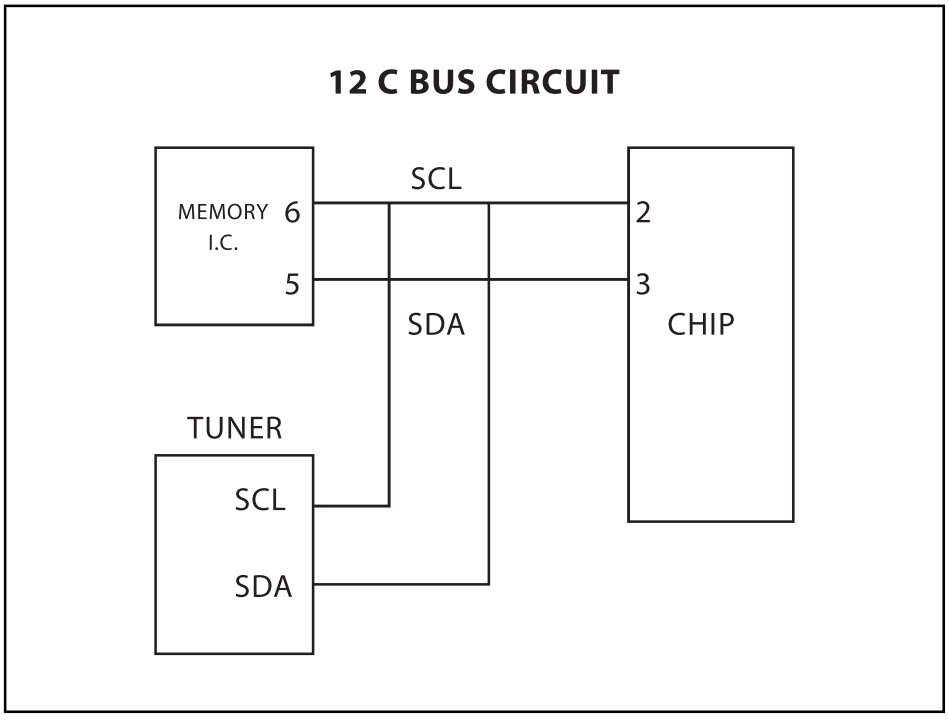

Fig 5.5.2: An I2C Bus circuit (Called I Square C or Interconnected IC.)

5.5.1: Colour Picture Tube

TV means Tele Vision ie seeing from a distance. It means TV signal transmission is happening at some place and TV signal reception and viewing is at another place which is distant from the place of transmission.

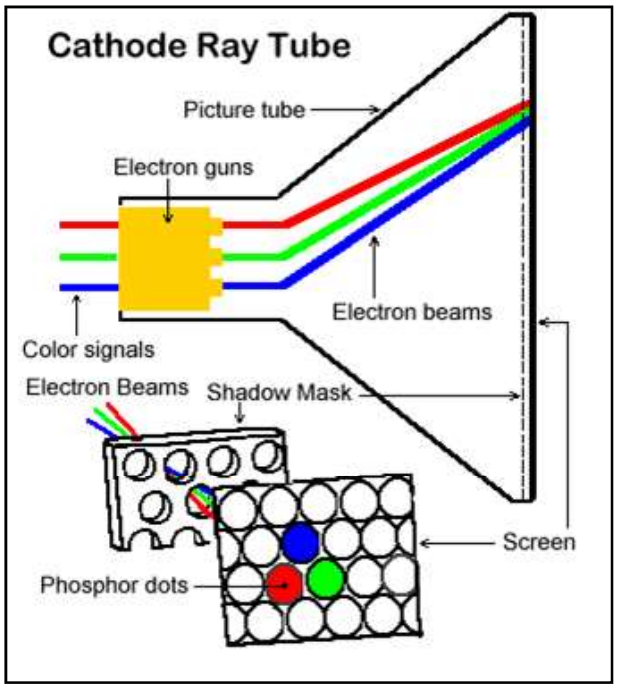

Fig 5.5.1.1: Cathod Ray Tube

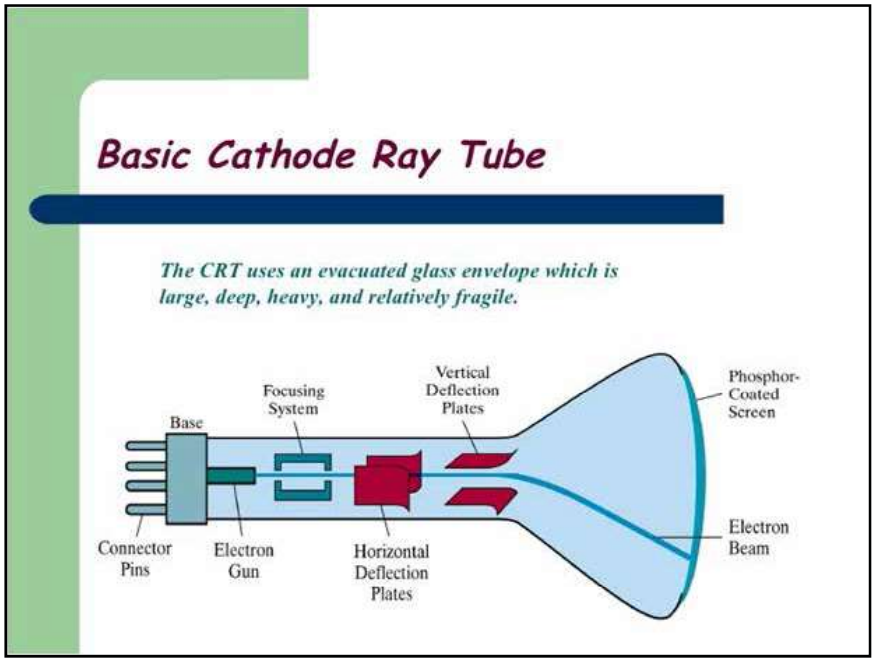

Fig 5.5.1.2: Basic Cathod Ray Tube

It has three electron guns , one each for Red, Green and Blue. As shown the screen has phosphor dots of these three colours. There is a shadow mask and the electrons pass through this mask and then they strike the respective phosphor dots as per the video signal.

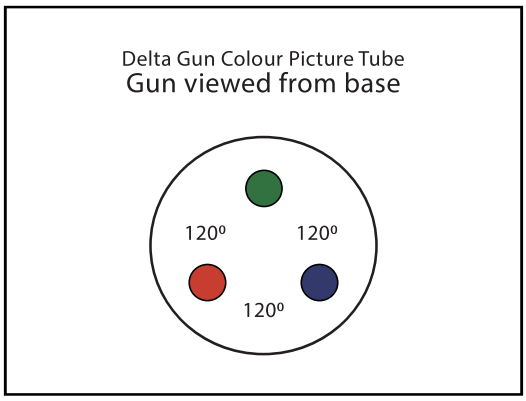

Fig 5.5.1.3: Delta Gun Color Picture View

Internal Degaussing Coil:

As CRT is used in a CRT TV and it works because of movement of electrons. Certain problems can occur due to this movement. To avoid this a degaussing coil and a PTC circuit is built into the circuit.When the set is switched on, AC passes through the PTC and then into the degaussing coil. This degaussing coil is made of Copper wire and when AC passes through it, a strong magnetic field is created due to the AC. This magnetic field degausses or demagnetizes the outer part of CRT and avoids any patch formation.
However, the patch may still be developed due to the following reasons:

1. There may be any magnetic or para magnetic items / things lying near the TV e.g. Radio or sound system, mobile phones, keys or any iron almirah etc. Patches may be developed due to this.
2. If the TV set is moved while it is on, it may develop patches.
   To remove such patches, switch off set for 15 minutes from Mains. Switch on the set after this time.
3. Patches may have been removed.

If still there is no improvement, check / replace the PTC and the coil.
If there is any magnetic field near the CRT TV, the electrons may be deflected from their original path resulting into colour patches on the screen. In certain such cases where patches developed may not be removed by the internal degaussing coil, an external degaussing coil may have to be used to remove these patches.

External degaussing Coil:

If the patches can not be removed by the internal degaussing coil, use an external degaussing coil. To use it, switch on the TV. Take the coil in front of the TV Screen. Switch on the coil and move in in clock wise direction 2 or 3 times in front of the screen. Now, switch off the coil and keep it away. Check the TV now. The patches may have been removed.

Fig 5.5.1.4: External Degaussing Coil

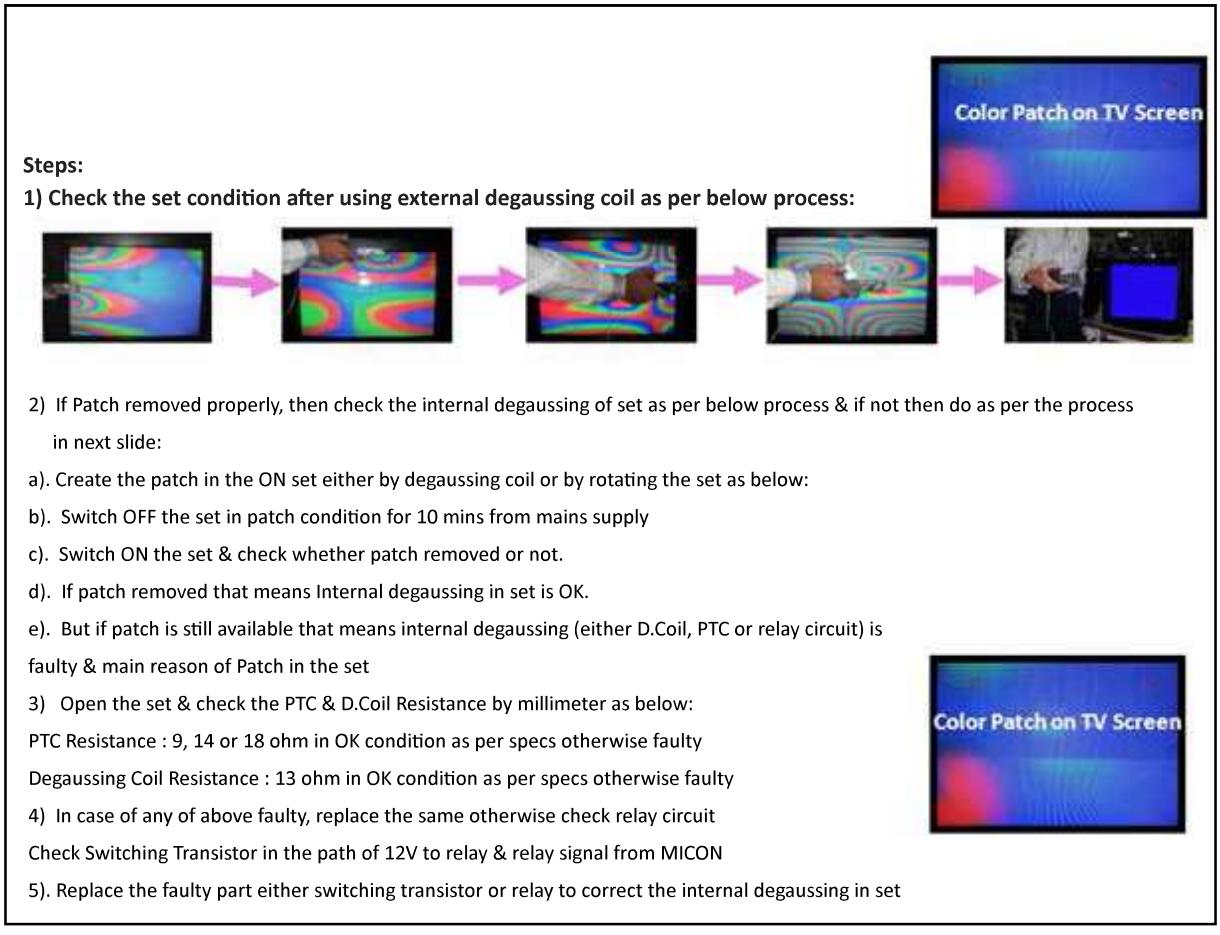

Fig 5.5.1.5: Steps to remove patch

1.	Tuner
2.	Micro Processor
3.	Memory IC
4.	SAW Filter
5.	STR or MOSFET or Switching Transistor
6.	SMPS Transformer
7.	Bridge Rectifier
8.	Vertical O/P IC
9.	Error Amplifier
10.	Fly Back Transformer FBT
11.	H-o/p Transistor
12.	Linearity Coil
13.	Colour Picture Tube CPT
14.	Speaker

Tab 5.5.1: Important Components of a CTV

Chassis Sanyo Key Component Matrix

IC	1	N101 LA 76931 S7N58Y4E (Microprocessor)
Switching Transistor	1	V513 (2SC 4460M)
IS24C16A/D-3P	1	N702 (Memory IC)
LA78040B-E	1	N451 (Vertical IC)
2SA1015	1	V511 (Error Amplifier)
EL817B	1	N501 (Opto coupler)
CRYSTAL OSC. 32.768K	1	G701
H.DRIVE BCT-10FL	1	T401
TUNER EWT5F3PA43 E01W1	1	A101
FBT BSC25-N4014K	1	T402
2SC2383-O	1	V431 (H-driver transistor)
SMPS X Mer	1	T 501 (BCK 40-27 IEC-A)
CV203CZ TDA2003	1	N601 (Audio o/p)

Tab 5.5.2: Chassis Sanyo Key Component Matrix

SMPS Voltage Flow Chart Sanyo Chassis

From	Votage	To	To
SMPS Pin13,VD 551	110V	Collector of Ho/p transistor thru FBT Pins 4,2	Tuner for 33V
SMPS Pin11,VD 553	24V	Collector of H driver transistor thru LDT primary	Pin 2 and Pin 6 thru VD451 of Vert o/p LA78040B-E
SMPS Pin14,VD554,R550, V507	9V	Pin19 of Microprocessor as HVcc	
SMPS Pin 14,VD 554,R550, R571,R572 V508	7B5V		tuner supply
SMPS Pin14,R799 L701	5VSB	Pin35 of Microprocessor as VDD	
SMPS Pin16,VD 555	17V	Pin 5 of Audio o/p CV203	

Tab 5.5.3: SMPS Voltage Flow Chart Sanyo Chassis

SMPS Main Voltages:

SMPS Pin	Voltage
10	112 V from Diode VD 522 to collector of H Out Put transistor
8	13 V from Diode VD 523 to Pins 2 and 6 of Vertical Output I.C. and collector of H-Driver Transistor
14	17 V FROM Diode VD 526 to pins 2 and 6 of Audio Output I.C.
13	10 V from Diode VD 525
11	-13 V from Diode VD 521 to pin 4 of Vertical Out Put I.C.

Tab 5.5.4: SMPS Main Voltages

FBT Voltages Sanyo Chassis

From	Votage	To	And to
SMPS Pin13,VD 551	110V	Collector of Ho/p transistor thru FBT Pins 4,2	Tuner for 33V
SMPS Pin11,VD 553	24V	Collector of H driver transistor thru LDT primary	Pin 2 and Pin 6 thru VD451 of Vert o/p LA78040B-E
SMPS Pin14,VD554,R550, V507	9V	Pin19 of Microprocessor as HVcc	
SMPS Pin 14,VD 554,R550, R571,R572 V508	7B5V		tuner supply
SMPS Pin14,R799 L701	5VSB	Pin35 of Microprocessor as VDD	
SMPS Pin16,VD 555	17V	Pin 5 of Audio o/p CV203	

Tab 5.5.5: FBT Voltages Sanyo Chassis

IC 76931 Pin Description

Pin	Function	Pin	Function
6	Audio out	33	Crystal 32.768K
8	IF Vcc 5V	34	
10	ABL	35	VDD 5V SB
11	R,G,B Vcc 9V	36	Key
12	Rout	44	FBPin
13	Gout	50	4.43 MHz Crystal
14	Bout	61	RFAGC
17	Vertlcal out	63	IF in
19	HVcc 9V	64	IF in
21	Hout		
23	Mute		
26	I.R.		
30			
31			
32			

Tab 5.5.6: IC 76931 Pin Description

5.5.2: Service and Design Data

We have here given a method of entering service data of a particular chassis. Each Company provides its engineers with this data and its code. Using this data, an engineer can check and do many adjustments and resolve many issues in field without opening the back cover of the set. Same is true for LCD and FPDs. However, design data should not be tried for change and the companies give clear instructions to their engineers about it.

Method to enter Service Data of a particular CRT TV Chassis

- Make Vol zero
- Press Menu on remote
- Go to brightness and enter
- Press 6568
- Press sleep timer
- Again press sleep timer for next menu
- To exit, press jump

Different chassis use different Micon and accordingly the method of opening service and design data is different. A Micon or Micro controller is a customized microprocessor which carries out functions as per specifications.

Caution: Before changing any setting, note down current setting of TV in your diary so that if there is no improvement, you can set the data as it was before you changed it.

