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Participant Handbook

Sector
Electronics

Sub - Sector
Communication & Broadcasting

Occupation
After sales service

Reference ID : **ELE/Q8106, Version 2.0**
NSQF Level 4

Digital Cable Technician - Access

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Price: ₹

Published by

Electronics Sector Skills Council of India (ESSCI)
155, 2nd Floor, ESC House, Okhla Industrial Area, Phase 3, New Delhi - 110020, India
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First Edition, July 2022

This book is sponsored by Electronics Sector Skills Council of India (ESSCI)

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Shri Narendra Modi
Prime Minister of India

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SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **"- Digital Cable Technician - Access "** QP No. **"ELE/Q8106, NSQF Level 4"**

Date of Issuance : 27.01.2022
Valid up to* : 02.06.2025
*Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)

Authorized Signatory
Electronics Sector Skill Council of India

Acknowledgements

The need for having a standard curriculum for the Job Role based Qualification Packs under the National Skills Qualification Framework was felt necessary for achieving a uniform skill based training manual in the form of a participant handbook.

I would like to take the opportunity to thank everyone who contributed in developing this handbook for the QP Digital Cable Technician - Access.

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

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

CEO

Electronics Sector Skills Council of Indi

About this Book

This Participant Handbook is designed to enable training for the "Digital Cable Technician – Access" Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.

Key Learning Objectives for the specific "Digital Cable Technician – Access" mark the beginning of the Unit/s for that NOS.

1. Explain the history behind cable and TV
2. Explain master distribution centre
3. Identify headend components
4. Identify Cable types
5. List the tools and devices at work
6. Explain Cable laying procedure
7. Explain STB installation and configuration
8. List testing procedure
9. List the troubleshooting procedures
10. Explain the troubleshooting cases
11. Identify the safety procedure
12. Explain safety
13. Use appropriate language for communication
14. Make the best impression

The symbols used in this book are described below.

Symbols Used


Key Learning Outcomes


Steps


Role Play


Tips


Notes


Unit Objectives


Activity

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1. Basics of Digital Cable Technology

Unit 1.1: Evolution of Cable and Satellite Television

Unit 1.2: Headend System and Distribution Network

Unit 1.3: Multi Play Digital Services

Unit 1.4: Access Network Architecture

ELE/N8108

Key Learning Outcomes

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

1. Explain the history behind cable and TV
2. Explain master distribution centre
3. Identify headend components
4. Identify Cable types
5. Explain cable structure
6. Identify supporting wires
7. Explain connectors
8. Define amplifier and power inserter

UNIT 1.1: Evolution of Cable and Satellite Television

Unit Objectives

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

1. Explain the history of cable TV
2. Explain the history of satellite television in India

Television was introduced to India, with experimental transmission from Delhi, on September 15, 1959. It was managed and controlled by All India Radio (AIR) which provided the engineering and programme professionals. That time, it included:

- 21 community television sets (CATV)
- A make shift studio
- A low power transmitter

In 1965, a news bulletin, in addition with a daily one-hour service, was started. The services were extended to a Mumbai in 1972.

The television stations were set up by Doordarshan in 7 cities by 1975. Those cities are Calcutta, Chennai, Srinagar, Amritsar and Lucknow. Though in the beginning, AIR and Doordarshan were controlled by the same management, but later, in 1976, Television services were separated from Radio.

The initial version of CATV started taking place in the households in some states, such as Maharashtra and Gujarat, by the name of Master antenna Television (MATV). In this system, one common antenna at the rooftop was used to serve 1 Door darshan channel and a local VCR channel in analog mode.

Doordarshan started facing a big challenge in the decade of 1990s. The Gulf War was covered by CNN through satellite and was telecast, in the national channels of the Asian and western countries. It created potentiality among the viewers, particularly in developing countries, to watch foreign broadcast via satellite.

In 1992, a Hong Kong based group of companies launched a Satelite, for Satellite Television Asian Region (STAR), whose footprint was available in Indian subcontinent. The STAR Television programmes are broadcast by AsiaSat-1 Satellite. The STAR TV channels, for example, Star Plus, BBC, Prime Sports and MTV (which is now replaced by V Channel) relay their signal round the clock. Zee TV, a Hindi channel, started showing its programs by using a transponder from Star TV.

The advent of Satellite television motivated the cable operators to receive its programs of the channels, rising on a regular interval. They also show their own programs, such as, popular serials and film based programmes in their own local channel, apart from linking satellite channels. It provided the Indian middle class families, an alternative of the DD. The popularity of satellite television became popular in small towns and villages of India too, as well as the metropolitan cities.

The demand of the customers for various channels was found increasing day by day with the growing number of channels. It was a limitation for analog transmission to create any further expansion. The era of digitization came in to action in 2003, starting from Metro cities and covering all the Indian subcontinents by December 2016. It recent days, more than 1200 channels are available in Indian footprint including SD and HD transmission. Customers can choose a plan to view the channels of his/her choice and pay only for those.

In the journey from MATV to Multi play services, there has been a significant advancement in the field of:

- Transmission technology
- Video compression and modulation technology
- Access technology or various delivery platforms

Development of fibre technology and its uses have provided unlimited bandwidth of data propagation and thus, made the network faster.

UNIT 1.2: Headend System and Distribution Network

Unit Objectives

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

1. Explain Cable and cable types
2. Explain Headend system
3. List the Cable Connectors
4. Describe Power Inserter
5. Describe Amplifier

1.1.1 Basic of Headend System

The master distribution centre of a CATV system is the headend, that receives the incoming television signals from various video sources such as video players, DBS satellites or local studios. It then selects the signal, amplifies and re-modulates them onto TV channels so that they can be transmitted through a distribution network, down the CATV system.

The incoming signals for headend systems, involve satellite receivers, off-air receivers and different types of transmission links. The signals are received and processed by the channel decoders. The headends typically use integrated receiver devices which incorporates multiple receiver and decoding and decryption functions into a single assembly. After the incoming signals are received, separated and converted into new formats, they are selected and encoded for being stored or retransmitted in the CATV network. These signals are then sent on the CATV distribution system after being modulated, amplified and combined.

Components of Headend System

The following figure lists the components of headend system:

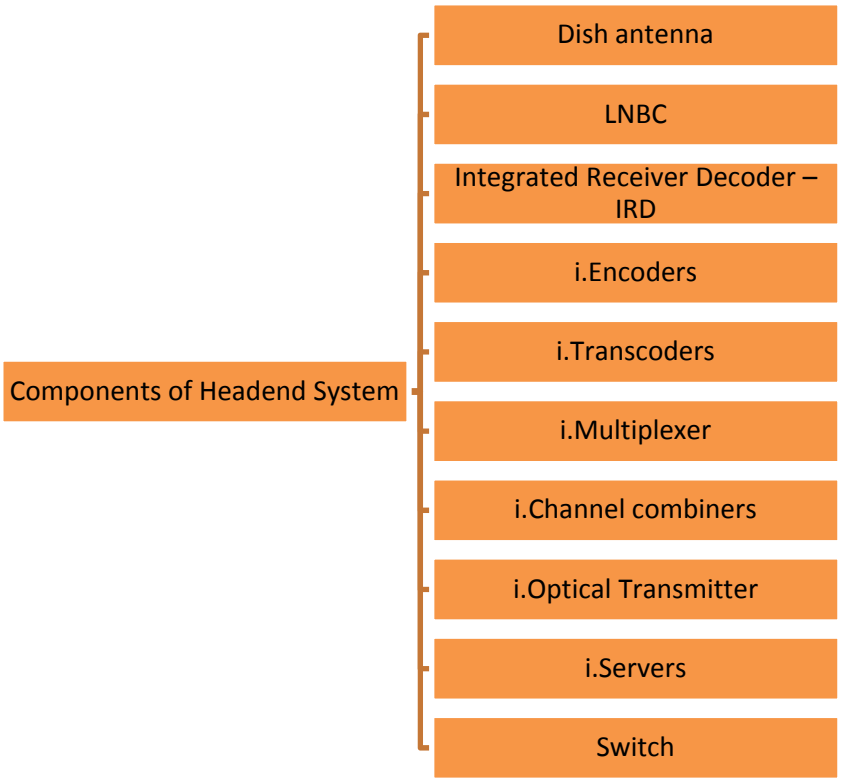


Fig. 1.1.1: Headend system components

Dish Antenna

It is a parabolic reflector that acts as the gateway of the satellite signal by receiving it from the satellite in C' band frequency within the range from 3.7 to 4.3 GHZ and concentrating them in a focal point where the they are gathered by a low noise block converter (LNBC).

LNBC

It is the device, placed in the front of the dish antenna. It receives the low-level microwave signal from satellite, amplifies and converts them to a lower frequency band ranging from 950 to 2150 MHz and transmits them to the indoor receiver.

Integrated Receiver Decoder (IRD)

The IRD helps to recover the desired base-band signal by the following steps:

- It receives low band frequency signals from LNBC
- It processes and decodes the signal
- It demodulates them and then decode as per the encoding system (while transmitted)

The following figure shows the components of IRD:

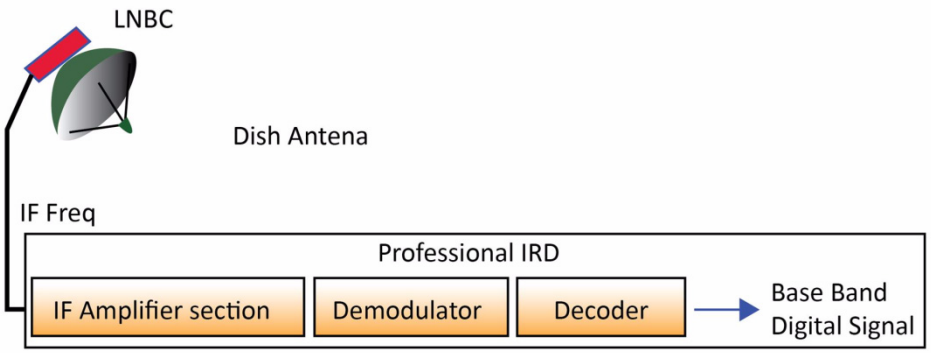


Fig. 1.1.2: IRD components

There are two professional IRD outputs. They are:

1. **Asynchronous Serial Interface (ASI):** It uses a 270-Mbps digital signal for transferring one or more compressed video, audio or various data signals, from the MPEG transport stream packets.
2. **Serial Digital Interface (SDI):** It is a family of digital video interfaces which was first standardized by the Society of Motion Picture and Television Engineers (SMPTE). The use of this interface are as follows:

a. The digital video interfaces defined by SMPTE 259M are used for broadcast-grade video.
b. High-definition SDI, standardized in SMPTE 292M, offers a nominal data rate of 1.485 Gbit/s
c. Uncompressed and unencrypted digital video signals, that may include embedded audio and time code, are transmitted within television facilities using SDI standards.
d. The standards can also be used for packetized data.

Difference between ASI and SDI Signal

Both ASI and SDI may be serial digital streams and use BNC connectors. But they are not interchangeable, which means, SDI cannot be fed out of one device and put into another device that is expecting ASI or vice versa. The main difference between the ASI and SDI signals is listed in the following table:

ASI	SDI
•ASI carries compressed data that may incorporate multiple programs, available in a particular frequency of a transponder.	•SDI is an uncompressed format for transferring a baseband digital signal which include audio or video program.

Fig. 1.1.3: Difference between ASI and SDI

Encoders

The encoders digitize the analog video signal to a baseband digital signal, compress and modify the format of the data and control signals which need to be transmitted by using some standard devised format or codec. The following figure shows location of encoder:

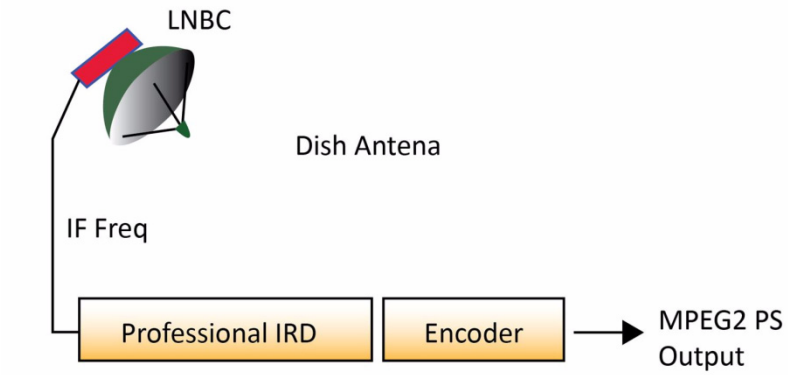


Fig 1.1.4: Location of encoder

Transcoder

It changes the format of a digital video, to make them viewable across various platforms and devices. Video transcoding is one to adapt the media formats, such as changing a MPEG-2 format to MPEG-4 format.

Multiplexer

It takes multiple program streams such as ASI or MPEG PS, to be transmitted through various channels, services, SMS, CAS, EPG and combines them into a single ASI or MPEG2 TS. This intelligent device is also called Multiple Program per Transport Stream (MPTS). The following figure shows the concept of a multiplexer:

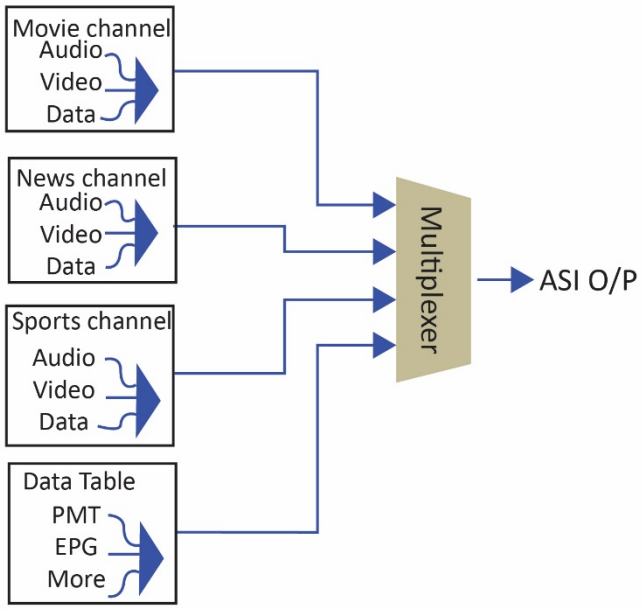


Fig. 1.1.5: Concept of a Multiplexer

Channel Combiners

It combines the multiple RF channels into a single transmission line preventing the signals from a single channel from pushing them back into a transmitter.

Optical Transmitter

An optical transmitter is a vital part of fibre optic communication. The light source of the transmitter, that coverts the electrical signal into light, may be light-emitting diodes (LEDs) or laser diodes (LDS). The following figure shows the concept of an optical transmitter:

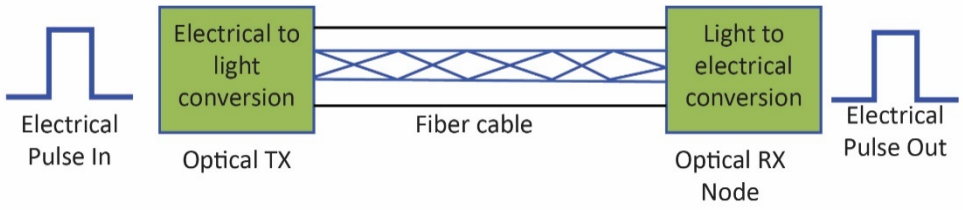


Fig. 1.1.6: Concept of an optical transmitter

Servers

A server is a hardware device, used to store, retrieve and send files and data from one electronic device to other devices such as computers, handheld gadgets or display devices connected on a network. On a wider scale, Internet, the worldwide computer network, depends on a large number of servers around the world. The files, data and functionality of a website are dependent on servers. It is a most powerful and contains high memory and storage.

Servers hold more power than their client computers in context to processing, memory and storage. The client computer requests information from the server. The servers are classified based on their usage.

The following figure lists the different types of servers:

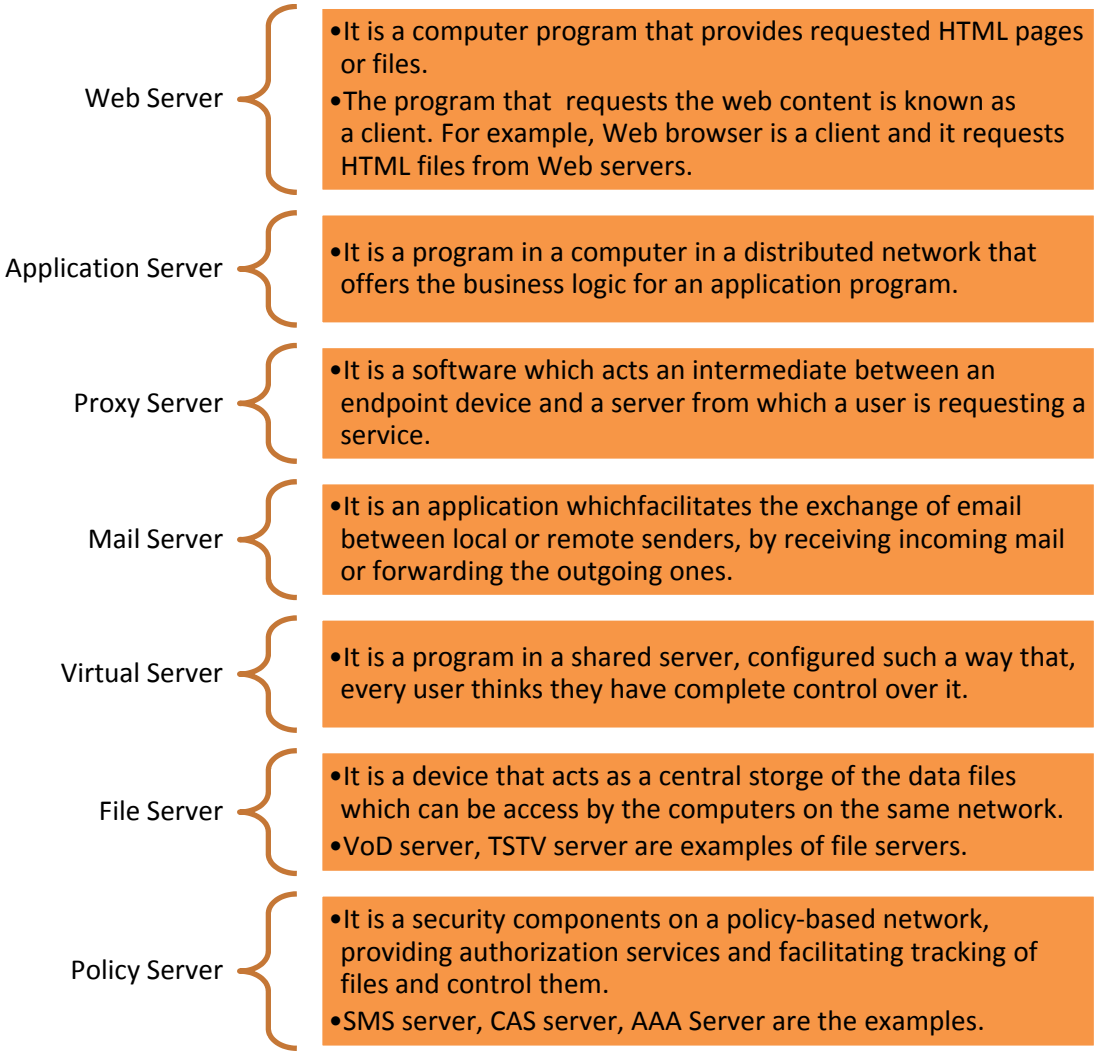


Fig. 1.1.7: Different types of servers

Switch

A switch is a network device which connects multiple devices, connected to the network. It receives, processes and forwards data, using packet switching, to the destination device. It acts as a multiport network bridge, that processes and forwards data at the data link layer, by using hardware addresses. Layer-3 switches or multilayer switches, also, process data at the network layer by incorporating routing functionality.

The digital services are basically packetized video which are stored in differed formats. The formats depend on the types of the devices that are required to be served. When the file is requested by a customer, it is routed to him/her by the switch only, after proper authentication.

1.1.2 Basic Distribution Network

A distribution network is used to distribute digital video programs, data services and value added digital services to the end customers. All the customers must be connected by cables to the Central office or headend. The distribution network is designed by the network experts of the Service Providers, in such a way that the customers can receive the least threshold level of signal all the time.

The main elements of a distribution network are:

- Cables
- Connectors

Cable

Cables are the nerves of the distribution system for providing services. Various services such as Telecom, CCTV and broadband services require to be pushed through a cable network.

The types of cables depend on the geography, customer base and availability. The cables used for primary, secondary and tertiary network are known as trunk line, feeder line and distribution line respectively. The cables are used as per the requirement such as, its length, loss and future expansion of the distribution network. The following figure lists the cables used in distribution network:

Fig. 1.1.8: Cables used in distribution network

Optic Fibre Cable

As name suggest it has bunch of fibres which are protected with the use of individual plastic covers. Digital data signals are transferred up to distances of hundreds of miles, through the optical cables in the form of light. The cables provide higher throughput rates as compared to electrical communication cables. This cable is commonly used in trunk lines.

The fibre-optics is replacing the copper wire system. The difference between the two, lies in the mechanism used for the data transfer. The fibre-optics use light pulses to transmit information whereas the copper wire system uses electronic pulses for the transfer. The following figure lists the benefits of the use of fibre optic cables:

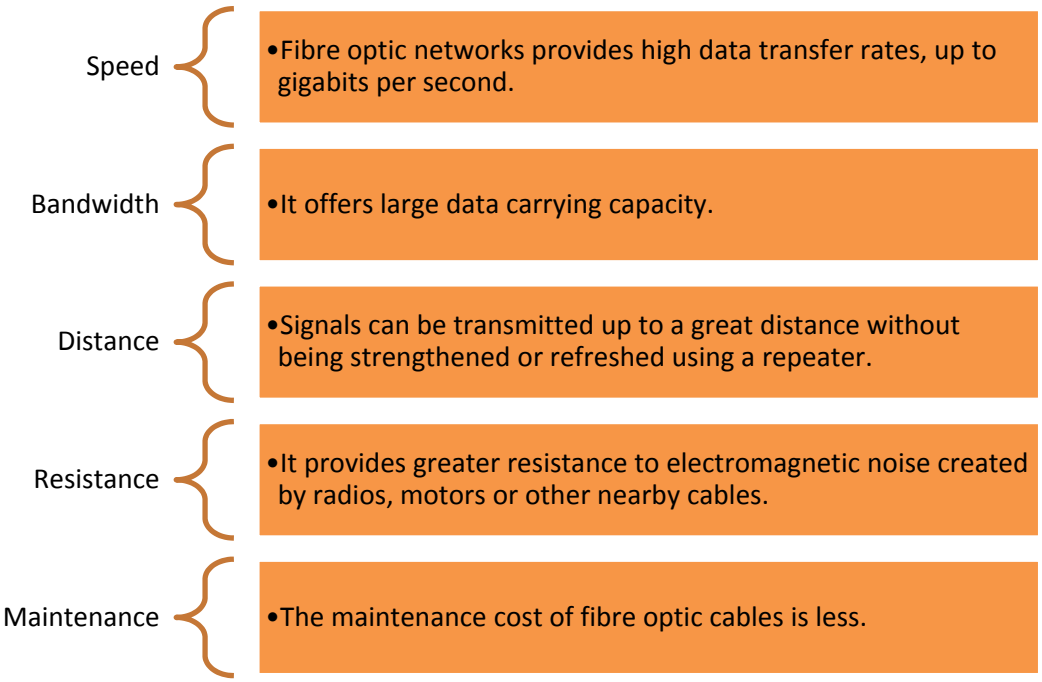


Fig. 1.1.9: Benefits of the use of fibre optic cables

There are two types of fibre optic cable commonly used:

- Single mode
- Multimode

Single Mode Fibre Cable

Single Mode cable provides one mode of transmission through a single strand of glass fibre of diameter of 8.3 to 10 microns. It requires a light source with a narrow spectral width and carries a bandwidth higher than multimode fibre. It has a small diametrical core allowing only one mode of light to propagate typically 1310 or 1550nm. Hence, the number of created light reflections gradually decreases as the light passes through the core, lowering the level of attenuation and thus, allowing the signal to travel further. This is generally used for the long-distance applications requiring higher bandwidth, run by CATV companies, Telco's and Colleges and Universities. The following image shows a single mode fibre cable:

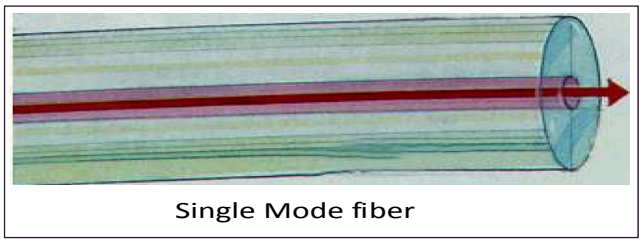


Fig. 1.1.10: Single mode fibre cable

Multi-mode Fibre Cable

The large diametrical core of multimode fibre optic cable allows multiple modes of light to propagate. The number of light reflections created gradually increases with the light passing through the core, and thus providing the ability for more data to pass through it within a

specific time duration. The quality of the signal is reduced over long distances due to the high dispersion and attenuation rate. It is generally used for short distance, data and audio/video applications in LANs. RF broadband signals, commonly used by the cable companies, cannot be transmitted via multimode fibre. The following image shows a multi-mode fibre cable:

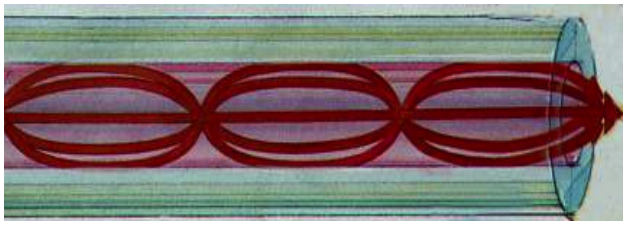


Fig. 1.1.11: Multi-mode fibre cable

Coaxial Cable

Coaxial cables are typically used in the distribution and feeder line of hybrid fibre coaxial (HFC) network. It has basically three layers in an order of inner conductor, through which the electrical signal flows, insulating layer and conductive shield. Sometimes, these layers are covered by insulating outer jacket. The coaxial cable is known in the market as Radio Guide (RG), for example RG 11, RG 6, RG59 and so on. The following image shows the structure of a coaxial cable:

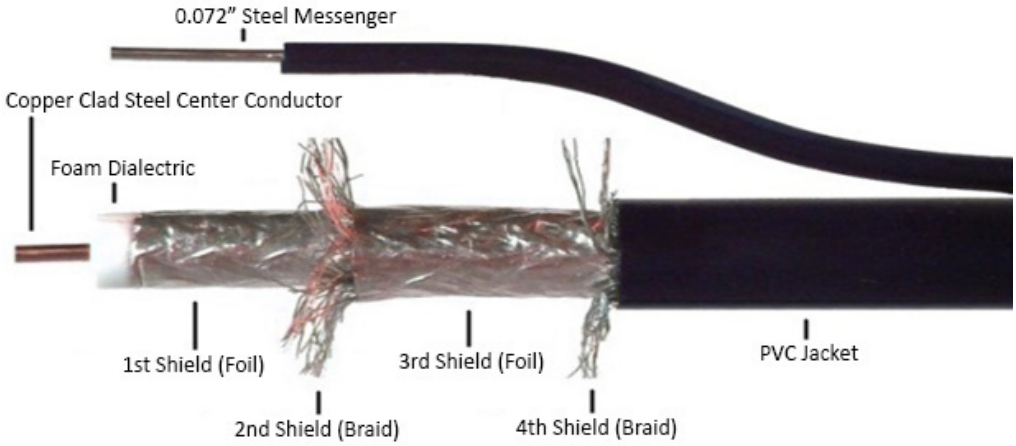


Fig. 1.1.12: Structure of a coaxial cable

The structure of the coaxial cable is as follows:

1. Centre conductor which is made of pure copper or copper-clad steel
2. Centre conductor bond which is of clean stripping polymer, to prevent moisture migration
3. A closed cell foam with high VP layer of dielectric - polyethylene for providing mechanical stability
4. Outer conductor with the following layers:
    - First outer conductor – A shield, securely bonded to the dielectric core, with an aluminum-polymer tape
    - Second outer conductor - Another additional aluminum-polymer tape for enhancing HF shield isolation before and after flexure

- Third outer conductor – Another extra aluminum-polymer tape for providing further HF shield isolation before and after flexure
- Fourth outer conductor – An aluminum braid of 34 or 36 AWG, used in quad-shield constructions for improving LF shield isolation in RF noise environments

5. Corrosion resistant protectant:
   - Indoor and aerial - A non-drip material for the elimination of moisture migration into the inner layers of the cable
   - Underground - A flowing compound with the ability to seal small jacket ruptures
6. Jacket – A UV stable outer jacket, made of polyethylene (PE) or flame retardant polyvinyl chloride (PVC), to protect the core throughout the life of the cable.
7. Integral messenger - A galvanized, carbon steel wire attached to the cable for support.

Unshielded Twisted Pair (UTP) Copper Cable

It is commonly used in telephone wiring and LANs. There are five types of UTP cables, classified based on their supporting bandwidth. The following image shows a UTP copper cable:

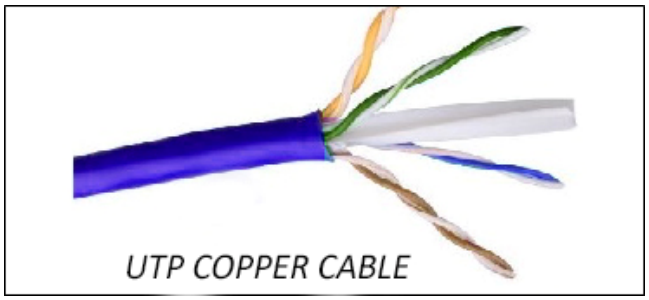


Fig. 1.1.13: UTP copper cable

The following table lists the types of UTP cables:

Type	Description	Speed
CAT3	It is usually deployed in phone lines, but it is rarely used now.	10 Mbps for up to 100 meters.
CAT4	It is used in token ring networks.	16 Mbps for up to 100 meters.
CAT5	It is used in Ethernet-based LANs, CAT5 contains two twisted pairs.	100 Mbps for up to 100 meters.
CAT5e	It is used in Ethernet-based LANs. It contains four twisted pairs.	1 Gbps for 100 meters.
CAT6	It is used in Ethernet-based LANs and data center networks. It contains four sets of twisted pairs which are tightly wound.	1 Gbps for up to 100 meters and 10 Gbps for up to 50 meters.

Fig. 1.1.14: Types of UTP cable

The following image shows different types of UTP cables:

Fig. 1.1.15: Different types of UTP cable

Connectors

Connectors are junctions which are used to repeatedly connect or disconnect a cable to/from another one or to/from a device such as a detector or a source. The connectors depend on the types of cable used.

Fibre Connectors

The end of an optical fibre is terminated using an optical fibre connector. It facilitates connection and disconnection of a cable, quicker than splicing. These align and join the core fibres mechanically, allowing the light to pass. A good connector allows very little loss of light, due to reflection or misalignment of the fibres. There are around 100 types of connectors available in the market. The connectors used in fibre cable are listed in the following table:

Type of connector	Image	Description
SC Connector		It has a locking tab, enabling push-on and pull-off operations. It is simple, cost effective and uses a ceramic ferrule for delivering correct alignment of the single mode fibres (SMF). It is commonly used in Gigabit Passive Optical Network (GPON), Ethernet Passive Optical Network (EPON), fibre media converters, multiplexers and so on.