Signal Type	Signal components	Resolution	Connector type	Signal available from	CRT TV or FPDTV
RF	Picture, Sound, synch and blanking all in one cable or wire	240 lines	Balun or Adaptor	Antenna which receives signal from TV Transmitter	Both
AV	Y, C and control signals	270 lines and better than RF	RCA yellow socket and jack	DVD	Both
S-Video	Y and C	400 Lines		DVD, Camcorder	FPD only
Component Video	Pb, Pr and Y	500 or more lines	RCA 3 cables for picture and separately sound has to be connected	DVD	Both
VGA	15 Pin D Sub	VGA,XGA, WXGA etc.	15 Pin D Sub	PC, Laptop	FPD only
HDMI	HDMI	2Mega Pixel or 4K	HDMI Cable	HDMI Generator, Laptop	FPD only

Tab 5.5.2.1: Connectivity of signals for CRT TV and LCD TV

EURO Multi System (CZ):

R/F Mode	**Video (A/V) Mode**
PAL	PAL
NTSC 4.43	NTSC 4.43
-	NTSC 3.58
SECAM	SECAM

Multi System (CS-System):

In Multi System CTV we can use any kind of video (Color) signal from any country transmission through any mode

R/F Mode	Video (A/V) Mode
PAL	PAL
NTSC 4.43	NTSC 4.43
NTSC 3.58	NTSC 3.58
SECAM	SECAM

PAL System (CB-System):

In Single System CTV we can use video (Color) signal as follows

R/F Mode	Video (A/V) Mode
PAL	PAL
-	NTSC 4.43
-	NTSC 3.58

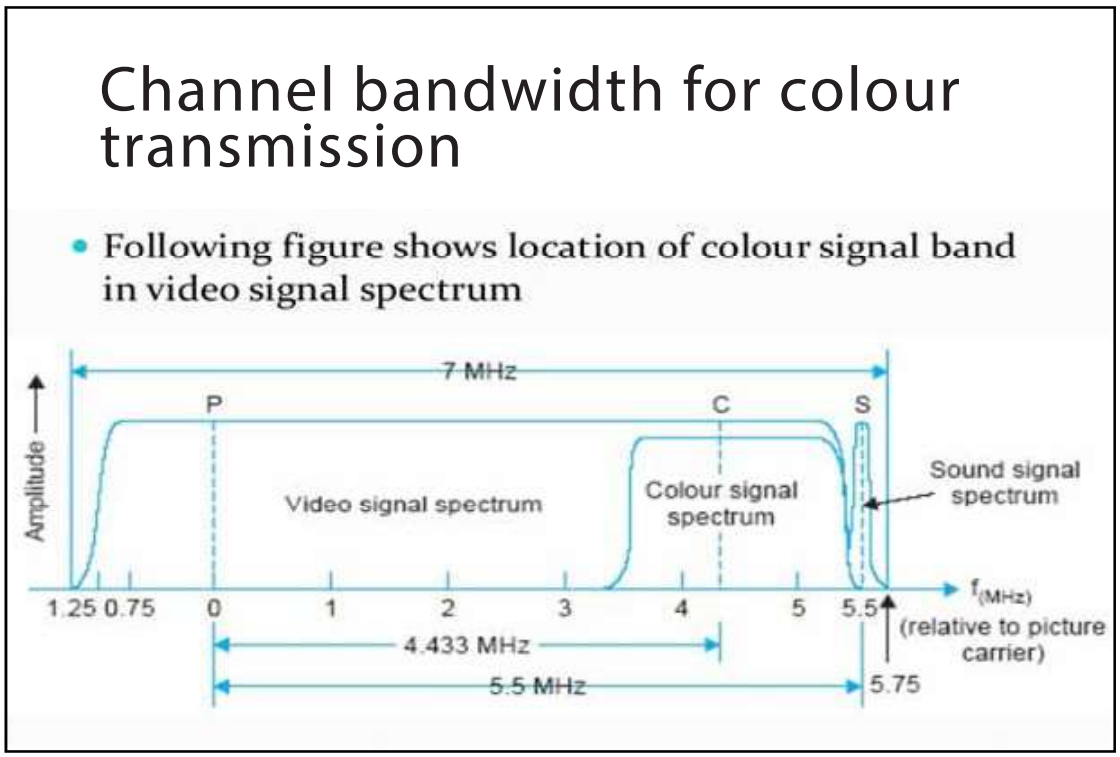

Fig 5.5.2: Channel bandwidth for colour transmission

The channel Bandwidth is =7 MHz
Video Bandwidth=5 MHz
PAL Colour Signal frequency=4.43 MHz
For economy and to ensure that the colour signal does not disturb Video, only 8 to 11 cycles of the colour signal are transmitted. This contains the colour information of the scene. This is called PAL Colour Sub Carrier or Burst. At the receiver, there is a crystal oscillator which produces exact frequency of 4.43 MHz and through this the burst signal is received in the TV or LCD receiver and we get the colour information.

5.5.3: Cathode Ray Tube

The signal from Video Out Put is now fed to Cathode of CRT. If other circuits are working properly and a signal is fed to TV, same will be displayed on the screen. We have covered CRT in detail separately. In a CRT TV, there is a PCB mounted on the CRT. The PCB is shown in the figure. There are three video out put transistors which are on this PCB. Sometimes video out IC is also used.

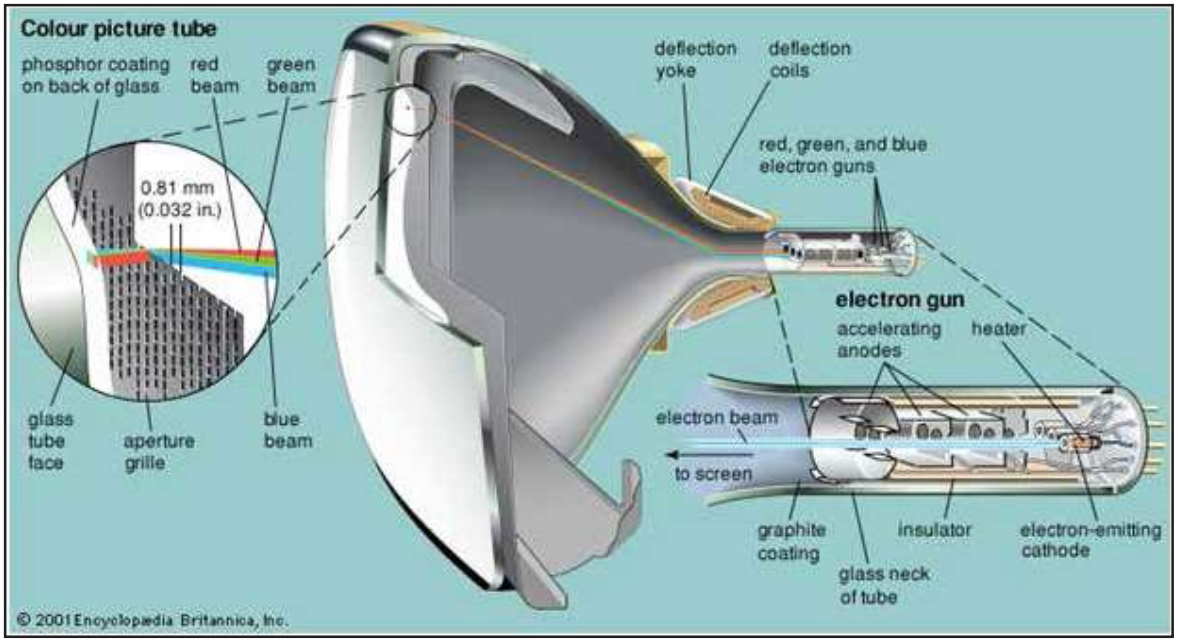

Fig 5.5.3.1: Colour Picture Tube with its parts

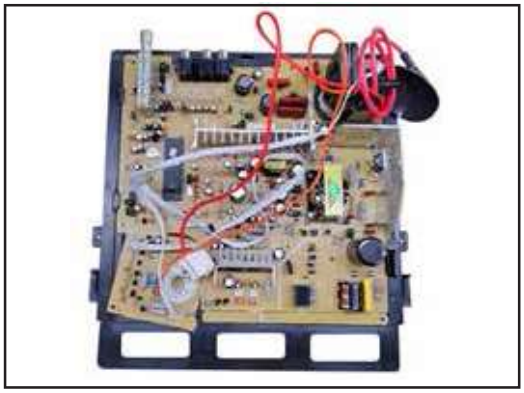

Fig 5.5.3.2: CRT PCB

Fig 5.5.3.3: Anode CAP which is fixed on Anode

Sound Stage:

In the Video Detector, the PIF and SIF beat together and we get the difference of these frequencies which is also called " Inter Carrier Sound ":

Picture I.F.=38.9 MHz
Sound I.F.= 33.4 MHz
Difference=5.5 MHz

In CTV, sound is separated before video detector to avoid harmonic generation from inter carrier sound frequency 5.5 MHz and PAL Colour Sub Carrier frequency of 4.43 MHz.

Sound Trap:

Now this 5.5. MHz signal has to go through a sound trap which keeps only the sound frequency and filters out all unwanted frequencies.

Sound Demodulator or Detector:

The sound signal had been modulated at the time of transmission and it is still in modulated condition. This modulated signal can not drive a speaker. So, first the sound signal is extracted or detected from this signal.

Sound Out Put:

The sound signal is given an amplification before it is fed to a speaker. From the speaker, we get the sound of the programme that we are watching.

UNIT 5.6: Audio Section

Unit Objectives

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

1. Explain sound section of a TV
2. Explain different types of sound system and its functionality
3. Identify various circuits used in sound system

Basics of Sound

Human Audible Frequency: 20-20000 Hz

1 Hz=1 Cycle per second

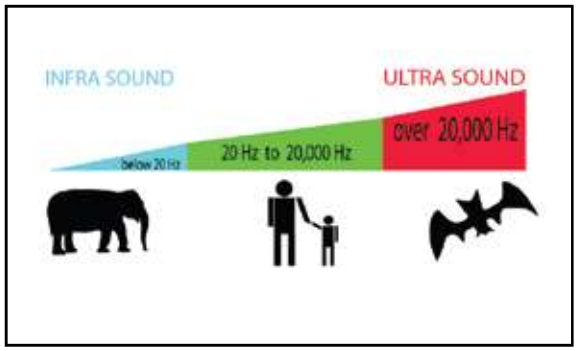

Fig 5.6.1: Audible Frequency

Figure: Human Audible Frequency Range

As is clear from the above figure, humans can only hear sound whose frequency lies between 20 Hz to 20000 Hz. But to reproduce the sound and music exactly in the same way as it is say, in a concert, is in itself a challenge.

Sound frequency can be divided as:

Low, Mid and High. The following table shows the range specifications

Frequency	Name	Instrument	Type of speaker for sound reproduction
Low	Bass	Table, Drum	Woofer
Mid	Dialogue	Voice	Mid Range
High	Treble	Treble	Tweeter

Tab 5.3.1: Low, Mid and High. The following table shows the range specifications

MONO:

In mono all audio signals are mixed and routed through a single audio channel.

A mono signal output through 2 or more speakers is still mono as each speaker reproduces same content of sound.

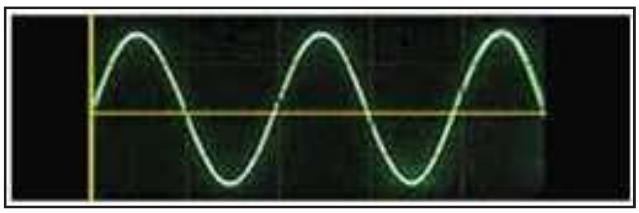

Fig 5.6.2: Mono Signal

STEREO:

Here 2 or more separate channels are used to give natural distribution of sound.

When we listen to these 2 channels on separate speakers, we feel as if we are present at the event.

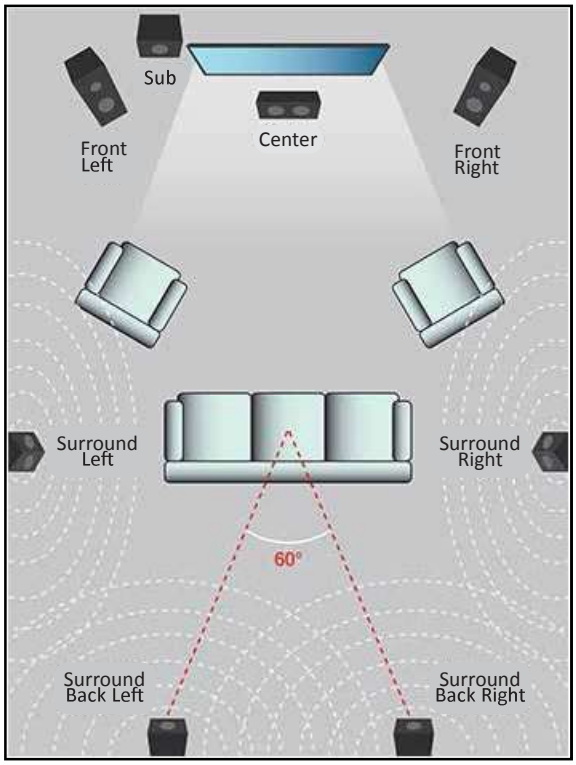

Fig 5.6.3: A 7.1 Speaker system

When the sound surrounds the listener from all sides, we say he is getting Surround Sound. In 7.1 system, we have 7+1=8 speakers. When it is a 5.1 speaker system, it means

There are 5+1=6 speakers which are as under

FL: Front Left

FR: Front Right SW: SubWoofer

Centre Speaker

RL : Rear Left

RR : Rear Right

This system is shown in the following diagram. With LCD or LED TV, where screen is very thin, speakers are very small and when LCD or LED is fixed in a big hall, a Sound System is required to get proper sound and a 5.1 system serves the purpose well. However, in CRT type TVs, the TV cabinet used was big and it was possible to have many speakers inside that cabinet. So, in some companies' models, there were Woofers, tweeters and also Mid Range speakers. Due to this, customer could get reasonably good sound output. Still it should be clear that there is a difference between sound output intensity or loudness and fidelity or quality. If one wants a good quality sound, one has to go for very high quality sound system cost of which can go upto several Lacs. As TVs are for the masses, a compromise has to be made by the manufacturers so that they are able to give a product which can deliver good quality picture and good sound. If a customer wants still better results, he has to choose the costliest models.

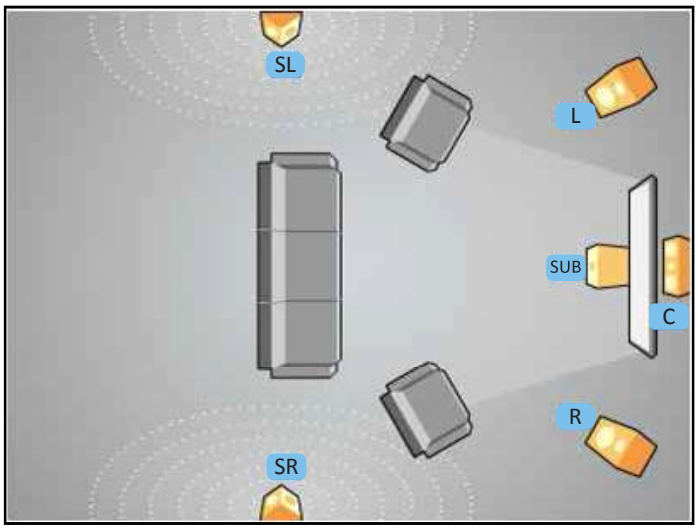

Fig 5.6.4: A 5.1 speaker system

5.5.5: PMPO

This is not a technical term but is actually a Marketing Term. Actual power is R.M.S. or Root Mean Square.
P.M.P.O. means Peak Music Power Output
This term is used to claim Audio Output.
This is a multiplication of R.M.S. Sound Output of the CTV set by a factor.
P.M.P.O =R.M.S.*A Multiplication Factor
Multiplication factor to RMS is not fixed. This Multiplication factor is decided by the Marketing Team of any company.

Raster:

Till now, we have seen the signal path as per the block Diagram. We saw the Video signal path and the sound signal path. To, to see the video Signal, we used a CRT. But we need brightness on the screen so that we can view the picture. The brightness on the screen without any signal is called Raster. This Raster is produced because of the scanning done by electrons horizontally and vertically.

Horizontal Stage:

It has a Horizontal Oscillator, a horizontal driver and a horizontal out put. The frequency of the Horizontzl Oscillator is kept at 15625 Hz. The electrons coming from the cathode ray tube are deflected horizontally using deflection coils which are mounted over the neck of the CRT. The output of the Horizontal oscillator can not directly drive the Horizontal Output circuit so a horizontal driver circuit is used to connect the oscillator and the output. The output then drives the Horizontal yoke.

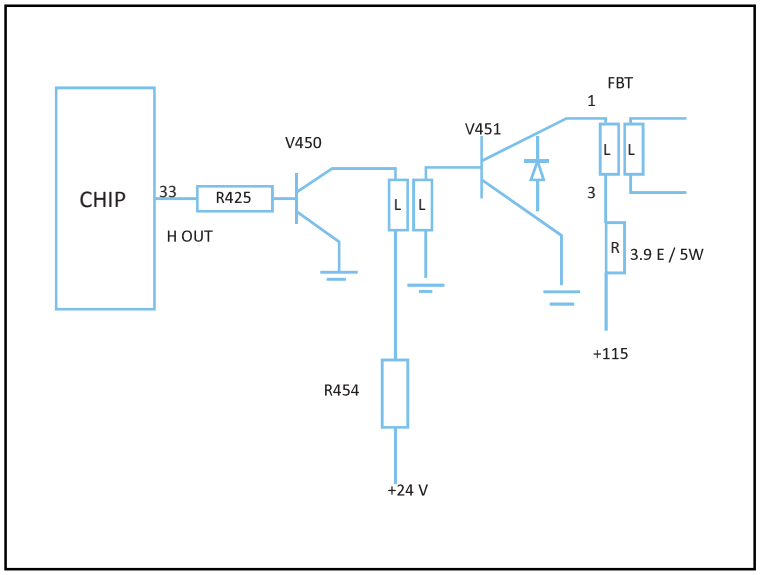

Fig 5.5.5.1: Horizontal Stage

Pin Number / Description	Voltage
HV	HV
Focus	Focus
Screen	Screen
10	200 V
8	3-4 V A.C. for heater or filament
9	ABL (Auto Brightness Limiter)
7	Ground

Tab 5.5.5: Voltages taken from FBT of a CRT Chassis for various stages.

Fig 5.5.5.2: Fly Back Transformer also called EHT Transformer and a Yoke

Vertical Stage:

Here we have a vertical oscillator and a vertical output. An IC can be used or transistors can also be used for vertical output stage. The frequency of vertical oscillator is same as frequency of AC in our country i.e. 50 Hz. If it is not kept so, picture will move up or down and we will get a Vertical Rolling.

AGC Circuit:

This is used to automatically control the gain of the incoming RF signal. It is a circuit between video out put and IF and RF amplifiers. Two AGC Voltages are generated:

RF AGC:

These voltages control then gain of the RF signal and we get optimum signal so that there is no distortion and noise.

IF AGC:

These voltages control then gain of the IF signal and we get optimum signal so that there is no distortion and noise.

Synch Circuits:

These are needed to control and correct the Horizontal and vertical frequency so that the picture being received in atransmission exactly follows the picture being transmitted from the Transmitter.

AFC Circuit:

This is used to automatically correct the frequency of the Horizontal Oscillator so that this frequency does not drift. If it drifts, you will find horizontal stripes on the screen without picture. This frequency pulse is taken from a winding of Fly Back Transformer and fed to the horizontal Oscillator. Horizontal oscillator is in the micro processor or in Jungle IC (This is the name of the IC which was used earlier and it contained Video and Horizontal and vertical oscillators).In still older sets, there were transistors used for Horizontal oscillator circuit.

SMPS:

The set needs power to operate and a SMPS is used to generate various DC supplies as per requirement. Each Company uses SMPS as per requirements of the chassis used in its models. DC Voltages that are generated are: 5V. 8V, 12V, 110V. Depending on circuit requirements, these voltages may vary.

Black and White TV Block:

We have already seen how signal travels in a TV receiver. To understand a CTV, we have to first understand how does a Black and White TV work. For displaying pictures, we need a medium. Here the medium is CRT or Cathode ray Tube. CRT functioning is separately explained in this book. For reproducing sound, there is a complete sound section.

In case of a CTV, The signal is received by antenna or is received through AV, RGB or USB depending on the type of source of signal selected. The signal, if received from Antenna, goes to Balun, Tuner, IF Section, Video Pre Amplifier, Video Output and CRT. As explained above, we have received the signal but to display it, we use CRT here. The cathode of the CRT emits electrons and the video signal goes to the grid.