FC Connector		It contains a threaded body, designed or high vibration situations. It is used in video over fibre transmission equipment. It is used in single-mode optical fibre as well as polarization-maintaining optical fibre.
ST Connector		It is similar to BNC connector. There are two versions, ST and ST-II. Both of them, include key and spring and use push-in and twist mechanism. It is commonly used in Multi-mode fibre (MMF) and single mode fibre (SMF) fibre optical cable (FOC).
Lucent connector (Little connector)		It is a form factor FOC which uses 1.25mm ferrule. It is used in small form-factor pluggable (SFP) module for long transmission signal. There are three types of LC named as: • Single mode LC APC • Single mode LC UPC • Multi-mode LC UPC

Fig. 1.1.16: Different types of fibre connectors

Coaxial Cable Connectors

Coaxial cables are used widely in audio, video, digital, RF and microwave industries. There are varieties of connectors available for coaxial cables based on their application. Most commonly used coaxial cable connectors are listed in the following figure:

F-Connectors

- It is typically used in domestic connections for permanent connections.
- It can support GHz and cost effective.
- It is used on 75 ohms coaxial feeder for CATV and high power video transmission.

Bayonet Neill-Concelman (BNC) connector

- It is the most common connector used for video applications, for example professional audio, video and broadcasting .
- It is typically used for RG59/U cables, it can also be terminated with RG6 and RG11.

Radio Corporation of America (RCA) Connectors

- It is used for transmitting audio and video signal.
- It can be installed quickly and easily because of its compression style.
- It is typically used on older televisions for composite/component video and for professional audio.

HDMI

- It is a connector and cable that can transmit high-quality audio and video streams of high-bandwidth between the devices.
- It is generally used in HDTV, DVD player, Projector or Blu-ray player.

Fig. 1.1.17: Different types of coaxial cable connectors

UTP Cable Connectors

Some of the UTP cable connectors are listed in the following figure:

Registered Jack-11 (RJ 11)

- It is used in connecting the telephone and modem by providing a four or six wire connection.
- It can be connected to a phone connector, modem port, phone jack or a phone line.

RJ 45

- It is 8 copper cable connector which is used in Ethernet networking for LAN, WAN, cable modem, set top box (STB), Ethernet hub connection.
- It looks alike a telephone jack, but is slightly wider than it.

Fig. 1.1.18: Different types of UTP cable connectors

Amplifier

An amplifier is an electronic device which has the ability to increase the power of a time-varying voltage or current. The main function of amplifier is to enhance the quality of received signal and reduce signal loss.

Amplifiers are used in broadcasting and wireless communications. Weak-signal amplifiers, designed to deal with very small input signals (in some cases, only a few nanovolts), are used primarily in wireless receivers. Power amplifiers are used in broadcast transmitters, wireless transmitters and hi-fi audio equipment.

Output Ports

Amplifier can have different number of output ports with the same strength of signal. The amplifier gets fixed amount of signal, which is distributed equally to all the output ports. Hence, higher is the number of output ports, lower will be the signal quality. The following image shows the signal strength varying with number of output port:

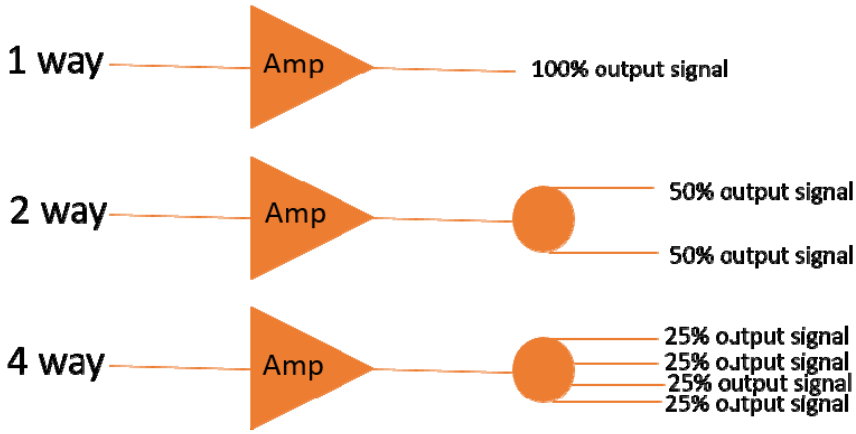


Fig. 1.1.19: Signal strength varying with number of output port

Return Path Capability

Amplifiers must have the ability to perform return path process. In telecommunication networks an amplifier should be capable of transmitting the signal back to the cable network for two-way communication. In two-way communication signals are sent back to cable network in the 5 to 42 MHz range. This process is called return path.

Amplifier Gain

Amplifiers increase the amplitude of a signal by using electric power from a power supply. The amount of amplification by an amplifier is represented as amplifier gain. It is the ratio of output power, voltage or current, to the input. Ideally, an amplifier is a circuit with a power gain, more than 1. The gain is expressed in dB:

- positive (+) dB shows boosted signal by amplifier
- negative (-) dB shows reduced signal by amplifier

For example, in 2-way output port amplifier signal is divided into 50%, in which it may cause 3.5dB signal loss. The following figure shows a typical 2-way RF amplifier in a circuit:

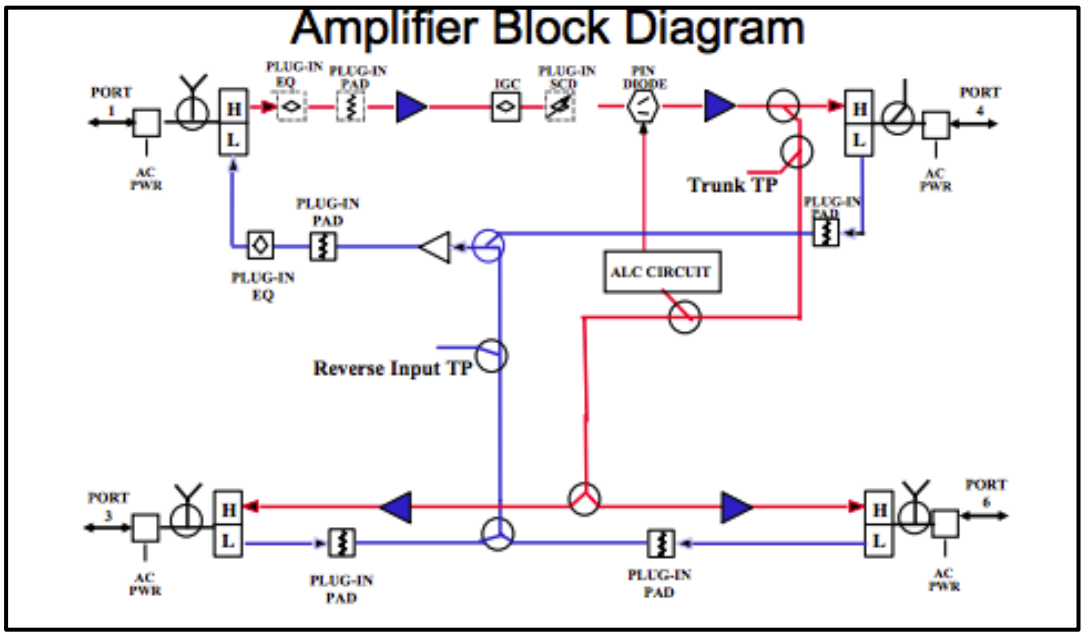


Fig. 1.1.20: A typical 2-way RF amplifier in a circuit

In the above figure, the amplifier has three stages of amplification:

- Input stage
- Intermediate stage
- Output stage

The gain and slope at various level can be controlled by the plug-in attenuator and slope control pad. The forward path and reverse path are depicted by red line and blue line. Reverse signal is received at lower frequency 5 to 45 MHz via same cable after being bifurcated through the diplexer. Plug-in attenuator and equalizer are used in the reverse path flow to shape the output as per the desired value.

Power Inserter

A power inserter is a device used to feed power into an amplifier via various output ports. Normally the output port is labelled as RF out/DC. It is used in cable TV and satellite TVs. It is used to allow the unit to be powered remotely, if the distribution amplifier cannot be placed near a power outlet. Normal power inserter requires jumper cable for implementation support. But use of jumper cable can take up extra spaces and additional cable bends which can reduce the performance and efficiency of power inserter device.

In most installations, power inserter is not used. The distribution amplifier can be plugged into the wall outlet directly, if it is mounted nearby.

General Features of Power Inserter

Normally power inserters in India have following features:

- They are aluminum casted with powder coating
- They have stainless steel closure bolts.
- They have good electromagnetic compatibility
- Current passing limit: 60VAC and 15Amps

The following image shows a power inserter:

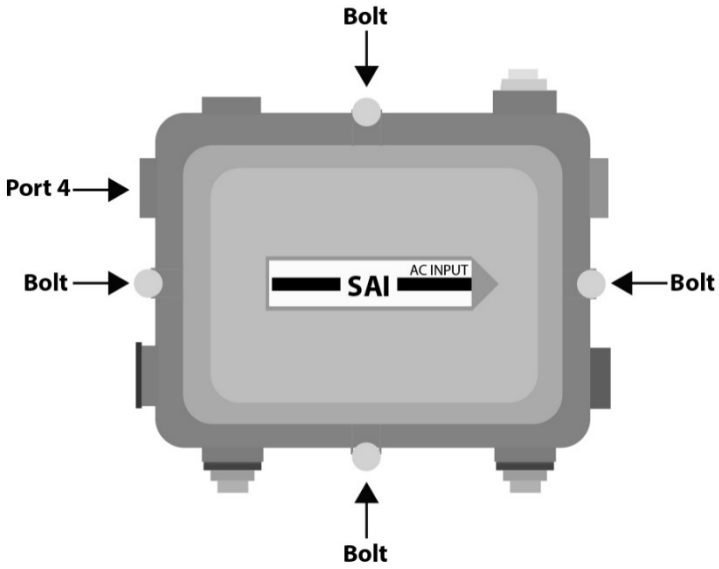


Fig. 1.1.21: Power inserter

There are different types of power inserter are available in the market. They are differentiated based on the pass band. Some of the power inserter available in the markets are as follows

- 750MHz power inserter
- 1 GHZ power inserter

Exercise

1. Match the following:

1. Dish Antenna	Change the video format
2. LNBC	Connects multiple device
3. IRD	Nerves of distribution system
4. Transcoder	Parabolic reflector
5. Optical transmitter	Vital part of fibre optic communication
6. Switch	Placed at the front of the dish antenna
7. Cable	Base band signal recovery

2. See the picture and give the name of the connector.

UNIT 1.3: Multi Play Digital Services

Unit Objectives

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

1. Explain Broadband Services
2. Describe DVB-C Standard
3. List the delivery Platform for Multi Play Services
4. Define DOCSIS over HFC Network
5. Define metro Ethernet Network
6. Describe GPON over FTTH

There are three basic multi play services which are explained in the following figure:

Data Services

- It allows subscribers to get connected to the Internet cloud to access, downloads, uploads various information, multimedia, video, etc in the form of internet packet data.
- Data services constitute of various data plans offering speeds above 512 kbps.
- Presently in our market place data rates of few Mbps to 100 Mbps are commonly offered. Plans can be classified as limited (fixed usage of data in GB) and unlimited (no limit on data usage).

Video Services

- The delivery of video services consists of Standard Definition (SD) and High Definition (HD) channels, which are available in various Geostationary satellites and have a footprint in Indian Subcontinent.
- The channels are of both of FTA (Free to Air) and Pay type. These services are called Live TV services. Also Video services are customized to the subscribers demand and content created and stored in the Servers. These services are known as Video on Demand.

Voice Services

- The time of legacy telephone system and calling through circuit switched network is getting obsolete slowly and IP telephone or Internet phone or VoIP is short for Voice over Internet Protocol, which is used for calling via internet.
- In recent times this VoIP and Internet phones are getting popular and even cable TV providers offer bundles that include VoIP.
- This has got a siginificance because it reduce the telephone lines interuption at work premises.

Fig. 1.3.1: Multi play services

The following diagram shows how VoIP working process:

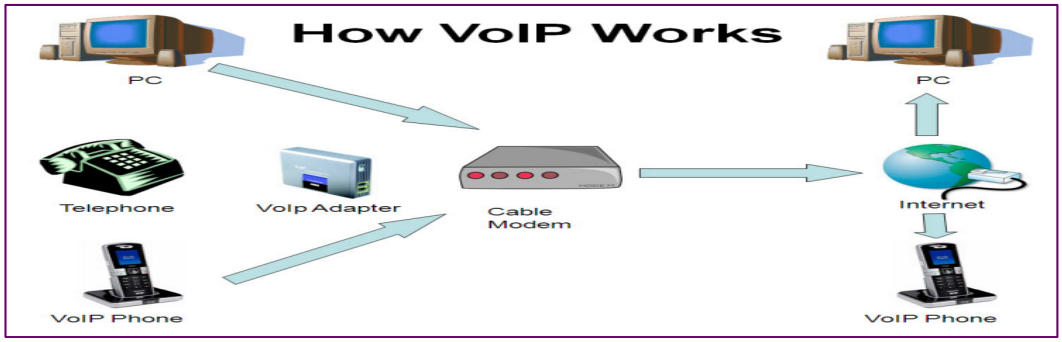


Fig. 1.3.2: VoIP working process

1.3.1 DVB-C Standard

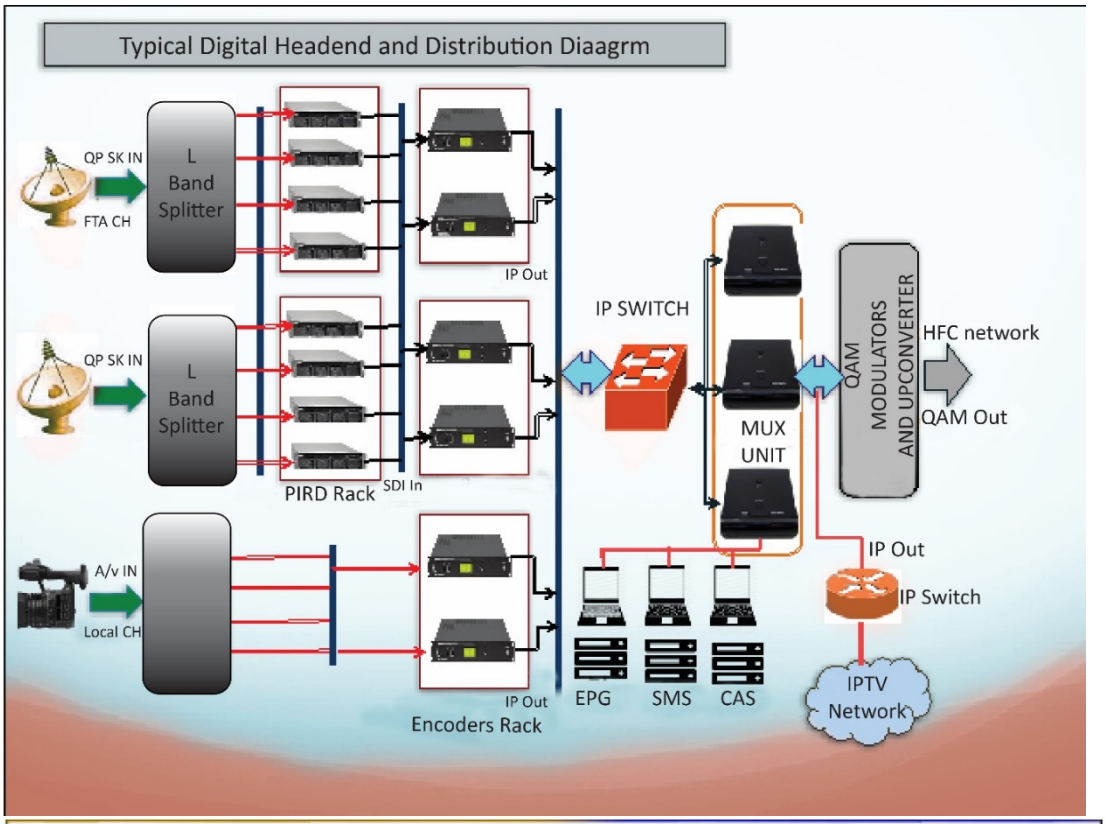
Digital video broadcasting cable (DVB-C) refers a digital broadcast standard that uses cable as the transmission medium. It is an open standard and has been devised by DVB organization Europe. Now it is well accepted standard being used all over the World for Digital services delivery through the Cable network.

According to the DVB C digital services are provided via access network using QAM modulation. QAM is quadrature amplitude modulation and it is a form of modulation which is widely used for modulating data signals onto a carrier used for radio communications. It is widely used because it offers advantages over other forms of data modulation.

Generally The QAM channels are set in the UHF range starting from 300 MHz till 862 MHz. The single analog channel Bandwidth is 8 MHz. One single QAM RF channel can cater 50 mbps data rate in QAM 256 modulation. Hence the number of video live channels that can be carried by one single RF channel of 8 MHz is 30 to 32 channels in SD format at a encoding rate of 1.5 mbps and 12 channels in HD format at the encoding rate of 4 mbps average.

Other digital services like Voice over IP and data services, digital video on demand, can also be accommodated in the QAM modulated RF channel.

The following diagrams show the schematic diagram and block diagram of digital headend system:



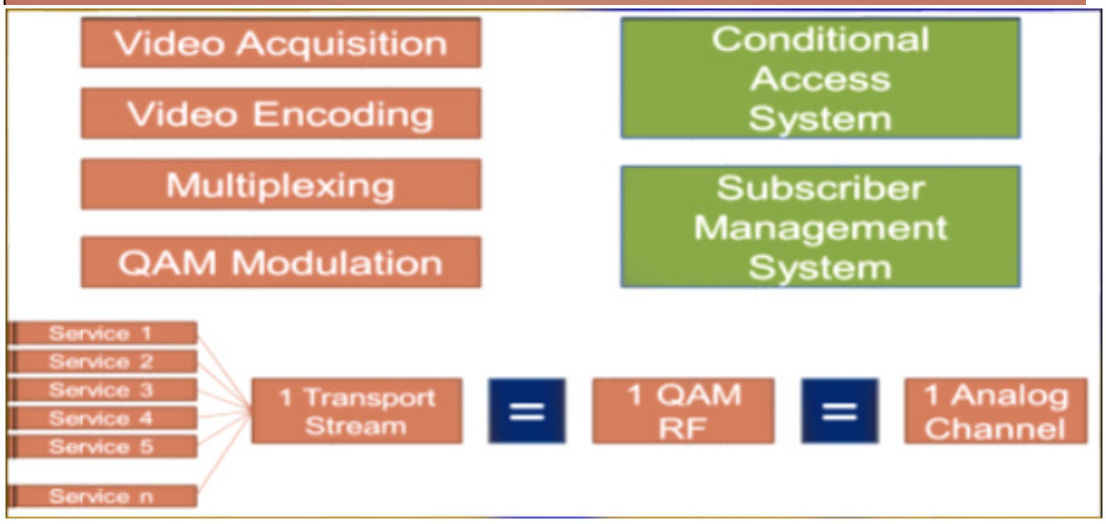


Fig. 1.3.3: Schematic diagram and block diagram of digital headend system

1.3.2 Broadband Services

Nowadays, broadband network has a vital role in telecommunication network in India. Broadband services are provided by various service providers such as telecom companies, cable TV companies and internet service providers (ISP).

The Broadband services constitute mainly of data services. However, the same data services could be combined with IPTV, digital video services, multimedia services and voice service to constitute a Multi play service using the same Broadband access network.

Moreover, applications today belong to the over the top (OTT) nature. OTT is data service, in which the packetized video is delivered through the IP network. MSOs, cable operators can deliver this video service in the same access network without the requirement of a separate delivery platform.

Computers get high speed internet connection to the web through access to the broadband internet. To deliver high-speed internet there are several technologies such as DSL, fibre optics, satellite and cable. Every technology provides a different access speeds. For instance, cable internet can deliver up to 2 MBps downstream and 600 KBps upstream.

Upstream and Downstream

Data that a computer sends to the internet is known as upstream. It is also termed as upload speed. Whenever an email is sent or a picture is posted on the internet, the computer uploads the data. The uploading speed through a cable modem ranges between 400 and 600 KBps. It shows the total bandwidth of data that a computer can send to the internet every second at full speed.

Downstream is the data that a computer receives from the internet. It is also termed as download speed. While downloading songs, videos or any data from the internet, the download bandwidth of the computer is being used. The downloading speed via cable modem ranges between 1 and 2 MBps.

Cable modem has asymmetrical speed because of different upstream and downstream capabilities. Normally, downloading speed of the computer is faster than the uploading speed for the same data.

Digital Subscriber Line (DSL)

DSL is a technology in which high-bandwidth data is transported over a telephone line that is directly connected to the modem. It is used to transfer huge amount of data like video, audio and multimedia infographics. It is also possible doing video and audio conferenecing using DSL.

In India, high speed network connections has to compete with cable or broadband services. DSL use the copper phone line and most of the service are asymmetric.

DSL services can be divided into symmetric and asymmetric based upon the customer requirment; whether a large amount of streaming has to be done or just support is needed for audio or video communications.

Asymmetric DSL (ADSL)

Internet is used for uploading purpose much more than for downloading. Hence, bandwidth required for uploading is higher than for downloading. In ADSL technology, increased network bandwidth is provided for the purpose of downloading from computer service provider to the user's computer than for uploading.

ASDL reduce the bandwidth used in upstream and provide high bandwidth for downloading from the internet service provider. This technology is commonly accepted in the home internet users because they prefer thehigh bandwith for the downloading.

Some of the common forms of asymmetric DSL are listed in the following figure:

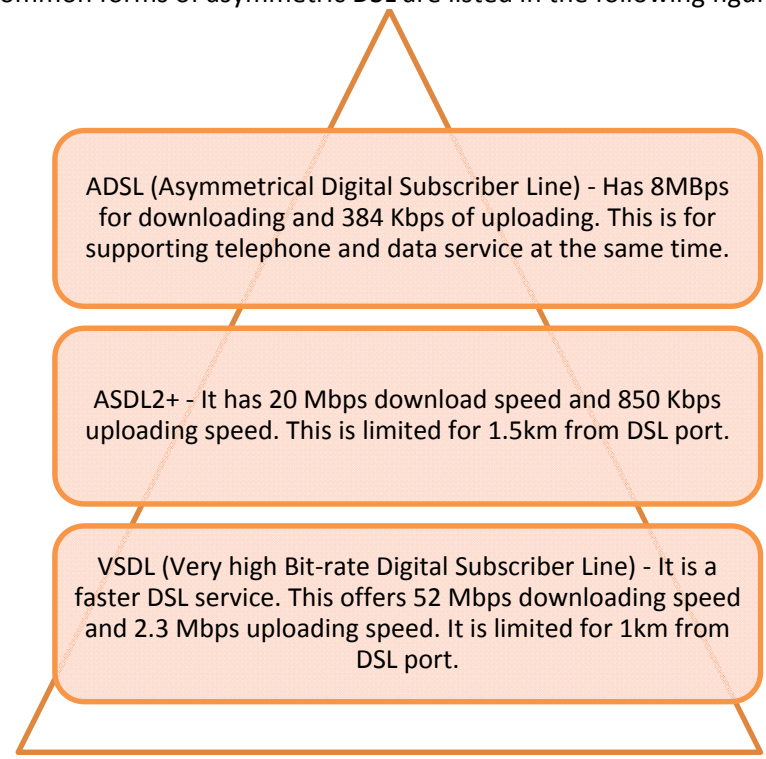


Fig. 1.3.4: Asymmetric DSL

1.3.2 Delivery Platform for Multi Play Services

There are several technology platforms through which the multi play digital services can be delivered. The following figure lists some of the technology platforms, currently deployed in markets:

Fig. 1.3.5: Multi play services delivery platform

1.3.3 DOCSIS over HFC Network

Data Over Cable Service Interface Specification (DOCSIS), is an international telecommunications standard that enable delivery of Broadband service over Cable TV networks. This technology is employed by the cable television operators for providing Internet access over the existing hybrid fibre-coaxial (HFC) network infrastructure. A DOCSIS system consists of a triple play architecture which can be used for delivering data, video and voice services.

The following figure shows the DOCSIS platform using HFC network as access technology:

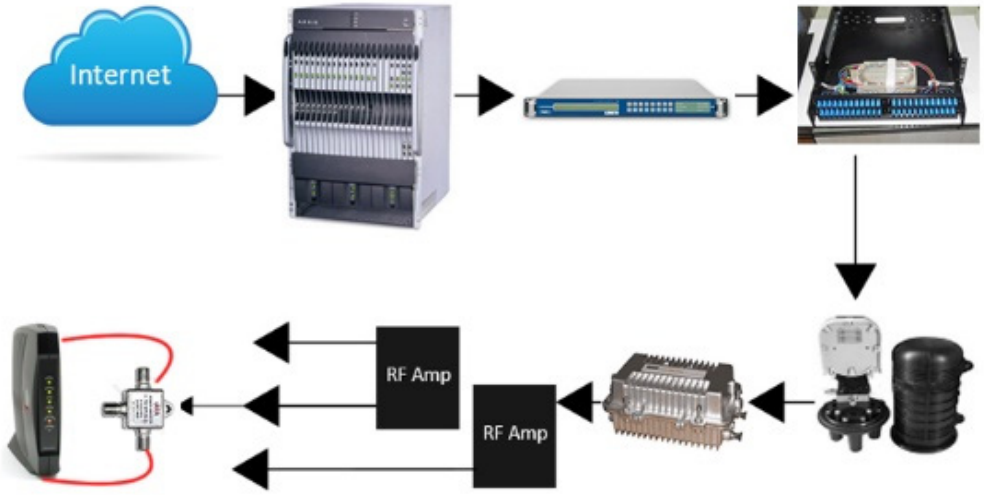


Fig. 1.3.6: DOCSIS platform using HFC network as access technology

DOCSIS platform consists of:

- A cable modem located at the customer premises
- A cable modem termination system (CMTS), located in cable head-end, that is comprised of a set of devices, allowing high-speed Internet access to home computers.

The following figures shows the connections of Cable modem connection at customer's premise:

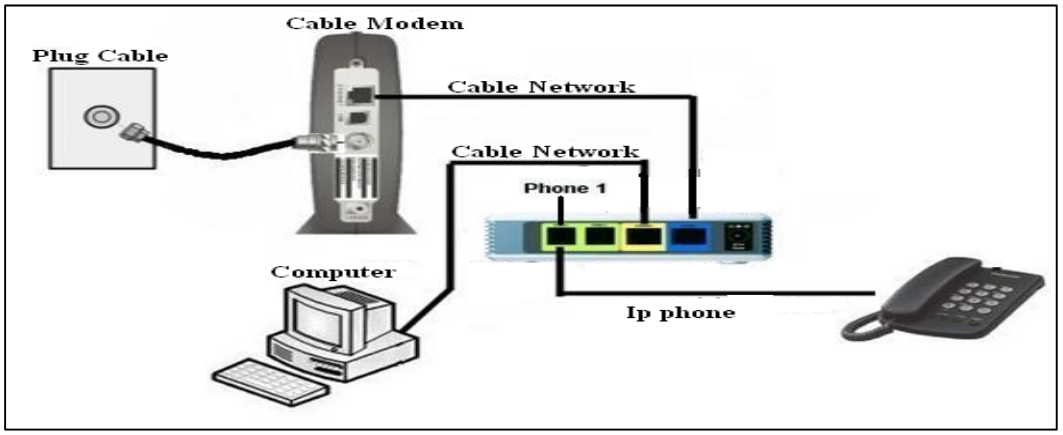


Fig. 1.3.7: Cable modem connection at customer's premise

CMTS sends and receives cable modem signals on a fibre and coaxial cable network. The CMTS:

- Receives upstream signals sent from a user's cable modem
- Converts the signals into IP packets
- Routes the signals to an Internet Service Provide for connection to the Internet

The CMTS also can send signals downstream to the user's cable modem. Cable modems cannot communicate with each other directly. They communicate by channelling their signals through the CMTS.

A typical CMTS is a device which hosts downstream and upstream ports. Data from the headend system reaches the customer using downstream frequencies and the data from the customers' premises reach the headend using upstream frequencies. The two-way capability in a network is provided by an HFC (Hybrid Fibre Coax) network. The following figure shows CMTS and cable modem interconnection:

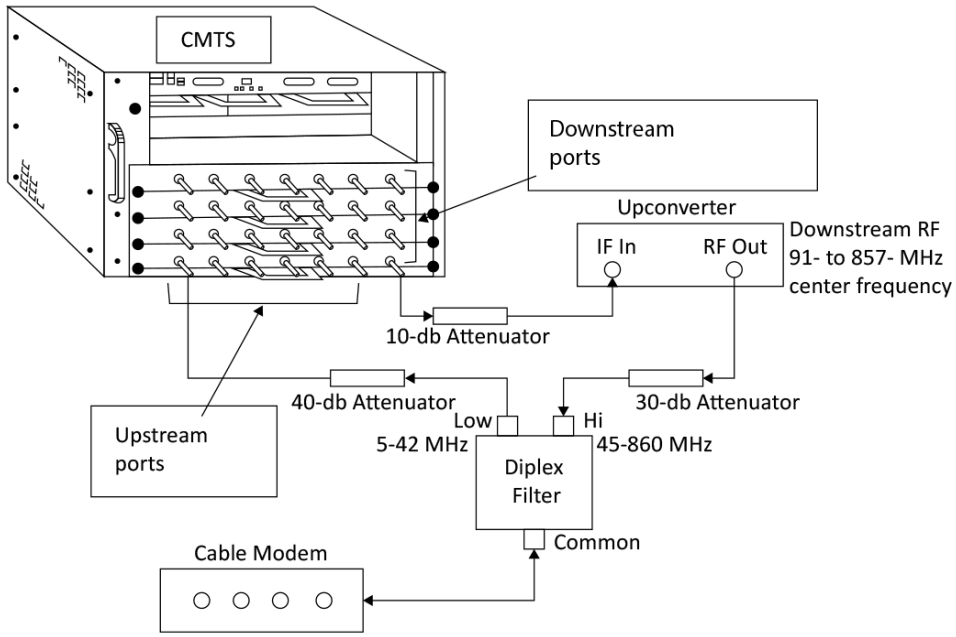


Fig. 1.3.8: CMTS and cable modem interconnection

One television channel is used for upstream signals from the cable modem to the CMTS, and another channel is used for downstream signals from the CMTS to the cable modem. When a CMTS receives signals from a cable modem, it converts these signals into Internet Protocol (IP) packets, which are then sent to an IP router for transmission across the Internet.

The signal is delivered through the fibre nodes followed by coaxial RF lines going to all over the adjacent areas catering to the connectivity with proper signal level and the SNR for running the services uninterruptedly.

Important Parameters

Some of the important parameters in the DOCSIS platform are given in the following table:

CMTS Rx Input Power Requirements including ingress and noise to the upstream demodulator	-4 dBmv up to 10 dBmV
Upstream frequency range	5-65 MHz
Downstream frequency range	113-862 MHz
Forward Signal Level to the modem	55 to 65dBuV
Reverse Signal Level from the modem	40 to 46dBmV
US PWR at Return Path Receiver (RPR)	-3 dBm
DS power	1+/-2 dBm
US SNR	> 32 DB
DS SNR	> 42 DB

Fig. 1.3.9 (a): Parameters of DOCSIS platform

Standard	Data rate per down stream channel
DOCSIS, J83B, 64QAM, 6 MHz	26.97 Mbit/s
DOCSIS, J83B, 256QAM, 6 MHz	38.81 Mbit/s
EURO-DOCSIS, DVB-C, 64QAM, 8 MHz	38.15 Mbit/s
EURO-DOCSIS, DVB-C, 256QAM, 8 MHz	51 Mbit/s

Fig. 1.3.9 (b): Data rates of DOCSIS platform

1.3.4 GPON over FTTH

GPON stands for gigabit passive optical network. It can be easily build on the FTTH network. GPON is an optimal option for FTTH technology, as it provides most economical ways to bandwidth-intensive applications and establishes a long-term strategic position in the broadband market.