A television receiver is an electronic device that receives audio and video signals from an antenna, cable/-satel-lite, or a video player and converts those signals into visible light rays and audible sound. A television receiver displays a picture as horizontal lines on the screen. Each line contains a series of red, green, and blue stripes. At viewing distance, the lines and stripes merge and we see a sharp picture in full color. Modern televisions rely on solid-state electronic components that require servicing by a trained technician.

5.5.6: Colour TV Block

How Does a Television Work?

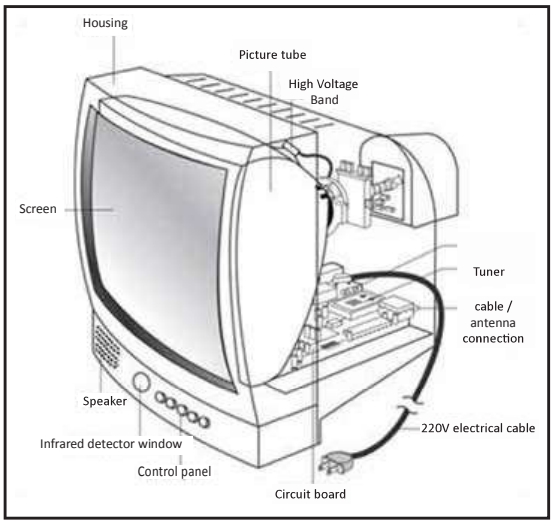

Fig 5.5.6: Identifying a Television Problem?

UNIT 5.7: Common Faults

Unit Objectives

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

1. Diagnose the defect and performance issues in various sections of CRT TV
2. Diagnose fault root cause and repair requirements of CRT TV
3. Carryout repair work of the defective section of CRT TV
4. Carryout service and maintenance requirements of CRT TV

In a CRT TV there are some common faults which may occur in any CRT TV of whatever make. These can be classified as under:

Fault Finding in CRT CTV:

Given below is a table in which common faults that can occur in a CRT TV are listed. Alongwith it in another column, we have given the action / solution for trouble shooting these faults:

S.N.	Fault	Action
1.	Dead	Check AC 230V, Check / replace fuse, VDR, PTC, bridge, s witching transistor, H out put transistor, FBT
2.	Stand by	Check 5V SB at pin 35 of microprocessor, check power low / high at pin 30 microprocessor, V551, V552, VD507, V507, Check 9V at emitter of V507,9V at pin 19 of microprocessor, Check Memory IC and its SDA, SCL, Check H-out from pin21 of microprocessor, H-drive at base ofV431,24V at collector of V431, check whether emitter of V431 and V431 is properly grounded
3.	No Raster, sound o.k.	Check whether filament is glowing, if yes, check brightness, screen, if no check heater voltage, heater continuity

S.N.	Fault	Action
4.	No Picture	If sound is OK , it means fault is after video detector ie in Video output, check RGB Vcc voltages
5.	No Sound	Check Speakers, Audio out put pin, mute circuit, Sound supply in SMPS
6.	NPNS	Check if speaker is ok, if not, replace. If yes, check sound supply 17V, CHK audio I.C, check audio o/p form microprocessor and audio in at audio ic, check mute circuit
7.	PNC/SNC	Check Antenna direction, cable, dipole, balun (for Antenna), cable, balun, adaptor, Tuner, SAW Filter, IF Circuit (for Antenna and cable connection both)
8.	No Sound / Distorted sound on some channels on	Do as in 5 above or Check whether it is cable or DTH Signal, Check in another house or another cable, try to adjust from MFT
9.	PNC/SNC on some channels	Check whether it is cable or DTH, Check in another house or another cable, try to adjust from MFT. MFT means Manual Fine tuning. It is used to tune manually.
10.	NP/NS from AV, Picture / sound ok from RF	Check AV out from microprocessor and follow the circuit right up to AV out

S.N.	Fault	Action
11.	NP/NS from component video	Check that connections are proper, Comp video has been selected in DVD ,Component video or RGB has been selected in TV/AV or Source.
12.	Vertical Fail	Check vert supply 24V at pin 2 and 6 of Vertical O/P I.C., Check 9V at Pin 7, Check drive from microprocessor pin 17 and at pin 1 of Vertical O/P I.C.
13.	Height less	Check vert supply 24V at pin 2 and 6 of Vertical O/P I.C.. Check 9V at Pin 7, Check drive from microprocessor pin17 and at pin 1 of Vertical O/P I.C.
14.	Remote not working	Check cells, check I.C., Infra Red receiver
15.	Horizontal Rolling	It means Horizontal Synch is not locked. Check FBISO. These are fly back pulses of 15625 Hz and are used to control Horizontal Frequency.
16.	Low contrast / dim pic	Check ABL Circuit. ABL means Auto Brightness Limiter. It is found between a FBT PIN and a Micon pin.
17.	No colour	Check colour crystal 4.43 MHZ. In some sets there are 2 crystals and 4.43 MHz Crystal is separate. However, in some sets where a higher frequency crystal is used, 4.43 MHz is also derived from it. Either therer will be a dry soldering or else the crystal may have become defective and you may need to replace it.

S.N.	Fault	Action
18.	Single colour miss	Check R,G,B out from Microprocessor pins.Check video o/p circuit-the particular transistor and its associated circuit. Normally, the transistor may have become defective or the resistor supplying supply to its collector may be open or high value.
19.	Vertical Rolling	Vertical synch pulses are contained in the Video Signal. They are separated in Microprocessor and fed to the vertical oscillator. If there is some fault in this circuit, the picture will roll vertically. If this fault is seen, check the voltages on the relevant pins of vertical oscillator. If these are not OK, Replace Micon IC. Also, resolder the Micon IC.
19.	Colour Patches	Check if there is any magnetic field due to any paramagnetic thing lying near by or magnetic field due to any electric overhead wires or any speakers of any sound system, mobile phone. Remove the cause if there is any such magnetic field. Switch off the set and switch it on after 15 minutes. Patch may be gone. Check and replace internal degaussing coil, PTC etc. If these are OK, use an external degaussing coil to remove the patch. Check if convergence is OK. If it still does not go, you may have to replace CRT.

Tab 5.7: Fault finding in CRT TV

- If there are color patches in the image, they are caused by magnetization of the TV's metal parts or picture tube. CRT TV sets have a built-in device which does demagnetizing. It is called Internal Degaussing Coil and is mounted on the back of the CPT. If a customer gets patches on his TV, turn the set on for one to two minutes, then turn it off. Repeat several times at half-hour intervals. If this fails, demagnetize the picture tube by running an external degaussing coil across the screen with the set turned off and then take the coil away, switch it off and keep it aside. It will remove the patch. If patch is still not removed, you may have to degauss again. Otherwise, check / PTC. If that also does not work and internal degaussing, check / replace internal degaussing coil. If that also does not work then fix some small magnets at the back of the CPT.

- If bright areas of a picture look silvery and details are indistinct, the picture tube is defective. When brightness is turned to low level, the picture will appear normal but dull. With brightness up, detail in white areas is lost. The picture may improve after the set has been on for an hour or more, but this means Picture tube is weak and needs replacem,ent.

- Low contrast
- This symptom can be divided as .

  A: Too much noise or snow,

  B: Simply poor contrast.

  Cause: Low contrast and snowy picture can be due toa fault in the antenna or in the RF circuit. Plain low contrast is generally in the IF Amplifier stage to video output stage..

5.6.1: Trouble - Shooting Procedure

- Find if low or less contrast is in all channels. If it is on only one channel, check if there is any loose or faulty contact in tuner stage. When there is a weak contrast in all channels, adjust the AGC from service data, both RF and IF AGC. If the fault is not rectified, check if the symptom is accompanied with snow or not. If the picture is snowy, check for an open circuit in the antenna / cable TV feeder cable or in the RF amplifier circuit. If the strength of the signal is very low, check the mixer, VIF, video detector and the AGC circuits. If the output voltage of the video detector is normal, check the video amplifier circuit.

Trouble-shooting the antenna circuit:

- An open or broken feeder cable connecting the external antenna and the receiver will result in less contrast and noisy picture. Check condition of the feeder cable by visual inspection and then check continuity using a Multi Meter. In areas near to sea, granules of salt adhering to the feeder cable will decrease the strength of the signal transmitted to the receiver. If this is suspected to be the cause, replace the feeder cable at least once a year or replace it with coaxial cable. Co-Axial Cable is also suggested in places where the house of the customer is on or near a very busy road and traffic density is very high. Co- Axial cable attenuates the noise due to the traffic.

- Please note that we will discuss TVs with manual tuning control and having transistors. This is done so that you understand the subject better. However, all present day TVs use Electronic Tuners and ICs in place of transistors.

- Due to this there is B&W picture even when there is color transmission. There can be following faults in this case:.

1) No color loss in all channels,
2) No color in a particular channel and
3) Intermittent color loss.

1. No color in all channels. A trouble in any of the following circuits may cause the symptom: bandpass amplifier, ACC, color killer, 4.43 MHz oscillator, 4.43 MHz output, burst gate and burst amplifier circuits.

2. No color in some or in a particular channel. This symptom is caused by a mis-adjustment in the local oscillator frequency or a loose contact in the channel selector switch.

3. Intermittent color loss. This is caused by a loose contact in the channel selector, mismatch between the antenna and the receiver or an intermittent operation of the 4.43 MHz oscillator.

- TROUBLE-SHOOTING PROCEDURE :
- In case of Micon which controls IF, Video, check / replace the Microprocessor and or the colour crystaloscillator.

Poor or Less color:

It can be called low, faded or less color. It is characterized by a weak maximum color reproduction. This symptom can be divided into two cases:

1) Low color in all channels

2) Low color in some channels

Weak color in all channels is caused by a breakdown in the ACC circuit or by a bandpass amplifier with a decreased gain.

Weak color in some stations is caused by a poorly tuned fine-tuning circuit, a mismatch between the antenna and the feeder cable, a defective antenna, a defective feeder cable or an old tuner.

TROUBLE-SHOOTING PROCEDURE:

- Set the color control at maximum and then adjust the fine-tuning circuit with the fine tuning knob to get maximum color for every station. If only some stations have weak color, check the matching of the antenna and the feeder wire. A mismatch between the antenna and the feeder cable will affect the receiver's reception and you will not get good color. But, if all channels have weak color and the color strength is not uniform, check and replace Micro processor. Check for a mismatch between antenna and cable by moving the cable slowly away from the antenna terminals. Check its effect on the color on the screen. If the color intensity changes as the foil is moved, then a mismatch between the cable and the antenna is confirmed. Such a mismatch can cause weak color reproduction.

  Trouble-shooting the ACC and the bandpass amplifier .

- A breakdown in the ACC (Automatic Color Control) circuit will reduce the gain of the first bandpass amplifier circuit. This will result in a decrease in the overall gain of the bandpass amplifier block. Check / Replace Microprocessor and associated circuit.

UNIT 5.8: Faults specific to different TV Sets

Unit Objectives

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

1. Explain faults specific to different TV Sets

We have shown above certain basic faults which occur in any CRT TV of any make. We may get different faults depending on the power supply and the picture and sound processing circuits and the CRT used. The faults may also depend on certain features incorporated in certain models e.g. TVs have child lock feature. However, if a customer uses child lock but forgets the password, it will be a fault for him and he will call the company to remove the fault.

UNIT 5.9: Safety Standards to follow

Unit Objectives

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

- Use best working practices to avoid potential safety hazards
- Assess your responsibilities for safety of TV sets

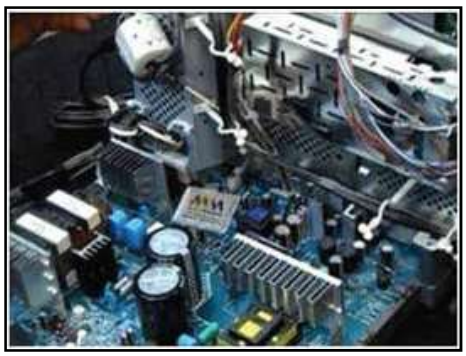

Fig 5.9.1: Safety Circuits

1. Each CRT TV has certain special circuits and or components for the safety of the customer and the service person. If any of these components becomes defective, it has to be replaced with the same component or equivalent component as prescribed by the manufacturer. If it is not done, it can be hazardous. It is called a Critical component.

2. If any protective device has become defective, same has to be replaced as per recommendation of the manufacturer. If any protective shield is missing same must be arranged and fixed.

3. AC fuse must be of the exact rating as specified by the manufacturer. No wire or jumper should be used in place of fuse as it may lead to a fire in the set.

4. When reinstalling the chassis and its assemblies, all protective devices, including: nonmetallic control knobs and compartment covers must be put back in same manner because these will protect the user from shock, if any.

5. There should be no holes / slots, cabinet openings from where one is able to insert fingers and contact dangerous voltages. Such openings include the spacing between the picture tube and the cabinet mask, very wide cabinet ventilation slots, or back covers not fitted / screwed properly.

6. Leakage Current Hot Check .

Warning: A leakage-current tester or a metering system should be used to check the leakage current.

7. After assembling the unit, the AC power cord plug should be directly inserted into the power socket. Measure the current between a known earth ground (metal water pipe, conduit, etc.) and all exposed metal parts, including: antennas, handle brackets, metal cabinets, screw heads and control shafts. The current measured should not exceed 0.5 milli amperes. The same process should be repeated by reversing the power-plug prongs in the AC outlet.

8. Antenna Cold Check:
   Disconnect AC plug from the AC source. Now, connect an electrical jumper across the two AC prongs. Connect one lead of the ohmmeter to an AC prong. Connect the other lead to the coaxial connector. It should show an open circuit.

9. X-ray Limits:
   The picture tube is especially designed to prohibit X-ray emissions. To ensure that there is no x-ray emission, a defective CRT should be replaced only with a CRT as recommended by the manufacturer or an equivalent tube.After replacement, the picture tube shields and mounting hardware also need to be reinstalled because they also provide protection from X-rays.
   High Voltage Limits:
   High voltage must be measured each time servicing is done on the B+, horizontal deflection or high voltage circuits.

10. Correct operation of the X-ray protection circuits must be reconfirmed whenever they are serviced. To ensure that the specified limits are not exceeded, each of the special components needs to be checked
    .
11. The customer or the service engineer should not try any design changes in the circuit as it may change the load of the circuit and may lead to malfunction / fire.

12. Hot Chassis Warning:
    Some TV receiver chassis are electrically connected directly to one conductor of the AC power cord. If an isolation transformer is not used, these units may be safely serviced only if the AC power plug is inserted so that the chassis is connected to the ground side of the AC source.

13. To confirm that the AC power plug is inserted correctly, do the following: Using an AC voltmeter, measure the voltage between the chassis and a known earth ground. If the reading is greater than 1.0V, remove the AC power plug, reverse its polarity and reinsert.
    Re-measure the voltage between the chassis and ground.

14. Some TV chassis have a secondary ground system in addition to the main chassis ground. This secondary ground system is not isolated from the AC power line. The two ground systems are electrically separated by insulating material that must not be defeated or altered.

15. Components, parts and wiring that appear to have overheated or that are otherwise damaged should be replaced with parts that meet the original specifications. Always determine the cause of damage or overheating, and correct any potential hazards.

16. The original lead dress, especially near the following areas: Antenna wiring, sharp edges, and especially the AC and high voltage power supplies must be followed. Pinched, out-of-place, or cut wiring must be corrected / replaced. The spacing between components and PCB should be kept same.

17. There should be no damage to AC power cord. The wires and components should not touch such parts which become heated during running of TV.

18. Use safety goggles with side shields if CRT has to be replaced.

19. Product Safety Notice:
    Some electrical and mechanical parts have special safety-related properties and if a different component is used when one such component becomes faulty, the protection circuit may not work.

Exercise:

1. In case of PNC / SNC fault in a TV, what will you check?
2. What is PAL Colour sub carrier frequency?
3. What voltage is given to anode of a colour picture tube?

Notes

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MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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

6. Repair Dysfunctional Flat Panel Display (FPD) TV set

Unit 6.1 – LCD and LED Television System

Unit 6.2 – Controls and features

Unit 6.3 – Common Faults

Unit 6.4 – Faults specific to different Television System

Unit 6.5 – Safety Procedure to follow

Key Learning Outcomes

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

1. Identify various sections of flat panel TV set
2. Apply cleaning method of flat panel TV set
3. Explain and use various features of flat panel TV set
4. Diagnose the defect and performance issues in flat panel TV set
5. Diagnose fault root cause and repair requirements of flat panel TV set
6. Carryout repair work of the defective section of flat panel TV set
7. Carryout service and maintenance requirements of flat panel TV set
8. Use best working practices to avoid potential safety hazards

UNIT 6.1: LCD and LED Television System

Unit Objectives

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

1. Explain difference between LCD and LED TV set
2. Identify units in flat panel TV set
3. Apply cleaning method for LCD panel

Led TV System Block Diagram:

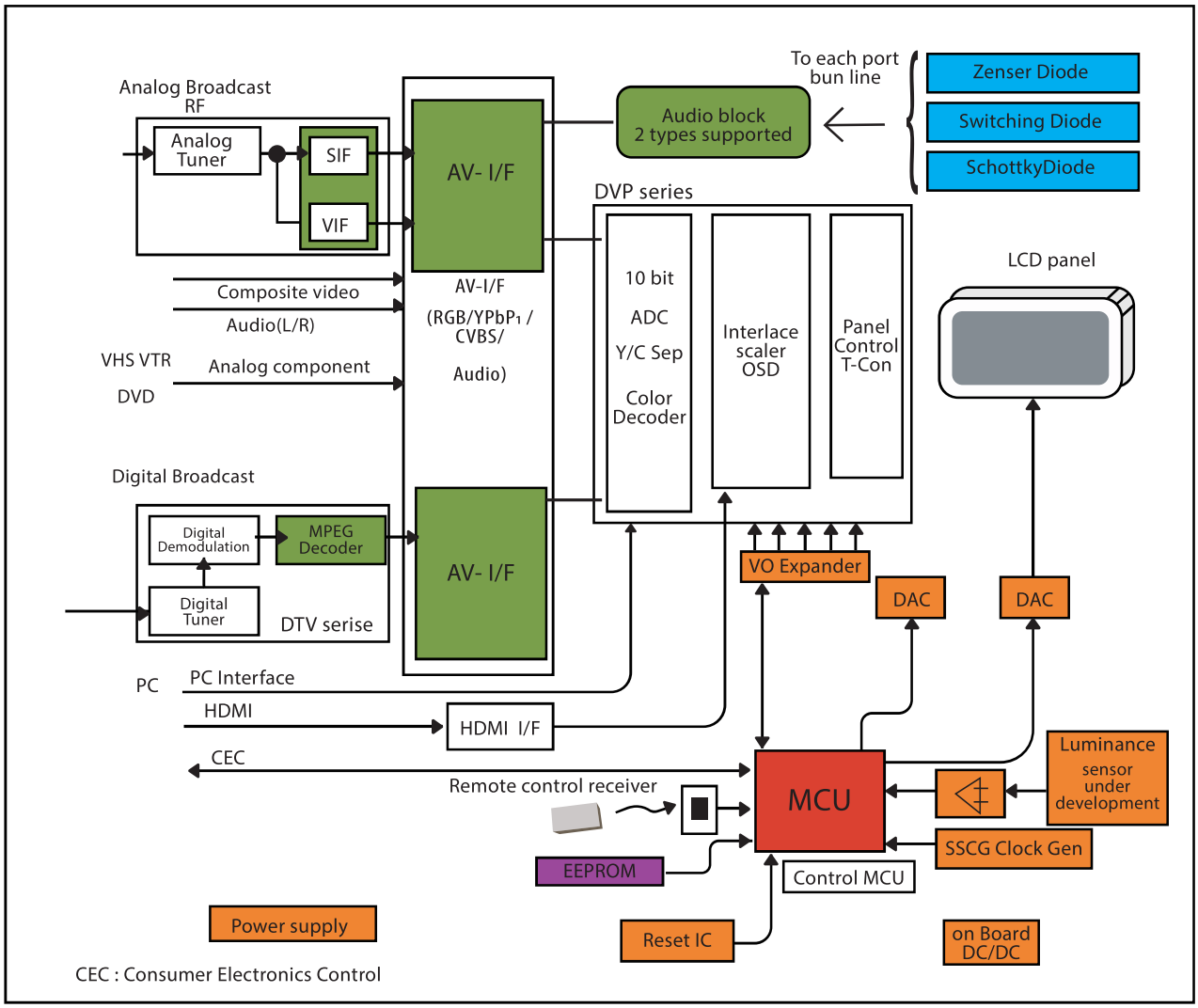

Fig 6.1.1: Led TV System Block Diagram

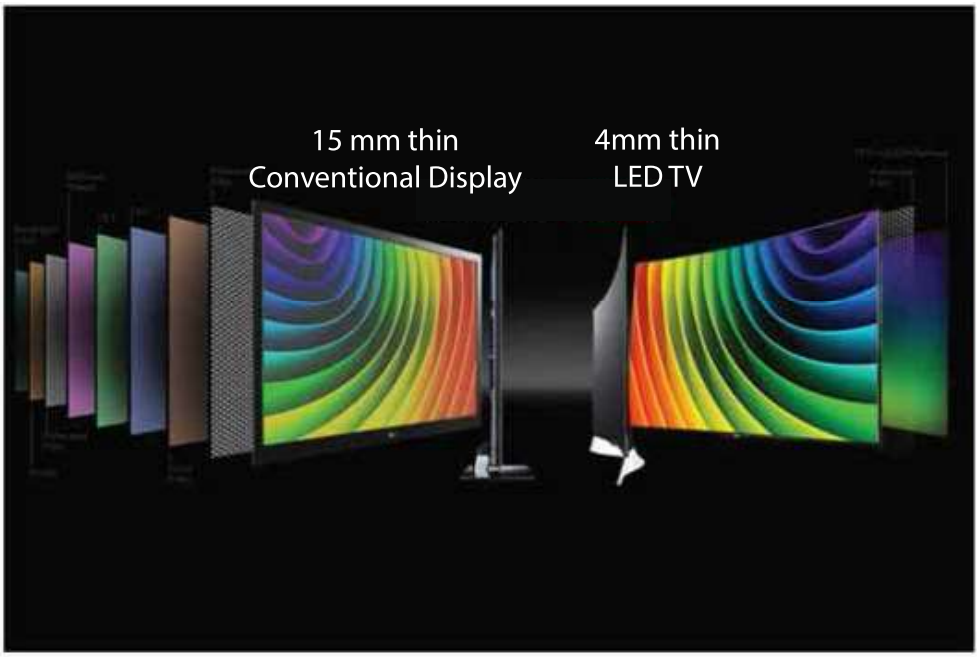

Fig 6.1.2: Display Comparison

It can be called low, faded or less color. It is characterized by a weak maximum color reproduction. This symptom can be divided into two cases:

1. Product lifetime can be shortened when it is used under conditions of high temperature and humidity.

2. When it is used at low temperature of 100 C or lower, response time and brightness are affected in such a way that the proper display may not be obtained

3. When exposed to drastic fluctuation of temperature (hot cold or cold to hot), the product may be affected, specially, drastic temperature fluctuation from cold to hot, produces drew on the surface which may affect the operation of the polarizer and product.

Fig 6.1.3: Product Life Time

Environmental Consideration

It is recommended to use the product in a clean place and to exercise caution to ensure it is not affected by duct or liquids, etc.

1. Its is used in dusty place , dust may cause an electrical short inside the product resulting in malfunction.

2. If the product is contaminated by humid or liquid substance, polarizer may be discolored. If the liquid enters may enter the product to cause electrical failure or corrosion which, in turn, may lead to malfunction

Fig 6.1.4: Environmental Consideration

Cards, Parts in a LCD TV:

1	Power Supply Card
2	Main Card orTuner Card
3	Invertor Card (In smaller sets it is on power supply card)
4	IR Card
5	Panel Key PCB
6	Panel
7	Speakers
8	Logic card on Panel
9	LVDS Connector

Tab 6.1: Cards, Parts in a LCD TV

6.1.2: Method Of Cleaning LCD Panel

1. Switch off the set. If the screen is dark, it will be easier to see the areas that are dirty or oily.

2. Use a dry soft cloth, wipe the screen very gently from right to left & left to right, not in circular motion.

   i) use the microfiber soft cloth.

   ii) Soft white cloth commonly used for cleaning the glasses of Photocopier Machine / Scanner etc.

3. If the dry cloth does not completely remove the dirt or oil stains from the panel, do not press harder in an attempt to scrub it off.

Pushing directly on the LCD screen can often cause permanent pixels damage. In such situation, try the following steps:

i) Take 2-Pieces of soft cloth. First Use a soft damp cloth (dip in mineral water). Gently wipe the Panel surface with damp cloth & immediately wipe it dry with a soft dry cloth.

ii) If there are some hard figure prints or greasy stains on the panel which is difficult to remove, use damp cloth in circular motion & immediately dry polish with the other cloth.

   Wipe from right &then left to right and doing this get to the bottom of the screen.

iii) For dirty stains, one can use diluted white-vinegar by mixing 50% water & 50% vinegar.

iv) Many companies sell cleaning stuff in spray containers for Flat-screen monitors but the vinegar mixture is easy to use& not harmful.

4. The plastic cabinet surrounding the screen can be cleaned with any multipurpose cleaner but avoid contact with the screen itself.

1. Do not use paper, tissue paper, or any cloth for wiping the LCD screen. Such materials can cause scratches on the screen.

2. Do not use cleaning agents containing ammonia, ethyl alcohol, acetone, toluene, ethyl acid, or methyl chloride. These can react with the LCD screen and damage it.

3. Do not put any liquid spray on the LCD screen otherwise it can enter the inside of the TV and damage the circuit inside it.

Voltage Distribution in a LCD TV:

S.N.	Supply Voltage	Description
1.	+5 V Stand by	It is available at 5V Stand by position and goes to IR, Display LED, Microprocessor and Memory
2.	+5 V Power	It becomes available when PS on is received from microprocessor
3.	+12V	It becomes available when PS on is received from Mains card and goes to invertor card for smaller screens.
4.	+24V	Same as above
5.	PS On	Power Supply On +5V and 12 V released only when PS On command is received from Tuner Card
6.	BL On	Back Light on pulse
7.	Panel Power	Panel becomes operative after receiving this voltage

Tab 6.1.1: Voltage distribution in a LCD TV

6.1.2: Plasma Display Panel

Plasma consists of a collection of free-moving electrons and ions - atoms that have lost electrons. Energy is needed to strip electrons from atoms to make plasma. The energy can be of various origins: thermal, electrical, or light (ultraviolet light or intense visible light from a laser).

Plasma:

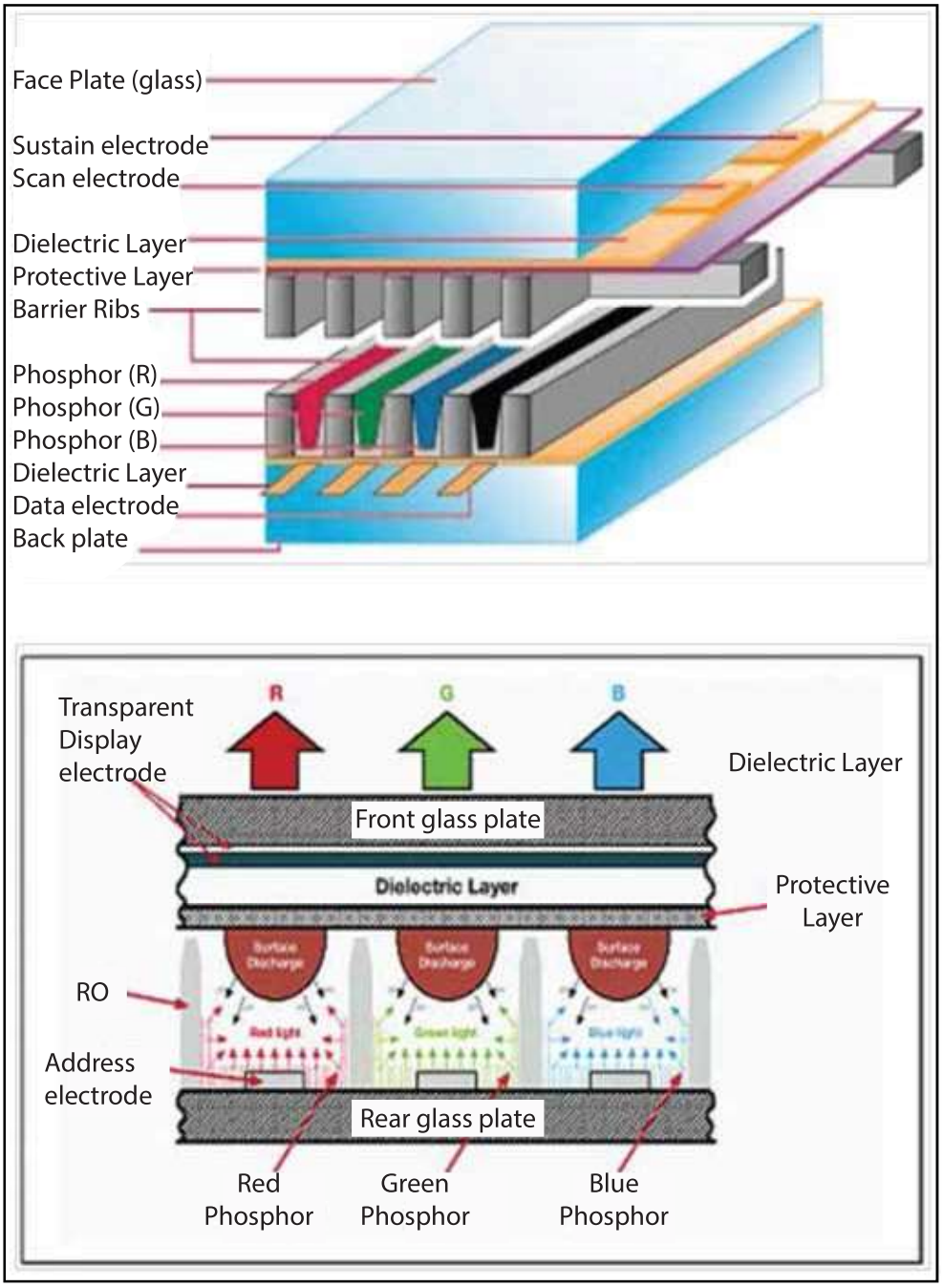

Fig 6.1.1: Plasma Display Panel

Plasma generates ultraviolet light which in turn excites the phosphor coating inside the glass envelope. The phosphor emits a single color of visible light. Each pixel consists of three sub-pixels, one each of red, green and blue. By combining these primary colors at varying intensities, all colors can be formed

UNIT 6.2: Controls and Features

Unit Objectives

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

1. Explain and use features of LCD TV set

Features of a LCD TV:

Fig 6.2.1: LCD TV

- Digital Noise Reducer, Hotel Mode, Programme Name
- Reminder Timer/Channel, Sleep Timer, On/Off Timer
- Programme Skip, Quick View, Freeze, Clock
- Volume, Tuning, Panel Lock

Tuning:

Commo

- 200 Programme, FS Tuning (FS means Frequency Synthesised)

Picture:

- 4 Picture mode (Std., Mild, User, Dynamic)
- 3 mode color temp control, Zoom
- Back light adjustment, Digi Comb Filter
- DCRE (Digital Colour Reality Engine)

Audio:

- 4 sound modes, 10Wx2(RMS), 2 Speakers, Equalizer
- Auto Volume Leveller, Bass & Treble Balance

Connectivity:

- S Video in, VGA in, PC Audio in, 2 HDMI, RF in, AV in,
- DVD Compatible

Specifications:

- 1366x768 Resolution
- 16:9 aspect ratio
- 16.7 million display color
- 30000:1 super contrast ratio
- 500cd/m2 brightness
- 6.5 ms response time

Before starting service the engineer should listen to customer, observe and check himself and if required, try the following steps. This applies to both CRT and LCD Set: Before calling for the TV repair service, there are many things customer can do himself to eliminate or reduce the cost of technical repair. The tips given here apply to both flat-screen television repair and tube-type television. These tips can also be used for dealing with common problems such as electrical cord repair, remote control repair and others.

Simple solutions which customer or engineer can check if a CRT TV or LCD TV is faulty

Symptom			Cause	Action
Power	Picture	Sound		
Dead / No Power	No	No	No AC from socket.	Check AC in socket / fix plug
Stand by only red light on	No	No	Remore or panel key may not be working	Try with panel key or remote key. If not O.K. customer should call service
OK	Picture not clear	Sound not clear	Check Antenna direction, ant wire, cable, Balun, dish connection	Only one TV to be run on one connection. Antenna wire not too long or coiled.Check at a neighbour's house with same cable / dish connection. If OK there, call cable / dish operator.In case of disg, check for weather, obstruction in path of signal
OK	Picture not clear	Sound not clear	In rainy season, signal from dish may not be received	Wait for rains to stop and or call dish operator
OK	Multiple pictures / Ghost	OK	Antenna direction wrong	Correct direction.
Interference	Lines on picture	Abnormal Sound	Electrical / Road disturbance	Check for any electrical or road disturbance

Symptom			Cause	Action
Power	Picture	Sound		
OK	OK	No sound	Volume may be on zero	Check / Correct volume settings from main menu/ service data for service engineer, Mute
OK	No brightness on screen	Ok	Brightness key	Check. Correct brightness, contrast settings, back light in case of LCD TV
OK	No Colour	Ok	Colour settings	Check / correct colour system as PAL 4.43mHz for PAL, correct colour settings
OK	Colour Patches	Patches on picture	Magnetic Field	Switch off set for about 15 minutes from mains. After this switch on again. It may be OK now otherwise remove any magnetic disturbance ant do degaussing if it is a CRT TV.
Remote not working	OK	OK	Weak cells in R.C.	Replace cells, clean remote eye glass from front, check distance and angle of operation, should be as per specs of company

Symptom			Cause	Action
Power	Picture	Sound		
No tuning	Picture OK on one channel only	Only one channel working	Set may be in child lock	Remove child lock
No function	No	No	TV Lock	Remove TV Lock
Panel not working	OK with remote	OK with remote	Panel Lock	Remove Panel Lock
No picture / sound when DVD is played	No	No	AV Lock	Remove Panel Lock
Clock is displayed on Screen	Ok	Ok	Timer Setting	Correct setting in Timer Menu or as per Company