It offers reliable and strong architecture to provide triple play services to the users.

The GPON technology uses the following signals in the optical domain:

- Data Upstream (Consumer to Network Operating Center) – 1310 nm
- Data Downstream (Consumer to Network Operating Center) – 1490 nm
- Video Broadcast (Downstream) – 1550 nm

Some common feature of GPON network are listed in the following:

- It provides 2.5 GBps downstream speed and 1.25 GBps upstream speed.
- It supports long distance up to 20 km and the performance is not affected over distance.
- Standard based and equipment's are easily available.
- Inherently secure wherein it is impossible for wiretapping, eavesdropping and other hacking.

Advantages of GPON Network

- The major advantage is that it supports many users via inexpensive passive optical splitters.
- In this network 64 ONT can share one fibre connection to the OLT.
- Allow service providers to deliver more capacity to carry bandwidth-intensive applications.
- Provide one of the most cost-effective ways for a service providers to deploy fibre.
- Provide a future proof mode of access as the speed of the broadband connection is limited by the terminal equipment rather than the fibre itself.
- Future speed improvements can be achieved via equipment upgrades before any upgrades on the fibre itself.

These advantages make the user to prefer fibre network by replacing copper network.

1.3.5 Metro Ethernet Network

It is an Ethernet network technology based metropolitan network. The common application of this network is to connect broadband user and business for internet services. To successfully attain scale and reliability in such implementation a structured approach using switches and routers are used. This technology is used by the Telcos to provide data and MPLS services. The following image represents the systematic diagram of metro Ethernet network technology:

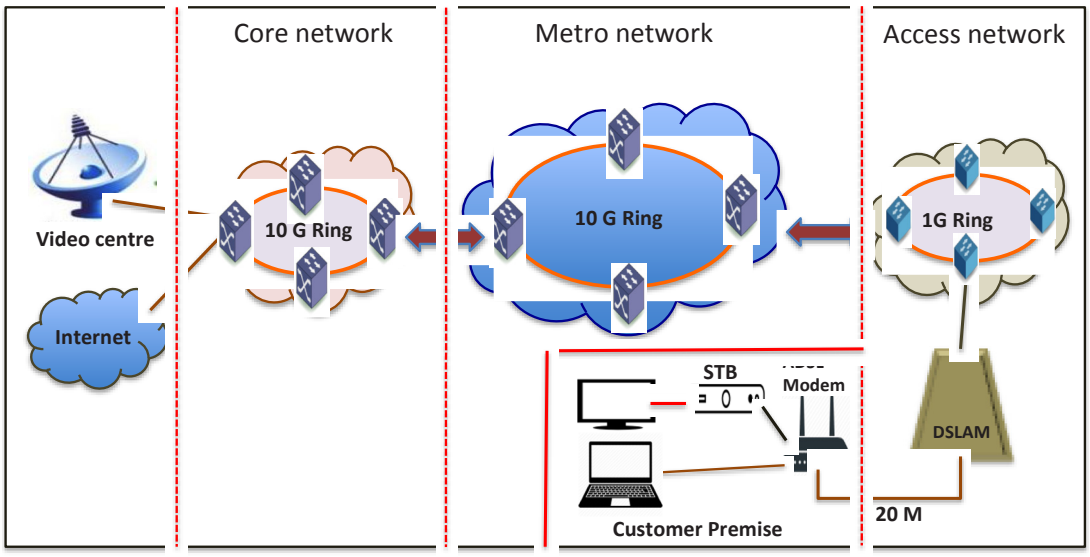


Fig. 1.3.10: Systematic diagram of metro Ethernet network technology

1.3.6 Ethernet over Coax (EOC) Technology

It is a modern way of delivering the multi play services via coaxial network. Coaxial network has been used for years due to CATV's early invention. Large amount of money has been spent on the network by operators. The IP video services have developed many fold and thus the delivery platform. However, a major obstacle to their adoption for upgrading existing sites is the necessity of new cabling. The cost of laying new Cat 5e cable for network devices can be significant, and the cable length limitations of Ethernet can be restrictive.

EOC helps to overcome this problem, by re-using existing analogue cabling to make new network connections. This can be achieved because similar analog cable that is existing in the built network delivers digital data and video services faster compared to Ethernet cable.

Coaxial cable has increased bandwidth upto 1GHz frequency, with decreased noise and signal loss. These features of coaxial cable enable it to carry more data for longer distances.

The major application of EOC is to utilize this available with connected home coaxial infrastructure. EOC can offer up to 100Mbps in both connection concurrently even at the higher distance such as 300 mts over single 75ohm coaxial cable.

Applications of EOC technology

EOC technology is used to deliver network connections in different coaxial cables in different situations, such as:

- New extended cost effective network connections, when compared to optical fibre, CATV, digital TV, OTT and IPTV services.
- Voice can be delivered using this technology.
- Simple and easy architecture.
- There is no need of special training or configuration knowledge to create connection.
- It is a direct point to point connectivity.
- It utilizes Master which is a distribution hub equipment. This takes video and internet data as input from any fibre network and delivers coaxial output.
- When master and slave connected over coaxial cable, the connection created automatically. There is no requirement of DIP switches.
- The network is automatic and IP and MAC address set up is not needed as the it is transparent.

Exercise

Fill in the blanks:

1._____refers a digital broadcast standard that uses cable as the transmission medium.

2. The Broadband services constitute mainly of _____

3. Data that a computer sends to the internet is known as _____

4. DSL use the copper phone line and most of the service are_____

5. Expand DOCSIS: _____

6. GPON is an optimal option for _____ as it provides most economical ways to bandwidth-intensive applications and establishes a long-term strategic position in the broadband market.

7. _____ is a modern way of delivering the multi play services via coaxial network.

8. In_____ increased network bandwidth is provided for the purpose of downloading from computer service provider to the user's computer than for uploading.

9. _____ is a technology in which high-bandwidth data is transported over a telephone line that is directly connected to the modem.

10. _____ allows subscribers to get connected to the Internet cloud to access, downloads, uploads various information, multimedia, video, etc in the form of internet packet data.

UNIT 1.4: Access Network Architecture

Unit Objectives

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

1. Explain One-way coaxial network
2. Explain 2-way HFC network
3. Define PON
4. List the components of GPON network
5. Explain UTP copper wire Network Architecture
6. Define digital services through DSL network
7. Explain typical Metro Ethernet Network Architecture
8. Explain ports configuration of EoC Master

1.4.1 One way Coaxial Network Architecture

Both the Analog and Digital Paid TV services are available in the Headend and is delivered through the One way Coaxial Cable network. In this type of network the video services are broadcast from the headend directly to the customers home.

Generally 500 series Coaxial cable or low loss RG 11 cable are used as Trunk line. High gain RF amplifiers are used as Trunk amplifier. The amplifiers are spaced at 300 to 320 mtrs apart if 500 series cable is used and 180 to 200 mtrs apart if RG 11 cable is used as trunk line. The amplifiers are power pass and carry to 50 Hz 60 to 90 V ac power through the trunk and fed to the next amplifier through the input connection. Splitters with >20 dB port to port Isolation is used to divide the trunk line and bifurcate the feeder line. Tap off is used to provide the connectivity to the customer. RG 6 or RG59 cable is used as drop cable from Tapoff port to the Customer end.

Amplifier's working frequency is generally 45 to 862 MHz. The trunk amplifier has a gain of 32 dB and can traverse till 200 mtrs of RG 11 cable as the loss of RG 11 per 100 mtr at 860 Mhz is 13 dB. And it can traverse upto 300 mtrs in case of 500 series as the loss in 500 series is 9 dB per 100 mtr. Unity gain method is applied for the cascaded amplifiers. Unity gain is that the gain of every amplifier in the cascading stages will compensate the loss incurred due to the Cable loss. Slope control chip used to control the slope of the lower and higher frequencies.

In the frequency range upto 300 MHz the FTA and must carry channels are tuned so that every TV set is capable of tuning these channels. Paid channels are digitized and uses higher frequency range above 300 MHz and transmitted through the cable using QAM modulation. These niche channels are available only through the addressable system via a STB.

The Video in digital mode is encoded in MPEG2/MPEG4 format. Multiple channels like this are then multiplexed and one TS output is created which is then Modulated using digital QAM modulation in a particular UHF frequency band. One channel of 8MHz Bandwidth in UHF range can modulate 12-14 channels in MPEG 2 encoding format. Hence the capacity of carrying the Channels have been increased to many fold using digitization.

The following figure shows the one-way coaxial network:

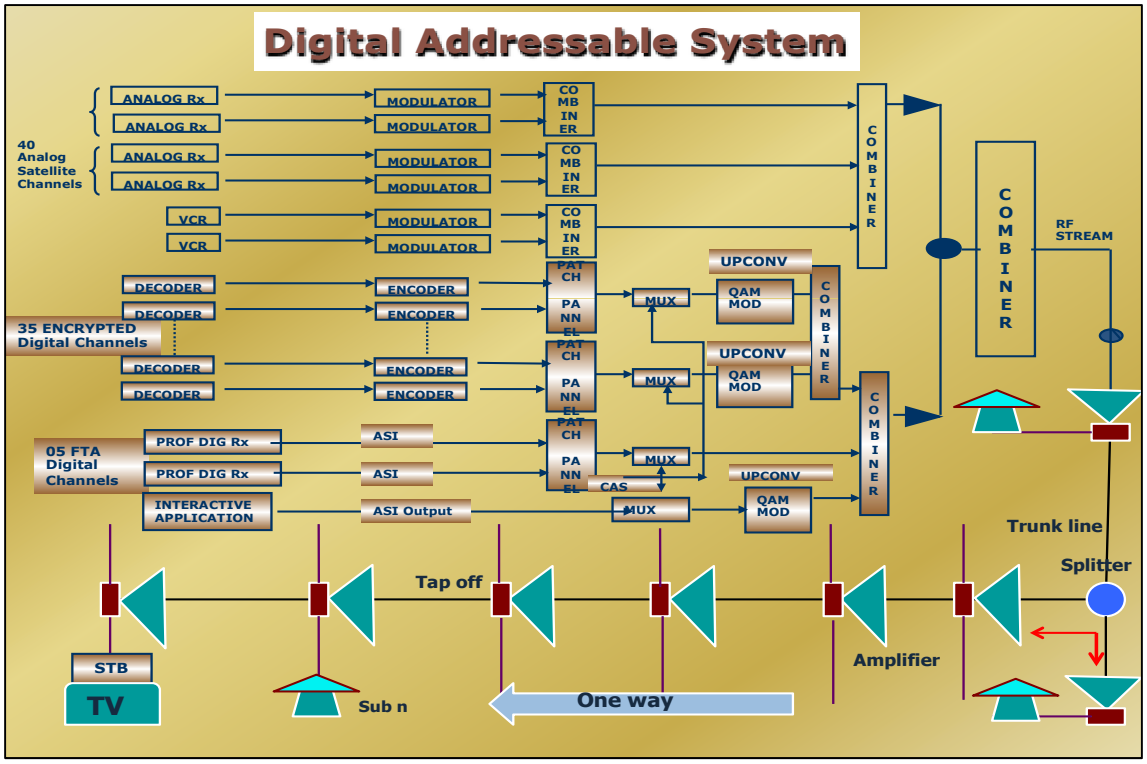


Fig. 1.4.1: One-way coaxial network

1.4.2 Two-way HFC Network Architecture

The following figures show a typical HFC network:

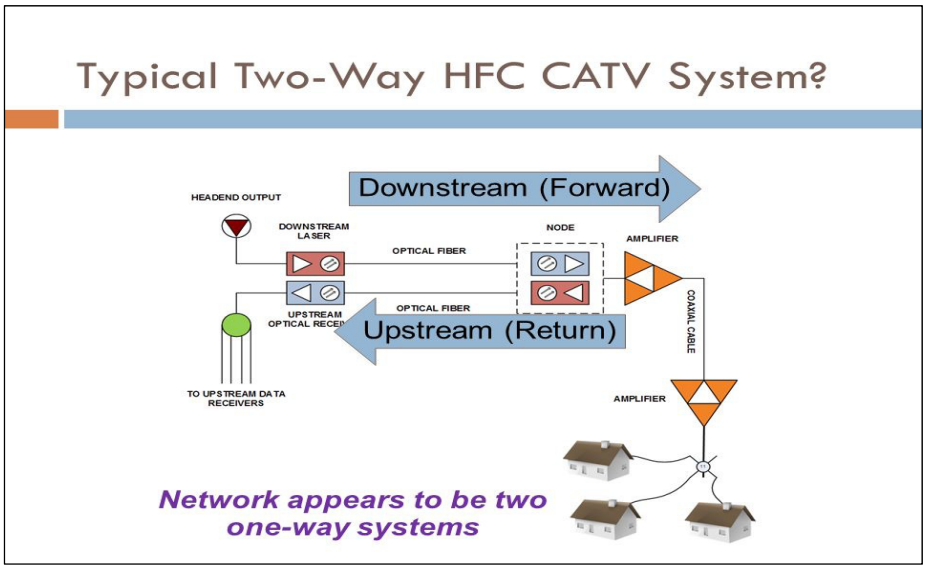


Fig. 1.4.2 (a): 2-way HFC network

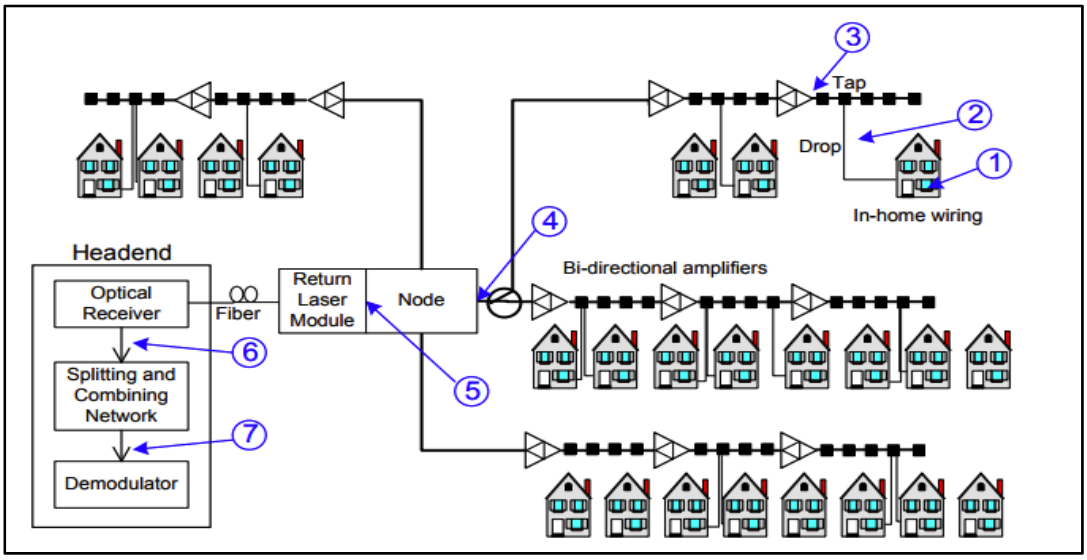


Fig. 1.4.2 (b): Upstream signal levels at the HFC network

Signals originate in the home (1) and flow through the plant towards the headend. The signal level in the plant is determined by the RF level produced by the transmitter at the house, which is most often a cable modem.

After the signal leaves the cable modem, it goes through a variety of losses such as in-house cable, splitters, ground block, drop cable, tap port, and feeder cable before reaching the amplifier station port (3). All signals from the homes go through different amounts of loss, but all of these signals should arrive at the amplifier port (3) at the same level. This is a key premise of return path design. These variations require setting the transmitters in each cable modem to its own unique level – the level that produces the desired signal level at the amplifier.

Once the signals reach the amplifier, they continue on their way toward the headend. Every span of cable between two amplifier stations must be aligned to **unity gain** so that the return path gain of every amplifier station exactly matches the loss of the cable and passives following it (i.e., the cable span towards the headend).

When the spans are all set to unity gain, the signal levels will be the same at every station. Ultimately, the signals reach the node station (4). Because the amplifiers have been aligned for unity gain, the signals at the node station port (4) are the same level as the signals at each amplifier station port (3).

From the node station port, the signals continue on to the return path laser module (5). The relative levels between the node station port and the input to the laser are adjusted by selecting the proper gain or attenuation level in the node. The following figure shows the adjusting of levels between the node station port and the input to the laser:

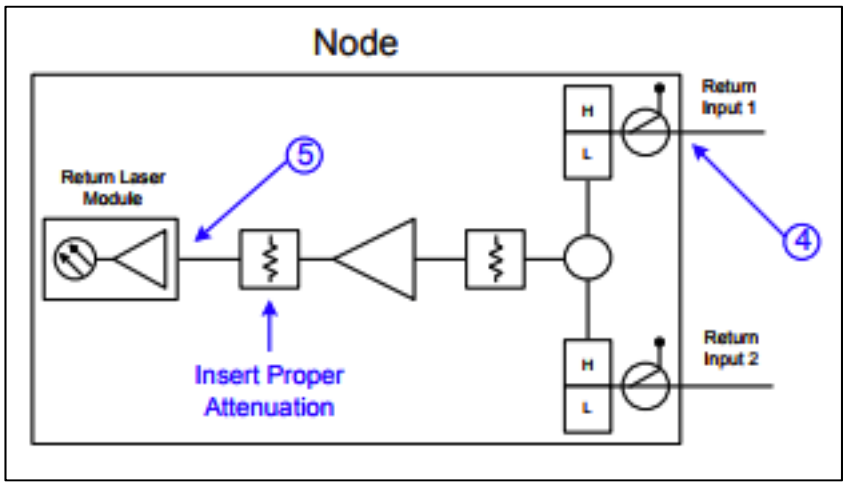


Fig. 1.4.3: Adjusting of levels between the node station port and the input to the laser

After entering the return path laser module, the signals are then carried on fibre to the headend or hub location where they are converted back to RF by a fibre optic receiver. This RF signal is then fed to the demodulator for that particular service. For DOCSIS services, the demodulator is the CMTS upstream input port.

1.4.3 FTTH network (OSP) Architecture

FTTH network is a fibre based access network. It connects users and enterprises to a central point known as point of presence (POP). It is the most preferred option for providing data services.

Passive Optical Network (PON)

PON is an access network that deploys optical fibres and optical splitters (Passive) to deliver services to multiple subscribers. PON contains optical line termination (OLT) at the communication provider's end and a number of optical network units
(ONUs) at the user's end. The term "passive" simply means that there are no power requirements while the network is up and running.

Optical Line Terminal (OLT) is a central location of PON and individual destnations are called as optical network units (ONU). Lines that terminate outside buildings are called fibre-to-the-neighborhood (FTTN) or fibre-to-the-curb (FTTC). Lines that extend all the way to buildings are called fibre-to-the-building (FTTB), or FTTH.

Passive optical network (PON) based FTTH access network is a point-to-multipoint, fibre to the premises network architecture in which unpowered optical splitters are used to enable a single optical fibre to serve multiple premises, typically 32–128. In addition, these networks have the ability to provide all communication services viz. voice, data and video from one network platform.

A PON takes advantage of wavelength division multiplexing (WDM), using one wavelength for downstream traffic and another for upstream traffic on a single Non-zero dispersion-shifted fibre.

Benefits of PON

In early 2009 PON was used in corporate networks because it is cheaper, faster, less powe consuming, easier to provision for voice, data and video, and can be managed easily. These were created to connect homes for phone, internet and TV services. PON benefits are listed in the following figure:

- Operation cost is cheap
- No elimination switches in network
- Power is not required in network
- It requires no recurring costs associated with a fabric ethernet switches
- Upgrade and installation cost is very low.
- Low netwrok energy cost.
- Simple infrastructure
- Single optic fibre cable is used.
- Eliminates large copper cables
- It provide high distance connection from data centre to desktop.
- Low maintenance cost.
- Use of fibre makes it stonger and durable.

Fig 1.4.5: PON benefits

GPON over FTTH Network

GPON enables FTTH deployments cost effectively resulting to promote the growth worldwide. The FTTH access network contains five areas as given in the following image:

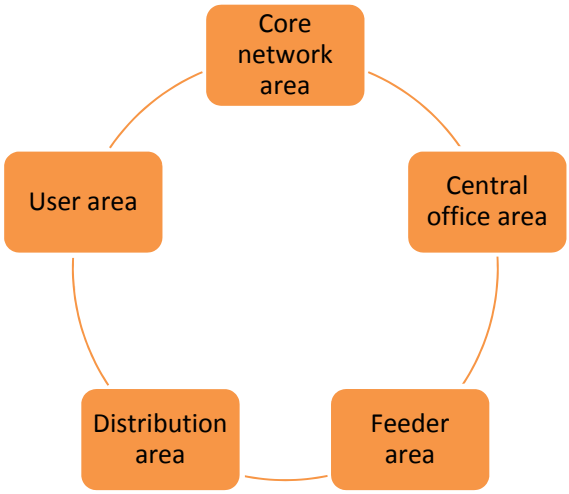


Fig 1.4.6: FTTH access network areas

The following image represents how the GPON OLT device deployed in a typical GPON network delivers services to residential homes. Signals from the POP (central location) OLT transmits to the splitter, then the splitter spreads the signal to the GPON ONT, the GPON ONT connects residential homes.

The components of GPON network are,

- Optical line terminal (OLT)
- Optical splitters
- Optical network terminal (ONT)

The following figure shows the GPON over FTTH network.

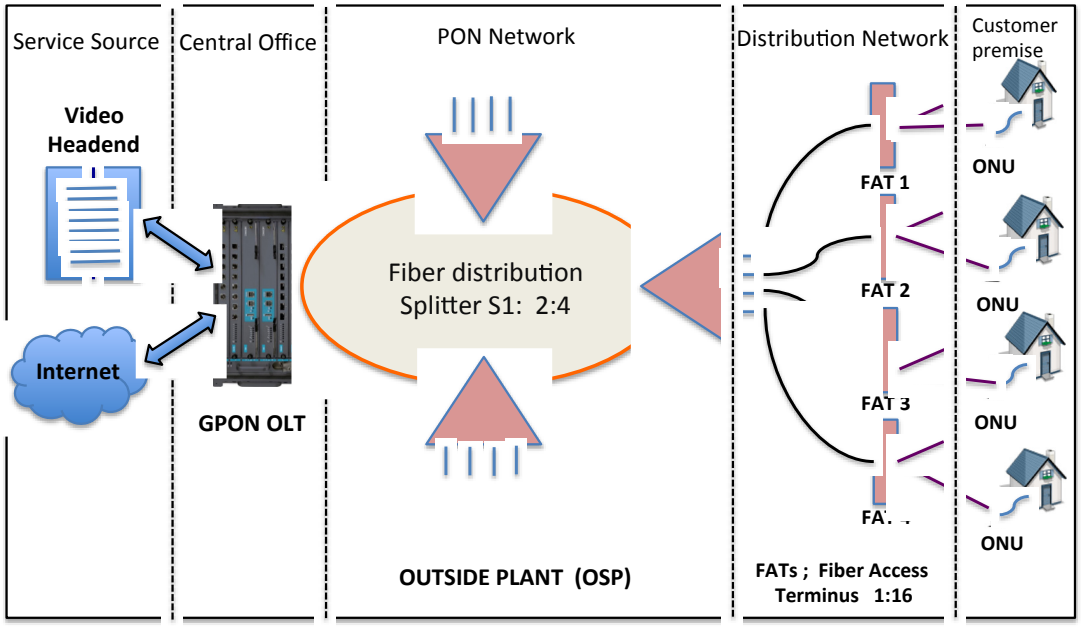


Fig 1.4.7 GPON over FTTH Network

Optical Line Terminal (OLT)

It is the main element of the network and it positioned in the local exchange. It is the engine that drives FTTH system. The major functions of OLT are:

1. Traffic scheduling
2. Buffer allocation

OLTs use DC power of -48 and has one line card for incoming internet, one system card for configuration onboard and one or more GPON cards. Each GPON cards contains more that one GPON ports.

Optical Splitters

It is used in splitting the power of signal. The signal is split into the number of fibres leaving the splitter and there are more that three levels of fibres corresponding to two or more levels of splitters. This function enable the data sharing by multiple users. Signal does not get affected in its structure or properties due to splitting. The passive optical splitters has following properties:

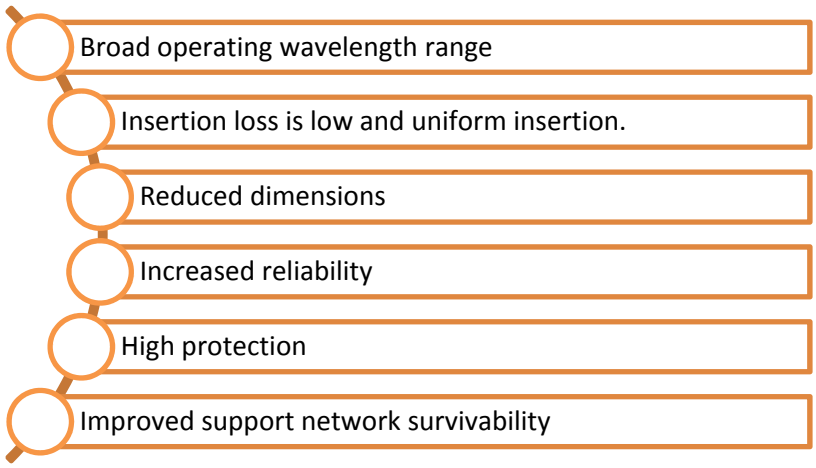


Fig 1.4.8: Properties of optical splitters

Optical Network Terminal (ONT)

These are deployed at the customer places. When it is connected to the OLT it denotes that no active elements are present in the link.

In the GPON network ONT is the connection between the customer place to central office of OLT.

ONT receives data at 1490nm and sends burst traffic at 1310nm. Analog video at 1550nm is received. Media Access Controller (MAC) controls the uploading traffic in an orderly manner and ensures that no collision occur at the junction due to upstream data transmission from different homes.

There are fibre to copper media converters that offer RJ11, RJ45, and F-Series connectors to connect the compatible device like Telephone set, STBs, Laptop etc.

The GPON FTTH access network architecture have tree topology to maximize the coverage with minimum network splits, hence reducing optical power. GPON network structure is explained in the following figure

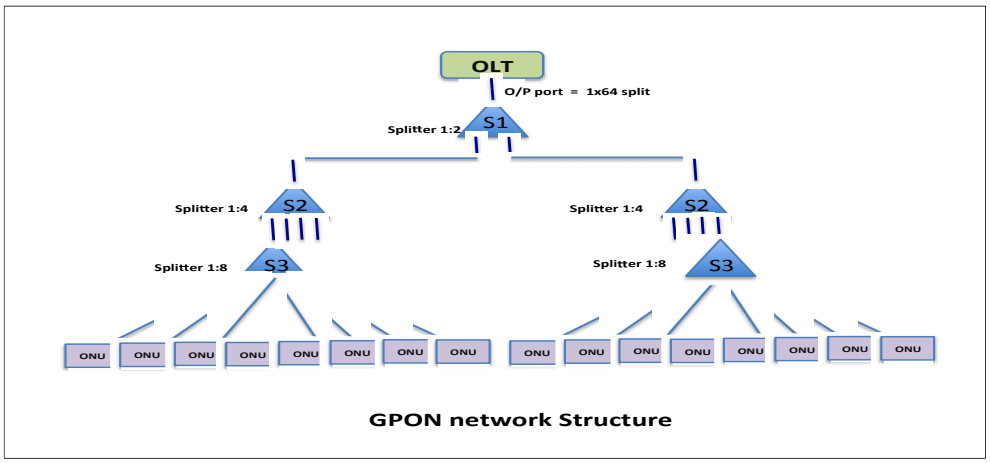


Fig 1.4.9: GPON network structure

Depending on the total available optical power budget, the distance between the OLT and ONT can be more than 20 km, which is a factor of the OLT laser port and the total loss budget.

1.4.4 UTP copper wire Network Architecture

Copper wire last mile delivery is strictly followed by the Telco players only, such as BSNL, MTNL, Airtel, Idea, Reliance etc.

In the initial phase of telephone system copper wires were used for delivering voice serviecs and now the same copper pair is used in delivering the multiplay services with the enhanced bendwidth as per the requirment of digital services.

Hybrid model is used in delivering services. The core network is a fibre core network and the access network is based on the various copper technology like DLC, DSL etc. DSL technology has gained high preference due to its installation advantage and traffic handling capacity.

Tripleplay architecture contains service provider network, the core network, the access network where end users reside and the equipment at the subscriber's home. A triple play solution can distribute 150 - 350 TV channels over an IP network with voice over IP and high-speed Internet. Video, voice and data services can be sent from IP head-end using an IP core network over an optical backbone network to central office (CO). The CO relies the data to the access network (AN) in which Digital Subscriber Line Access Multiplexers (DSLAMs) will be proposed to home`s services requirements.

Telecommunication market studies addreess that wide range of telecommunication networks due to major business cases.

Asymmetrical Digital Subscriber Lines (ADSL), as an access technology over the existing nonloaded copper loop plant, are intended to provide up to 8 Mbps downstream digital transport from central office to customers and up to 640kbps upstream transmission. Such an asymmetric transmission has potential usage in services like advanced videotext, compressed TV quality video and distant education applications, where most of the information goes from the service providers to the customers. The following figure shows the digital services through the DSL network.

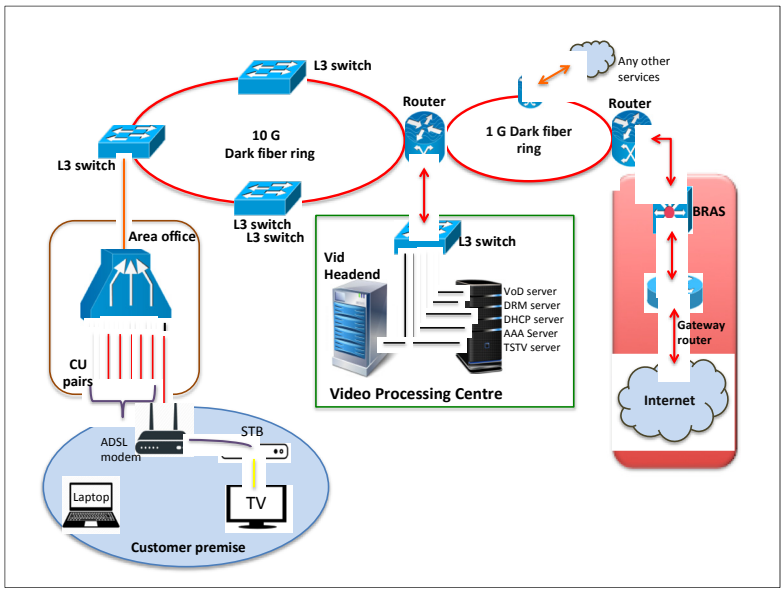


Fig 1.4.10: Digital services through DSL network

DSLAM

Most important and critical part of the Telco DSL network. Stands for "Digital Subscriber Line Access Multiplexer." A DSLAM is a device used to aggregate and route incoming DSL connections to the Internet. Since a "multiplexer" combines multiple signals from various DSL modems into one, a DSLAM combines a group of subscribers' connections into one aggregate Internet connection.