Tab 6.2: TV Fault Symptom, Cause & Action

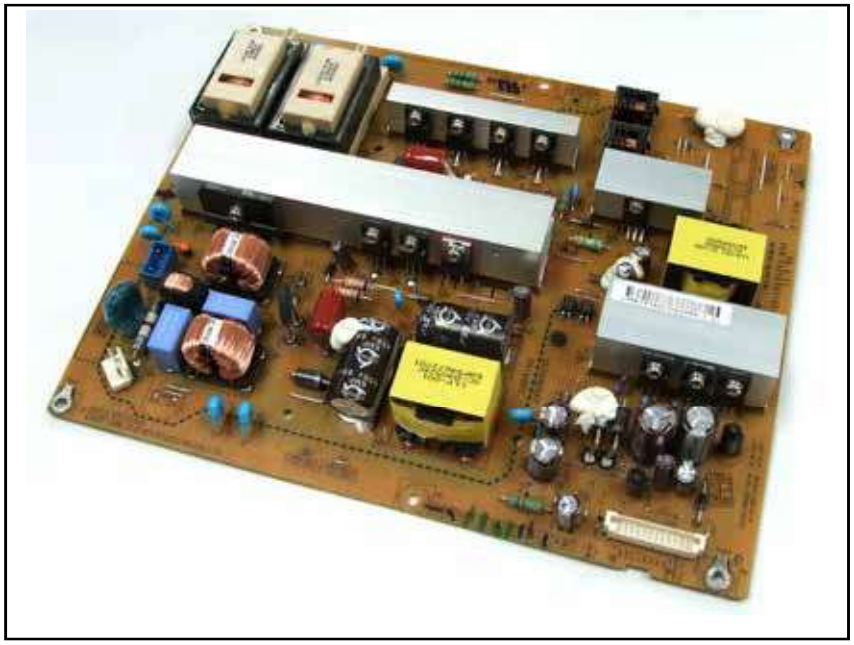

Fig 6.2.1: Power Supply and Inverter Connector

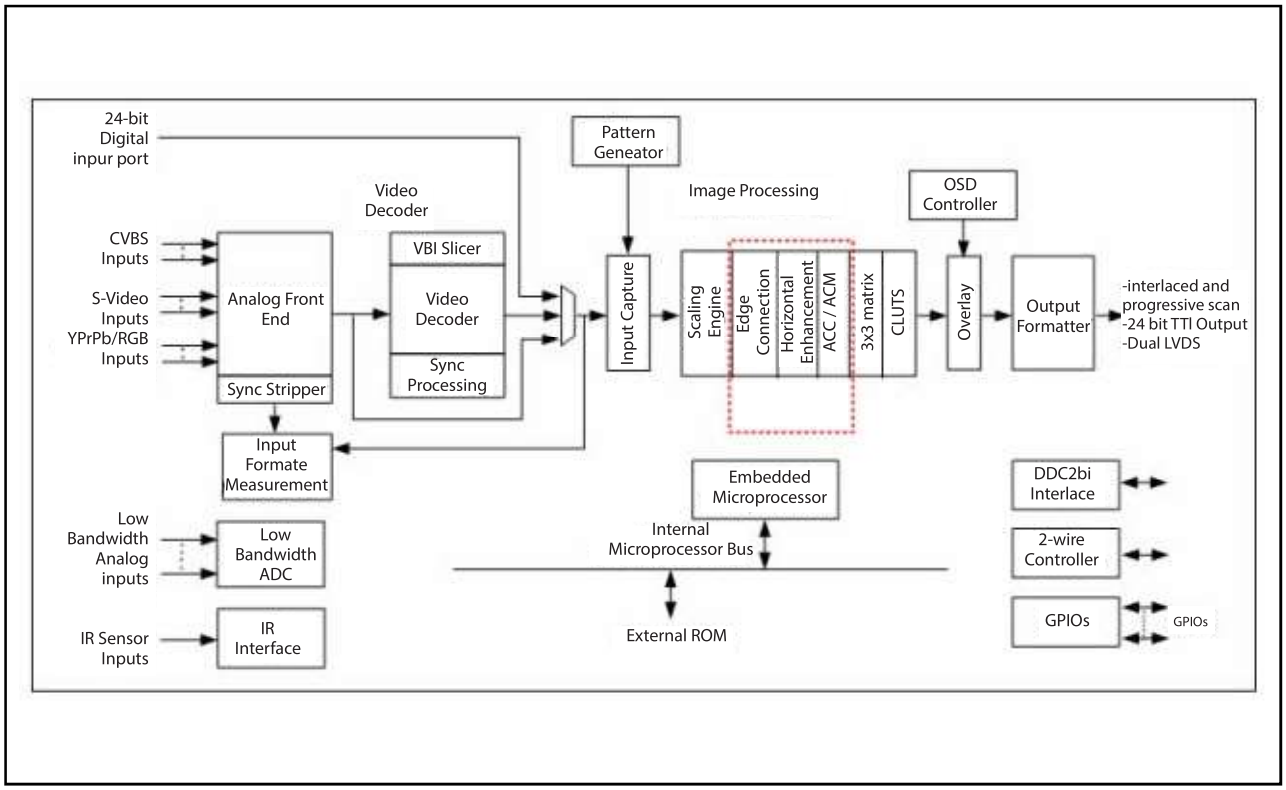

Fig 6.2.2: Voltage Chart - LCD TV

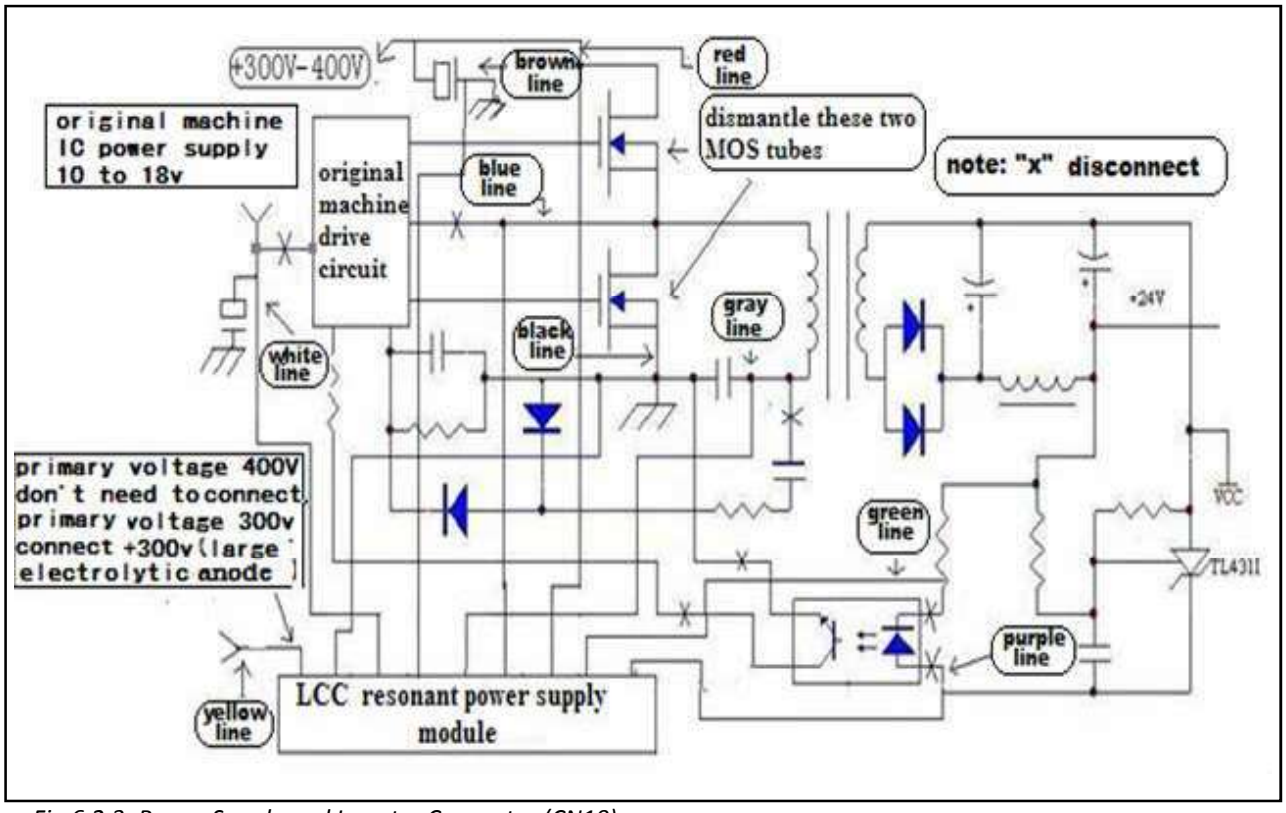

Fig 6.2.3: Power Supply and Inverter Connector (CN10)

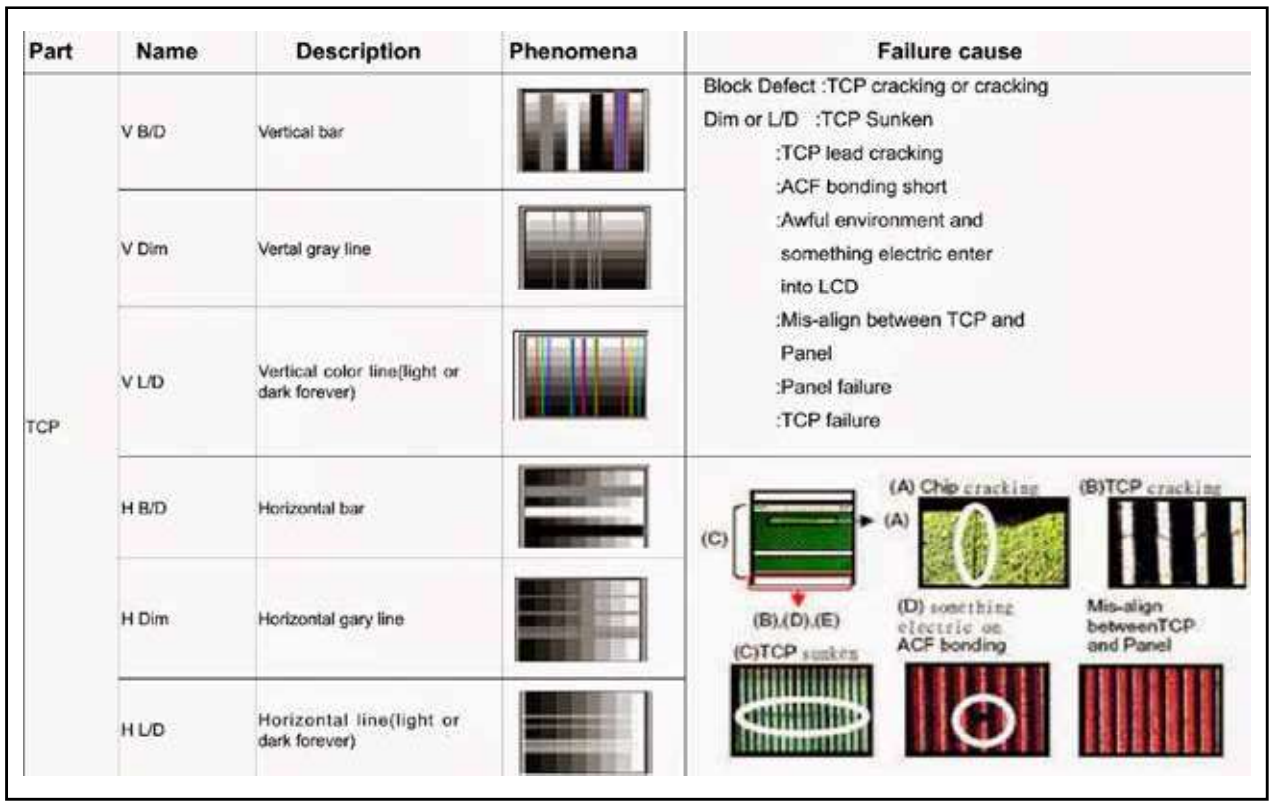

Fig 6.2.4: Panel failure mode

In the above figure are shown certain cases of Panel failure.

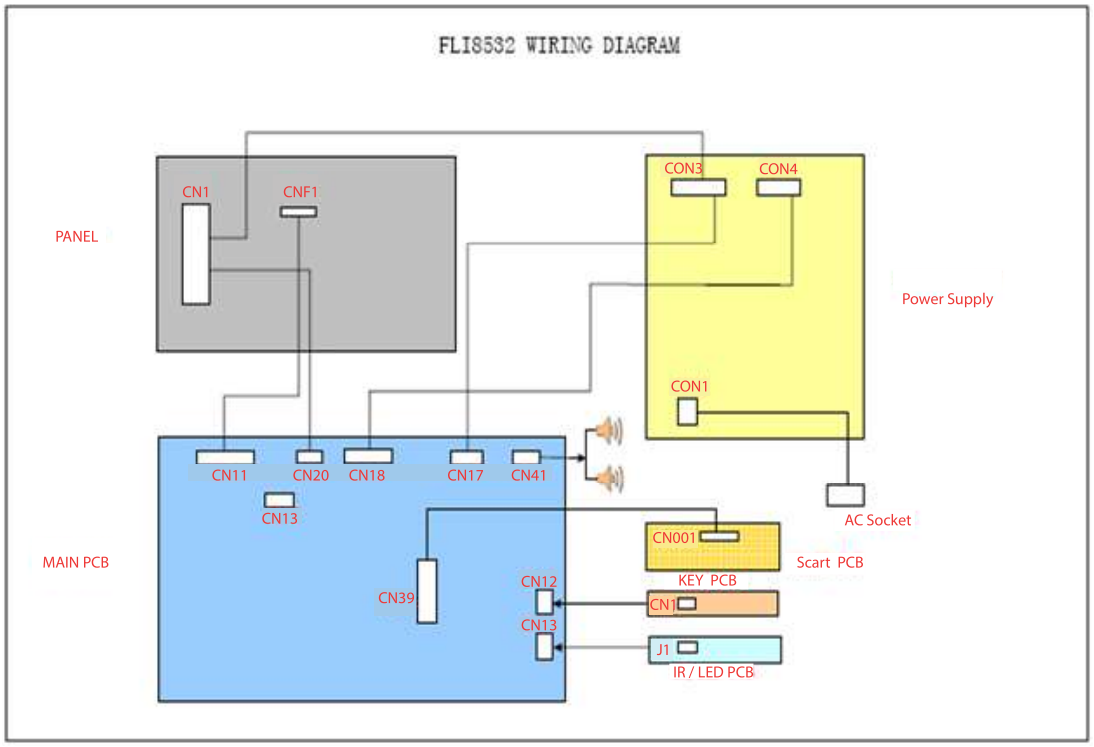

Fig 6.2.5: Wiring diagram of a LCD TV using Micon FL8532

UNIT 6.3: Common Faults

Unit Objectives

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

1. Diagnose the defect and performance issues in flat panel TV set
2. Diagnose fault root cause and repair requirements of flat panel TV set
3. Carryout repair work of the defective section of flat panel TV set
4. Carryout service and maintenance requirements of flat panel TV set

Trouble Shooting:

Trouble shooting can be done in the following 4 ways. It should be noted that these methods can be applied to any Electronic product or any product using Electronic circuitry. These are:

1. Substitution: This is the oldest method and is used by all technicians. New technicians use it because they still are not clear how to detect the symptom and how to proceed for trouble shooting. In this method, technician keeps on changing parts till he is able to rectify.This way some times the set may be repaired but it may take too much time and repair may be too costly for the Company. So, to avoid it, the method of isolation must be used.

2. Isolation: In this the fault is isolated stage wise and then sub circuit and then component wise. This is one of the best methods of rectification. In this first the faulty stage is identified and then the faulty component is traced and replaced. It is very important to understand and know the block diagram and signal and power flow. If these are clear, one can isolate the defective stage and part and replace the defective part.

3. Signal Injection: In this an external signal is injected at an appropriate point to check the behavior of circuit with that signal. If circuit improves with that it means that there is some problem with the signal in the set. If that is corrected, set will become O.K.

4. Checking wave shapes: If fault can not be rectified by any of the above methods, wave shape is checked at check points and this way the faulty component can be traced and repaired.

6.3.1: Repair Flat Panel TV Sets

LCD Faults & Symptoms:

While there can be hundreds of faults and their symptoms, we summarize here some of the standard faults occurring most frequently in LCD TV of any make. These faults have been tabulated for easy understanding of reader. Symptom is what we see, action is what can be done to solve the issue.:

Trouble Shooting a LCD TV:

S.N.	Symptom	Action
1.	LCD dead,LED not glowing	Check AC power, Fuse, Bridge, MOSFET, Power supply card
2.	LCD in stand by, Red LED glows but does not change colour when set is switched on	Check 5V line, Check if PS on signal being received from Main Card
3.	Red led glows but no back light when set switched on	Check 24V/12V,BL pulse from main card, invertor card
4.	Stand by.Red light changes to blue on command but returns to red again in 2-3 seconds	It menas there is a shorting in the load, Check and remove shorting.
5.	No brightness on screen but sound OK, back light OK	It means Invertor OK, Check LVDS supply and data
6.	No brightness on screen but sound OK, No back light	Check B+ 5V, Back light on pulse,12V LVDS, Back light adj 5V, CCFL, Panel
7.	Picture is dull, Sound and back light OK	Check LVDS Mapping, panel selection in service data, load sw
8.	Vertical line or lines on picture	Check for loose contacts in LVDS connector, socket, FPC from logic card to panel, check / replace panel

S.N.	Symptom	Action
9.	Horizontal bars	Check / replace CCFL, Panel
10.	Noise lines on picture but sound OK	It is due to sparking
11.	No Sound, Picture is OK	Check Audio O/PIC supply

Tab 6.3: LCD Troubleshooting

Service and Design Data:

This data is very important and useful for service personnel. Each Company provides its engineers with such data and its code. Using this data, an engineer can check and do many adjustments and resolve many issues in field without opening the back cover of the set. Same is true for CRT TVs and FPDs. Using this data engineers can check, adjust picture, contract, brightness, backlight intensity etc. and can also check / load SW as in some cases data loading through USB can be done by first entering service data.

However, before changing service data values, engineer should note the current data in his diary so that if the fault is not resolved by change of data, he should restore the original data.

UNIT 6.4: Faults specific to different Television System

Unit Objectives

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

1. Explain faults specific to different flat panel TV Sets

We have shown above certain basic faults which can occur in any Company's any model FPD TV. However, there are certain faults which can be Company specific. These can be due to design, Quality Control issues, Model specific or solution / microprocessor specific, production issues, parts specific or Company's service policy or lack of technical expertise by the field technician. These can also be due to Inward Quality Control known as IQC or Outward Quality Control known as OQC. Many Times in some companies, if a specific part is not available, R&D / QC may allow use of an equivalent part. But if that part has not been tested and Service also has not been trained about its use, the part may fail in field. If ESD safety measures are not used in production, stores and service even then parts may totally fail fail or may fail and behave intermittently. In LCD / LED TV In LCD TV, such faults can occur due to

4. Panel Faults: If a particular panel is chosen and the panels have some inherent defects
5. Software or Firmware Faults: The firmware is Company specific and customized as per its requirements. The set may hang or function intermittently or behave erratically if there is a firmware fault.

Apart from this there can be different faults in LED, OLED and Plasma TV because of difference in power requirements of these sets and also because of different methods of backlighting eg. Edge lighting in LED TV while OLED and Plasma have their own light and do not use any backlight.

UNIT 6.5: Safety Procedure to follow:

Unit Objectives

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

1. Use best working practices to avoid potential safety hazards
2. Assess your responsibilities for safety of TV sets

Apart from the safety procedures discussed in other sections. ESD safety has also to be considered during repair of LCD / LED TVs. ESD means Electro Static Discharge. ESD Safety has been explained in Unit 4.2. There are other safety considerations which must be taken care of either at Company workshop or at Customer's place. First of all, we will see what are the hazards:

- Electrical: Please check for any loose wires, wires hanging overhead or wires / electric cables lying on the ground in the workplace. Also, check and ensure that the AC socket where the LCD TV is plugged is not loose and there is no sparking asit can lead to fire.

- Liquid Spillage: Check for any liquid spillage on the floor.

- Keeping children away: If you are at customer's house for repair, you may request him to keep children and elders away as you will be working on high voltage.

- Soldering Iron: Keep your iron safely in a stand and in a side so that no one can touch it even by accident.

- Gas Leakage: Be alert for any gas leakage.

6.5.1: FAQ on CRT and FPD TV

Q.1 What is composite video?

Ans. 1) Composite video is the basic Video Signal available from a Video Source e,g. Camcorder, Player, Video out from TV, Analogue set top box of Dish TV, DVD Player.
The composite video Signal is connected using a single-core shielded cable & Yellow Color RCA Jack or Socket (Radio Company of America) as shown in figure below:

Fig 6.5.1: Composite Video Connectors and Cable

This type of signal is composed of various components as listed below:

1) B & W video information
2) Chroma (Color) information &
3) Control Signals (Horizontal & Vertical Synchronization & Blanking Pulses). Its Picture resolution is 240 to 270 Horizontal lines only. Therefore the Quality of picture is similar for VCD, VCR, TV-Transmission & SD (Standard resolution) Video Games etc.But this picture quality is better than that of RF.

Q.1 Define a Pixel

Ans. 2) Pixel stands for Pix El i.e. PICTURE Element. Pix is short form of picture and El is short form of element. Pixel is the smallest element or point of a picture within the displayed video or within the display system like CRT or FPD.

Q. 3 Define resolution?

Ans. 3) Resolution is normally defined in 3-Different ways as:

a) Horizontal Resolution: It defines define picture quality of CRTTV, FPD, Analog Video Camera, DVD Players)
b) Vertical Resolution (This term is rarely used and is of very less significance for viewing)
c) Pixel Resolution (Essentially used to define picture quality in case of CDT, TFT-LCD Monitors, PDP, LCD-Projectors, HD-Games & Computer generated graphics.

H-Resolution: It is the total number of visible black vertical lines displayed on a TV screen, while the lines are placed in Horizontal Direction on a white background

Vertical-Resolution: It is the total number of visible black Horizontal lines displayed on a TV screen, while the lines are placed in Vertical Direction on a white background.
Commonly this figure is not spoken about as the same will always be smaller then the H-Resolution.

Pixel Resolution: It is defined as the angle subtended by the pixel on the eye so that the eye can resolve or view it.:

Native Resolution: It is the total no of pixels available on a Display Panel .
Example: If an LCD Panel contains 1920 Pixels in H-Direction & 1080 Pixels (Dots) in vertical direction, then the Pixel resolution of that LCD Panel = (1920 X1080) Pixels
= 2 Mega Pixels (Approx., Actually it is=2.07 Mega Pixels)
Picture Resolution: It is the number of pixels contained in the Picture signal.
Example: 720 X 1024i: This means the picture is composed of 720 lines & each line contains 1024 dots (Pixels). i stands for picture processed in Interlaced scan system..

Q.4 What is RGB & what is VIBGYOR?

Ans. 4) RGB (Red, Green & Blue) are the primary colors through which all colours are reproduced in CTV by colour addition.
VIBGYOR stands for seven colours of Rainbow.
Therefore in analog & digital video systems, it is sufficient to deal with only primary colors, as these colors mixed at different mathematical proportion can produce any color available in nature including Silver & Gold.
VIBGYOR is Violet, Indigo, Blue, Green, Yellow, Orange & Red (VIBGYOR).
But in a Colour TV, all seven colours of rainbow are not used to show colours. Instead only three primary colours e.g. Red, Green and Blue are used in the following proportions:
Red 30%
Green 59%
Blue 11%
Y=.30R+.59G+.11B

Q.5 What is S-video?

Ans. 5) S-Video expanded as Super Video or separate video. In this the Picture resolution is as much as 400 Lines. It is analogue and is better than AV.
A special cable with 2-Core shielded wire is used with 4-Mini DIN socket as shown in figure.

Fig 6.5.2: S-Video Socket

The video signal has 2 parts:

a) Y – Luminance Signal (B&W and Control Signal) &

b) C - Chrominance (Chroma or Color Signal)

There are 4 pins in this: One for Y, second for Y ground, third for C, fourth for C ground.

This signal can be available from Hi-8 Camera, DVD-Player, Set Top Box etc. Advanced models of CTV, PDP, LCD-TV & Projection TVs may have such input facility.

Q.6 What is component video?

Ans. 6) In this Video signal has three components. Component Video has more resolution than S-Video. In this Chroma-Signal is split into 2-Parts as:

1. Blue Color Difference Signal (B-Y) also known as Pb (Port Blue) or Cb (Chroma Blue). Blue coloured jack and port are used in this.
2. Red Color Difference Signal (R-Y) also known as Pr (Port Red) or Cr (Chroma Red). Red coloured jack and port are used in this

Y-Signal or Luminance signal or B&W Signal is the third component.

Important:

Component Video is both Analogue and Digital:

In both Resolution, Representability, Signal processing are different.

Picture Resolution in Analog Component Video: 500 ~ 800 H-Lines

Picture Resolution in Digital Component Video: 720i/p ~ 1080i

Q.7 How to connect component video?

Ans. 7) In Component Video three Cables with RCA Jack / Socket are used only for Picture& two RCA - Connectors separately for Stereo Sound (two speakers) as shown :

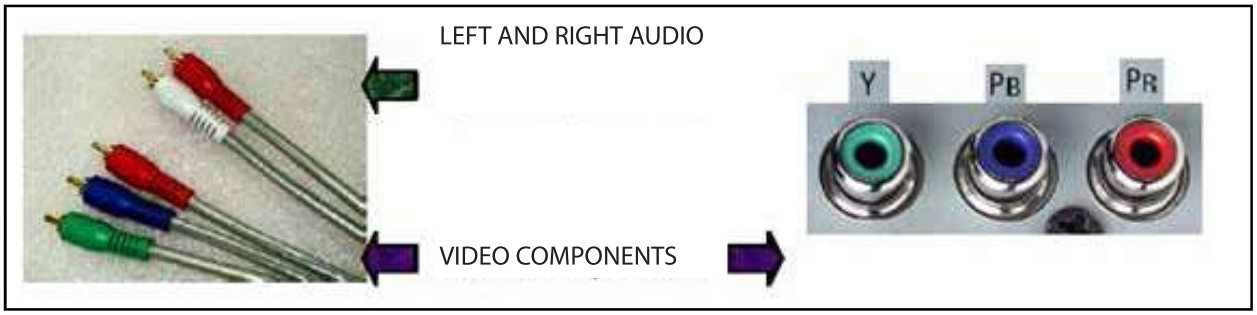

Fig 6.5.3: S-Video Socket

Q.8 What is picture resolution of component video

Ans. 8) Picture Resolution from Components Video can be as high as HD-TV Resolution & beyond right from the most basic 240 Horizontal Lines as follows:

ANALOG: 500H-Lines from DVD/DVD-R, Y, Pb, Pr
800H-Lines from VCR
Standard Vision 1024-H X 768-V (Equivalent to XGA)
Wide Vision 1280-H X 768-V (WXGA), Equivalent to 32-Bit Computer Generated Extended Graphics Array

DIGITAL : HD-1 & 2: 720i / 720p/ 1080i from HDTV-Set Top Box, Blu ray-DVD

Q.9 What is RGB-video?

Ans. 9) RGB-Video is Computer generated Video through 15-pin D-Sub connector. This is Analog Video Signal

The horizontal resolutions for such type of video varies from 320-Lines to as high as > 2300-Lines

This picture resolution is classified as VGA, XGA, UGA etc.

Q.9 What is full form of VGA,XGA, W-XGA,& UGA

Ans. 9)

Short Name	Expanded Name & Resolution	Resolution with Aspect Ratio
VGA:	Video Graphics Array	640 X 480 4:3
S-VGA:	Super – VGA	800 X 6004:3
XGA	Extended Graphics Array	1024 X 768 4:3
W-XGA:	Wide Extended Graphics Array	1280 X 768 16:9
UGA:	Ultra Graphics Array	1720 X 968 16:9

Q.11. What do you understand by Frame & Field?

Ans. 11) A complete scene is recorded or filmed in a frame . It is like one page of a book. In CCIRB, a frame has 625 Lines. This frame is further divided into two fields-Odd and Even

In odd field only odd line numbers 1, 3, 5 --- etc are shown. Odd field has 312.5 lines. In even Field even line Nos. 2, 4, 6, 8 --- etc are shown.Even field also has 312.5 lines.

Q.12. Expand NTSC, PAL, & SECAM?

Ans. 12) NTSC National Television System Committee (American System)

PAL Phase Alteration by Line (German System)

SECAM Sequential Color a Memoir (French System)

Q.13. What do you mean by Progressive Scanning?

Ans. 13) In Progressive scanning all the lines in a Frame are scanned systematically one after another.

Q.14. What do you mean by Interlaced Scanning?

Ans. 14) In this a frame is divided into 2 fields-odd and even.First odd field containing odd number of linesis displayed. After this even field containing even no of lines is displayed.

Q.15. Which is better; 100HZ TV or a 50 Hz conventional TV?

Ans. 15) 100Hz TV is a flicker free TV so it is better while the conventional TV is has flicker.

Q.16. How is aspect ratio defined for a TV?

Ans. 16) Ans. 16. This ratio describes the geometrical shape of a TV or a FPD. All our movements are in horizontal direction so the aspect ratio is so kept so that width is more than height and our eyes can comfortably see a scene.

Dimension Standard, specifies the proportion or Ratio of the Width & Height of a TV or FPD to give a similar look irrespective of the size of a Display Panel.

Two Standards are in common practice these days:

4:3

16:9

Q.17. Explain RCA & DIN socket.

Ans. 17) RCA- Socket developed in US & named as Radio Company of America-Socket
DIN-Socket developed in German and expanded as Dutch Industrial Norms - Socket

Q.18. What is USB-Port & USB cable?

Ans. 18) USB (Universal Serial Bus) is a Communication Port found in Computers & Computer peripherals. In this Serial Data is communicated through USB Port from a Computer to the Digital Gadget through an USB-Cable.
Different Versions of USB is found in practical application as per Bandwidth & Data Transfer rate such as USB-1.0, 1.1 & 2.0 etc.

Fig 6.5.4: USB Cable

Q.19. What is D-sub Connector?

Ans. 19)

Fig 6.5.5: D-SUB Connector

They are available in different configurations as 9-Pin, 15-Pin, 25-Pin etc.

Q.20. How a 15 pin D- Sub connector is used?

Ans. 20) 15-Pin D-SUB is used for Monitor connection (In / Out) in the following applications. This carries Analog Video Signal.

a) PC & Monitors
b) LCD TV
c) LCD Projectors
d) LCD Projection TV
e) PDP – PC Input
f) Digital Set Top Box

Q.21. What are 9-Pin,15-Pin & 25 Pin D-sub port

Ans. 21) 9-Pin D-Sub: For Serial Data Communication
(Digital Camera, MP-3 Players, Digital Databank etc.)
15-Pin D-Sub: RGB In/Out for output to Lap top, PC Monitors.
25-Pin D-Sub: Parallel Data for Communication (Printer, Scanner etc)

Q.22. Is there any difference in resolution of Composite, Component & S-Video signals ?

Ans. 22) Resolution of these signals is as given in table:

Types of Video	Composite Video	Component Video	S-Video
Resolution	240 ~ 270 Hor-Lines	500 Hor-Lines	400 Hor-Lines

Tab 6.5.1.2: Video Resolution

Q.23. What is a TFT LCD?

Ans. 23) Ans. 23) TFT LCD (Thin Film Transistor Liquid Crystal Display) is a type of LCD flat panel display where each pixel is controlled by a transistor and a capacitor placed at the back of the panel plate.

Q.24. What is contrast ratio?

Ans. 24) It is the ratio of brightness in maximum black area to the brightness in brightest area . This ratio is used to define contrast of LCD TV.
Contrast Ratio = Light in Maximum Black Area / Light in Maximum White Area
Example:
If black area brightness =0.5 Candela/m²
& the white area produces brightness=500 Candella/m²
Then CR = 0.5 / 500 = ½*500 =1/1000= 1:1000
Candella is the unit of brightness.
Contrast ratio is used for LCD / LED TVs and is defined in two ways :

1) For a dark room: For this test is done in test conditions in a dark room to ensure that light from surroundings does not enter the room.
2) For areal living room : It being a real room like in any body's house, it is affected by brightness within the room. Due to this the value of the super contrast is not the actual value.
But companies use terms as Dynamic Contrast Ratio etc which is a marketing term and it is not technical..

Q.25 What is MP-3

Ans. 25) It is Motion picture expert group audio layer 3.0
It is a digital format to compress audio files.

Q.26 What is MPEG-1 & MPEG-2?

Ans. 26) MEPG-1 : It is Motion Picture Expert Group 1 format and covers Large video-files
MPEG-2 : It is Motion Picture Expert Group II. It also has video files.

Q.27. What are advantages of a LCD TV?

Ans. 27) 1. Aesthetic Slim Design, can be wall mounted.
2. Low power consumption as compared to CRTTV or Plasma TV.
3. Better resolution.
4. No UV-radiation, No X-Ray & no irritation to human eye.
5. No colour patch problem as no electrons are used.

Q.28. Whcih is better CRT or LCD TV?

Ans. 27) CRT had its own advantages. Since it has phosphors, it has its own light and it does not need a back light. So, its contrast is excellent. Contrast means difference between black and white. In CRT TV, you get black when you keep contrast and brightness zero. But in LCD TV, you may not get perfect black because some back light can pass through the crystals even when brightnrss is kept zero. In CRT TV , there are no issues of a response time as in a LCD TV. However, because of electrons movement in CRT TV, we get issues of colour patches and convergence. Also, because of some curvature in the CPT, any vertical or horizontal line will not appear straight in a CRT TV. The CRT TV is also very bulky, heavy and its aesthetics are poor. Its power consumption is also high. It can not be hanged on a wall. Its connectivity is also not as good as that of FPD.Colour reproduction is excellent in a FPD.

Thus, it is cleat that every technology has its advantages and disadvantages. Inspite of its short-coming in contrast, LCD is definitely much better that a CRT TV.

Exercise:

1. Name the cards used in a LCD TV.
2. What are the main voltages in a LCD TV?
3. What is CCFL?
4. Which colours are used to produce all colours in a LCD TV?
5. How will you connect a Laptop having HDMI output to a LCD TV.
6. You have a pendrive and have saved a movie in it. Can you play it on a LCD TV/ How?
7. Can you use a detergent or Colin Spray to clean panel of a LCD TV?
8. What is the best height for mounting LCD on a wall?
9. A customer has a wooden partition in his room and asks you to mount the LCD TV on it? What will you do?

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7. Communicate and coordinate effectively with others

Unit 7.1 – Communicate effectively with supervisor and colleagues
Unit 7.2 – 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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Skill Development
Corporation
Transforming the skill landscape

ESSCI
Skilling India in Electronics

8. Work effectively, sustainably and safely

Unit 8.1 – Achieve optimum productivity and quality

Unit 8.2 – Implement health and safety procedures

Unit 8.3 – Organise waste management and recycling

Unit 8.4- 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.

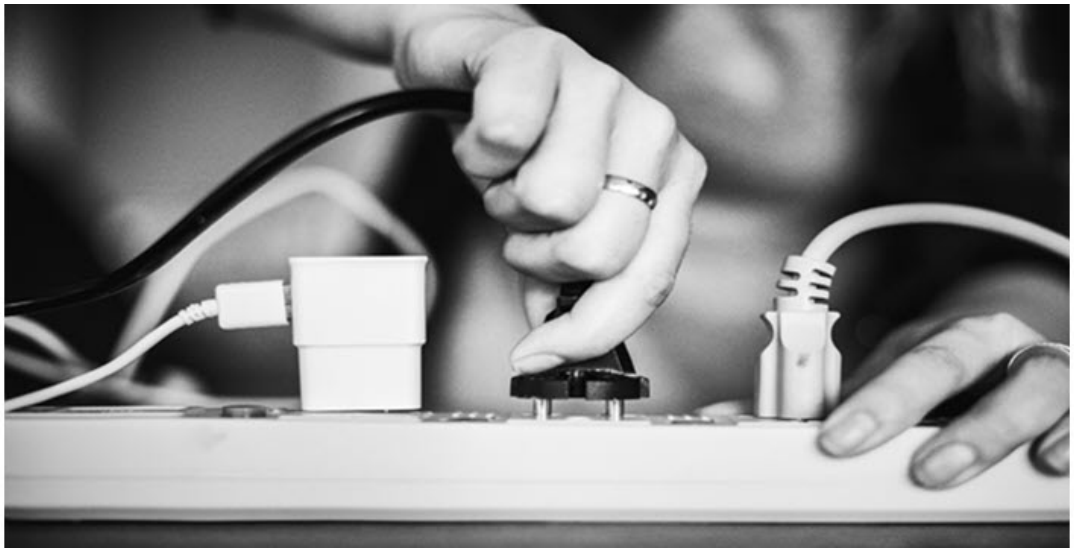
4 Work with your team

   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

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9. Employability & Entrepreneurship Skills

Key Learning Outcomes

At the end of this unit, 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. Understand 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. Understand 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 how to maintain a positive attitude
15. Discuss the role of attitude in self-analysis
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 basic computer terminology

36. Recall the functions of basic computer keys
37. Discuss the main applications of MS Office
38. Discuss the benefits of Microsoft Outlook
39. Discuss the different types of e-commerce
40. List the benefits of e-commerce for retailers and customers
41. Discuss how the Digital India campaign will help boost e-commerce in India
42. Explain how you will sell a product or service on an e-commerce platform
43. Discuss the importance of saving money
44. Discuss the benefits of saving money
45. Discuss the main types of bank accounts
46. Describe the process of opening a bank account
47. Differentiate between fixed and variable costs
48. Describe the main types of investment options
49. Describe the different types of insurance products
50. Describe the different types of taxes
51. Discuss the uses of online banking
52. Discuss the main types of electronic funds transfers
53. Discuss the steps to prepare for an interview
54. Discuss the steps to create an effective Resume
55. Discuss the most frequently asked interview questions
56. Discuss how to answer the most frequently asked interview questions
57. Discuss basic workplace terminology
58. Discuss the concept of entrepreneurship
59. Discuss the importance of entrepreneurship
60. Describe the characteristics of an entrepreneur
61. Describe the different types of enterprises
62. List the qualities of an effective leader
63. Discuss the benefits of effective leadership
64. List the traits of an effective team
65. Discuss the importance of listening effectively
66. Discuss how to listen effectively
67. Discuss the importance of speaking effectively
68. Discuss how to speak effectively
69. Discuss how to solve problems
70. List important problem solving traits

71. Discuss ways to assess problem solving skills
72. Discuss the importance of negotiation
73. Discuss how to negotiate
74. Discuss how to identify new business opportunities
75. Discuss how to identify business opportunities within your business
76. Understand the meaning of entrepreneur
77. Describe the different types of entrepreneurs
78. List the characteristics of entrepreneurs
79. Recall entrepreneur success stories
80. Discuss the entrepreneurial process
81. Describe the entrepreneurship ecosystem
82. Discuss the government's role in the entrepreneurship ecosystem
83. Discuss the current entrepreneurship ecosystem in India
84. Understand the purpose of the Make in India campaign
85. Discuss the relationship between entrepreneurship and risk appetite
86. Discuss the relationship between entrepreneurship and resilience
87. Describe the characteristics of a resilient entrepreneur
88. Discuss how to deal with failure
89. Discuss how market research is carried out
90. Describe the 4 Ps of marketing
91. Discuss the importance of idea generation
92. Recall basic business terminology
93. Discuss the need for CRM
94. Discuss the benefits of CRM
95. Discuss the need for networking
96. Discuss the benefits of networking
97. Understand the importance of setting goals
98. Differentiate between short-term, medium-term and long-term goals
99. Discuss how to write a business plan
100. Explain the financial planning process
101. Discuss ways to manage your risk
102. Describe the procedure and formalities for applying for bank finance
103. Discuss how to manage your own enterprise
104. List important questions that every entrepreneur should ask before starting an enterprise

UNIT 9.1: Personal Strengths & Value Systems

Unit Objectives

At the end of this unit, 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. Understand the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
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12. List the characteristics of entrepreneurs with achievement motivation
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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

9.1.1 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

Tips to 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 checkups. ☐
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!

Swachh Bharat Abhiyan

We have already discussed the importance of following good hygiene and health practices for ourselves. But, it is not enough for us to be healthy and hygienic. We must also extend this standard to our homes, our immediate surroundings and to our country as a whole.