For example, a DSL access multiplier may receive signals from all the DSL modems in a certain neighbourhood and patch them through to the Internet backbone. The DSLAM processes each incoming connection and may limit the bandwidth of certain DSL lines. Most DSL service providers use multiple DSLAMs to help route incoming and outgoing traffic in the most efficient way possible.

BRAS

The "BRAS" is a Broadband Remote Access Server router that forwards packets between the core network and last mile subscriber. It is a complex router that implements dynamic per-subscriber IP policies, based on preassigned time frame, Quality of Service (QoS) profiles, rate limiters, packet manipulation, address assignment, session termination and forwarding.

Centre Offices (CO)

The CO router relies the data to the access network (AN) which consists of digital subscriber line access multiplexers (DSLAMs) and broadband digital loop carriers (DLCs). There it has the so-called last mile distribution of the service (i.e. video, voice or data) which afterwards enters the subscriber's home through the ADSL modem. Central Office router and Remote DSLAMs at the region subnet are supplied with Gigabit Ethernet links

1.4.5 Metro Ethernet Network Architecture

Metro Ethernet is an Ethernet transport network that provides point-to-point or multipoint connectivity services over a metropolitan area network (MAN). Ethernet originated as a LAN technology, and became a replacement for low-speed WAN technologies.

DSLAM are aggregated by Aggregation Switches also called (metro Ethernet network). A metro Ethernet network is useful when a switched layer between the DSLAM at Region subnet and the CO router in Aggregation subnet provides cost-effective aggregation capacity. Such a scenario would arise if the bandwidth utilization per-DSL-port is not enough to justify connecting DSLAMs directly to the CO. This benefit needs to be weighed against the expected traffic loads to and from DSLAMs.

Access Network (AN)

Access Network (Region Subnet) This network shows an example for the delivery of Multi-Play services (Data, Voice and Video, multimedia(over Asymmetric Digital Subscriber Line (ADSL) with data rate (downstream 12Mpbs/ upstream 1.3Mpbs). It simulates end-to-end communications between residential customers and backbone network.

Typical metro ethernet network architecture is given in the following figure:

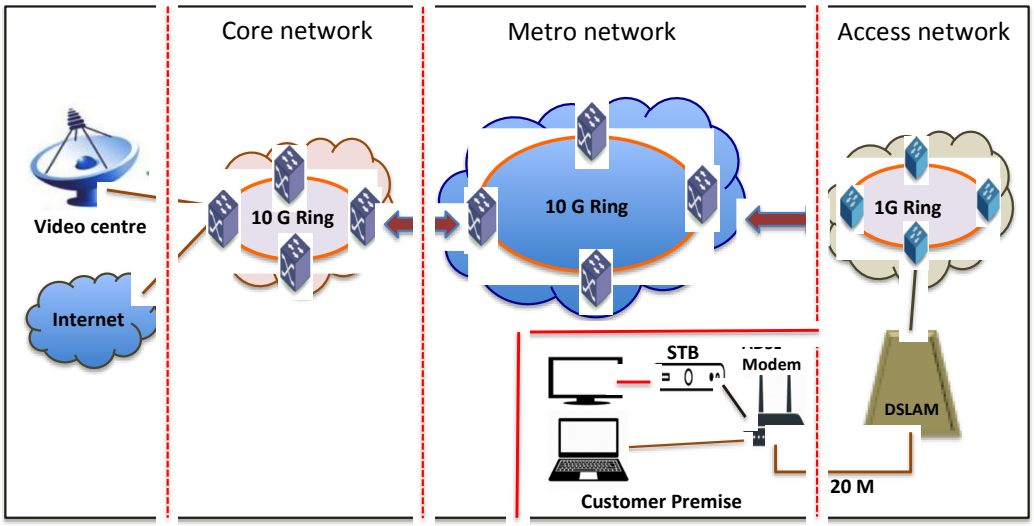


Fig 1.4.11 : Typical Metro Ethernet Network Architecture

1.4.6 Ethernet Over Coaxial cable (OSP) Architecture

Ethernet over Coaxial cable network is a recent invention. As it is well-known fact that the coaxial cable is a very famous and important medium of delivering video services. This coaxial network is also readily available with a minor to major Cable operator. EOC is a device which can utilize the existing coax network for delivering its services.

At the backhaul of the Master equipment the Video and data services are fed in. The services can be made available through a CMTS, OLT or ONU to the Master via an optical cable.

The output of the Master is the coaxial output with mixed Video and data services. The following figure shows the ports configuration of EoC master.

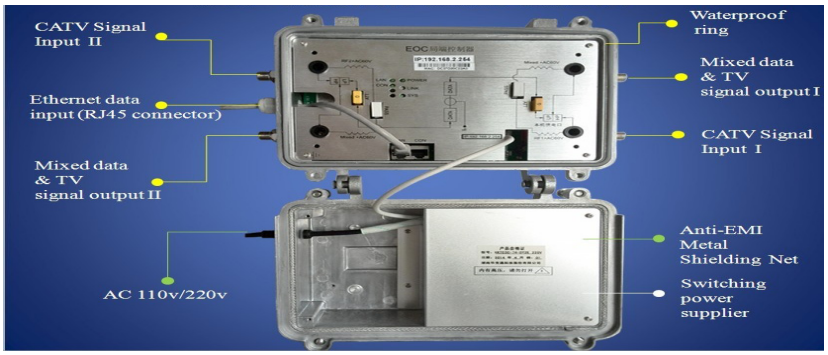


Fig 1.4.12 : Ports configuration of EoC Master

The output being coaxial, Coaxial cable network can be directly connected to the Master Output. The output can be carried upto 500 mtrs of length without adding any more active device. Thus it provides a better signal to noise ration.

The normal 1 GHz Tapoff or splitters are used to provide the connectivity to the households. The connection can be given through a EOC Slave unit which works as a modem in this case and again provide Ethernet output thru RJ45 connection. The connection is given to the STB for video decoding and to the Laptop or desktop for Data.

From one Master outport port 50 Slaves can be connected. Hence a 8 port Master alone can cater for 400 customers. This is a very simple mechanism and there is no configuration required. Direct connectivity to the coax network will start delivering the signal. EOC is a cost effective, highly available, and easy to install and maintenance solution. A network architecture is shown below:

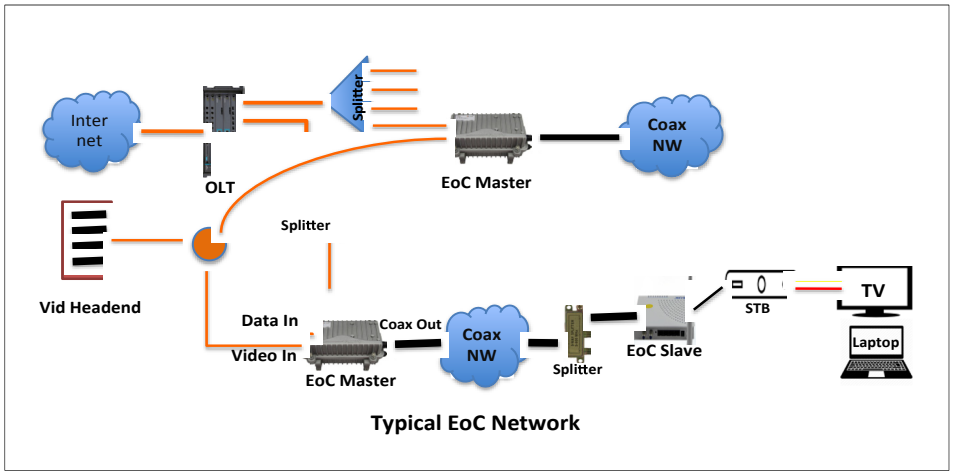


Fig 1.4.13: Typical EoC network

Exercise

Write 50 to 100 words about the following topics.

1. What is PON and give two advantage of PON.

_____

_____

_____

_____

2. Write the components of GPON network.

_____

_____

_____

_____

3. Write major function of OLT.

_____

_____

_____

_____

4. Write 3 properties of optical splitters.

_____

_____

_____

_____

5. Define BRAS.

_____

_____

_____

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2. Building Access Network and Installation

Unit 2.1: Tools and Equipment

Unit 2.2: Building Access Network for DOCSIS

Unit 2.3: Building OSP of Fibre Access Network

Key Learning Outcomes

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

1. List the tools and devices at work
2. Explain Cable laying procedure
3. Explain STB installation and configuration
4. Define splicing and its types
5. Explain OSP network
6. Explain the network architecture

UNIT 2.1: Tools and Equipment

Unit Objectives

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

1. List the tools and equipment used for installation
2. List the tools used for setting up connection
3. List the tools required for maintenance of RF network (coaxial) / Ethernet Network / Fibre cables

2.1.1 Tools and Testers

It is very important to select the tools and tester during installation to improve the efficiency of work. A digital cable technician should carry all the required tools and tester along with him at the time of installation. There should be no lack or alternative of tool. It is must to have following tools for every digital cable technician at the time of installation.

Tool Name	Function	Image
Screw Driver- Star headed	For screwing purpose	
Screw Driver- flat headed	For screwing purpose	
Line Tester	Helps to check the electricity. Light lit up at the presence of electric field.	
Pliers	Used to grip any objects	

Wire stripper	Helps to strip the wire insulation part	
Wire cutter	Helps to cut the wire	
Utility Knife	Helps in cutting wire or other materials at the time of installation	
Coaxial cable compression tool	It helps in F-type connection. It helps installers with a multi-functional high strength reliable method for compressing connectors.	
Ethernet crimping tool	Used to prepare the Telephone connect jack RJ11 or Ethernet connection by RJ45	
Coaxial crimping tool	Helps to connect cable by crimping method.	
Fibre Optic Kevlar cutter	Helps to cut Kevlar Fibre optic cables.	

Fibre Optic Loose tube cutter	Helps to clean cut the loose tubes of Fibre optic cable. And also used to cut the PVC jackets of the Fibre.	
Fibre Optic Stripper	Helps to separate the primary coating on the optical Fibre.	
Fibre Optic Cleaver	Helps to cut the glass optical Fibre in a perpendicular direction.	
Fibre optic jacket remover	Helps in removing protective coatings, jackets.	
Digital Multi meter	Helps to measure Voltage, Current, Resistance and continuity of any circuit or equipment.	
CATV Signal Level meters	Helps in Cable TV coaxial networks, to measure the signals.	
Digital CATV QAM meters	Helps to measure the QAM channel signal level and also used to balance the network for forward and reverse path.	

Splicing Machine	Helps to join two optical Fibres end-to-end using heat. The goal is to fuse the two Fibres together for a negligible loss.	
OTDR (Optical Time domain Reflectometer)	Used to ascertain the overall health of the Fibre, continuity and losses if any. The OTDR uses a light pulse and sends it to the Fibre under test. It receives the backscattered light and interprets the result in graphical form	
Optical Power Meter	An optical power meter measures the power of an optical signal at various wavelengths such as 850nm, 980nm, 1300nm, 1310nm, 1490nm, 1550nm, 1625nm	
Optical Laser Source	Light source is laser diode or LED is used to inject an optical signal into Fibre to test the performance of a Fibre optic system.	

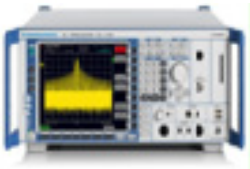
Visual Fault Locator	Visual Fault locators are used in Fibre optic cable testing. These testers use red LED light and inject the same at one end of the Fibre. The other end of the OFC is visually observed to identify the Fibre	
Spectrum Analyser	Used to measure and analyse various RF parameters like Noise level.	

Fig 2.1.1 Tools and testers

2.1.2 Tools used in Testing and Troubleshooting

Test Equipment for OFC Network

OTDR:

OTDR stands for optical time domain reflectometer. This is used to check the fibre quality, loss and continuity. This send the light pulse to the fibre which is used under the test. Once the light backscattered it display the result in the graphic form.

Fig 2.1.2 OTDR

Optical Power Meter:

It is used to measure the optical signal. This can measure the wavelength such as 850nm to 1625nm.

Fig 2.1.3 Optical power meter

Optical Loss Test Set (OLTS):

This is a device which is used to measure the loss of the two ends of link. It contains the light source at the end of link and power source at the other end of link. It can measure insertion loss and optical return loss.

Fig 2.1.4 Optical loss test set

Visual Fault Locater:

It is used in fibre optic cable testing. It contains the red LED light which is injected into the end of fibre. Other end of fibre is observed visually to identify the fibre. It comes in different shape and LED source.

Fig 2.1.5 Visual fault locator

Optical Microscope:

It is also known as fibre viewer or fibre microscope. It is a hand held device. This helps to inspect the connectors and it ensure that fibre terminations are clean and smooth.

Fig 2.1.6 Optical microscope

Test Equipment for RF Network

The test equipment used in the RF network are listed in the following:

Satellite signal Level meter:

It is used to measure the IF output of C-Band dish antenna signals. It helps in tuning and maintenance of dish antennas. The frequency range of these signal level meter is 900 MHz to 2150 Mhz which is also known as “L” band frequency.

Fig 2.1.7 Satellite signal level meter

Signal Level meters:

It is used in Cable TV coaxial networks. It is also referred as Field Strength Meter (FSM). The signal level meters are capable of measuring the signals in the forward path (48 MHz to 860 MHz). Some devices are also capable of measuring the signals in the reverse path (0 to 40 MHz).

Fig 2.1.8 Signal level meters

Digital CATV QAM meters:

The digital QAM meters measures the digitally modulated CATV frequencies. Normally the digitally modulated signals are of QAM type. This device measures the signal level and also the BER (Bit Error Ratio) and MER (Modulation Error Ratio). The device can also plot the constellation diagram for a visual understanding.

Fig 2.1.9 Digital CATV QAM metre

Return Path Signal Generator:

This device is used to tune the return path coaxial network. The device is connected at the end of the trunk line and generates the required RF which is measured with a signal level meter at any point in the network.

Fig 2.1.10:Return path signal generator

Tools required for maintenance of RF network (coaxial) / Ethernet Network / Fibre cables:

The following are the tools that are commonly used during RF, Ethernet and fibre cable troubleshooting.

Coaxial cable compression tool (for RG-6 and RG-11)

This tool is used to connectorise RG-6 and RG-11 cables. The proper connector is required with the tool.

Fig 2.1.11 Coaxial cable compression tool

Coaxial cable stripper:

This tool is used to remove the outer PVC sheath of the coaxial cable. It comes fitted with multiple blades to accommodate various cable sizes.

Fig 2.1.12 Coaxial cable stripper

Ethernet crimping tool:

This tool is used for connecting CAT5 and similar cables. For CAT5 cables RJ45 connectors are used.

Fig 2.1.13 Ethernet crimping tool

Network cable tester:

This tool is used to check the correct connectivity of CAT5 and other similar cables. It is used as a remote -master pair with one end being connected with the master and the far end being connected with the remote.

Fig 2.1.14 Network cable tester

Fibre Optic Kevlar cutter:

This tool is used to cut kevlar strength members (aramid yarns) in fibre optic cables.

Fig 2.1.15 Fibre optic Kevlar cutter

Fibre Optic Loose tube cutter:

This tool is used to clean cut the loose tubes (made of PBT) in a fibre optic cable. It is also used to cut the PVC jackets of the patchchords and pigtails. The may have multiple blades which may be adjusted as per requirement.

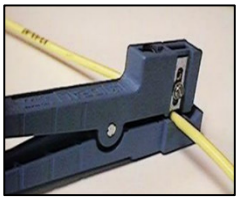


Fig 2.1.16 Fibre optic loose tube cutter

Fibre Optic Stripper (250mm):

This tool is used to separate the 250 micrometre primary coating on the optical fibre.

Fig 2.1.17 Fibre optic stripper

Fibre Optic Stripper (900 mm):

This tool is used to separate the 900 micrometre of tight buffer coating on the optical fibre inside the patch chords and pigtails.

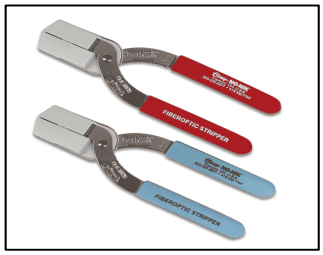


Fig 2.1.18 Fibre optic stripper

Fibre Optic Cleaver:

The fibre optic cleaver is used to cut the glass optical fibre in a perpendicular direction.

Fig 2.1.18: Optic cleaver

Exercise

Write the functions of following image:

Image	Function
	
	
	
	
	

UNIT 2.2: Building Access Network for DOCSIS

Unit Objectives

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

1. List the cable laying procedure
2. Define powering of the nodes
3. Explain coaxial network tuning and balancing
4. Define reverse path tuning
5. Explain balancing of network using the test modem
6. List the ways of DOCSIS modem connection
7. Explain installation of cable modem
8. Explain configuration activities for ONU
9. List the important parameters

DOCSIS over HFC network has the main central office, connected through an optical fibre ring, covering a geographic region. There are multiple hubs at different CMTS locations, under the primary ring of fibre, catering to the specific areas. The areas are subdivided into multiple sub areas, which are catered by optical nodes by taking light signal as an input and providing RF output. The RF output is distributed among all the households of that area using the coaxial cable TV network. The following figure shows the structure of DOCSIS delivery platform:

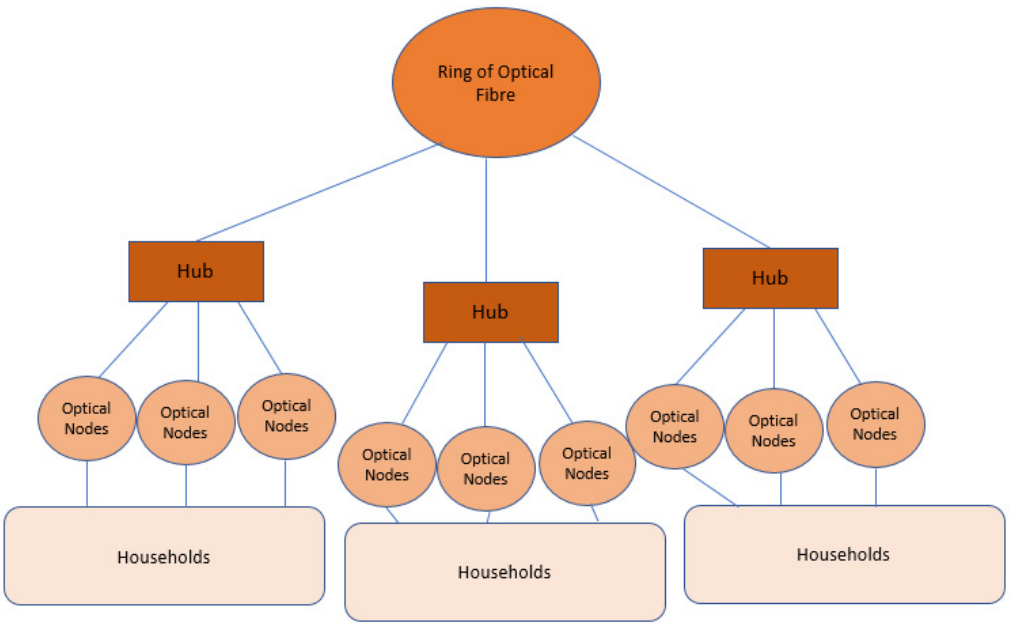


Fig. 2.2.1: Structure of DOCSIS delivery platform

For building the access network for DOCSIS, the steps listed in the following figure, should be followed:

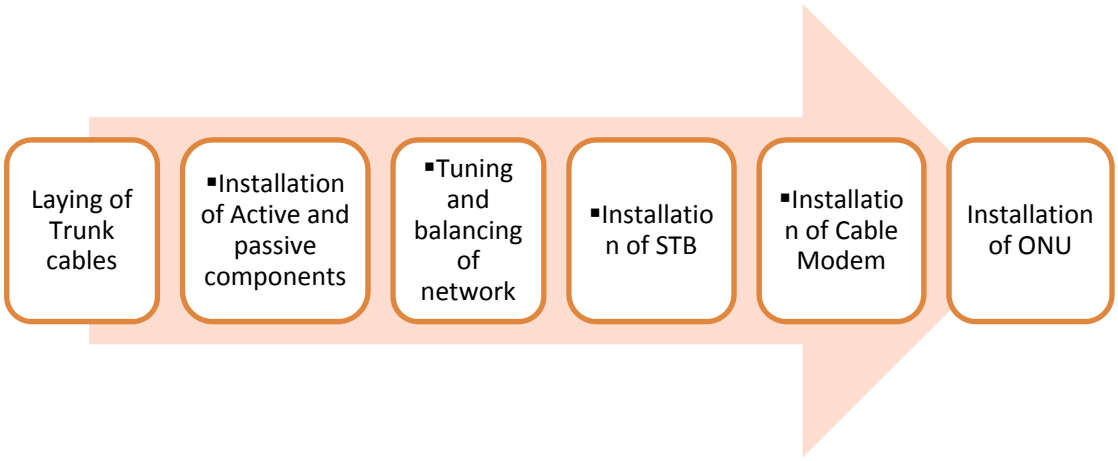


Fig. 2.2.2: Building the access network for DOCSIS

2.2.1 Cable Laying Procedure

A DCT should know about cable laying procedures for the delivery platforms. For DOCSIS RG 11 coaxial cable is being used as trunk line at space of 170 to 200 meters apart and total number of cascading done in one trunk is 3. This cable is supplied in wooden drum containing approximately 300 meters of RG 11 per drum. The RG11 cable is a low loss and a preferred medium to convey the digital video signals. Selection of space of amplifier should be based on the cable loss and the Gain of Amplifier. The loss chart is shown in the following table:

Cable type:	RG-11		RG-6	
dB loss per 100	ft	m	ft	m
Frequency (MHz)				
5	0.36	1.18	0.61	2.00
30	0.75	2.46	1.17	3.84
50	0.93	3.05	1.44	4.72
350	2.36	7.74	3.65	12.0
400	2.53	8.30	3.92	12.9
450	2.69	8.82	4.17	13.7
550	3.01	9.87	4.65	15.3
600	3.16	10.4	4.87	16.0
750	3.58	11.7	5.50	18.0
862	3.88	12.7	5.93	19.5
900	3.97	13.0	6.07	19.9
950	4.10	13.4	6.25	20.5
1000	4.23	13.9	6.43	21.1

Fig. 2.2.3: Loss chart

Node output is divided into 4 trunk lines. Each Trunk line has 3 RF amplifiers in cascade covering a length of 600 meters one way. Thus, total number of RF amplifiers used in the overall coaxial network are 12. One amplifier serves for 40 connections and hence the node covers approximately 500 connectivity in a specific area. One line card of CMTS can cater to 8 to 10 nodes within 20 Km range given the Optical power output from the Transmitter.

Once one node serves to 500 users, total number of user that can be served by one CMTS line card is around 5000.

The following figure lists of procedure of cable laying in the trunk lines:

Make a plan for laying cables for single way or two way with reverse path as per the planned route provided by the supervisor or Area LCO.

Select the cable which will be used as a trunk. There are various types of Coaxial cables types such as flexible co-axial, armored coaxial, 500 series cable and so on.

Before laying the cable, compute the height and length of the pole or tree and design all logistics like messenger wire, clipping wire, Ladder, Belt, Shoe etc.

Make list of requirement of all the network related equipment and materials known as Bill of Material (BoM) and get the materials at working site.

Examine the line for electricity using a line tester, as there may be metallic poles electric power line where the cable to be laid.

Make sure to lay the cables on a low tension line, particularly, 220 V 50 Hz line.

Use messenger wires to support trunk line cables without crushing the cable.

Use clipping wire to clip the cables at a distance of 1 meter throughout the trunk/sub-trunk line.

Keep the cables in such a way that, it is away from heating vents and water heaters.

Keep minimum 12-16 feet height for trunks.

Carry out laying of cables as per the planned route like from pole to by climbing up the ladder safely.

Follow all the safety procedure when working on electric poles. Carry safety equipment like helmet, goggles, shoes and safety belt.

Create a loop of 3-5 meters cable on every pole after 80 meter.

Do not bend the cable less than three inch to avoid shorts, cable impedence and signal loss.

Keep proper fitting of the enclosure box for housing.

Design the enclosure of actives and passives in such a way that the entry and exit points are at the bottom. Provide proper rain protection if it is on side.

Create a small cable drip loop at the input and output of the amplifier to avoid water entry to the amplifier.

Examine the box have provision for locking and test proper connection is established by using standard connecters.

Connect the trunk cables, input and output of the amplifiers and install passives (Tap off/Splitters) as per the planned diagram.

Fig. 2.2.4: Cable laying procedure

For connection purpose compression connectors are used. Insertion loss in these connectors are less than 1dB. Special compression tool is used for perfect connection.

All the amplifiers kept on the electric poles, need to be secured keeping inside a box properly clamped with the pole keeping the nuts inside and locked by an inbuild locking system. Anti-static bedding should be used in between the metal poles and the metallic amplifier box.

Design Criteria

The following design criteria should be used when laying the cables.

Cascade = 1 node + 3 amplifiers.

4th amplifier can be added at special cases. The following diagram shows the example of N+3 and N+4 architecture.

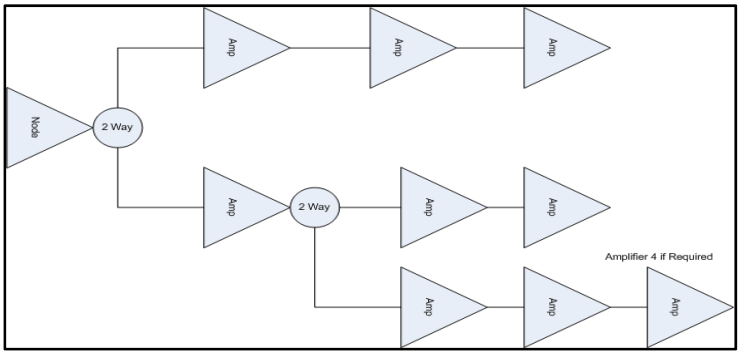


Fig 2.2.5 Designing criteria

2.2.2 Powering of the Nodes

Node powering is a serious issue because the performance of total network and the user experience directly depend on the node function. Hence the node need to be powered with an UPS or inverter to provide continuous operation. Typical power supply of node input power is 60 V to 90 V AC with 50 Hz frequency. A step-down transformer is used to feed the supply to the node and the transformer is fed with the Inverter or UPS backup so that it is providing power continuously. The following points for powering the node should be considered:

- If possible, power supplies and inserters should be located at the node.
- RG11 extension cable can be used if the power supply cannot be placed at the node, but it is limited for 80 meters length.

- An inverter needs to be used within a distance of 80 meter from node to provide seamless switching between the storage power supply and the active PS and. This location of the inverter should be accessible on 24/7 basis, for maintenance staff.
- To attain low frequency noise there should be a proper earthing to earth the powering equipment.

The following diagram represents the systematic flow of powering node:

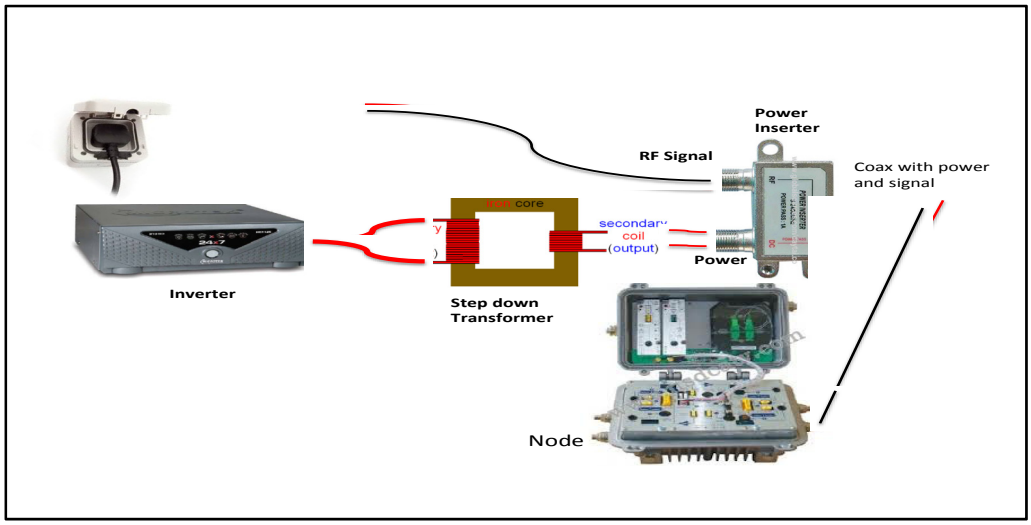


Fig. 2.2.6 Powering node

Node Switching

The steps for node switching are as follows:

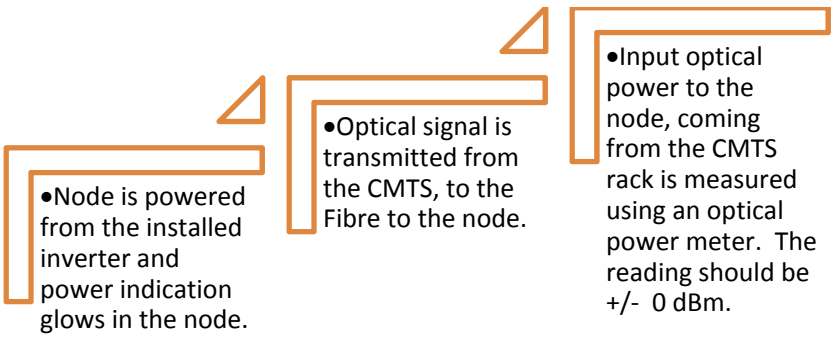


Fig. 2.2.7: Node switching

2.2.3 Tuning and Balancing Network

Coaxial Network Tuning and Balancing

Output of the node which is RF in the range of 112 to 862 MHz multiplexed with data and video services and uses QAM 64/256 modulation. RF amplifiers should be tuned depending on the forward frequency range being used for the digital transaction purpose.

The frequencies used for digital carrier are in the ultra-high frequency (UHF) range that is within 300 MHz to 862 MHz, keeping 112 MHz as the low frequency reference point for tuning.

The reverse spectrum is 5 to 65 MHZ but the center frequency at which the reverse signal level calculated is 30 MHz.

The input here is direct conversion of light to RF. The RF output level should be Lower frequency at 92-93 dBuV and the highest frequency output level should be 104 to 106 dBuV. The RF level is measured using a Signal Level meter (DB Meter) or by a QAM analyzer.
The reverse input at the node should be 72-75 dBuV. All these measurements will be done on the attenuated input and o/p port in the Amps. So, 20 dB attenuation should be calculated.

Reverse Path Tuning

The steps are as follow:

1. The reverse signal is changed to light and sent to the CMTS through Fibre. Splicing technician should go to the CMTS NOC and take the output reading of the optical reverse signal and should be +/- 0 dBm.
2. The Fibre carrying the input and output from to the node should be tagged with the RPR Tx. Tag.
3. By this forward and reverse signal balancing of the node is completed.
4. Reverse signal is simulated through a signal generator. The frequency at which the signal is generated is 30 MHz. The fixed RF level at the Gen out is 90 dBuV.
5. The Required input level should be 72 dBuV.
6. The gen out should be adjusted to 72 dBuV by using the required attenuation stages.
7. The input read at the Input port should be 52 dBuV.
8. Now the same level should be achieved at the node RF reverse input port.

Balancing of Network Using Test Modem

The steps to balance the network using test modem are as follow:

- The modem requires 60dBuV signal level to get locked condition. Signal generator signal level is adjusted to 60 dBuV by adding 60 meters of cable loss.
- This signal level is fed to the modem and modem gets locked. There are two indicators used to confirm whether modem is locked. After this DCT should call on the central NOC.
- Technician should confirm the MAC id of the modem to the Central NOC person and confirms the address and location of the Amplifier for which the balancing is being done.
- The NOC engineer gets the info of the modem once the modem with same MAC id is registered in the CMTS NR (Network Register).
- NOC engineer confirms the Upstream power and SNR and Downstream power and SNR. The values should be:
  - Upstream power: 45DBm
  - Downstream power: 1+/-2 dBm
  - Upstream SNR: 32 to 46 DB
  - Downstream SNR: >42 dB
- NOC engineer confirms the loss given in RF line till modem. And thus, the balancing for one Amplifier is completed. And same process is followed for all other amplifiers.

2.2.4 Installation of CPE for HFC Network

The following figure lists the general procedure to install a Set Top Box (STB) at the customers' premises:

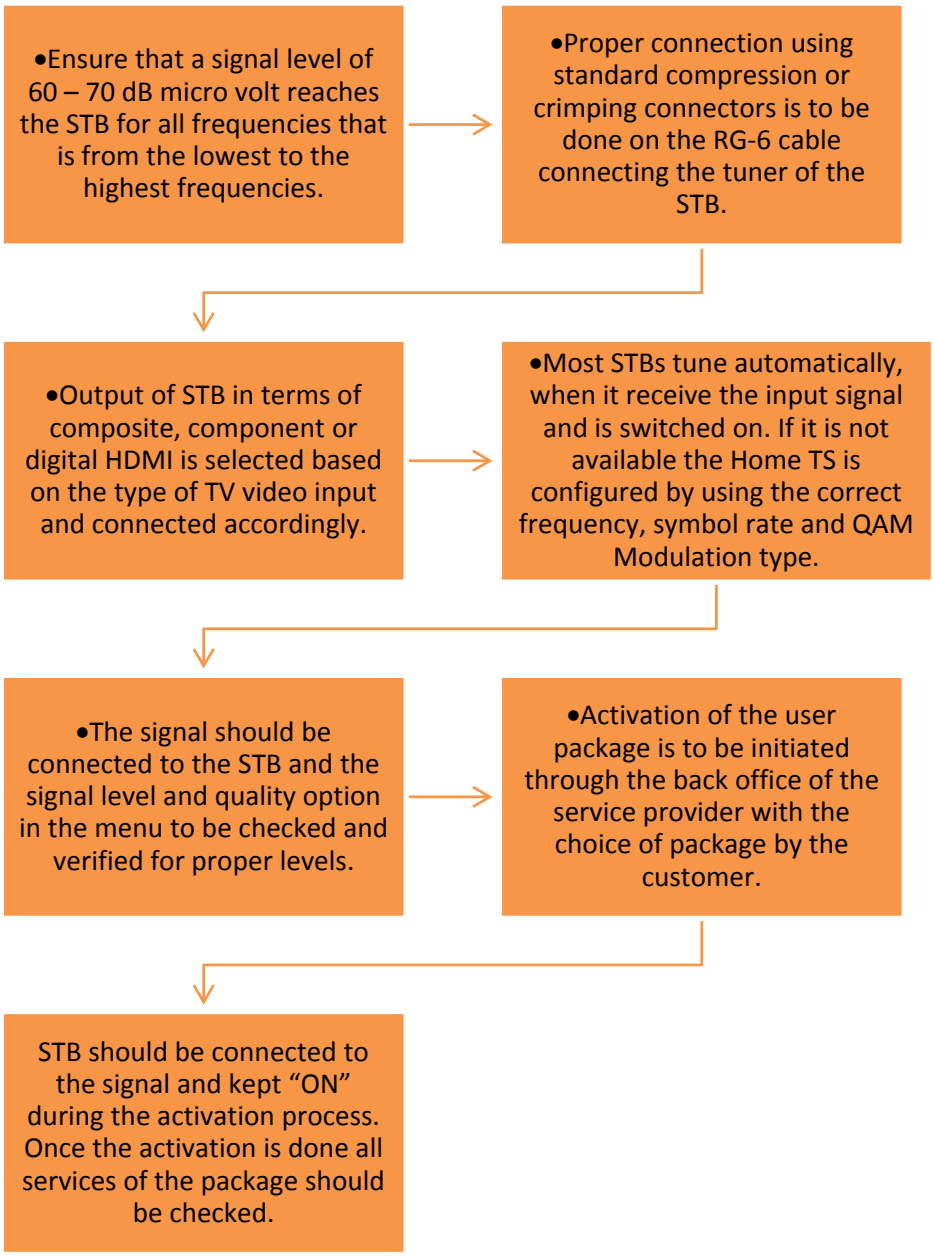


Fig. 2.2.8: Installing a Set Top Box (STB)

The following diagram represents the scenario when both STB and the DOCSIS modem is present at the home:

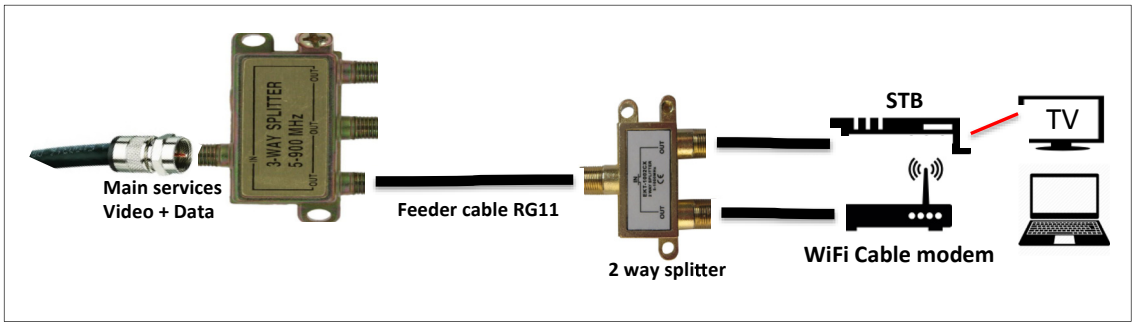


Fig 2.2.9: Connection of DOCSIS with both modem and STB

2.2.5 Installation of Cable Modem

The following steps are followed for the installation of DOCSIS modem at the customers premises

- Splitter is user to divide the signals for both modem and STB.
- If STB is unavailable the RF signal is directly connected to the cable modem input port.
- Connect the PC by using a USB port and a proper data cable or via WAN. It should be remembered that PC is not connected to both the ports simultaneously. Connecting two separate PCs, at the same time, to the cable modem can be done by:
  - Connecting one PC to the Ethernet port
  - The other PC to the USB port
- Insert the AC power cord on the back of the cable modem, into the POWER connector and thereafter plug the cord in an available AC power source.
- Allow some time to get the modem power established and get connected to the CMTS. A green indication will come up.
- Check all the parameters like US level and SNR and DS level and SNR. Record it.
- Setup the cable modem to configure the Internet devices (PC or any Wifi device) for Internet access.
- The configuration may be carried out by TCP/IP method or may be carried by the USB driver. This process will be dependent on the particular model and the service provider.

2.2.6 Configuration Activities for ONU (Optical Network Unit) in GPON installation

It is important to check the level of optical power at the input. It will provide a satisfactory performance in power level within the range from -12 dBm to -20 dBm. The data sheet of the ONU clearly specifies the maximum and the minimum optical power levels. The goal should be to present the power level which is in the middle of maximum and the minimum levels.

The following table shows the LED indications for ONT / ONU:

PWR	• On: The power of the ONU is on • Off: There is power supplied to ONU
OPTICAL INPUT	• On: Normal optical power • Blinking: Lower optical power than that of the receiver • Off: Abnormal optical link
LINK	• On: Registration to OLT is successfully done • Blinking: Registering to OLT is in progress • Off: Registration to OLT failed
ETH / LAN	• On: Normal Ethernet connection • Blinking: Data is being sent over Ethernet port • Off: No Ethernet connection
WIFI	• Blinking: Data is being sent • Off ： WLAN function is disabled

Fig 2.2.10: LED indications

Note: LED indications may vary with different make and models

The following activities are accomplished thereafter:

- The ONT or ONU may work either in the bridge mode or in the router mode:
  - In bridge mode, the ONU connects the Ethernet port (LAN port) to the PC directly
  - In router mode, a WAN port is required. All LAN ports of the ONU connects to the WAN port.
- Registration of ONT or ONU is done after the ONU is connected to the optical power. The commands to register them, is given through the NMS at the NOC end. ONU interface commands are used from the NMS to configure the speed limits allowed at the user end.
- ONU is assigned the VLAN through remote management configuration and then is connected to the PC and tested for connectivity (ping command to OLT IP address).
- The following configuration set of commands are used from the NMS for configuration of security:
  - Loop Detection: For preventing flooding of ports due to unnecessary looping of ports
  - Broadcast Limit configuration: To limit Broadcast traffic
  - Multicast configuration: To configure multicast traffic
  - ARP flood limit configuration
  - ACL configuration: To block certain IPs
- The following maintenance commands can be used from the NMS to get status of all ONU:
  - Check ONU optical power
  - Show MAC address of ONU
  - Show ONU status

Some Important Parameters

CNR for various modulation schemes to achieve 1.0E-8 (1x10-8) BER are listed in the following table:

Modulation Type Required	CNR Required
BPSK	12 dB
QPSK	15 dB
16-QAM	22 dB
64-QAM	28 dB
QAM 256	34 dB

Signal Level

Forward: Downstream Signal	Minimum Input @ all frequencies	71dBµV
	Dual Output (reduced by 3.5dB)	• Output at 1GHz = 106.5dBµV • Output @ 550MHz = 99.6dBµV • Output at 87MHz = 92.5dBµV
Reverse: Upstream Signal	Minimum Input at reverse amp @ all frequencies	76dBµV
	Output @ 5MHz	96dBµ
	Output @ 65MHz	96dBµV
	Optical power at Node	+/- 1 dB
	Optical Power at RPR	> -3 dBm
	Loss in RG 11 Coaxial cable at 1GHz per 100 mtr	20 dB
	RG-11 cable Minimum bend radius (Cabling)	114 mm (4.5")
	Forward Signal Level to the modem	55 to 65dBuV (Downstream)
	Reverse Signal Level From Cable modem	41 to 46dBmV (Upstream)

Exercise

Write the following in 50-100 words.

1. Write about the powering a node procedure.

2. Write about reverse path tuning.

3. Write the procedure involved in balancing network using test modem.

4. Write about the cable modem installation.

5. Write about cable laying procedure.

UNIT 2.3: Building OSP of Fibre Access Network

Unit Objectives

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

1. List the components of outside plant (OSP)
2. Explain open trenching
3. Define aerial cable installation
4. List the significance of splicing
5. Explain the mechanical splicing procedure
6. Explain mechanical splicing -assembly
7. List the fusion splicing requirements
8. Explain splicing preparation
9. Explain the method of Fusion splicing
10. List the accessories used in fibre network

2.3.1 Introduction

Fibre optics used in telecommunication, cable TV are laid outside the building. These fibres are hanged on the poles or buried underground. These fibres are laid from short distance like few 100 meters to long distance like 100 kilometers.

OSP utilize the single mode fibre. The fibre number differ and it can be very high. In Indian markets the number of fibres up to 96 is used. Long distance cables are designed in a way to overcome moisture and rodent damage. The components of OSP are listed in the following figure:

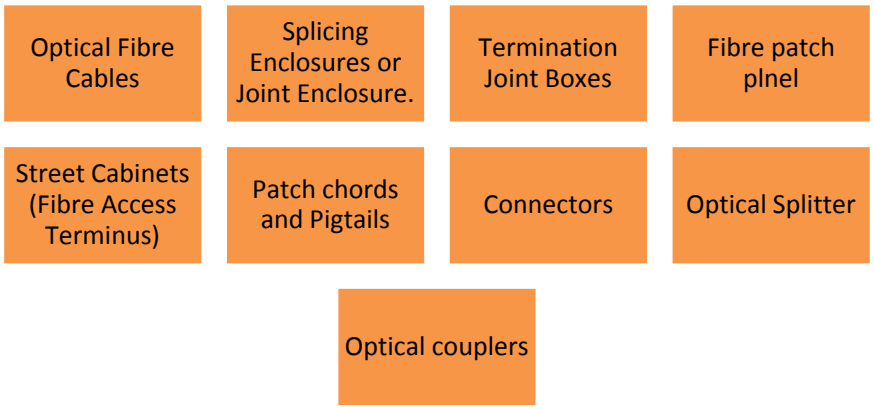


Fig 2.3.1: Components of OSP

Accessories Used in Fibre Network

Fibre Management System (FMS)

FMS is the basic component of the optical distribution frame (ODF), located in central offices, regional hub offices and customer premises. It is designed to provide cross-connect and interconnect between incoming Fibre cables and Fibre optic equipment. These systems are

capable of handling large volumes of Fibre in a consistent and structured manner. The following image shows an FMS:

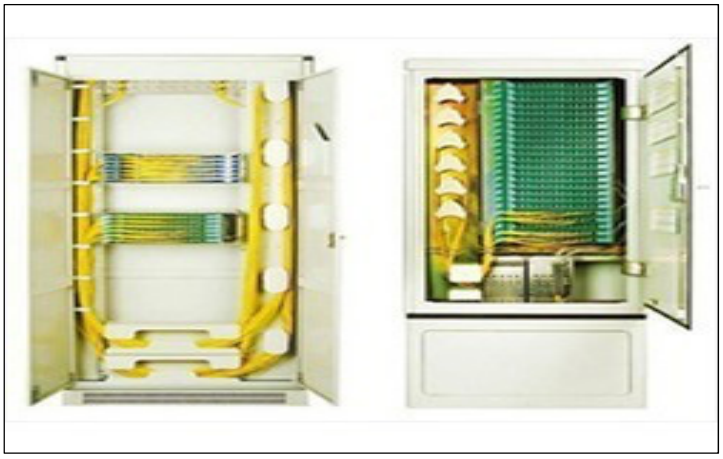


Fig 2.3.2: FMS

Fibre Access Terminus (FAT)

The FAT box is designed to splice and interconnect Fibre optic cables and managed inside the tray. It is very suitable for FTTH applications in multi dwelling buildings for providing multiple Fibre to the home connections. The FAT is wall mountable, very easy to install and maintain. FAT also used for Fibre distribution that allows straight through application with taking out only the required Fibres dedicated for the particular area, while the other Fibres from the distribution cable continue without interruption through the box. The following image shows an FAT:

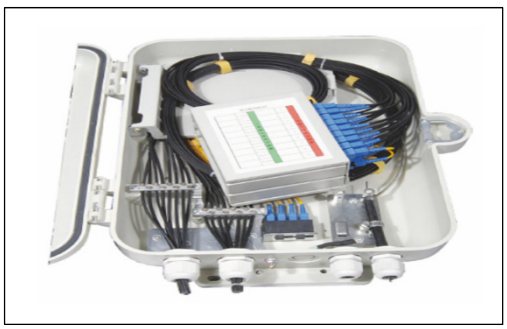


Fig 2.3.3: FAT

Joint Closure (JC)

Fibre optic splice closure is a device to offer room to fuse splice optical Fibre and also to give protections for the fused fibre joint point and the Fibre cables. There are different optic splice closures for different applications, such as aerial, duct Fibre cables and direct buried. Generally, Fibre optic splice closures are used outdoors, some even used underwater.

The following image shows a joint closure:

Fig 2.3.4: Joint closure

Optical Coupler

A Fibre optic coupler is an optical device which connects one or more Fibre ends for transmission of light waves in multiple paths. It can combine two or more inputs into a single output and can divide a single input into two or more outputs. The signal can be more attenuated using coupler when compared to a splice or connector, as the input signal can be divided amongst the output ports.

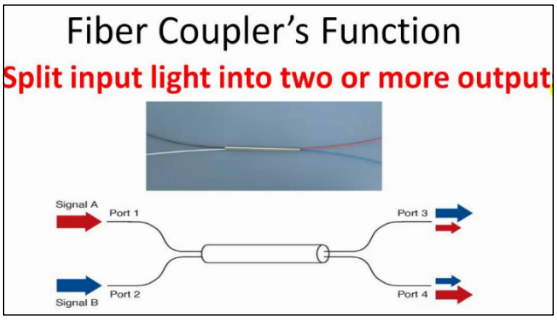


Fig 2.3.5: Coupler

Optical Splitter

It is a device that splits the light wavelength into several parts by a certain ratio. The simplest couplers are Fibre optic splitters. Mostly used in PON for splitting point to multi point functions. These devices have at least three ports to 64 port. Two kinds of Fibre splitters are most used as listed as following:

1. One is the traditional fused type Fibre optic splitter FBT splitter, which features competitive prices.
2. Another is PLC Fibre optic splitter, which is of compact size and suit for density applications.

The following image shows an optical splitter:

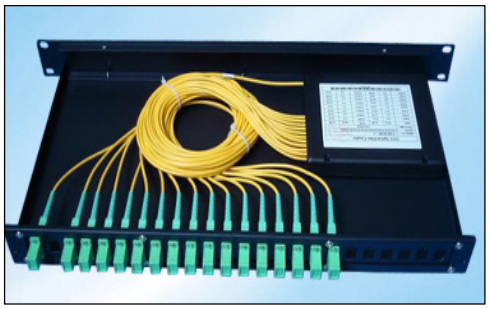


Fig 2.3.6: Splitter

Patch Cord

It is a f cable capped at either end with connectors that allow rapid and convenient connection to any optical devices such as optical transmitter, an optical switch etc. It is used as a reference cable to take reading or to measure optical power, Loss test, Fibre trace etc. Various connectors are used like ST, LC, FC, SC, mechanical transfer registered Jack (MT-RJ), Multi-fibre Push On (MPO), MU, SMA (SubMiniature version A), based on the equipment interface connectors. The following image shows a set of patch cords:

Fig 2.3.7: Patch cord

2.3.2 GPON Network OSP Design and Implementation

A digital cable technician should have the knowledge of a GPON OSP design to build and install the network. To implement the network the steps in the following figure need to be followed:

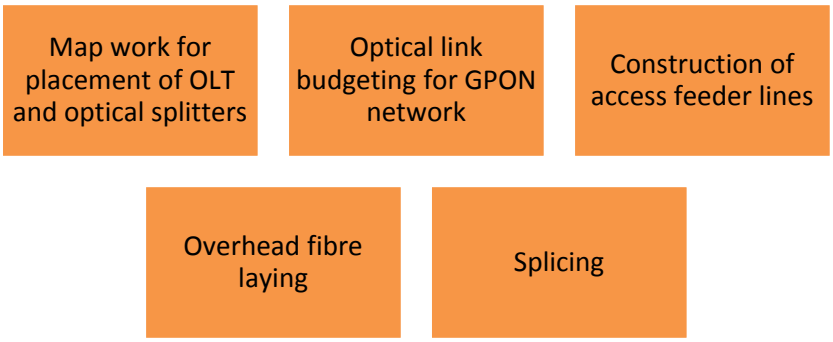


Fig 2.3.8: Steps to implement a GPON OSP

2.3.3 Placement of OLT and Optical Splitters

The first step is to map work for placement of OLT and optical splitters and the procedure is given in the following:

- It is important to get the area map when implementation of GPON is needed. For instance, if the area with 2000 homes need to be covered. On the map the number of household on each building is marked out to get the actual number of home passes.
- The entire area is divided into 8 parts so that each is catered by one port of the OLT. Based on the suitability to make a junction point the S1 splitter is placed in the area served by each of the OLT port and under the splitter S1 for each area there will be 2 number of S2 splitters and 2 number of S3 splitters under each S2 splitters. Total splits 1:64. These should be marked suitably as shown in the following figure:

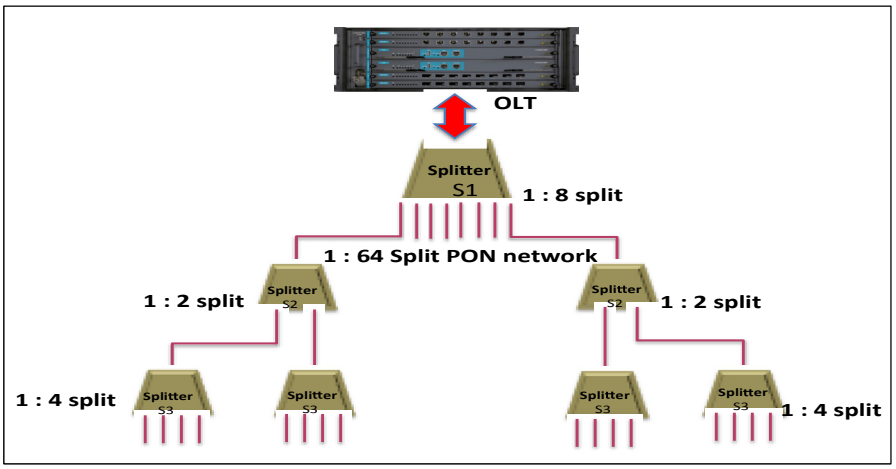


Fig 2.3.9: Design of the placement of the splitter and OLT

2.3.4 Optical Link Budgeting for GPON Network

The OLT and the ONU each contains on transmitter and receiver. The transmitter used at both OLT and ONU are of comparable power levels. The Receiving power levels sensitivity may be different at the OLT and ONU. The Receiver sensitivity is the minimum power required by the receiver to perform satisfactorily. For practical purposes following the ONU power levels will ensure proper network operations. A typical power level configuration as given in the following table:

	Tx Power	Rx Sensitivity
ONU / ONT (Optical Network Unit – CPE device)	0 dBm	-26 dBm
OLT (Optical Line termination equipment)	1 dBm	-30 dBm

Fig 2.3.10: Figure level configuration

Link Budget Calculation

Total Power Budget available = Tx Power of OLT – Receiver Sensitivity of ONT

= 1 – (- 26) = 27 dB

Working Limit of Power Budget = Budget Available – Design Margin
Let the Design margin = 3 dB
Working Budget = 27 dB – 3 dB = 24 dB
Assuming Splitter Loss - S1 (for Splitter 1:2) = 3.5 dB;
S2 (for Splitter 1:4) = 6.5 dB; and
S3(for Splitter 1:8) =12.5 dB
Total Splitter Loss = S1 + S2 + S3 = 22.5 dB
Maximum OFC Loss = Working Budget – Total Splitter Loss
= 24 dB – 22.5 dB = 1.5 dB
Maximum Span of OFC (including all spans of S1, S2, S3) = 1.5 / 0.35 = 4.2 km

2.3.5 Construction of Access Feeder Lines

The OLT is connected to all passive optical splitters S1, S2 and S3 by OFC. The OFC cable feeder lines can be either underground or overhead. Most commonly used methods for underground OFC cabling are open trenching and horizontal directional drilling (HDD). Optical Fibre Cables should be pulled through HDPE pipes of outer diameter of 50mm, 40 mm or 32 mm.

Open Trenching

OFC is laid through HDPE pipes, in the trench, at around 1.5-meters depth, measured from top of the pipe. Considering the pipe's diameter and provisions of soft soil below the pipe, it is desirable for the trench to be dug to depth more than 1.60 meters. The cables can be laid at a low depth, in case of obstructions.

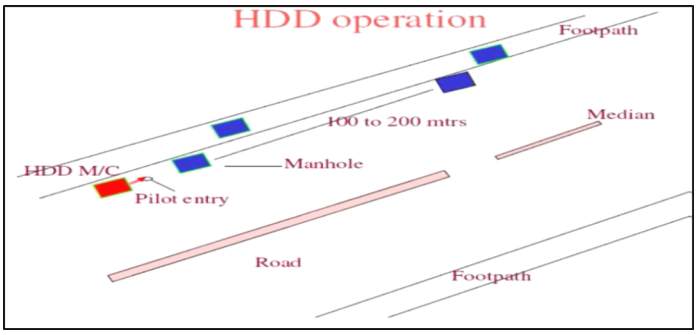


Fig 2.3.11: Open trenching (a)

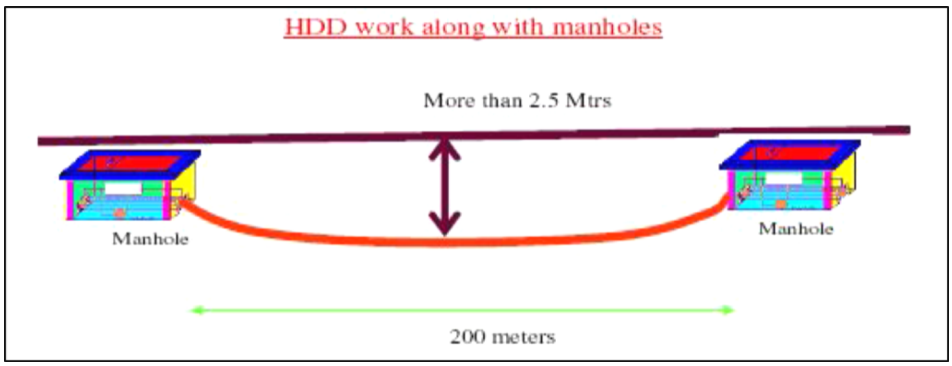


Fig 2.3.11 Open trenching (b)

Typically, the depth of the drilled portion requires to be more than 250 cm. It may be required to dig required to a 10-meters distance, from the leading edge of the proposed manhole, to achieve the required depth. The manhole, opened for the entry and exit pit, needs to be at least of 1.5 x 1.5 x 1.7 meters. Before starting the drilling process, both entry and exit pits are opened.

2.3.6 Overhead Fibre laying

The fibre cables, noticed hanging on the poles (electrical, telephone or private grouted), are known as aerial fibre cables, used widely for OSP installation on poles. Aerial fibre cables are created to prevent from natural destructions and to avoid damages. There are many types of aerial fibre optic cable. The guidelines followed before installation of aerial cable is listed in the following figure:

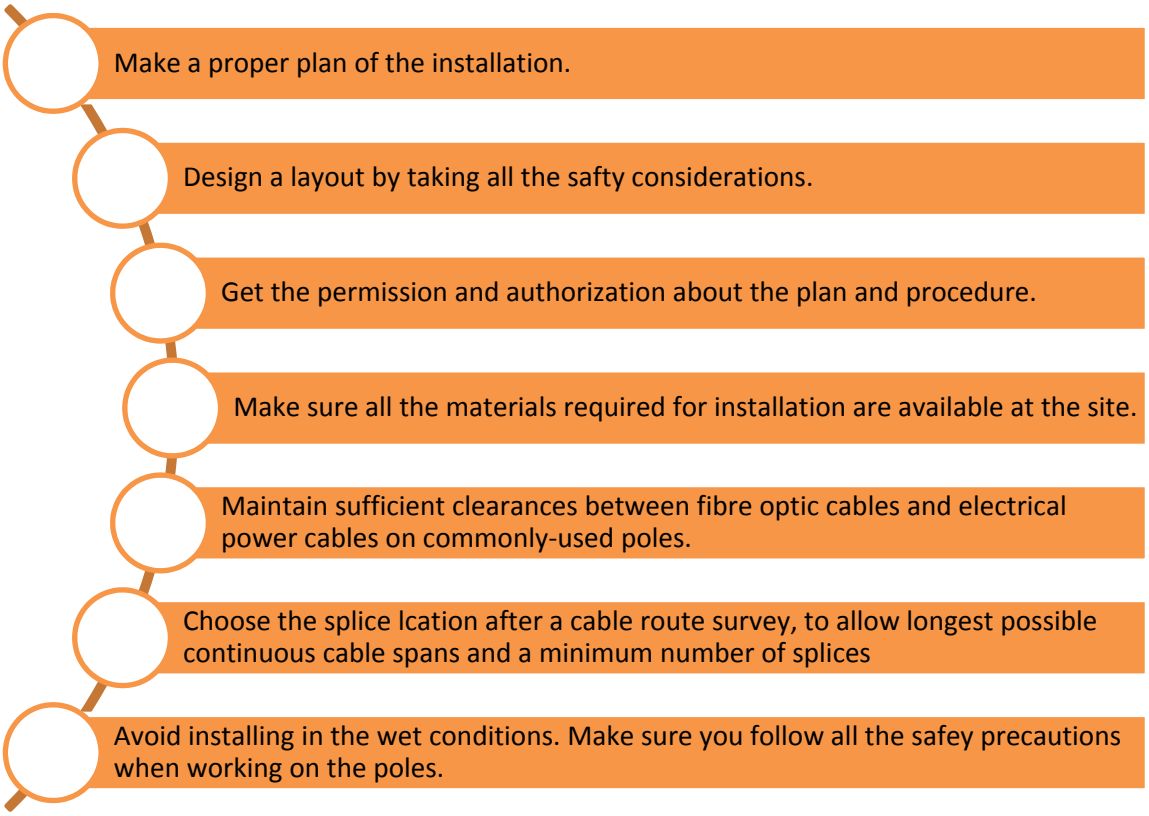


Fig 2.3.12: Prerequisites for aerial cable installation

Installation of Aerial Fibre

Aerial cable installation can be seen in most of the areas, where cables are installed on utility poles like Telephone, Electricity or private grouted poles. This method is easier, faster and cost effective when compare to underground installation. But these cables are subject to continual tension due to changes in temperature, weather condition and other man made disturbances. Fibre cables may not have enough strength to allow direct aerial installation but with the use of some methods and special cable, it can be possible for aerial cable installation.

The procedure used in aerial cable installation is given in the following figure:

Lash a regular OSP fibre 12/24 core cable to a messenger. Messange cable selected to give strength to support fibre optic cable over poles and clamps.

Take messanger cable and tie it to both end using clamp or by putting knots on the utility poles. Use hangers to hold the OSP of cable in regular intervals on the messange wire.

Unwind the fibre cable from the drum and insert one end through the hanger hole and pull it using pully. Hanger hooks can be replaced by using the clipping wire and tying with the cable and messenger.

Pull the optical fibre cable onto temporary support rings and lashed, or alternately, laid along the ground under the messenger and an aerial guide in front of the lasher used to position the cable next to the messenger for lashing.

Support the cable is by clamping to the strength member of the cable in a manner similar to installing a messenger strand.

All dielectric self-supporting (ADSS) cables suitable for Aerial installation that are designed with more strength members and a thicker jacket to have adequate strength to withstand the rigors of aerial installation when installed with special hardware designed to grip the cable on the jacket properly without causing damage to the cable over long term high tension loading.

Use Helix to support the Fibre and provide strength at road turning. Bending radius by the manufacturer requires to be followed. Max allowable bend is 10x circumference of the cable.

Fig 2.3.13: Installation of Aerial fibre

The following figure show the aerial fibre cable:

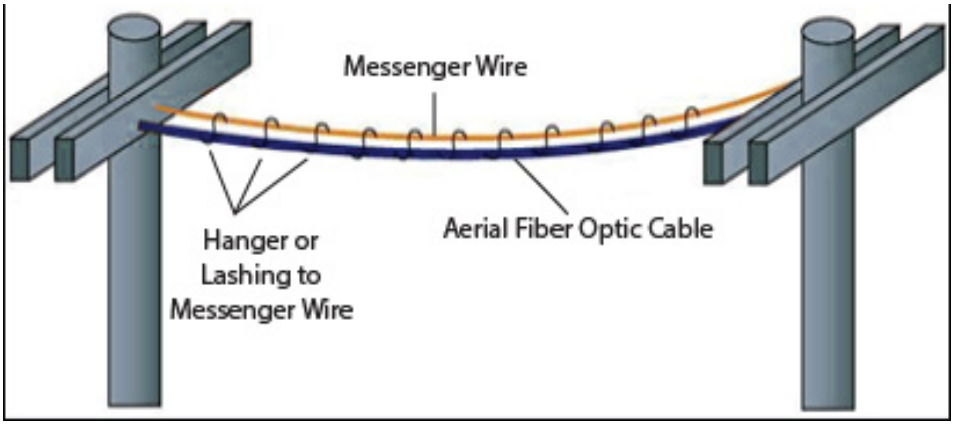


Fig 2.3.14.: Aerial fibre cable laying on poles

General Precautions

The following precautions always apply when handing fibre optic cable.