The 'Swachh Bharat Abhiyan' (Clean India Mission) launched by Prime Minister Shri Narendra Modi on 2nd October 2014, believes in doing exactly this. The aim of this mission is to clean the streets and roads of India and raise the overall level of cleanliness. Currently this mission covers 4,041 cities and towns across the country. Millions of our people have taken the pledge for a clean India. You should take the pledge too, and do everything possible to keep our country clean!

What are Habits?

A habit is a behaviour that is repeated frequently. All of us have good habits and bad habits. Keep in mind the phrase by John Dryden: "We first make our habits, and then our habits make us." This is why it is so important that you make good habits a way of life, and consciously avoid practicing bad habits.

Some good habits that you should make part of your daily routine are:

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

Some bad habits that you should quit immediately are:

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

Tips

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

9.1.2: 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 evacuations

9.1.3 Self Analysis – Attitude, Achievement Motivation: What is Self-Analysis

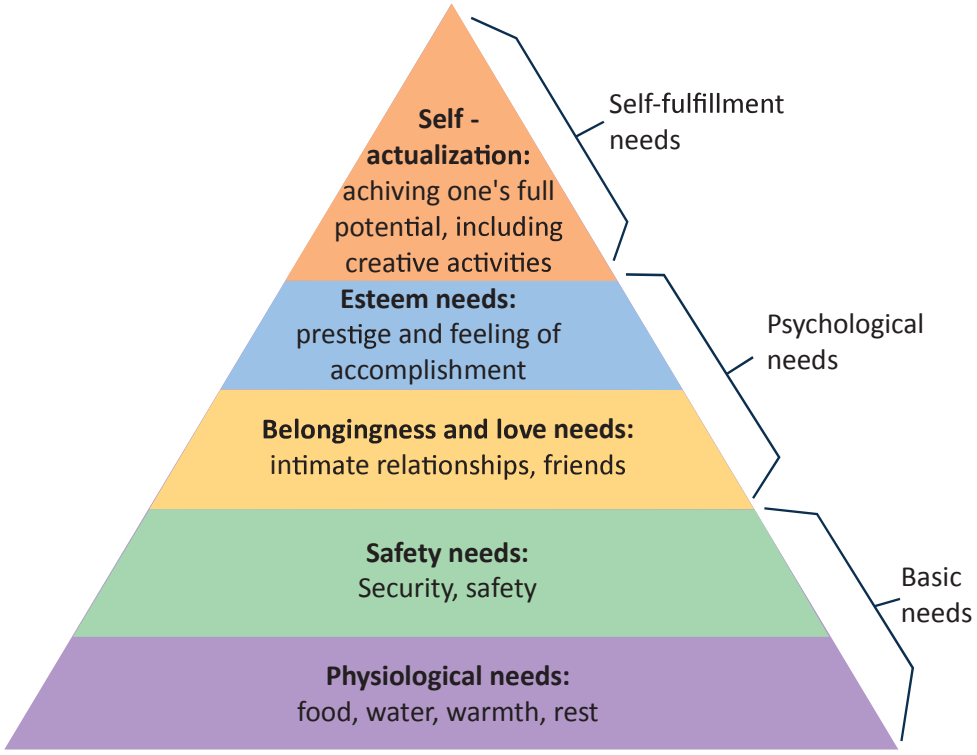
To truly achieve your full potential, you need to take a deep look inside yourself and find out what kind of person you really are. This attempt to understand your personality is known as self-analysis. Assessing yourself in this manner will help you grow, and will also help you to identify areas within 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.



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-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

The level of motivation achievement in a person differs from individual to individual. It is important that entrepreneurs have a high level of achievement motivation – a deep desire to accomplish something important and unique. It is equally important that they hire people who are also highly motivated by challenges and success.

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?

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 is Attitude?

Now that we understand why motivation is so important for self-analysis, let's look at the role our attitude plays in better understanding ourselves. Attitude can be described as your tendency (positive or negative), to think and feel about someone or something. Attitude is the foundation for success in every aspect of life. Our attitude can be our best friend or our worst enemy. In other words:

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

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

What Are Your Strengths and Weaknesses?

Another way to analyze 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.

9.1.4 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.

They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

- Honesty and employees: When entrepreneurs build honest relationships with their employees, it leads to more transparency in the workplace, which results in higher work performance and better results.
- Honesty and investors: For entrepreneurs, being honest with investors means not only sharing strengths but also candidly disclosing current and potential weaknesses, problem areas and solution strategies. Keep in mind that investors have a lot of experience with startups and are aware that all new companies have problems. Claiming that everything is perfectly fine and running smoothly is a red flag for most investors.
- Honesty with oneself: The consequences of being dishonest with oneself can lead to dire results, especially in the case of entrepreneurs. For entrepreneurs to succeed, it is critical that they remain realistic about their situation at all times, and accurately judge every aspect of their enterprise for what it truly is.

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.

What are Work Ethics?

Being ethical in the workplace means displaying values like honesty, integrity and respect in all your decisions and communications. It means not displaying negative qualities like lying, cheating and stealing.

Workplace ethics play a big role in the profitability of a company. It is as crucial to an enterprise as high morale and teamwork. This is why most companies lay down specific workplace ethic guidelines that must compulsorily be followed by their employees. These guidelines are typically outlined in a company's employee handbook.

Elements of a Strong Work Ethic

An entrepreneur must display strong work ethics, as well as hire only those individuals who believe in and display the same level of ethical behavior in the workplace. Some elements of a strong work ethic are:

- **Professionalism**: This involves everything from how you present yourself in a corporate setting to the manner in which you treat others in the workplace.
- **Respectfulness**: This means remaining poised and diplomatic regardless of how stressful or volatile a situation is.
- **Dependability**: This means always keeping your word, whether it's arriving on time for a meeting or delivering work on time.
- **Dedication**: This means refusing to quit until the designated work is done, and completing the work at the highest possible level of excellence.
- **Determination**: This means embracing obstacles as challenges rather than letting them stop you, and pushing ahead with purpose and resilience to get the desired results.
- **Accountability**: This means taking responsibility for your actions and the consequences of your actions, and not making excuses for your mistakes.
- **Humility**: This means acknowledging everyone's efforts and had work, and sharing the credit for accomplishments.

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, etc.
- **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.

9.1.5 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.

9.1.6 Time Management: What is Time Management?

Time management is the process organizing your time, and deciding how to allocate your time between different activities. Good time management is the difference between working smart (getting more done in less time) and working hard (working for more time to get more done).

Effective time management leads to an efficient work output, even when you are faced with tight deadlines and high pressure situations. On the other hand, not managing your time effectively results in inefficient output and increases stress and anxiety.

Benefits of Time Management

Time management can lead to huge benefits like:

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

Not managing time effectively can result in undesirable consequences like:

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

Traits of Effective Time Managers

Some traits of effective time managers are:

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

Effective Time Management Techniques

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

- Plan out your day as well as plan for interruptions. Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- Put up a “Do Not Disturb” sign when you absolutely have to complete a certain amount of work.
- Close your mind to all distractions. Train yourself to ignore ringing phones, don’t reply to chat messages and disconnect from social media sites.

- Delegate your work. This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- Stop procrastinating. Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- Prioritize. List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- Maintain a log of your work activities. Analyze 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.

9.1.7 Anger Management: What is Anger Management

Anger management is the process of:

1. Learning to recognize the signs that you, or someone else, is becoming angry
2. Taking the best course of action to calm down the situation in a positive way

Anger management does not mean suppressing anger.

Importance of Anger Management

Anger is a perfectly normal human emotion. In fact, when managed the right way, anger can be considered a healthy emotion. However, if it is not kept in check, anger can make us act inappropriately and can lead to us saying or doing things that we will likely later regret.
Extreme anger can:

- **Hurt you physically:** It leads to heart disease, diabetes, a weakened immune system, insomnia, and high blood pressure.
- **Hurt you mentally**: It can cloud your thinking and lead to stress, depression and mental health issues.
- **Hurt your career**: It can result in alienating your colleagues, bosses, clients and lead to the loss of respect.
- **Hurt your relationships**: It makes it hard for your family and friends to trust you, be honest with you and feel comfortable around you.
  This is why anger management, or managing anger appropriately, is so important.

Anger Management Strategies

Here are some strategies that can help you control your anger:

Strategy 1: Relaxation

Something as simple as breathing deeply and looking at relaxing images works wonders in calming down angry feelings. Try this simple breathing exercise:

1. Take a deep breath from your diaphragm (don't breathe from your chest)
2. Visualize your breath coming up from your stomach
3. Keep repeating a calming word like 'relax' or 'take it easy' (remember to keep breathing deeply while repeating the word)
4. Picture a relaxing moment (this can be from your memory or your imagination)

Follow this relaxation technique daily, especially when you realize that you're starting to feel angry.

Strategy 2: Cognitive Restructuring

Cognitive restructuring means changing the manner in which you think. Anger can make you curse, swear, exaggerate and act very dramatically. When this happens, force yourself to replace your angry thoughts with more logical ones. For instance, instead of thinking 'Everything is ruined' change your mindset and tell yourself 'It's not the end of the world and getting angry won't solve this'.

Strategy 3: Problem Solving

Getting angry about a problem that you cannot control is a perfectly natural response. Sometimes, try as you may, there may not be a solution to the difficulty you are faced with. In such cases, stop focusing on solving the problem, and instead focus on handling and facing the problem. Remind yourself that you will do your best to deal with the situation, but that you will not blame yourself if you don't get the solution you desire.

Strategy 4: Better Communication

When you're angry, it is very easy to jump to inaccurate conclusions. In this case, you need to force yourself to stop reacting, and think carefully about what you want to say, before saying it. Avoid saying the first thing that enters your head. Force yourself to listen carefully to what the other person is saying. Then think about the conversation before responding.

Strategy 5: Changing Your Environment

If you find that your environment is the cause of your anger, try and give yourself a break from your surroundings. Make an active decision to schedule some personal time for yourself, especially on days that are very hectic and stressful. Having even a brief amount of quiet or alone time is sure to help calm you down.

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.

9.1.8 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 behavioral symptoms of stress.

Cognitive Symptoms	Emotional Symptoms
• Memory problems	• Depression
• Concentration issues	• Agitation
• Lack of judgement	• Irritability
• Pessimism	• Loneliness
• Anxiety	• Anxiety
• Constant worrying	• Anger

Physical Symptoms	Behavioral Symptoms
• Aches and pain	• Increase or decrease in appetite
• Diarrhea or constipation	• Over sleeping or not sleeping enough
• Nausea	• Withdrawing socially
• Dizziness	• Ignoring responsibilities
• Chest pain and/or rapid heartbeat	• Consumption of alcohol or cigarettes
• Frequent cold or flu like feelings	• Nervous habits like nail biting, pacing etc.

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 attiude and focus on being proactive.

9.2. Digital Literacy: A Recap

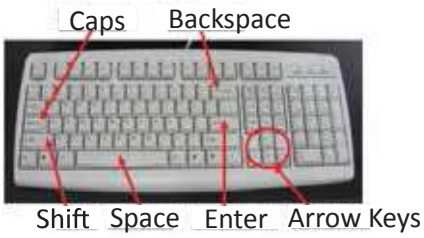
Unit Objectives

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 basic computer terminology
5. Recall the functions of basic computer keys
6. Discuss the main applications of MS Office
7. Discuss the benefits of Microsoft Outlook
8. Discuss the different types of e-commerce
9. List the benefits of e-commerce for retailers and customers
10. Discuss how the Digital India campaign will help boost e-commerce in India
11. Describe how you will sell a product or service on an e-commerce platform

9.2.1 Computer and Internet basics: Basic Parts of a Computer

Basic Parts of a Keyboard



Basic 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.
- **Desktop**: The first screen displayed after the operating system loads.
- **Background**: The image that fills the background of the desktop.

Basic Parts of a Computer

- **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.
- **Icon**: A small picture or image that visually represents something on your computer.
- **Cursor**: An arrow which indicates where you are positioned on the screen.
- **Program Menu**: A list of programs on your computer that can be accessed from the Start menu.
- **Taskbar**: The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.
- **Recycle Bin**: A temporary storage for deleted files.

Basic Internet Terms

- **The Internet**: A vast, international collection of computer networks that transfers information.
- **The World Wide Web**: A system that lets you access information on the Internet.
- **Website**: A location on the World Wide Web (and Internet) that contains information about a specific topic.
- **Homepage**: Provides information about a website and directs you to other pages on that website.
- **Link/Hyperlink**: A highlighted or underlined icon, graphic, or text that takes you to another file or object.
- **Web Address/URL**: The address for a website.
- **Address Box**: A box in the browser window where you can type in a web address.

Basic Computer Keys

- **Arrow Keys**: Press these keys to move your cursor.
- **Space bar**: Adds a space.
- **Enter/Return**: Moves your cursor to a new line.
- **Shift**: Press this key if you want to type a capital letter or the upper symbol of a key.
- **Caps Lock**: Press this key if you want all the letters you type to be capital letters. Press it again to revert back to typing lowercase letters.
- **Backspace**: Deletes everything to the left of your cursor.

Tips 

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

9.2.2 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.

9.2.3 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 individuals 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.

9.3: 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

9.3.1 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.

9.3.2 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.

Savings 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 needs 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 (Aadhaar) 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.

9.3.3 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, tax etc.	Material consumed, wages, commission on sales, packing expenses, etc.

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.

9.3.4 Investment, Insurance and Taxes:

Investment

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

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

Insurance

There are two types of insurance – Life Insurance and 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, cargo etc. 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.

9.3.5 Online Banking, NEFT, RTGS etc.: What is Online Banking

Internet or online banking allows account holders to access their account from a laptop at any location. In this way, instructions can be issued. To access an account, account holders simply need to use their unique customer ID number and password.

Internet banking can be used to:

- Find out an account balance
- Transfer amounts from one account to another
- Arrange for the issuance of cheques
- Instruct payments to be made
- Request for a cheque book
- Request for a statement of accounts
- Make a fixed deposit

Electronic Funds Transfers

Electronic funds transfer is a convenient way of transferring money from the comfort of one's own home, using integrated banking tools like internet and mobile banking.

Transferring funds via an electronic gateway is extremely convenient. With the help of online banking, you can choose 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 banks, 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

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

RTGS

RTGS stands for Real Time Gross Settlement. This is a real time funds transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. The transferred amount is immediately deducted from the account of one bank, and instantly credited to the other bank's account. The RTGS payment gateway is maintained by the Reserve Bank of India. The transactions between banks are made electronically.

RTGS can be used by individuals, companies and firms to transfer large sums of money. Before remitting funds through RTGS, you will need to add the beneficiary and his bank account details via your online banking account. In order to complete this registration, you will require the following information:

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

To transfer money through IMPS, the you need to:

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

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

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	Upto 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	Upto 10,000 – 5 above 10,000 – 1 lac – 5 above 1 – 2 lacs – 15

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.

9.4. 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

9.4.1 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 analyze the job description.
   - Make a note of the knowledge, skills and abilities required to fulfill 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, behavioral and case study questions are asked.
   - Think about the kind of answers you would like to provide to typical questions asked in these three areas.
   - Practice these answers until you can express them confidently and clearly.

4. **Plan your attire for the interview.**
   - It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
   - Ensure that your clothes are clean and well-ironed. Pick neutral colours – nothing too bright or flashy.
   - The shoes you wear should match your clothes, and should be clean and suitable for an interview.
   - Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.
5. **Ensure that you have packed everything that you may require during the interview.**
   - Carry a few copies of your resume. Use a good quality paper for your resume print outs.
   - Always take along a notepad and a pen.
   - Take along any information you may need to refer to, in order to fill out an application form.
   - Carry a few samples of your work, if relevant.
6. **Remember the importance of non-verbal communication.**
   - Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
   - Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
   - Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.
7. **Make a list of questions to end the interview with.**
   - Most interviews will end with the interviewer(s) asking if you have any questions. This is your chance to show that you have done your research and are interested in learning more about the company.
   - If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
   - Some good questions to ask at this point are:
     - What do you consider the most important criteria for success in this job?
     - How will my performance be evaluated?
     - What are the opportunities for advancement?
     - What are the next steps in the hiring process?
   - Remember, never ask for information that is easily available on the company website.

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.

9.4.2 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:

Jasmine Watts
Breach Candy, Mumbai – India
Contact No: +91 2223678270
Email: jasmine.watts@gmail.com

Step 2: Add the Profile Summary Section

This part of your resume should list your overall experiences, achievements, awards, certifications and strengths. You can make your summary as short as 2-3 bullet points or as long as 8-10 bullet points.

Example:

Profile Summary

- A Content Writer graduated from University of Strathclyde having 6 years of experience in writing website copy.
- Core expertise lies in content creation for e-learning courses, specifically for the K-12 segment.

Step 3: Include Your Educational Qualifications

When listing your academic records, first list your highest degree. Then add the second highest qualification under the highest one and so on. To provide a clear and accurate picture of your educational background, it is critical that include information on your position, rank, percentage or CPI for every degree or certification that you have listed.

If you have done any certifications and trainings, you can add a Trainings & Certifications section under your Educational Qualifications section.

Example:

Educational Qualifications

- Masters in International Management (2007) from Columbia University with 8.8 CPI.
- Bachelor of Management Studies (2004) from Mumbai University with 87% marks.
- 10+2 with Math, Stats (2001) from Maharashtra Board with 91% marks.
- High School (1999) from Maharashtra Board with 93% marks.

Step 4: List Your Technical Skills

When listing your technical skills, start with the skills that you are most confident about. Then add the skills that you do not have as good a command over. It is perfectly acceptable to include just one skill, if you feel that particular skill adds tremendous value to your résumé. If you do not have any technical skills, you can omit this step.

Example:

Technical Skills

- Flash
- Photoshop

Step 5: Insert Your Academic Project Experience

List down all the important projects that you have worked on. Include the following information in this section:

- Project title
- Organization
- Platform used
- Contribution
- Description

Example:

Academic Projects

Project Title: Different Communication Skills

Organization: True Blue Solutions

Platform used: Articulate

Contribution: Content writing and graphic visualization

Description: Development of storyboards for corporate induction & training programs

Step 6: List Your Strengths

This is where you list all your major strengths. This section should be in the form of a bulleted list.

Example:

Strengths

- Excellent oral, written and presentation skills
- Action-oriented and result-focused
- Great time management skills

Step 7: List Your Extracurricular Activities

It is very important to show that you have diverse interests and that your life consists of more than academics. Including your extracurricular activities can give you an added edge over other candidates who have similar academic scores and project experiences. This section should be in the form of a bulleted list.

Example:

Extracurricular Activities

- Member of the Debate Club
- Played tennis at a national level
- Won first prize in the All India Camel Contest, 2010

Step 8: Write Your Personal Details

The last section of your résumé must include the following personal information:

- Date of birth
- Nationality
- Gender & marital status
- Languages known

Example:

Personal Details

- Date of birth: 25th May, 1981
- Gender & marital status: Female, Single
- Nationality: Indian
- Languages known: English, Hindi, Tamil, French

Tips

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

9.4.3 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.