- Never exceed the cable's stated maximum pulling tension.
- Never exceed the cable's stated minimum bending radius.
- Never exceed the cable's maximum crush load.
- Never set a cable reel on a flange side (to prevent cable crossings during payoff)
- Adhere to local personnel safety practices.
- Do review and follow equipment safety practices.
- Apply caps over free cable ends to prevent water intrusion.

Additional general safety precautions exist when working with overhead facilities or in areas of traffic congestion are listed in the following:

- When working with overhead conductors and facilities, ensure that all personnel are aware and trained on the applicable safety requirements. Occupational Safety and Health Act (OSHA) and the National Electric Safety Code (NESC) guidelines can be followed.
- Ensure cables are properly grounded during installation in overhead facilities near power lines. Fibre cables with metallic components can accumulate an electric potential when near power lines.
- Proper safety cones and traffic control devices should always be used. The project manager should coordinate his work with local traffic officials. Safety zones utilizing traffic signs and cones should be placed at all working locations.

2.3.7 Splicing

Splicing is a process of connecting two fibre cables permanently. Sometimes semi-permanent splicing is known as termination or connectorization. Splicing produce less light loss and back refection.

Significance of Splicing

Significance of splicing are listed in the following figure:

- It joins two broken fibres.
- It connects some of the cores straight through a patch cabinet.
- It extend the cable run.
- Fusion splicing has less loss when two cables joined together.
- It attaches a pre-terminated pigtail.

Fig 2.3.15: Significance of splicing

Pre-Requisites of Splicing

Before starting the splicing, a DCT should:

- Find the splicing position and location.
- Check whether mechanical or fusion splicing is needed depending on the cable that you're working on.
- Make sure all the tools required for splicing is available.
- Also check the tools and equipment that is needed for splicing.
- Make sure that battery is charged for splicing.
- Have design of splicing and ROW letter copy if the fibre is laid overhead.

Types of Splicing

There are major two types of splicing as following:

1. Mechanical splicing
2. Fusion splicing

Mechanical Splicing

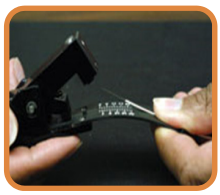
This type of splicing is used for as temporarily joining two ends of optical fibres together. It does not require any specialized training. Commonly it is performed when the fast restoration of fibre cut is needed. The following image shows the mechanical splicing of fibre:

Fig 2.3.16: Mechanical splicing

Two fibre optics cables are precisely aligned together with the use of alignment device and index matching gel of a similar RF index, covering the possible air gaps and allowing the light travel from one fibre to another with least loss of reflection. Mechanical splicing procedure is given in the following figure:

Step 1

- Strip back fibre buffer and coating 1.5 inches from the fibre tip. Clean stripped fibre with Isopropyl Alcohol and Lint-Free Wipe.



Step 2

- Cleave fibre to 14mm in length. Clean the cleaved fibre with Isopropyl Alcohol and Lint-Free Wipe.e

Step 3

- Insert first fibre tip mid way into the v-groove of the splice core. Insert the second fibre tip into the splice core until it butts up against the first fibre.

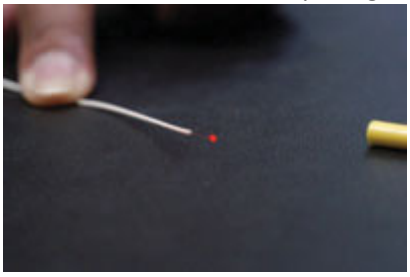
Step 4

- In the last, lay the splice core with the joined fibres into the bottom shell of the splice housing. Snap the top shell onto the bottom shell to complete the assembly. If you wish to make this a permanent splice, place a drop of quick curing adhesive into each epoxy hole in the top shell of the splice.

Fig 2.3.17: Mechanical splicing procedure

Testing the Mechanical Splicing

To test the splicing visual fault locator (VFL) is used. Light from the VFL is applied on the fibres and if the fibre is illuminating then it means that two fibre ends are mated properly. This is because light from the VFL is injected into the fibres and insert the cleaved end mid-way through the splice core. It causes the fibre to illuminate. The following image shows the testing procedure of mechanical splicing:



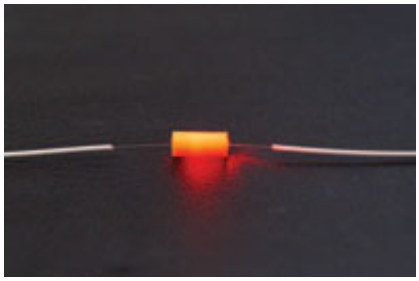


Fig 2.3.18: Mechanical splicing testing

Fusion Splicing

Fusion splicing is the process of connecting two optical fibres to make the continuous optical path maintaining the lowest optical loss. Fibres are connected with the use of several electrical arcs, by cleaning the fibres first and then heating their surfaces. The fibres are pushed together after being heated, to create a continuous optical path. The following figure shows the concept of fusion splicing:

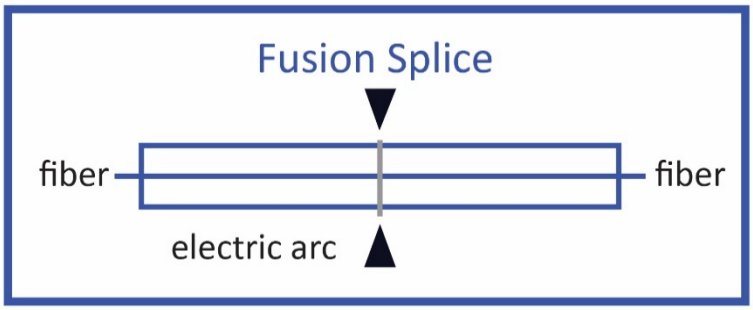


Fig 2.3.19: Fusion splicing

Requirement of Tools and Testers

Tools and testers required for the fusion splicing are listed in the following table:

Sl no.	Tools/Eqpt name	Specification	Qty	Remarks
1	Fusion Splicing Machine	Fujikura 60S	1	
2	Precision Cleaver		1	
3	Round Cutter		1	
4	Fibre stripper		1	
5	Long nose plier		1	
6	Screw Driver		1	Set of + and -
7	Fibre nipper		1	
8	Heat shrink tube protector		-	As required
9	Lint free tissue paper		-	As required
10	Isopropyl (IP)		1	Bottle
11	Fibre disposable container		1	
12	Eye protector	Glass	1	
13	Working mat		1	

Fig 2.3.20: Fusion splicing requirements

Procedure of Fusion Splicing

The steps for the fusion splicing are as follows:

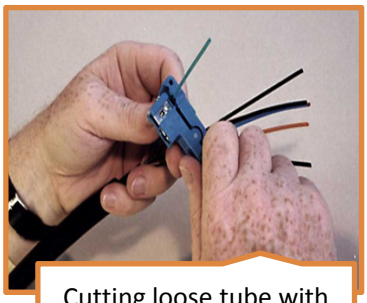
Step 1: Preparation for Splicing

The first step in fusion splicing is to prepare the fibre by stripping the protective coating and then making the bare fibre to show. Then the cleaning of fibre is done.

The following image shows the preparation of splicing:

Stripping Outer sheath with round stripper

Stripping jacket with jacket ripper



Cutting loose tube with tube cutter

Fig 2.3.21: Splicing preparation

Step 2: Cleave the fibre

Using a good fibre cleaver is important for the fusion splice. The cleaved end must be mirror-smooth and perpendicular to the fibre axis to obtain a proper splice. The following image shows the procedure of cleaving of fibre:

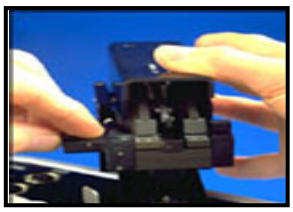


Fig 2.3.22: Cleave the fibre

Step 3: Fuse the Fibre

Two steps are done in this process which are listed in the following:

1. Alignment – It is automatic or manual procedure depending on the fibre that needs for splicing. The accurate alignment depends upon the tool quality.
2. Heating – It is done after alignment. The electrical arc is used to melt the fibres and attached permanently together.

The alignment process of fibre is shown in the following figure:

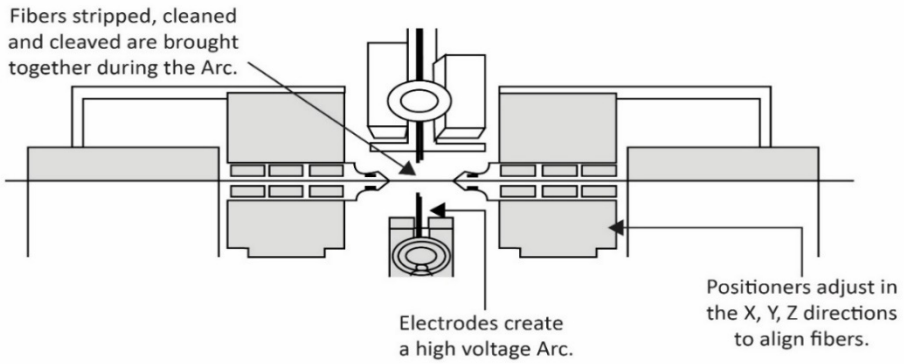


Fig 2.3.23: Alignment of two Fibre cables on a machine for splicing

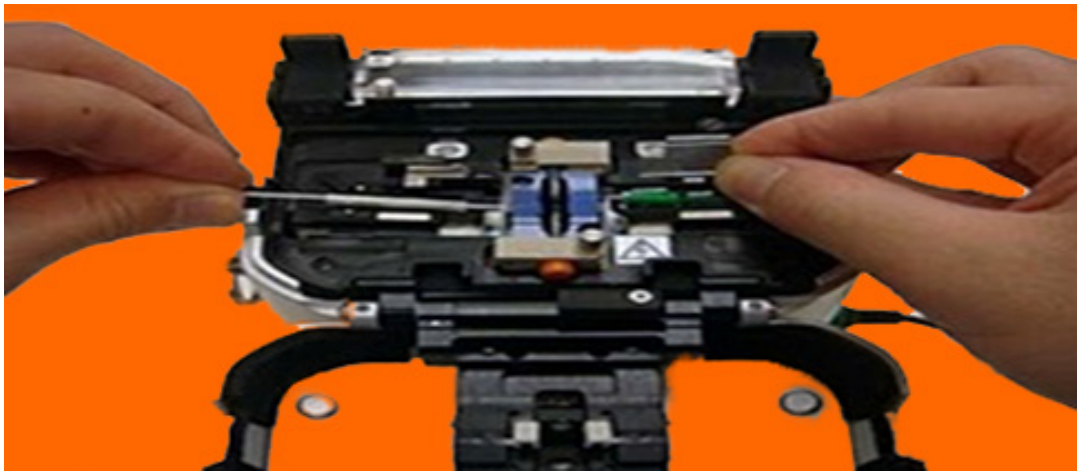


Fig 2.3.24: Method of Fusion splicing

Step 4: Protect fibre

It is a process of protecting the fibre from bending and tensile forces. This helps to avoid breakage during handling. Fused fibre can hold up to 0.5 to 1.5lbs but still we need protection. It is done with the use of heat shrink tubing, silicone gel. In some cases, mechanical crimp protectors are used.

Once the splicing is done then clean and smooth fibre end display observed in the splicing machine screen making the total fusion splicing loss should be better than 0.1 dB.

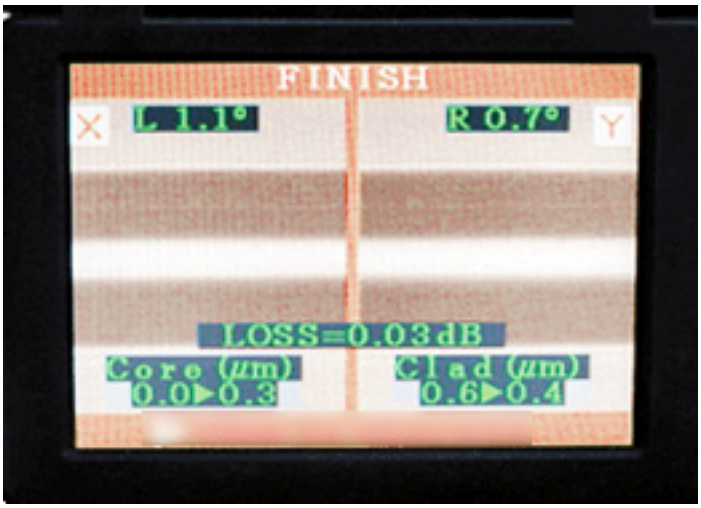


Fig 2.3.25: Showing splice loss

Exercise

Write the following in 50-100 words.

1. What are the components of OSP.

2. Write two main step involved in GPON network OSP design and implementation.

3. Write about open trenching.

4. Write about overhead fibre laying.

5. Define splicing.

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3. Testing and Troubleshooting Procedure

Unit 3.1: Testing of Access Network

Unit 3.2: Troubleshooting and Fault Analysis of Access Network

Key Learning Outcomes

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

1. List testing procedure
2. List the troubleshooting procedures
3. Explain the troubleshooting cases
4. Identify the common problems

UNIT 3.1: Testing of Access Network

Unit Objectives

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

1. List the testing parameters
2. Define optical splitter losses
3. Explain fibre optic measurement
4. Explain measurement of power at end point using source and OPM
5. List the Optical time-domain reflectometer (OTDR) trace procedure
6. Define loss measurement using an OTDR During PON installation

3.1.1 Testing of Fibre Network Parameters

A DCT should have the right tools and test equipment for testing the access network. The following figure lists the tools and equipment required for testing:

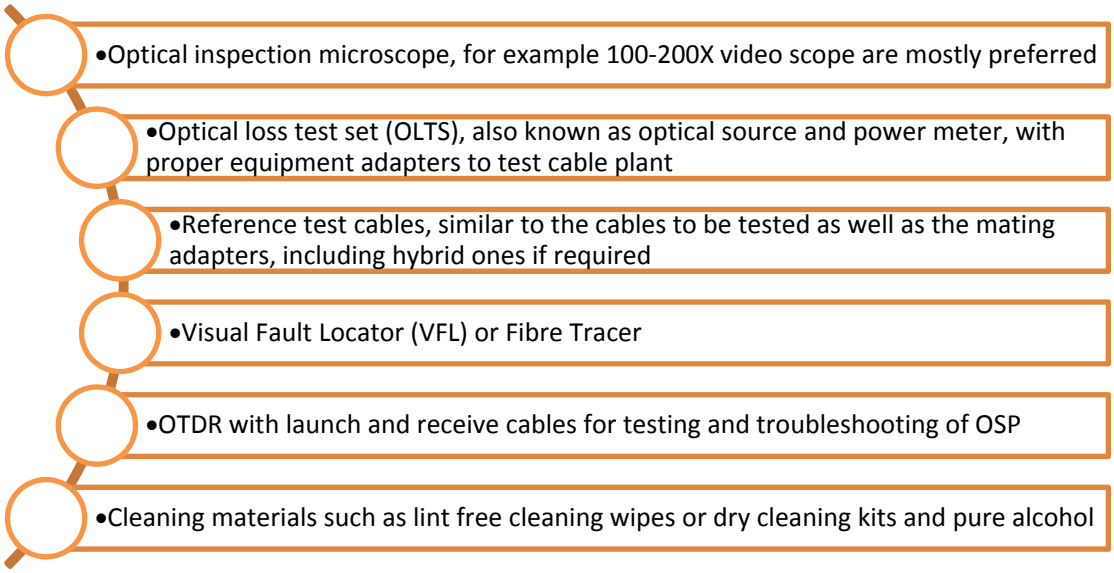


Fig 3.1.1: Tools and equipment required for testing

The following table lists the fibre optic testing requirements:

Test Parameter	Required Instrument
Optical Power level (At source output) and Receiver Signal Level	Optical Power Meter
Source Wavelength and Spectral WiDCT	Optical Spectrum Analyzer
Backscatter for Loss, Length and Fault Location	OTDR
Attenuation or Loss of Fibres, Cables & Connectors (Insertion Loss)	Optical Power Meter and Laser Source or OLTS
Bandwidth / Dispersion (SM: Chromatic and Polarization Mode MM: Modal and Chromatic,)	Dedicated Bandwidth Testers

Reflectance	OTDR, Optical Continuous Wave Reflectometer (OCWR)
Fault Location finding	Visual Cable Fault Locator

Fig 3.1.2: Testing parameters and required instruments

Optical Splitter Losses

Standard loss curve of splitter with various ratios is given in the following table:

Loss Type		Qty.	Avg. loss dB	Total average loss (DB)					
				S 1:64	S 1:32	S 1:16	S 1:8	S 1:4	S 1:2
Fibre cable (Kms)		20	0.36	7.2	7.2	7.2	7.2	7.2	7.2
Adapter (Pc)		7	0.2	1.4	1.4	1.4	1.4	1.4	1.4
Connector loss		1	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Extra loss (dB)		1	1	1	1	1	1	1	1
Passive optical splitter (pc)	S 1:64	1	19.7	**19.7**					
	S 1:32	1	16.5		**16.5**				
	S 1:16	1	13.5			**13.5**			
	S 1:8	1	10.5				**10.5**		
	S 1:4	1	7.2					**7.2**	
	S 1:2	1	3.2						**3.2**
Total loss in (dB)				**29.7**	**26.5**	**23.5**	**20.5**	**17.2**	**13.2**

Fig 3.1.3: Optical splitter loss

1× N (single-input) and 2 × N Dual input PLC splitters loss

Single input (1xN) PLc splitter loss				Dual input (2xN) PLc splitter loss			
Split Ratio	Insertion loss dB Max	Uniformity dB max	Return loss dB min	Split Ratio	Insertion loss dB Max	Uniformity dB max	Return loss dB min
S 1:2	3.2	0.3	50	S 2:2	4.2	1.1	50
S 1:4	7.2	0.5	50	S 2:4	7.7	1.2	50
S 1:8	10.5	0.8	50	S 2:8	11	1.6	50
S 1:16	13.5	1	50	S 2:16	14.6	2.4	50
S 1:32	16.5	1.3	50	S 2:32	17.8	3	50
S 1:64	19.7	2	50	S 2:64	21.5	3.7	50
S 1:128	23.6	2.7	50	S 2:128	25.1	4	50

Fig 3.1.4: PLC splitter loss

3.1.2 Documentation

Documentation is the important process when your testing the network. Ensure that the preparation of cable layouts for every Fibre to be tested has a loss budget so that the end value we are looking for is known. The DCT should create a spreadsheet mentioning all the cables and Fibres before entering the field and should take a printout of the spreadsheet for comparing test result against the plotted Fibre.

3.1.3 Measuring Optical Power

Basic fibre optic measurement is required for measuring the optical power at the end of a Fibre. It helps know about the power loss and the power presented at a receiver or power from a source. Generally, transmitters and receivers have receptacles for Fibre optic connectors. To measure the power:

- Of a transmitter, a test cable is attached to the source and the power at the other end is measured
- Of a receiver, the cable attached to the receiver receptacle is disconnected and the output is measured using a meter

The following figure shows the measuring of optical power:

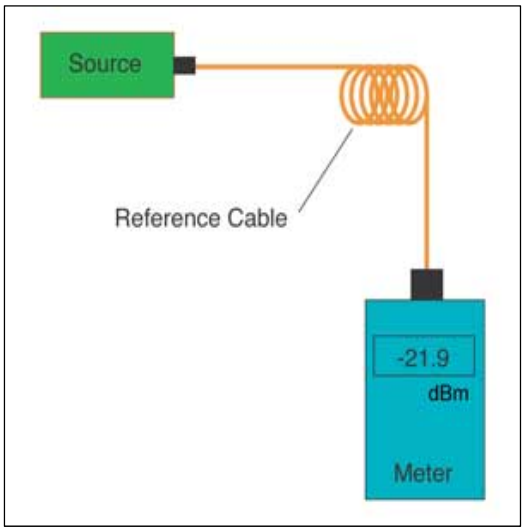


Fig 3.1.5: Fibre optic measurement

The following figure shows the measurement of power at end point using source and OPM:

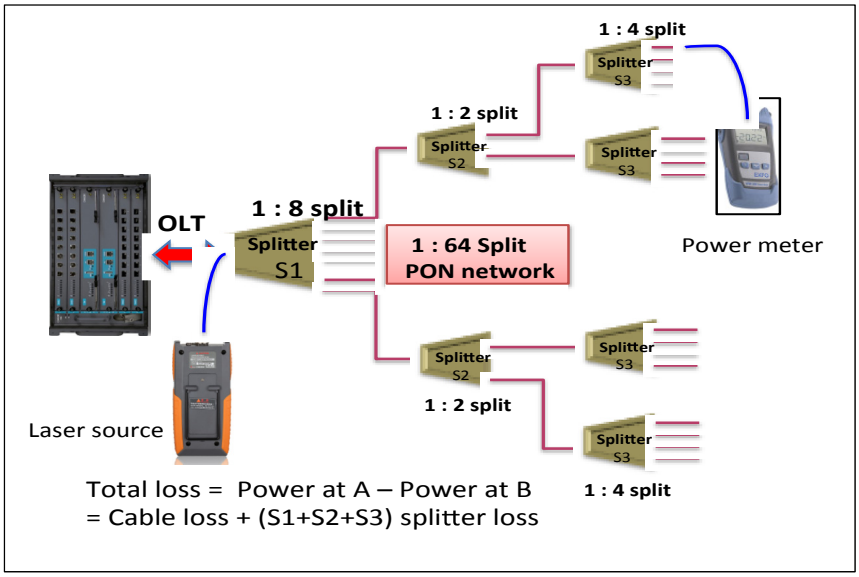


Fig 3.1.6: Measurement of power at end point using source and OPM

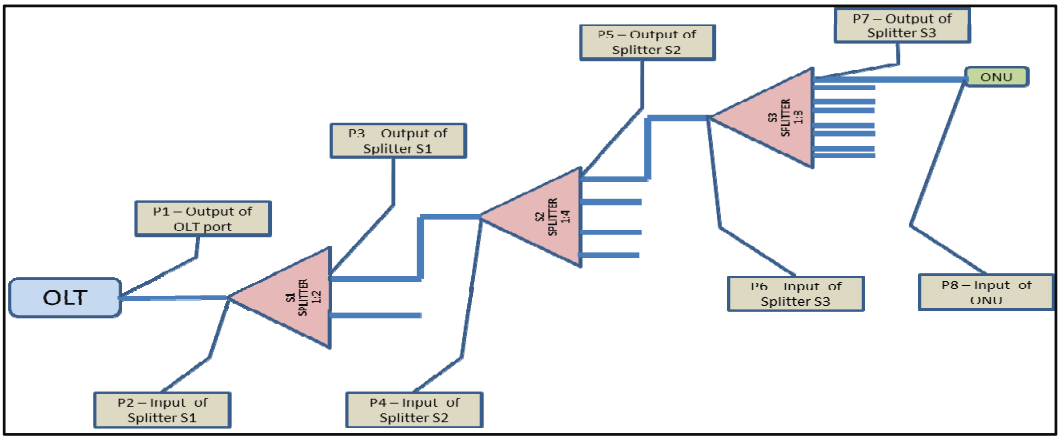
The following table shows the typical optical power levels of Fibre optic communication systems:

Network Type	Wavelength, nm	Power Range (dBm)
Datacom	650, 850, 1300	0 to -30 (1 to 100uW)
CATV, DWDM	1310, 1490, 1550	+20 to -6 (250 uW to 10mW)

Fig 3.1.7: Optical power levels typical of Fibre optic communication systems

3.1.4 Recording of Power level at Various Points of Network

All records for optical power at various points in the network should be recorded in the following format as given in the following figure:



OLT Port	P1– Power	P2– Power	P3- Power	P4- Power	P5- Power	P6- Power	P7 - Power	P8 - Power	Total Loss (dB)
Card 1: Port1									

Fig 3.1.8: Recording of power level at various points of network

A standard operating procedure should be made and the power levels should be checked after certain intervals.

1. In case the power received at the ONU varies by more than 3 dB, troubleshooting for the loss needs to be done.
2. In case the losses is due to particular splitter S1, S2 or S3 the corresponding splitter needs to be replaced.
3. In case of loss due to any particular section of OFC cable the same need to be replaced.
4. In case the OFC section is too long to replace a n OTDR should be used to locate the high loss point and subsequent restoration is to be carried out.

3.1.5 OTDR Trace Procedure

OTDR is mainly used for long distance Fibre health check. For preparing fibre cable to be tested, the DCT should do the following tasks:

- Strip the outer jackets, armour, and buffer tubes away from the cable, to one meter.
- Clean the Fibres inside the cable and organize them as per the industry standard colour code.
- Strip, clean and cleave the first test Fibre and insert it into other end of the mechanical splice in such a way that it lightly butts against the pigtail Fibre.

OTDR Setting up and Bare Fibre Testing

The procedure followed in setting up OTDR and bare fibre testing is given in the following figure:

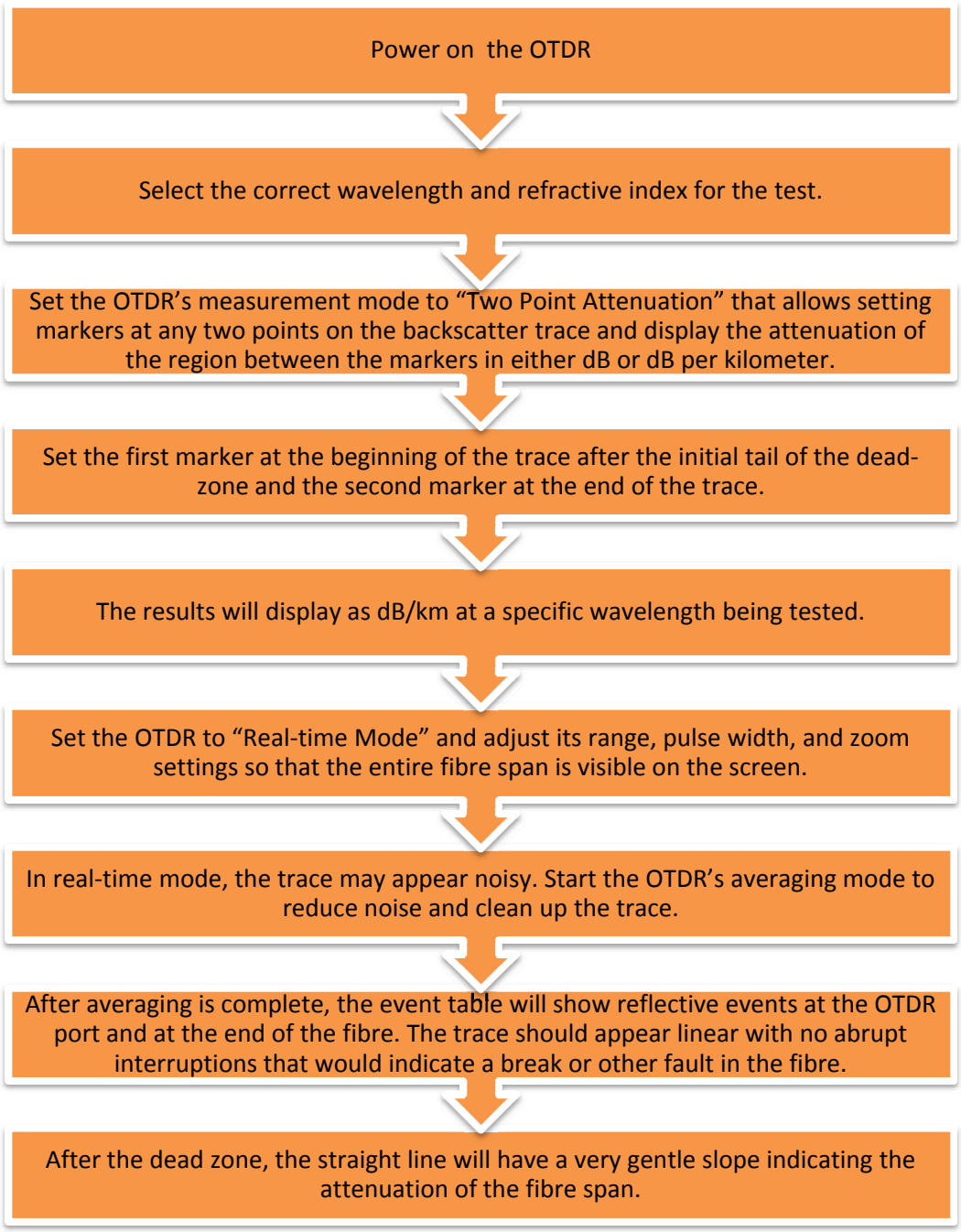


Fig 3.1.9: OTDR Setting up and Bare Fibre testing

Loss Measurement Using an OTDR During PON Installation

Cable section should It is important to ensure that each cable section meets or exceeds the cable specifications. This can best be accomplished by using an OTDR. A true diagnosis of the entire length of fibre is achieved. Unlike an OLTS, which characterizes the overall loss of an entire link using two instruments, an OTDR provides a detailed map of all of the section

losses, allowing users to locate and characterize every individual element in the link, including connectors, splices, splitters, couplers and faults.

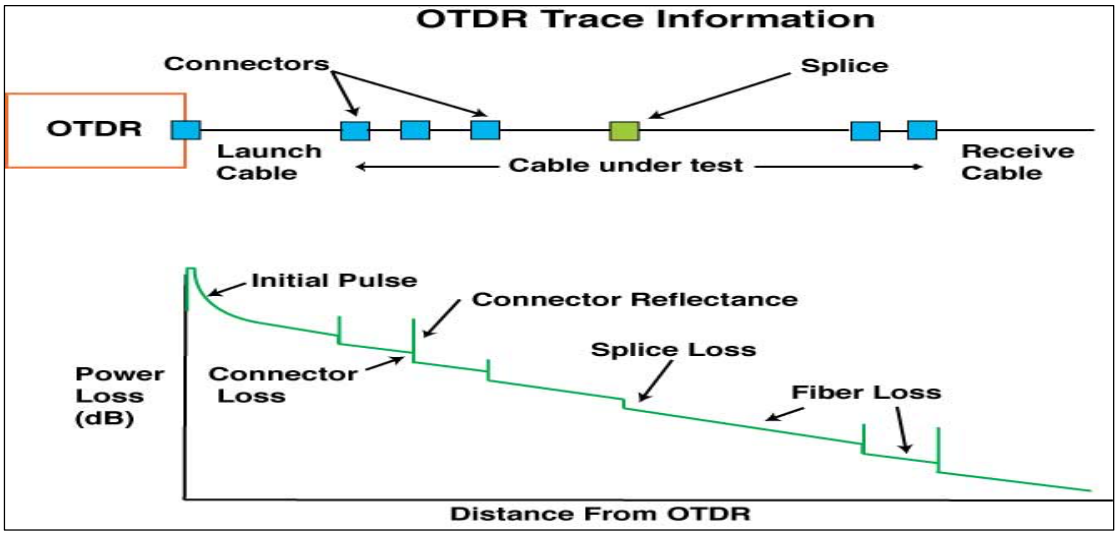


Fig 3.1.9: Optical trace analysis.

An OTDR operates by sending a high-power pulse of light down the Fibre and measuring the light reflected back. Every event in the link (i.e., each optical component and optical fault) causes a reflection or an optical loss, or both. Fibre ends and Fibre breaks, as well as connectors and other components, each reflect a small part of the pulse back to the OTDR. The OTDR uses the time it takes individual reflections to return to determine the distance of each event. The faults that can be detected by the OTDR include misalignments and mismatches, angular faults, dirt on connector ferrules, Fibre breaks and macrobends.