9.4.4 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 services 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 background, work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer made by the 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 and pitches 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 intern, to work at the employer's company for a fixed, limited time period.
- **Interview**: A conversation between a potential employee and a representative of an employer, in 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, address, contact 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.
- **Lay Off**: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- **Leave**: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- **Letter of Acceptance**: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- **Letter of Agreement**: A letter that outlines the terms of employment.
- **Letter of Recommendation**: A letter written for the purpose of validating the work skills of a person.
- **Maternity Leave**: Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor**: A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- **Minimum wage**: The minimum wage amount paid on an hourly basis.
- **Notice**: An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.
- **Offer of Employment**: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract**: A contract of employment that continues till the employer or employee terminates it.
- **Overqualified**: A person who is not suited for a particular job because he or she has too many years of work experience, or a level of education that is much higher than required for 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/Headhunters/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.

9.5. Understanding Entrepreneurship

Unit Objectives

1. At the end of this unit, you will be able to:
2. Discuss the concept of entrepreneurship
3. Discuss the importance of entrepreneurship
4. Describe the characteristics of an entrepreneur
5. Describe the different types of enterprises
6. List the qualities of an effective leader
7. Discuss the benefits of effective leadership
8. List the traits of an effective team
9. Discuss the importance of listening effectively
10. Discuss how to listen effectively
11. Discuss the importance of speaking effectively
12. Discuss how to speak effectively
13. Discuss how to solve problems
14. List important problem solving traits
15. Discuss ways to assess problem solving skills
16. Discuss the importance of negotiation
17. Discuss how to negotiate
18. Discuss how to identify new business opportunities
19. Discuss how to identify business opportunities within your business
20. Understand the meaning of entrepreneur
21. Describe the different types of entrepreneurs
22. List the characteristics of entrepreneurs
23. Recall entrepreneur success stories
24. Discuss the entrepreneurial process
25. Describe the entrepreneurship ecosystem
26. Discuss the government's role in the entrepreneurship ecosystem
27. Discuss the current entrepreneurship ecosystem in India
28. Understand the purpose of the Make in India campaign
29. Discuss the relationship between entrepreneurship and risk appetite
30. Discuss the relationship between entrepreneurship and resilience
31. Describe the characteristics of a resilient entrepreneur
32. Discuss how to deal with failure

9.5.1 Concept Introduction, (Characteristic of an Entrepreneur, types of firms / types of enterprises): Entrepreneurs and Entrepreneurship

Anyone who is determined to start a business, no matter what the risk, is an entrepreneur. Entrepreneurs run their own start-up, take responsibility for the financial risks and use creativity, innovation and vast reserves of self-motivation to achieve success. They dream big and are determined to do whatever it takes to turn their idea into a viable offering. The aim of an entrepreneur is to create an enterprise. The process of creating this enterprise is known as entrepreneurship.

Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

1. It results in the creation of new organizations
2. It brings creativity into the marketplace
3. It leads to improved standards of living
4. It helps develop the economy of a country

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:

- Bill Gates (Founder of Microsoft)
- Steve Jobs (Co-founder of Apple)
- Mark Zuckerberg (Founder of Facebook)
- Pierre Omidyar (Founder of eBay)

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.

9.5.2 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.

Importance of Teamwork in Entrepreneurial Success

For an entrepreneurial leader, building an effective team is critical to the success of a venture. An entrepreneur must ensure that the team he builds possesses certain crucial qualities, traits and characteristics. An effective team is one which has:

1. **Unity of purpose:** All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.
2. **Great communication skills:** Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.
3. **The ability to collaborate:** Every member should feel entitled to provide regular feedback on new ideas.
4. **Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.
5. **Visionary members:** The team should have the ability to anticipate problems and act on these potential problem 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.

9.5.3 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
- Nod and use encouraging words and gestures
- Be open-minded
- Think about the speaker's perspective
- Be very, very patient
- Pay attention to the tone that is being used
- Pay attention to the speaker's gestures, facial expressions and eye movements
- Not try and rush the person
- Not let the speaker's mannerisms or habits irritate or distract you

How to Listen 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.

9.5.4 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
- Being proactive
- Having a positive attitude
- Asking the right questions
- Not panicking
- 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 startup. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate

Take a look at some steps to help you negotiate:

Step 1: Pre-Negotiation Preparation	Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.
Step 2: Discuss the Problem	This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.
Step 3: Clarify the Objective	Ensure that both parties want to solve the same problem and reach the same goal.
Step 4: Aim for a Win-Win Outcome	Try your best to be open minded when negotiating. Compromise and offer 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

9.5.5 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.

A business opportunity means a good or favourable change available to run a specific business in a given environment, at a given point of time.

Common Questions Faced by Entrepreneurs

A critical question that all entrepreneurs face is how to go about finding the business opportunity that is right for them.

Some common questions that entrepreneurs constantly think about are:

- Should the new enterprise introduce a new product or service based on an unmet need?
- Should the new enterprise select an existing product or service from one market and offer it in another where it may not be available?
- Should the enterprise be based on a tried and tested formula that has worked elsewhere?

It is therefore extremely important that entrepreneurs must learn how to identify new and existing business opportunities and evaluate their chances of success.

When is an Idea an Opportunity?

An idea is an opportunity when:

- It creates or adds value to a customer
- It solves a significant problem, removes a pain point or meets a demand
- Has a robust market and profit margin
- Is a good fit with the founder and management team at the right time and place

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

- Economic trends
- Changes in funding
- Changing relationships between vendors, partners and suppliers
- Market trends
- Changes in political support
- Shift in target audience

Ways to Identify New Business Opportunities

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.

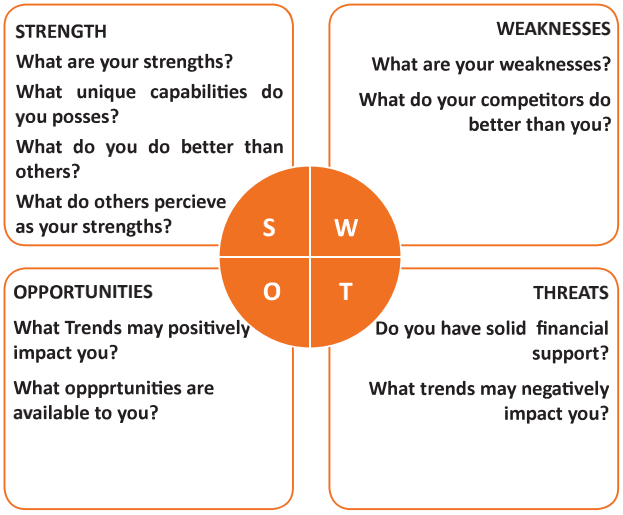
5. Think About Product Differentiation

   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:



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 analyze it.
To analyze an opportunity, you must:

- Focus on the idea
- Focus on the market of the idea
- Talk to industry leaders in the same space as the idea
- Talk to players in the same space as the idea

Tips 

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

9.5.6 Entrepreneurship Support Eco - System: What 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.

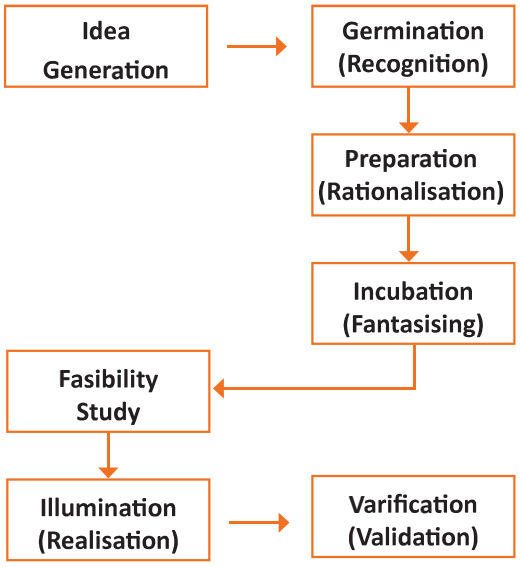
Stage 4: Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.

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.



What is an Entrepreneur?

The entrepreneurship support ecosystem signifies the collective and complete nature of entrepreneurship. New companies emerge and flourish not only because of the courageous, visionary entrepreneurs who launch them, but they thrive as they are set in an environment or 'ecosystem' made of private and public participants. These players nurture and sustain the new ventures, facilitating the entrepreneurs' efforts.

An entrepreneurship ecosystem comprises of the following six domains:

1. **Favourable Culture:** This includes elements such as tolerance of risk and errors, valuable networking and positive social standing of the entrepreneur.
2. **Facilitating Policies & Leadership:** This includes regulatory framework incentives and existence of public research institutes.
3. **Financing Options:** Angel financing, venture capitalists and micro loans would be good examples of this.
4. **Human Capital:** This refers to trained and untrained labour, entrepreneurs and entrepreneurship training programmes, etc.
5. **Conducive Markets for Products & Services:** This refers to an existence or scope of existence of a market for the product/service.
6. **Institutional & Infrastructural Support:** This includes legal and financing advisers, telecommunications, digital and transportation infrastructure, and entrepreneurship networking programmes.

These domains indicate whether there is a strong entrepreneurship support ecosystem and what actions should the government put in place to further encourage this ecosystem. The six domains and their various elements have been graphically depicted.

Early Customers

- Early adopters for proof-of-concept
- Expertise in productizing
- Reference customer
- First reviews
- Distribution channels

Leadership

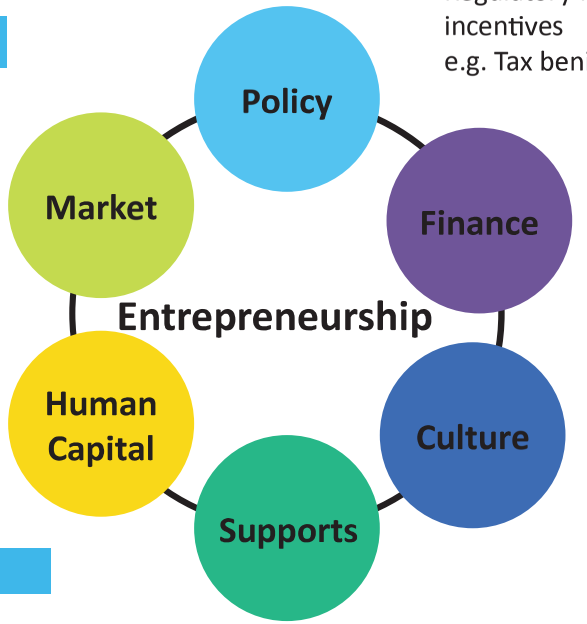
- Unequivocal support
- Social legitimacy
- Open door for advocate
- Entrepreneurship strategy
- urgency, crisis and challenge

Government

- Institutions
  e.g. Investment, support
- Financial support
  e.g. for R&D, jump start funds
  Regulatory framework
  incentives
  e.g. Tax benifits
- Research institutes
- Venture-friendly legislation
- e.g. Bankruptcy, contract enforcement, property rights, and labour

Networks

- Entrepreneure's networks
- Diaspora networks
- Multinational corporations



Financial Capital

- Micro-loans
- Angel investors, friends and family
- Zero-stage venture capital
- Venture capital funds
- Private equity
- Public capital markets
- Debt

Labour

- Skilled and unskilled
- Serial entrepreneures
- Later generation family

Success Stories

- Visible successes
- Wealth generation for founders
- International reputation

Educational Institutions

- General degrees (professional and academic)
- Specific entrepreneurship training

Societal norms

- Tolerance of risk, mistakes, failure
- Innovation, creativity, experimentation
- Social status of entrepreneur
- Wealth creation
- Ambition, drive, hunger

Infrastructure

- Telecommunications
- Transportation & logistics
- Energy
- Zones, incubation centers, clusters

Non-Government Institution

- Entrepreneurship promotion in non-profits
- Conferences
- Business plan contests
- Entrepreneur- friendly association

Support Professions

- Legal
- Accounting
- Investment bankers

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

Entrepreneurship ecosystems eventually become (largely) self-sustaining. When the six domains are resilient enough, they are mutually beneficial. At this point, government involvement can and should be significantly minimized. Public leaders do not need to invest a lot to sustain the ecosystem. It is imperative that the entrepreneurship ecosystem incentives are formulated to be self-liquidating, hence focusing on sustainability of the environment.

Government's Role in the Entrepreneurship Ecosystem

Encouraging new ventures is a major focus for policymakers. Governments across the world are recognizing that new businesses flourish in distinctive types of supportive environments. Policymakers should study the scenario and take into account the following points whilst they formulate policies and regulations that enable successful entrepreneurship support ecosystems.

1. Policymakers should avoid regulations that discourage new entrants and work towards building efficient methods for business startups. Policies and regulations that favour existing, dominant firms over entrepreneurial ventures, restrict competition and obstruct entry for new companies.
2. Instead of developing policies conceptually intended to correct market failures, policymakers should interact with entrepreneurs and understand the challenges faced by them. The feedback should be used to develop policies that incite idea exploration, product development and increased rates of deal flow.
3. Entrepreneurial supporters should create a database that enables identifying who the participants in the ecosystem are and how they are connected. These ecosystem maps are useful tools in developing engagement strategies.
4. Disruptions are unavoidable in economic and social life. However, it's important to note that economic disruption gives rise to entrepreneurial opportunities. Architects of the entrepreneurship ecosystems (entrepreneurs, mentors, policymakers and consumers,) should anticipate these dips, thus capitalizing on the opportunities they create.

The need for effective strategies to enable local entrepreneurship support ecosystems is a practical one. Better understanding of the actual ecosystems provides a framework within which policy makers can ask relevant questions, envisage more efficient approaches, and assess ensuing outcomes.

Snapshot of the Entrepreneurship Ecosystem in India

Entrepreneurship has earned a newfound respect in India. Many Indians, with exposure to the world of business, who traditionally would have opted for a job, are setting up their own ventures. Many elements of the entrepreneurship ecosystem are beginning to come together. For example, increase in venture capitalists, government schemes and incubators, academia industry linkages, and emerging clusters and support to rural economy. All these initiatives are effective but there is a need to scale up and enrich the ecosystem further in the following ways:

1. We need to review our attitude towards failures and accept them as learning experiences.
2. We must encourage the educated to become entrepreneurs and provide students in schools and colleges with entrepreneurship skills.

3. Universities, research labs and the government need to play the role of enablers in the entrepreneurship support ecosystem.
4. Policymakers need to focus on reducing the obstacles such as corruption, red tape and bureaucracy.
5. We need to improve our legal systems and court international venture capital firms and bring them to India.
6. We must devise policies and methods to reach the secondary and tertiary towns in India, where people do not have access to the same resources available in the cities.

Today, there is a huge opportunity in this country to introduce innovative solutions that are capable of scaling up, and collaborating within the ecosystem as well as enriching it.

Make in India Campaign

Every entrepreneur has certain needs. Some of their important needs are:

- To easily get loans
- To easily find investors
- To get tax exemptions
- To easily access resources and good infrastructure
- To enjoy a procedure that is free of hassles and is quick
- To be able to easily partner with other firms

The Make in India campaign, launched by Prime Minister Modi aims to satisfy all these needs of young, aspiring entrepreneurs. Its objective is to:

- Make investment easy
- Support new ideas
- Enhance skill development
- Safeguard the ideas of entrepreneurs
- Create state-of-the-art facilities for manufacturing goods

Tips

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

9.5.7 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 startup with a revolutionary concept will have a very high risk appetite. The startup can afford short term failures before it achieves longer term success. This type of appetite will not remain constant and will be adjusted to account for the present circumstances of the company.

Risk Appetite Statement

Companies have to define and articulate their risk appetite in sync with decisions made about their objectives and opportunities. The point of having a risk appetite statement is to have a framework that clearly states the acceptance and management of risk in business. It sets risk taking limits within the company. The risk appetite statement should convey the following:

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired tradeoff 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
- Strong social connections
- Skill to learn from setbacks
- Ability to look at the bigger picture
- Ability to diversify and expand
- Survivor attitude
- Cash-flow conscious habits
- 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 the 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.

9.5.8 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 startup. 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.

9.6: 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. Understand 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

9.6.1 Market Study / The 4 Ps of Marketing / Importance of an IDEA: Understanding Market Research

Market research is the process of gathering, analyzing 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 research is the more expensive than conducting exploratory research.

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?
- Can it be sold at a profit?

Price

Once all the elements of Product have been established, the Price factor needs to be considered.

The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some 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?
- What is the best medium to use to reach your target audience?
- When would be the best time to promote your product?
- How are your competitors promoting their products?

Place

According to most marketers, the basis of marketing is about offering the right product, at the right price, at the right place, at the right time. For this reason, selecting the best possible location is critical for converting prospective clients into actual clients.

Some questions to ask yourself are:

- Will your product or service be looked for in a physical store, online or both?
- What should you do to access the most appropriate distribution channels?
- Will you require a sales force?
- Where are your competitors offering their products or services?
- Should you follow in your competitors' footsteps?
- Should you do something different from your competitors?

Importance of an IDEA

Ideas are the foundation of progress. An idea can be small or ground-breaking, easy to accomplish or extremely complicated to implement. Whatever the case, the fact that it is an idea gives it merit. Without ideas, nothing is possible. Most people are afraid to speak out their ideas, out for fear of being ridiculed. However, if are an entrepreneur and want to remain competitive and innovative, you need to bring your ideas out into the light.

Some ways to do this are by:

- Establishing a culture of brainstorming where you invite all interested parties to contribute
- Discussing ideas out loud so that people can add their ideas, views, opinions to them
- Being open minded and not limiting your ideas, even if the idea who have seems ridiculous
- Not discarding ideas that you don't work on immediately, but instead making a note of them and shelving them so they can be revisited at a later date

Tips 

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

9.6.2 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.

9.6.3 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 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.

9.6.4 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 3-5 year projection and outlines the plan that the company intends to follow to grow its revenues. A business plan is also a very important tool for getting the interest of key employees or future investors.

A business plan typically comprises of eight elements.

Elements of a Business Plan

Executive Summary

The executive summary follows the title page. The summary should clearly state your desires as the business owner in a short and businesslike 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
- The incentives that you offer

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 fulfill 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.

9.6.5 Procedure and Formalities for Bank Finance:

The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for startups. 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 startups, offering funding to thousands of startups 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 shareholders' funds
- Adequate security
- Experience in business
- Good reputation

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 analyzing 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.

9.6.6 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.

Use all your skills and the skills of your employees to market your enterprise in an effective manner. You can 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.

9.6.7. 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[1] or industry expert that I can call on?
5. Who is my ideal customer[2]?
6. Who are my competitors[3]?
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[4] 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[5] 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[6] 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[7] of my business?
18. What taxes[8] will I need to pay?
19. What kind of insurance[9] 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 covers human life while general insurance covers assets like animals, goods, cars etc.

Notes