Optical Fibres uniformly backscatter a small portion of the light over their entire length. The OTDR measures this backscattered light to determine the attenuation of the Fibre. Sudden reductions in the level of backscattered light correspond to optical losses due to splices or other events.

For instance, the typical attenuation of the Fibres can be measured over the ranges of wavelengths used in the PON, typically:

• 0.33 dB/km at 1310 nm (0.35 dB/km for worst case)

• 0.21 dB/km at 1490 nm (0.27 dB/km for worst case)

• 0.19 dB/km at 1550 nm (0.25 dB/km for worst case)

Exercise

Multiple choice questions

1. What is the device used to measure the optical power level?
   a. Optical Power Meter
   b. OLTS
   c. VSL
   d. OTDR
2. What is the device used to measure attenuation or loss of fibres, cables and connectors?
   a. Optical Power Meter
   b. Optical Power Meter & Laser Source or OLTS
   c. OCWR
   d. VFL
3. What is the device used to measure the fault location and distance finding?
   a. OTDR
   b. Dedicated Bandwidth Testers
   c. VSL
   d. VFL
4. What is the device used to measure the reflectance?
   a. OTDR, OCWR
   b. OCWR, OVWR
   c. VFL, OTDR
   d. OLTS, OTS
5. What is the device used to measure the backscatter for loss, length and fault location?
   a. VFL
   b. Laser source
   c. OTDR
   d. OLTS

UNIT 3.2: Trouble shooting and fault analysis in Access Network

Unit Objectives

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

1. Explain fault analysis
2. List the troubleshooting cases
3. Explain GPON services troubleshooting procedure
4. Define trouble shooting in the RF Amplifier
5. Explain trouble shooting in the customer premises
6. Explain trouble shooting in the optical node

3.2.1 Troubleshooting, Fault Analysis

Point-to-Multipoint FTTH Network (PON) Topology.

Troubleshooting a point-to-multipoint FTTH network (also known as a PON network) differs significantly. As per following image, a PON network contains one OLT connected via a splitter to multiple optical network terminals ONTs (one for each subscriber, up to 64 subscribers). **PON Case 1:**

One customer in a particular area is not able to assess the service, where as other people in the same area are able to access it.

As a DCT you must think and check for the solution.

Common cause for this problem are listed below:

i. Fault in the distribution fibre between the customer and the closest splitter
ii. Fault in the Optical Terminal Network equipment
iii. Fault in the customer's home wiring

The above points are explained in detail in the following image:

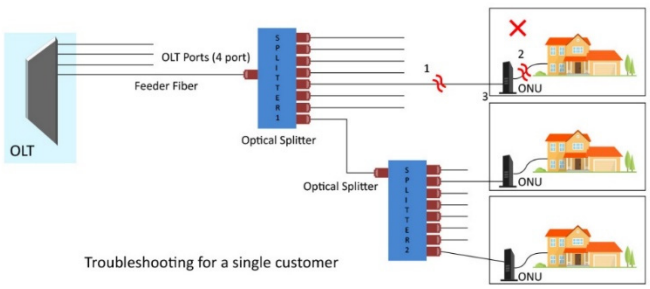


Fig 3.2.1 Example of case – 1

PON Case 2:

Customers connected to the same splitter facing problem in receiving service, but customer connected to same OLT are not facing problem. This problem can occur because of following causes:

i. Issue in last splitter
ii. Issue in the fibre link between the cascaded splitters
iii. Issue at the drop fibre

The above points are described in detail in the following picture:

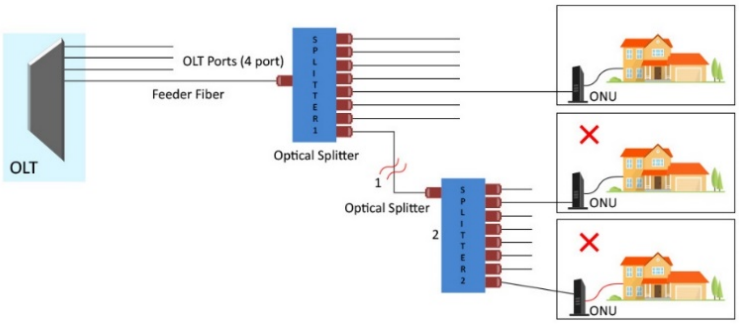


Fig 3.2.2 Example of case - 2

PON Case 3:

In this case all the customers are affected, no one is able to receive the service. In this case the possible causes for this solution are listed as below:

i. Issue with the splitter closest to the OLT
ii. Issue with the feeder fibre or cable of the fibre network
iii. Issue in the OLT equipment

The above points are described in detail in the following picture:

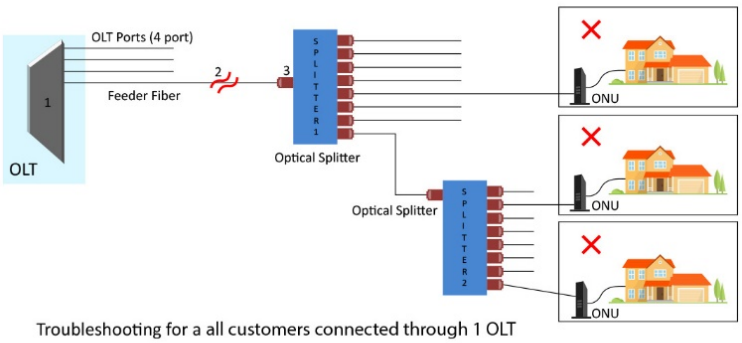


Fig 3.2.3 Example of case – 3

Other Variable:

Splices or Connectors at Strategic Places If connectors are available at the splitters, terminals, or drops, isolating part of the faulty network easier. Inspecting connectors and taking OTDR measurements using 1310/1550 nm wavelengths are often performed on network sections that are out of service. In-service testing (test on a network carrying traffic) is needed mostly when the entire network is spliced and when some but not all customers are affected.

3.2.2 Step by step Trouble shooting GPON services

Issue	Causes	Troubleshooting procedure
ONT issue and decreased optical level.	Damage or problem with connectors. High macro bends after last splitter.	At the end of the cable: Check the optical power using optical power meter. Check the connector terminals at the splitter output.
ONT not working and no optical power.	Fibre break at the last splitter.	Confirm on the optical power using OTDR. If no optical power at the drop terminal then drop the cable has fault. Hence change it.
ONT problem but optical power is normal.	Defective ONT	Replace the ONT once you find it as defective.
Some of ONT connected to the splitter are not working and optical power is low.	Defective or dirty macro bends at the splitter.	Check the optical power. Check the connectors. Check the macro bends. Inspect the power at the input.
All the ONT connected to splitter not working and no optical power.	Fibre break at the last splitter.	Test the fibre, ONT and splitter and replace it.
None of the ONTs are working and no optical power.	Break in feeder Fibre line Problem in the Central Office	Test the feeder Fibre with the help of OTDR from the CO or the Hub office. Measure the OLT output power. Masure the output power at WDM couple.

Increased BER.	Decreased power at ONT.	Inspect the cable, connectors and ONT.
Intermittent problem in the individual service.	ONT hardware issue.	Check the ONT and perform troubleshooting procedure.

Fig 3.2.4 Issues and causes

The following figure shows the overall GPON distribution network:

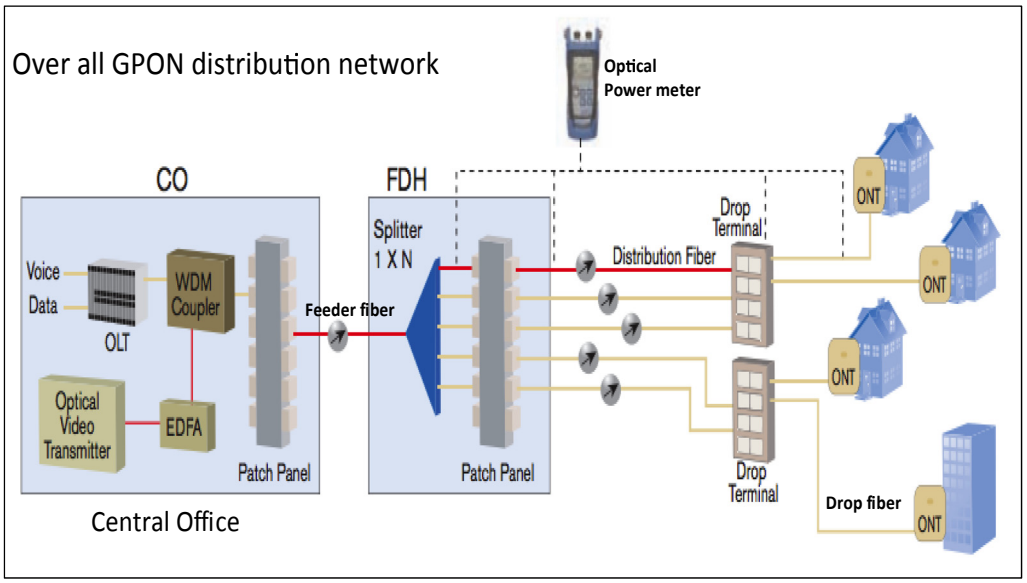


Fig 3.2.5: GPON Network

3.2.3 HFC Plant (OSP) Systematic Troubleshooting Procedures

HFC network cover three distinct areas wherefrom the problems arise. There are following three troubleshooting procedure that is done.

- Observation and measurement at the customer residence
- Observation and measurement at the upstream RF amplifier
- Observation and measurement at the upstream optical node

At the customer premises:

Usually customer raise a complaint in case of any issue. These complaints are converted into tickets or service request.

Most common/general complaints received are:

a) Issues related to TV or internet performance.
b) Signal quality issue

c) Loss of signal
d) Damage or any affect to the signal receiver
e) Interference issue

As a DCT you must understand these problems and response to the client on immediate basis.

For these complaints you should check the cable layout and its quality. These is the best solution for most of the problems that are listed above.

It is must to prepare and carry the spreadsheet of cables and fibre before you visit the customer place.

At the RF Amplifier:

If the technician is unable to restore the service at the customer premises, then the person should check the RF amplifier or node upstream of the customer's network.

When testing a network, a technician should be positioned at the next amplifier for forward path and another technician should be at the head end for testing reverse path.

Procedure:

The procedure involves steps as follows:

Step 1 – Physical Inspection:

Procedure followed in physical inspection is given in the following figure:

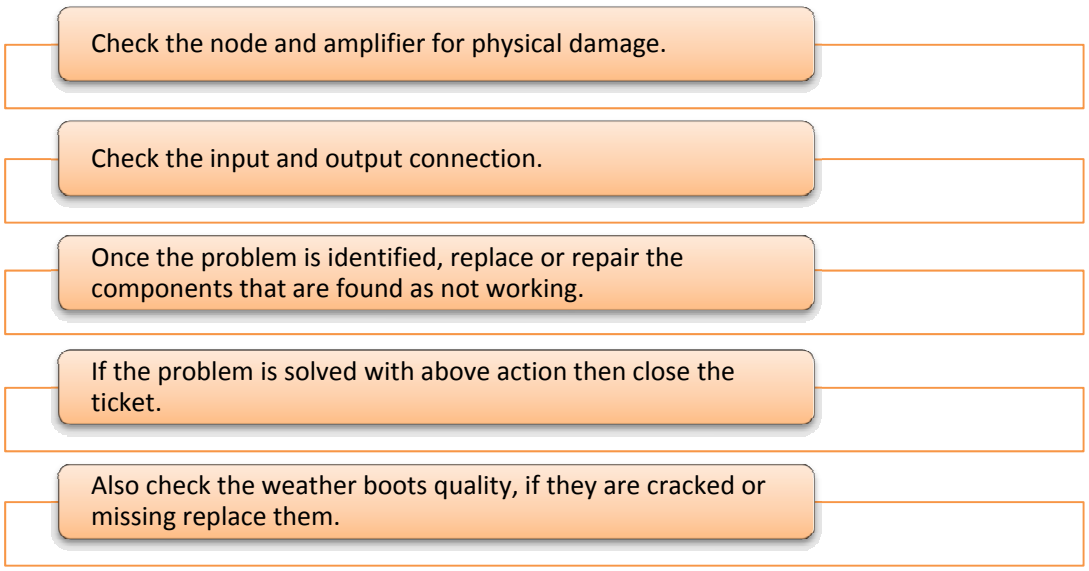


Fig 3.2.6: Physical inspection

Step 2 – External Connection Inspection:

Procedure followed in external connection inspection is given in the following image:

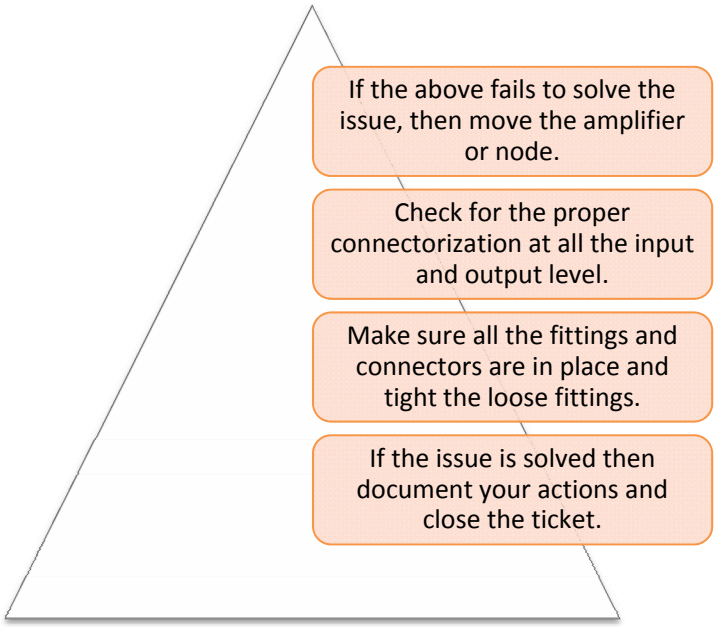


Fig 3.2.7 External connection inspection

Step 3 – Internal Connection Inspection:

Procedure followed in internal connection inspection is given in the following image:

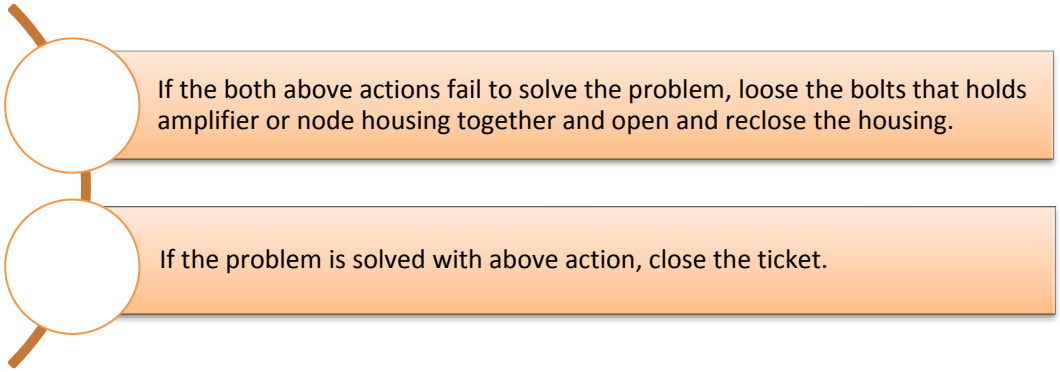


Fig 3.2.8: Internal connection inspection

Step 4 – Visual Inspection:

Procedure followed in visual inspection is given in the following image:

This process involves in careful visualization of the RF launcher for white residue which indicates water intrusion and excess heat.

Check for the red LED warnings which indicates the faults.

Open the amplifier and move the accessories and cable harness to restore oxidized connections.

If the issue is solved then document your actions and close the ticket. If problem still remains then check the node upstream.

Fig 3.2.9: Visual inspection

At the Optical Node:

The trouble shooting in the optical node procedure needs following steps:

1. Checking transmitter
2. Checking receiver
3. Checking plug-in pads

The above steps are discussed in detail in as follows:

1. **Checking Transmitter**

Procedure for checking the transmitter is given in the following image:

Open the upstream node and check whether power and laser LED is on at the customer network transmitter feeding portion.

If any light is off then check the AC and DC power supply voltages.

If there is any voltage problem correct it and restore the power.

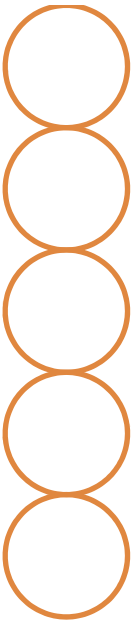
Check both power and laser LED is on.

If the problem is solved, document the procedure and close the ticket.

Fig 3.2.10: Checking transmitter

2. Checking Receiver

Procedure for checking the receiver is given in the following image:



Inspect the receiver which is fed by the customer portion of the network

Check both power and optic LED is on. If both are on then it indicates normal operation.

If any one or both LED are off, then check the power source, fibre bulkhead connector and fibre routing.

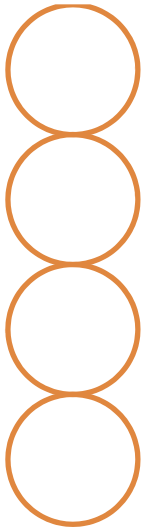
If there is any problem restore them and verify that both LEDs are on.

Once it is done, document the procedure and close the ticket if the issue solved.

Fig 3.2.11: Checking Receiver

3. Checking Plug-in-Pads

Procedure for checking the plug-in-pads is given in the following image:



If both LEDs in transmitter and receiver are on, but the function is abnormal then check the plug-in-pads.

Check if plug-in-pads in the transmitter and receiver is seated correctly.

In case any suspect remove and plug it again.

If the procedure restore the device, document the findings and close the ticket.

Fig 3.2.12: plug-in-pads

Exercise

Write the possible cause for the following problems:

One customer in a particular area is not able to assess the service, where as other people in the same area are able to access it.	
Customers connected to the same splitter facing problem in receiving service, but customer connected to same OLT are not facing problem.	
In this case all the customers are affected, no one is able to receive the service.	
ONT issue and decreased optical level.	
ONT not working and no optical power.	
None of the ONTs are working and no optical power.	
Intermittent problem in the individual service.	

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4. Safety at Work Place

Unit 4.1 – Safety equipment and procedure

Key Learning Outcomes

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

1. Identify the safety procedure
2. Explain safety at work place

UNIT 4.1: Safety Equipment and Procedure

Unit Objectives

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

1. Identify safety precautions and safety needs
2. Explain safe working practices
3. Identify the personal protective equipment
4. Identify how to ensure site, mechanical and electrical safety

4.1.1 Safety Precautions

As a DCT you will be working in the outdoor locations and cables in which safety is very important. The most common problems occur when working at the heights and with fibres. Because fibres can get into the eyes and can cause harmful effects. Fibres are commonly caused at the time of splicing and termination which are very sharp and can cause harmful effect to the skin as well as to the eyes. So, as a DCT you must follow following precautions while working on the field:

- When working with the fibres make sure you work on the black surface which helps to find the fibre residues easily.
- Wear safety clothing which cannot observe the fibre particles and can be disposed easily.
- Do not eat in the customer location.
- Wear the safety glasses to protect your eyes.
- Wear helmet while working in the heights.
- Do not look at the end of any active fibre cables.
- Always make sure that no light is available at the end when using OPM.
- When checking the fibre splicing do not lean on the fibre that needs to be tested. Always look at the fibre at 6 inch distance.
- Work in the ventilated areas.
- If you're using contact lens do not touch it while working. Also do not touch eyes while working.
- Wash your hands properly before eating or touching the eyes.
- Make sure you dispose the fibres with care.
- Clean the area after your work is finished.
- Never smoke while working.
- Do not keep flammable objects while doing splicing. Because high voltage can cause fire.

4.1.2 Safety Needs

Safety plays major role in every digital cable technician role. As DCT, you must carry following things to maintain safety:

Ladder with support

- This is used for laying of cable, fault finding of overhead network

Safety belt

- Personal safety while workin on height

Safety Glass

- Used for safety of eyes while working on Optical fibre splicing

Safety Gloves

- Used by the Installer while working on Electrical pole or electrical system

Rope sole shoes

- To be used by the Installer while working on Electrical poles and specially on wet condition.

Safety Helmet

- Used for the safety of the Head in case of any injury received.

Fig 4.1.1: Safety needs

Tips

Following are the recommended tips:

- Use double sided tapes to remove broken or stray pieces of fibre.
- Use labelled and tightly sealed containers for disposal
- Use protective clothing
- Do not smoke in areas where splicing is happening

4.1.3 Adherence to Safe Working Practices

Safety procedures and measures are dependent on the type of work. There may be a need for electrical safety, fire safety or mechanical safety for a DCT.

The following figure lists the general measures an employee should be aware of to ensure safety:

Daily Safety Instructions

- Take safety measures to prevent accidents.
- Ensure zero accidents while at work.
- Avoid damaging components due to negligence in electrostatic discharge (ESD) procedure.
- Ensure no loss for company due to safety negligence.
- Ensure proper maintainance of machine and work process for achieving quality output as per the company standards.

Before Starting Work

- Plan and discuss requirement of work to be done.
- Consider potential hazards and measures to be taken.
- Confirm permission to isolate (use a permit system if relevant).
- Isolate the electrical equipment or circuit.
- Place a "DANGER, DO NOT OPERATE" tag.
- Put up safety barriers when required.
- Use the correct earthing equipment.
- Cover and insulate a nearby live apparatus.
- Check test instruments and get authorization to do the work.

When Working

- Use safety observers when required.
- Always wear PPE.
- Never rely on memory.
- Connect the earth and neutral conductors first.
- Check the isolation points before resuming work after a break.
- Check and clean the tools that are used regularly.
- Use non-conducting tape measures.

After Completion of Work

- Check if tools are left after work completion.
- Remove own earthing equipment.
- Notify all personnel involved that the equipment will be energized.
- Hand in the work permit (if relevant).
- Remove "DANGER, DO NOT OPERATE" tags.
- Switch off all machineries.
- Remove and store all PPE properly.

Fig. 4.1.2: General safety measures for an employee

4.1.4 Personal Protective Equipment (PPE)

PPE are essential to avoid any electrical, heat or physical hazard. A PPE product may not eliminate a particular hazard from occurring but it avoids an employee from being exposed to it.

PPE are specially made to protect workers from the following:

- Injuries caused by impacts of electricity
- Electrical hazards
- Heat and chemicals

- Other occupational safety hazards

The following figure lists the components of PPE:

Fig. 4.1.3: Components of PPE

PPE also include the following items:

- Buttoned to neck, cuff-less (without folds) shirts
- Trousers
- Reinforced footwear
- Cap and shoulder covers

Protective clothes refer to clothing designed specially to protect workers from potential hazards. Lab coats and ballistic vests worn by scientists and law enforcement officials

respectively also fall under this category. The different items of the PPE can either be worn individually or in complete sets.

The following image lists the PPE used at a workplace:

Fig. 4.1.4: PPE at a workplace

4.1.5 Precautions to Health and Safety Hazards Site Safety

The digital cable technician should make a site safety plan and abide by certain guidelines to ensure jobsite safety as shown in the following figure:

Ensure that the workplace is not messy to avoid the possibility of tripping over.

Take necessary precautionary measure if the workplace is a sloped roof with clutter, as the possibility of falling off the roof significantly increases.

Ensure that the tools are kept in their proper places to avoid any injuries.

Use sunscreen, stay well-hydrated and wear light-colored clothes on bright sunny days while working on a roof top. The chances of sunburn and heat exhaustion increases in such a case.

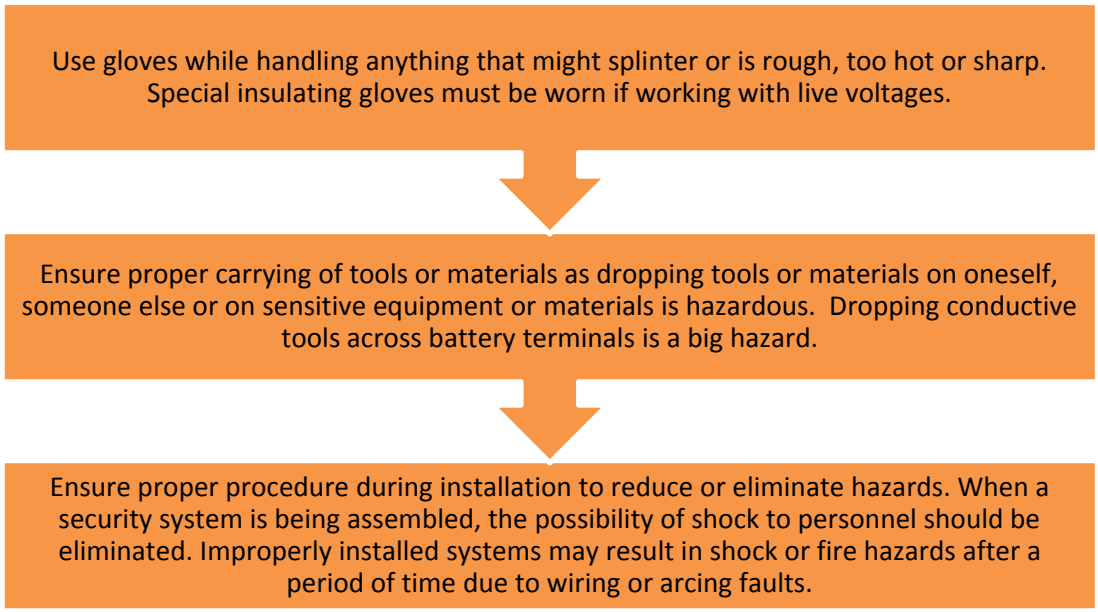

Fig. 4.1.5: Ensuring site safety

While working at a height, the technician should take proper measures such as guardrails, safety harness and fall arrestors to reduce the risk of a fall.

Mechanical Safety

During building and installation of the access network, mechanical safety for the onsite working professional is the key point to be considered. The person should carry mechanical safety equipment, especially while installing security systems at heights. There may also be a few minor hazards which include burns or cuts from sharp tools.

Electrical Safety

One of the most potential causes of an accident may be an electric shock for working professionals on site. The precautions are of utmost importance when it comes to the job role of a digital cable technician.
To ensure electrical safety, the technician needs to check the points as shown in the following figure:

Fig. 4.1.6: Ensuring electric safety

Exercise

Choose the correct option:

1. To pick up broken or stray pieces of Fibre we must use:
   a. Tweezers
   b. Hands
   c. Double sided tape
   d. None of the above

2. While working in with fibre cable:
   a. We can smoke
   b. We can eat
   c. We should not carry an inflammable material or fire hazard
   d. All of the above

3. While working with Fibre optic we should use:
   a. Cotton gloves
   b. Leather gloves
   c. Leather gloves and protective eye-wear
   b. All of the above

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5. Soft Skills and Work Ethics

Unit 5.1 – Effective Communication and Coordination at Work

Unit 5.2 – Working Effectively and Maintaining Discipline at Work

Unit 5.3 – Maintaining Social Diversity at Work

ELE/N9905

Key Learning Outcomes

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

1. State the importance of work ethics and workplace etiquette
2. State the importance of effective communication and interpersonal skills
3. Explain ways to maintain discipline in the workplace
4. Discuss the common reasons for interpersonal conflict and ways of managing them effectively.

UNIT 5.1: Efffecte Communicacation aCoordinainati t Work

Unit Objectives

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

1. Work efffectely at the workplace.
2. Demonstrate practicesrelated to gender and PwD sensitazation.

5.1.1 Importance of Work Ethics and Workplace Etiquette

Workplace ethics are a set of moral and legal guidelines that organizations follow. These guidelines influence the way customers and employees interact with an organization. Workplace ethics essentially guide how an organization serves its clients and treats its employees.

For example, if a company seeks to fulfil the promises it makes, it may develop processes and set up a robust support system to address this policy and build customer/client loyalty. To achieve this goal, the company may implement specific incentive programs for employees to encourage them to produce high-quality work and ensure the organization fulfils the promises it makes to its clients/ customers.

Many organizations, often the large ones, set detailed ethical codes to guide their operations and control how the organizational processes impact the stakeholders. These ethics usually help organizations maintain certain standards of responsibility, accountability, professionalism and among others, as they navigate through different challenges and day-to-day circumstances. By following these guidelines, organizations often experience several benefits that improve the lives of stakeholders, such as customers, employees, leaders, etc.

Examples of Common Workplace Ethics

Fig. 5.1.1 Examples of Common Workplace Ethics

Workplace ethics are essential for a successful organization with a satisfied and loyal team. High ethical standards help in ensuring all stakeholders, such as customers, investors, employees, and other individuals involved in the workplace operations, feel the organization is safeguarding their interests. By creating and implementing ethical guidelines, organizations can keep the best interests of their employees in mind while maintaining a positive influence on those they impact through their processes.

As a result, employees maintain the organization's best interests by being ethical in their daily work duties. For example, fairly-treated employees of an organization who understand the organization's commitments to environmental sustainability are usually less likely to behave in a manner that causes harm to the environment. Thus, they help maintain a positive public image of the organization. It means that workplace ethics help in maintaining reciprocal relationships that benefit organizations at large and the individuals associated with and influenced by the organizational policies.

Benefits of Workplace Ethics

There are various benefits of implementing workplace ethics. When organizations hold themselves to high ethical standards, leaders, stakeholders, and the general public can experience significant improvements. Following are some of the key benefits of employing ethics in the workplace:

Fig. 5.1.2 Benefits of Workplace Ethics

5.1.2 Interpersonal Communication

Interpersonal communication is a process that involves sharing ideas and emotions with another person, both - verbally and non-verbally. It is essential to interact effectively with others in both personal and professional lives. In professional life or the workplace, strong interpersonal skills play a crucial role in achieving effective collaboration with colleagues.

Interpersonal Skills

Interpersonal skills, in other terms, are known as people skills, which are used to communicate and interact with others effectively. These are soft skills one uses to communicate with others and understand them. One uses these skills in daily life while interacting with people

Examples of Interpersonal Skills

Fig 5.1.3 Examples of Interpersonal Skills

Numerous interpersonal skills involve communication. Communication can be verbal, such as persuasion or tone of voice — or non-verbal, such as listening and body language.

Importance of Interpersonal Skills

Interpersonal skills are essential for communicating and collaborating with groups and individuals in both personal and professional life. People with strong interpersonal skills often are able to build good relationships and also tend to work well with others. Most people often enjoy working with co-workers who have good interpersonal skills.

Among other benefits of good interpersonal skills is the ability to solve problems and make the best decisions. One can use the ability to understand others and good interpersonal communication skills to find the best solution or make the best decisions in the interest of everyone involved. Strong interpersonal skills help individuals work well in teams and collaborate effectively. Usually, people who possess good interpersonal skills also tend to be good leaders, owing to their ability to communicate well with others and motivate the people around them.

Interpersonal communicationis the key to working in a team environment and working ccollectely to achieve shared goals. Following are the interperso

Verbal Communication

The ability to speak clearly, appropriately and confidently can help one communicate effectively with others. It is vital to select the appropriate vocabulary and tone for the target audience.

For example – one should speak formally and professionally in the work environment, while informal language is acceptable in an intimate environment with close friends and family. Also, one should avoid using complex or technical language while communicating with an audience that may not be familiar with it. Using simple language in a courteous tone helps achieve better communication, irrespective of the audience.

Active Listening

Active listening is defined as the ability to pay complete or undivided attention to someone when they speak and understand what they are saying. It is important for effective communication because without understanding what the speaker is saying, it becomes difficult to carry forward a conversation. One should ensure to use appropriate verbal and non-verbal responses, e.g. eye contact, nodding, or smiling, to show interest in what the speaker says. Active listening is also about paying attention to the speaker's body language and visual cues. Asking and answering questions is one of the best ways to demonstrate an interest in conversing with the other person.

Active listening is critical for communicating effectively without ambiguity. It helps one understand the information or instructions being shared. It may also encourage co-workers to share their ideas, which ultimately helps achieve collaboration.

Body Language

One's expression, posture, and gestures are as important as verbal communication. One should practice open body language to encourage positivity and trust while communicating. Open body language includes - maintaining eye contact, nodding, smiling and being comfortable. On the other hand, one should avoid closed body language, e.g. crossed arms, shifting eyes and restless behaviour.

Empathy

Empathy is the ability to understand the emotions, ideas and needs of others from their point of view. Empathy is also known as emotional intelligence. Empathetic people are good at being aware of others' emotions and compassionate when communicating with them. Being empathetic in the workplace can be good to boost the morale of employees and improve productivity. By showing empathy, one can gain the trust and respect of others.

Conflict Resolution

One can use interpersonal communication skills to help resolve disagreements and conflicts in the workplace. This involves the application of negotiation and persuasion skills to resolve arguments between conflicting parties. It is also important to evaluate and understand both sides of the argument by listening closely to everyone involved and finding an amicable solution acceptable to all.

Good conflict resolution skills can help one contribute to creating a collaborative and positive work environment. With the ability to resolve conflicts, one can earn the trust and respect of co-workers.nal communicationskills that vital for success at work:

Teamwork

Employees who communicate and work well in a team often have better chances of achieving success and common goals. Being a team player can help one avoid conflicts and improve productivity. One can do this by offering to help co-workers when required and asking for their feedback and ideas. When team members give their opinions or advice, one should positively receive and react to the opinions/advice. One should be optimistic and encouraging when working in groups.

Improving Interpersonal Skills

One can develop interpersonal skills by practising good communication and setting goals for improvement. One should consider the following tips to improve their interpersonal skills:

- One should ask for feedback from co-workers, managers, family or friends to figure out what needs improvement concerning their interpersonal skills.
- One can identify the areas of interpersonal communication to strengthen by watching others.
- One can learn and improve interpersonal skills by observing co-workers, company leaders and professionals who possess good interpersonal skills. This includes watching and listening to them to note how they communicate and the body language used by them. It is vital to note their speed of speaking, tone of voice, and the way they engage with others. One should practice and apply such traits in their own interactions and relationships.
- One should learn to control their emotions. If stressed or upset, one should wait until being calm to have a conversation. One is more likely to communicate effectively and confidently when not under stress.
- One can reflect on their personal and professional conversations to identify the scope of improvement and learn how to handle conversations better or communicate more clearly. It helps to consider whether one could have reacted differently in a particular situation or used specific words or positive body language more effectively. It is also vital to note the successful and positive interactions to understand why they are successful.
- One should practice interpersonal skills by putting oneself in positions where one can build relationships and use interpersonal skills. For example, one can join groups that have organized meetings or social events. These could be industry-specific groups or groups with members who share an interest or hobby.
- Paying attention to family, friends and co-workers and making efforts to interact with them helps a lot. One should complement their family, friends and co-workers on their good ideas, hard work and achievements. Trying to understand someone's interests and showing interest in knowing them can help one build strong interpersonal skills. Offering to help someone, especially in difficult situations, helps build stronger and positive workplace relationships.
- One should avoid distractions, such as a mobile phone, while interacting with someone. Giving someone full attention while avoiding distractions helps achieve a clear exchange of ideas. By listening with focus, one can understand and respond effectively.

- One can attend appropriate courses on interpersonal skills or sign up for workshops at work to improve interpersonal skills. One can find many resources online also, such as online videos.
- For personal mentoring, one can approach a trusted family member, friend, co-worker, or current/ former employer. A person one looks up to with respect and admires is often a good choice to be selected as a mentor. One can even hire a professional career or communication coach.

Interpersonal communication skills often help one boost their morale, be more productive in the workplace, complete team projects smoothly and build positive and strong relationships with co-workers.

Notes

UNIT 5.2: Working Efffectely and Maintaining Discipline at Work

Unit Objectives

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

- Discuss the importance of following organizational guidelines for dress code, time schedules, language usage and other behavioural aspects
- Explain the importance of working as per the workflow of the organization to receive instructions and report problems
- Explain the importance of conveying information/instructions as per defined protocols to the authorised persons/team members
- Explain the common workplace guidelines and legal requirements on non-disclosure and confidentiality of business-sensitive information
- Describe the process of reporting grievances and unethical conduct such as data breaches, sexual harassment at the workplace, etc.
- Discuss ways of dealing with heightened emotions of self and others.

5.2.1 Discipline at Work

Discipline is essential for organizational success. It helps improve productivity, reduce conflict and prevent misconduct in the workplace. It is important to have rules concerning workplace discipline and ensure that all employees comply with them. In the absence of discipline, a workplace may experience conflicts, bullying, unethical behaviour and poor employee performance. An efficient workplace disciplinary process helps create transparency in the organization. Benefits of disciplinary standards:

All employees follow the same rules which helps establish uniformity and equality in the workplace

Managers and supervisors have defined guidelines on what accon to take while initi atg disciplinary y aon

With well-defined and enforced disciplinary rules, an organiizaon can avoid various safety, security, rupati nal risks

Fig 5.2.1 Benefits of Disciplinary Standards

Maintaining an organized and cohesive workforce requires maintaining discipline in both personal and professional behaviour. It is important to follow the appropriate measures to keep employees in line without affecting their morale.

Defining Discipline

The first and crucial step in maintaining workplace discipline is to define what is meant by discipline. It helps to evaluate common discipline problems and devise guidelines for handling them effectively.

Among a number of areas, discipline usually covers:

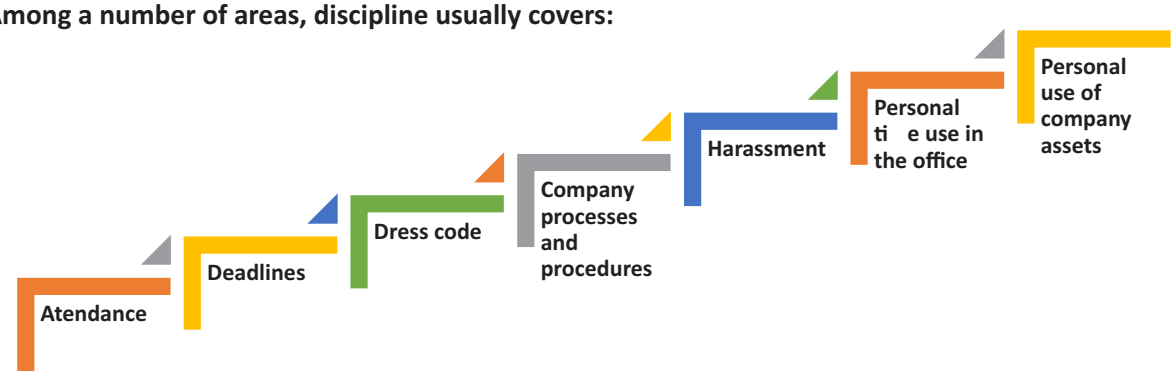


Fig 5.2.2 Examples of Workplace Discipline

According to demography and local issues, it may also include substance use and related issues.

It is vital for a workplace to have an employee handbook or company policy guide, to serve as a rulebook for employees to follow. The employee handbook/ company policy guide should be reviewed and updated periodically according to any issues or areas, or concerns identified concerning workplace discipline. Such manuals should also cover all the laws and regulations governing workplace behaviour.

Defining and documenting workplace rules aids in their implementation, ensuring little or no ambiguity. All employees in a workplace should also have easy access to the workplace guidelines so that they can refer to them to get clarity whenever required. To maintain discipline at work, it is also critical to ensure uniform application of workplace guidelines to all employees without exception.

5.2.2 Employee Code of Conduct

The employee code of conduct manual serves as a guide for employees to inform them regarding the behaviour expected from them at work. It helps create a good work environment with consistent behaviour from employees. The manual should list examples of acceptable and not acceptable behaviours at work. The code of conduct should be discussed with employees so that they have the clarifications required.

For example, an organization may create guidelines concerning the conduct with clients to ensure no contact is made with them except for business purposes, also prescribing the use of appropriate means of communication.

Employees should have a clear understanding concerning their job responsibilities and the behaviour expected from them with all stakeholders, e.g. company personnel, clients and associated third parties. It is critical to have documented guidelines for employees to follow concerning all aspects of work. It should also document the disciplinary action to be followed in case of non-compliance, e.g. verbal and

then written warning, temporary suspension or eventual termination of service in case of repeated non-compliance with the employee code of conduct. Employees should know what the company rules are and what will happen if they break the rules. However, disciplinary action should be initiated only when reasonably required to avoid its misuse for employee harassment.

There should also be an effective mechanism for employees to raise their concerns/ grievances and have them addressed while maintaining privacy, as required, e.g. raising concerns regarding the behaviour of a co-worker.

The employee code of conduct manual must be duly reviewed and approved by the concerned stakeholders, such as the Human Resources (HR) department and company executives.

5.2.3 Interpersonal Conflicts

Interpersonal conflict is any type of conflict between two or more people. These are found in both - personal and professional relationships - among friends, family, and co-workers. In the workplace, interpersonal conflict is often observed when a person or group of people interfere with another person's attempts at completing assignments and achieving goals. It is critical to resolve conflicts in the workplace to boost the morale of employees, repair working relationships among them, and improve customer satisfaction.

Reasons for Workplace Conflicts

Workplace conflicts are often observed when two or more people have different points of view. This can happen between managers, co-workers, or clients and customers. In general, interpersonal conflicts are caused by a lack of communication or unclear communication.

Some of the leading reasons for workplace conflicts are:

- Difference in values
- Personality clashes
- Poor communication

Example of poor communication – if a manager reassigns a task to another employee without communicating with the employee to whom it was originally assigned, interpersonal conflict can arise among them. This may potentially make the first employee, i.e. who was originally assigned the task, feel slighted and mistrusted by the manager. It may even cause animosity in the first employee toward the employee who has now been assigned the task.

Types of Interpersonal Conflict

Following are the four types of interpersonal conflicts:

a. **Policy-related interpersonal conflict**

When a conflict relates to a decision or situation that involves both parties, it can be called a policy-related interpersonal conflict. Example – two people or groups working on the same project, trying to adopt different approaches. To resolve policy-related interpersonal conflicts, the parties involved should try to look for a win-win situation or make a compromise. This is especially critical to resolve trivial issues so that work is not affected and common goals are achieved.

b. **Pseudo-conflicts**

Pseudo-conflict arises when two people or groups want different things and cannot reach an agreement. Pseudo-conflicts usually involve trivial disagreements that tend to hide the root of the issue.

c. **Ego-related interpersonal conflicts**

In ego conflicts, losing the argument may hurt or damage a person's pride. Sometimes ego conflicts arise when a number of small conflicts pile up on being left unresolved. To resolve ego-related conflicts, it's best to find the root of the issue and work towards a resolution.

d. **Value-related interpersonal conflicts**

Sometimes conflicts may occur between people when they have different value systems. Such conflicts can be difficult to identify initially, making the people involved think the other party is being disagreeable or stubborn, wherein they just have different values. Some co-workers may highly value their personal/ family time after office that they may be unreachable to clients during non-office hours, while others may place a high value on client satisfaction and may still be available for clients during non-office hours. Conflict may arise among such people when they may be required to coordinate to help a client during after-office hours. Value-related interpersonal conflicts are often difficult to settle since neither party likes to compromise.

Resolving Interpersonal Conflicts

Conflicts are usually likely in the workplace; they can, however, be prevented. Often resolving interpersonal conflicts through open communication helps build a stronger relationship, paving the way for effective coordination and success. Some ways to resolve interpersonal conflict:

- **Communication -** A great way to resolve interpersonal conflicts is for the opposing parties to listen to one another's opinions and understand their viewpoints. Meeting in person and keeping the conversation goal-oriented is important. One can have effective communication by following some measures, e.g. staying on the topic, listening actively, being mindful of the body language, maintaining eye contact, etc.

- **Active Listening -** One should patiently listen to what the other person is saying without interrupting or talking over them. It helps one display empathy and get to the root of the issue. Asking questions to seek clarification when required helps in clear communication and conveys to the other person that one is listening to them. Practising active listening is a great way to improve one's communication skills.
- **Displaying Empathy -** Listening attentively and identifying the anxieties/ issues of co-workers is a great way to show empathy and concern. It is essential to understand their feelings and actions to encourage honesty and avoid future conflict.
- **Not Holding Grudges -** With different types of people and personalities in a workplace, it is common for co-workers to have conflicts. It is best to accept the difference in opinions and move on. Being forgiving and letting go of grudges allows one to focus on the positive side of things and perform better at work.

Work-related interpersonal conflicts can be complicated because different people have different leadership styles, personality characteristics, job responsibilities and ways in which they interact. One should learn to look above interpersonal conflicts, resolving them to ensure work goals and environment are not affected.

5.2.4 Importance of Following Organizational Guidelines

Policies and procedures or organizational guidelines are essential for any organization. These provide a road map for the operations of the organization. These are also critical in ensuring compliance with the applicable laws and regulations by guiding the decision-making process and business operations.

Organizational guidelines help bring uniformity to the operations of an organization, which helps reduce the risk of unwanted and unexpected events. These determine how employees are supposed to behave at work, which ultimately helps the business achieve its objectives efficiently.

However, organizational guidelines are ineffective and fail to serve their purpose if they are not followed. Many people don't like the idea of following and abiding by specific guidelines. Such people should be made to understand the benefits of following the organizational guidelines. Some of the key benefits are given below:

With well-defined organizational guidelines in place, no individual can act arbitrarily, irrespective of their position in the organization. All individuals will know the pros and cons of taking certain actions and what to expect in case of unacceptable behaviour. Benefits of following organizational guidelines:

- Consistent processes and structures - Organization guidelines help maintain consistency in operations, avoiding any disorder. When all employees follow the organizational guidelines, an organization can run smoothly. These ensure that people in different job roles operate as they are supposed to, knowing what they are responsible for, what is expected of them, and what they can expect from their supervisors and co-workers. With clarity in mind, they can do their jobs with confidence and excellence. With every person working the way intended, it's easy to minimise errors.

  With all the staff following organizational guidelines, the organization has a better scope of using time and resources more effectively and efficiently. This allows the organization to grow and achieve its objectives.
- **Better quality service -** By following organizational guidelines, employees perform their duties correctly as per the defined job responsibilities. It helps enhance the quality of the organization's products and services, helping improve the organization's reputation. Working with a reputable organization, employees can take pride in their work and know they are contributing to the reputation.
- **A safer workplace -** When all employees follow organizational guidelines, it becomes easy to minimise workplace incidents and accidents. It reduces the liabilities associated with risks for the organization and limits the interruptions in operations. Employees also feel comfortable and safe in the workplace, knowing their co-workers are ensuring safety at work by following the applicable guidelines.

Different organizations may have different guidelines on dress code, time schedules, language usage, etc. For example – certain organizations in a client-dealing business requiring employees to meet clients personally follow a strict dress code asking their employees to wear formal business attire. Similarly, organizations operating in specific regions may require their employees to use the dominant regional language of the particular region to build rapport with customers and serve them better. Certain organizations, such as banks, often give preference to candidates with knowledge of the regional language during hiring.

Working hours may also differ from one organization to another, with some requiring employees to work extra compared to others. One should follow the organizational guidelines concerning all the aspects of the employment to ensure a cohesive work environment.

5.2.5 Workflow

Workflow is the order of steps from the beginning to the end of a task or work process. In other words, it is the way a particular type of work is organised or the order of stages in a particular work process.

Workflows can help simplify and automate repeatable business tasks, helping improve efficiency and minimise the room for errors. With workflows in place, managers can make quick and smart decisions while employees can collaborate more productively.

Other than the order that workflows create in a business, these have several other benefits, such as:

- Identifying Redundancies - Mapping out work processes in a workflow allows one to get a clear, top-level view of a business. It allows one to identify and remove redundant or unproductive processes.

  Workflow gives greater insights into business processes. Utilizing such useful insights, one can improve work processes and the bottom line of the business. In many businesses, there are many unnecessary and redundant tasks that take place daily. Once an organization has insight into its processes while preparing workflow, it can determine which activities are really necessary.

  Identifying and eliminating redundant tasks creates value for a business. With redundant tasks and processes eliminated, an organization can focus on what's important to the business.

- Increase in Accountability and Reduction in Micromanagement - Micromanagement often causes problems in a business setting as most employees don't like being micromanaged, and even many managers don't like the practice. Micromanagement is often identified as one of the reasons why people quit their job.

  However, the need for micromanagement can be minimized by clearly mapping out the workflow. This way, every individual in a team knows what tasks need to be completed and by when and who is responsible for completing them. This makes employees more accountable also.

  With clearly defined workflow processes, managers don't have to spend much time micromanaging their employees, who don't have to approach the manager to know what the further steps are. Following a workflow, employees know what is going on and what needs to be done. This, in turn, may help increase the job satisfaction of everyone involved while improving the relationships between management and employees.

- Improved Communication - Communication at work is critical because it affects all aspects of an organization. There are instances when the main conflict in an organization originates from miscommunication, e.g. the management and employees disagreeing on an aspect, despite pursuing the same objectives. Poor communication is a common workplace issue that is often not dealt with.

- This highlights why workflow is important. Workplace communication dramatically can increase with the visibility of processes and accountability. It helps make the daily operations smoother overall.

- Better Customer Service - Customers or clients are central to a business. Therefore, it is imperative to find and improve ways to improve customer experience. Relying on outdated manual systems may cause customer requests or complaints to be overlooked, with dissatisfied customers taking their business elsewhere. However, following a well-researched and defined workflow can help improve the quality of customer service.

By automating workflows and processes, an organization can also reduce the likelihood of human error. This also helps improve the quality of products or services over time, resulting in a better customer experience.

5.2.6 Following Instructions and Reporting Problems

All organizations follow a hierarchy, with most employees reporting to a manager or supervisor. For organizational success, it is vital for employees to follow the instructions of their manager or supervisor. They should ensure they perform their duties as per the given instructions to help achieve the common objectives of the organization and deliver quality service or products. This consequently helps maintain the reputation of the organization.

It is also important to be vigilant and identify problems at work or with the organizational work processes. One should deal with the identified within their limits of authority and report out of authority problems to the manager/ supervisor or the concerned person for a prompt resolution to minimise the impact on customers/clients and business.

5.2.7 Information or D ta Sharing

Information or data is critical to all organizations. Depending on the nature of its business, an organization may hold different types of data, e.g. personal data of customers or client data concerning their business operations and contacts. It is vital to effective measures for the appropriate handling of different types of data, ensuring its protection from unauthorized access and consequent misuse.

One should access certain data only if authorised to do so. The same is applicable when sharing data which must be shared only with the people authorised to receive it to use it for a specific purpose as per their job role and organizational guidelines. For example – one should be extra cautious while sharing business data with any third parties to ensure they get access only to the limited data they need as per any agreements with them. It is also critical to monitor how the recipient of the data uses it, which should strictly be as per the organizational guidelines. It is a best practice to share appropriate instructions with the recipient of data to ensure they are aware of the purpose with which data is being shared with them and how they are supposed to use and handle it. Any misuse of data must be identified and reported promptly to the appropriate person to minimise any damage arising out of data misuse.

These days most organizations require their employees and business partners or associated third parties to sign and accept the relevant agreement on the non-disclosure of business-sensitive information. In simple terms, business-sensitive information is confidential information. It is proprietary business information collected or created during the course of conducting business, including information about the business, e.g. proposed investments, intellectual property, trade secrets, or plans for a merger and information related to its clients. Business-sensitive information may sometimes also include information regarding a business's competitors in an industry.

The release of business-sensitive information to competitors or the general public poses a risk to a business. For example, information regarding plans for a merger could be harmful to a business if a competitor gets access to it.

5.2.8 Reporting Issues at Work

Most organizations have defined guidelines on appropriate reporting processes to be followed for reporting different types of issues. For example – one can report any grievances or dissatisfaction concerning co-workers to their manager/supervisor, e.g. data breaches or unethical conduct. If the concern is not addressed, then the employee should follow the organizational guidelines and hierarchy for the escalation of such issues that are not addressed appropriately.

For example – any concern related to sexual harassment at the workplace should be escalated to the concerned spokesperson, such as Human Resources (HR) representative, and if not satisfied with the action taken, it should be reported to the senior management for their consideration and prompt action.

5.2.9 Dealing with Heightened Emotions

Humans are emotional beings. There may be occasions when one is overwhelmed by emotions and is unable to suppress them. However, there may be situations when one must manage emotions well, particularly at work.

Stress in one's personal and professional life may often cause emotional outbursts at work. Managing one's emotions well, particularly the negative ones, is often seen as a measure of one's professionalism. Anger, dislike, frustration, worry, and unhappiness are the most common negative emotions experienced at work.

Ways to manage negative emotions at work:

- **Compartmentalisation –** It's about not confining emotions to different aspects of one's life. For example, not letting negative emotions from personal life affect work-life and vice versa. One should try to leave personal matters and issues at home. One should train their mind to let go of personal matters before reaching work. Similarly, one can compartmentalise work-related stresses so that negative emotions from work don't affect one's personal life.

- **Deep breathing and relaxation –** Deep breathing helps with anxiety, worry, frustration and anger. One should take deep breaths, slowly count to ten - inhaling and exhaling until one calms down. One can also take a walk to calm down or listen to relaxing music. Talking to someone and sharing concerns also helps one calm down.

- **The 10-second rule -** This is particularly helpful in controlling anger and frustration. When one feels their temper rising, they should count to 10 to calm down and recompose. If possible, one should move away to allow temper to come down.

- **Clarify -** It is always good to clarify before reacting, as it may be a simple case of misunderstanding or miscommunication.

- **Physical activity -** Instead of losing temper, one should plan to exercise, such as running or going to the gym, to let the anger out. Exercise is also a great way to enhance mood and release any physical tension in the body.

- **Practising restraint -** One should avoid replying or making a decision when angry, not allowing anger or unhappiness to cloud one's judgement. It may be best to pause any communication while one is angry, e.g. not communicating over email when angry or upset.

- **Knowing one's triggers -** It helps when one is able to recognise what upsets or angers them. This way, one can prepare to remain calm and plan their reaction should a situation occur. One may even be able to anticipate the other party's reaction.

- **Be respectful -** One should treat their colleagues the same way one would like to be treated. If the other person is rude, one need not reciprocate. It is possible to stay gracious, firm and assertive without being aggressive. Sometimes, rude people back away when they don't get a reaction from the person they are arguing with.

- **Apologise for any emotional outburst –** Sometimes, one can get overwhelmed by emotions, reacting with an emotional outburst. In such a case, one should accept responsibility and apologise immediately to the affected persons without being defensive.

- **Doing away with negative emotions -** It is recommended to let go of anger, frustration and unhappiness at the end of every workday. Harbouring negative emotions affects one emotionally, affecting their job performance also. Engaging in enjoyable activities after work is a good stress reliever.

Notes

UNIT 5.3: Maintaining Social Diversity at Work

Unit Objectives

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

1. Explain the concept and importance of gender sensitivityand equality.
2. Discuss ways to create sensitivityfor different genders and Persons with h Disabiliti(PwD).

5.3.1 Gender Sensitivity

Gender sensitivity is the act of being sensitive towards people and their thoughts regarding gender. It ensures that people know the accurate meaning of gender equality, and one's gender should not be given priority over their capabilities.

Fig 5.3.1 Gender Equality

Women are an important source of labour in many sectors, yet they have limited access to resources and benefits. Women should receive the same benefits and access to resources as men. A business can improve its productivity and quality of work by providing better support and opportunities to women.

Important Terms

- **Gender Sensitivity-** Gender sensitivity is the act of being sensitive to the ways people think about gender.
- **Gender Equality -** It means persons of any gender enjoy equal opportunities, responsibilities, and rights in all areas of life.
- **Gender Discrimination –** It means treating an individual unequally or disadvantageously based on their gender, e.g. paying different wages to men and women for similar or equal job positions.

Strategies for Enhancing Gender Equity

To enhance gender equity, one should:

- Follow gender-neutral practices at all levels at work.
- Participate together in decision-making.
- Help in promoting women's participation in different forums.
- Assist women in getting exposure to relevant skills and practices.
- Assist women in capacity building by mentoring, coaching or motivating them, as appropriate.
- Assist in the formation and operation of women support groups.
- Assist in the implementation of women-centric programmes.
- Combine technical training with reproductive health and nutrition for coffee farming households.
- Assist in making a work environment that is healthy, safe, and free from discrimination.

Bridging Gender Differences

Men and women react and communicate very differently. Thus, there are some work differences as both genders have their style and method of handling a situation.

Although, understanding and maturity vary from person to person, even between these genders, based on their knowledge, education, experience, culture, age, and upbringing, as well as how one's brain functions over a thought or problem.

In order to bridge the gap, one should:

- Not categorize all men and women in one way.
- Be aware of the verbal and non-verbal styles of communication of every gender to avoid any miscommunication and work better.
- Be aware of partial behaviour and avoid it.
- Encourage co-workers of different genders to make room by providing space to others.

Ways to reduce Gender Discrimination

- Effective steps against sexual harassment by the concerned authorities and general public.
- Gender stereotypes are how society expects people to act based on their gender. This can only be reduced by adopting appropriate behaviour and the right attitude.
- Objectification of females must be abolished.

Ways to Promote Gender Sensitivity in the Workplace

Practices that promote gender diversity should be adopted and promoted.

- All genders should receive equal responsibilities, rights, and privileges.
- All genders should have equal pay for similar or the same job roles/ positions.
- Strict and effective workplace harassment policies should be developed and implemented.
- An open-minded and stress-free work environment should be available to all the employees, irrespective of their gender.
- Women should be encouraged to go ahead in every field of work and assume leadership roles.
- Follow appropriate measures for women's empowerment.
- Men should be taught to be sensitive to women and mindful of their rights.

5.3.2 PwD Sensitivity

Some individuals are born with a disability, while others may become disabled due to an accident, illness or as they get old. People with Disabilities (PwD) may have one or more areas in which their functioning is affected. A disability can affect hearing, sight, communication, breathing, understanding, mobility, balance, and concentration or may include the loss of a limb. A disability may contribute to how a person feels and affect their mental health

Important Terms

·**Persons with Disabilities (PwD) –** Persons with Disabilities means a person suffering from not less than 40% of any disability as certified by a medical authority.

·**Types of Disability:**

a. Blindness – Visually impaired
b. Low Vision
c. Leprosy Cured
d. Hearing impairment
e. Locomotor disability
f. Mental retardation
g. Mental illness

PwD Sensitivity

PwD sensitivity promotes empathy, etiquette and equal participation of individuals and organizations while working with individuals with a disability, e.g. sensory, physical or intellectual.

Ways to be PwD Sensitive

To be sensitive to PwD, one should:

- Be respectful to all Persons with Disabilities (PwD) and communicate in a way that reflects PwD sensitivity.
- Always be supportive and kind towards a PwD with their daily chores.
- Be ready to assist a PwD to help them avail of any benefit/ livelihood opportunity/ training or any kind that helps them grow.
- Encourage and try to make things easier and accessible to PwD so that they can work without or with minimum help.
- Protest where feasible and report any wrong act/behaviour against any PwD to the appropriate authority.
- Learn and follow the laws, acts, and policies relevant to PwD.

Appropriate Verbal Communication

As part of appropriate verbal communication with all genders and PwD, one should:

- Talk to all genders and PwD respectfully, maintaining a normal tone of voice with appropriate politeness. It is important to ensure one's tone of voice does not have hints of sarcasm, anger, or unwelcome affection.
- Avoid being too self-conscious concerning the words to use while also ensuring not to use words that imply one's superiority over the other.
- Make no difference between a PwD and their caretaker. Treat PwD like adults and talk to them directly.
- Ask a PwD if they need any assistance instead of assuming they need it and offering assistance spontaneously.

Appropriate Non-verbal Communication

Non-verbal communication is essentially the way someone communicates through their body language. These include:

- **Facial expressions -** The human face is quite expressive, capable of conveying many emotions without using words. Facial expressions must usually be maintained neutral and should change according to the situation, e.g. smile as a gesture of greeting.
- **Body posture and movement -** One should be mindful of how to sit, stand, walk, or hold their head. For example - one should sit and walk straight in a composed manner. The way one moves and carries self, communicates a lot to others. This type of non-verbal communication includes one's posture, bearing, stance, and subtle movements.

- **Gestures -** One should be very careful with their gestures, e.g. waving, pointing, beckoning, or using one's hands while speaking. One should use appropriate and positive gestures to maintain respect for the other person while being aware that a gesture may have different meanings in different cultures.

- **Eye contact -** Eye contact is particularly significant in non-verbal communication. The way someone looks at someone else may communicate many things, such as interest, hostility, affection or attraction. Eye contact is vital for maintaining the flow of conversation and for understanding the other person's interest and response. One should maintain appropriate eye contact, ensuring not to stare or look over the shoulders. To maintain respect, one should sit or stand at the other person's eye level to make eye contact.
- **Touch -** Touch is a very sensitive type of non-verbal communication. Examples are - handshakes, hugs, pat on the back or head, gripping the arm, etc. A firm handshake indicates interest, while a weak handshake indicates the opposite. One should be extra cautious not to touch others inappropriately and avoid touching them inadvertently by maintaining a safe distance.

Rights of PwD

PwD have the right to respect and human dignity. Irrespective of the nature and seriousness of their disabilities, PwD have the same fundamental rights as others, such as:

- Disabled persons have the same civil and political rights as other people
- Disabled persons are entitled to the measures designed to enable them to become as self-dependent as possible
- Disabled persons have the right to economic and social security
- Disabled persons have the right to live with their families or foster parents and participate in all social and creative activities.
- Disabled persons are protected against all exploitation and treatment of discriminatory and abusive nature.

Making Workplace PwD Friendly

- One should not make PwD feel uncomfortable by giving too little or too much attention
- One should use a normal tone while communicating with a PwD and treat them as all others keeping in mind their limitations and type of disability
- Any help should be provided only when asked for by a PwD
- One should help in ensuring the health and well-being of PwD.

Expected Employer Behaviour

Some of the common behavioural traits that employees expect from their employers are:

- Cooperation: No work is successful without cooperation from the employer's side. Cooperation helps to understand the job role better and complete it within the given timeline.
- Polite language: Polite language is always welcomed at work. This is a basic aspect that everybody expects.
- Positive Attitude: Employers with a positive attitude can supervise the work of the employees and act as a helping hand to accomplish the given task. A person with a positive attitude looks at the best qualities in others and helps them gain success.
- Unbiased behaviour: Employers should always remain fair towards all their employees. One should not adopt practices to favour one employee while neglecting or ignoring the other. This might create animosity among co-workers.
- Decent behaviour: The employer should never improperly present oneself before the employee. One should always respect each other's presence and behave accordingly. The employer should not speak or act in a manner that may make the employee feel uneasy, insulted, and insecure.

Exercise

1. List down three examples of workplace ethics.
2. List down three examples of interpersonal skills.
3. Identify two reasons for workplace conflicts.
4. Identify two ways of resolving interpersonal conflicts
5. List down two ways of dealing with heightened emotions at work.
6. List down two types of non-verbal communication.

Notes

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
Skilling India in Electronics

6. Basic Health and Safety Practices

Unit 6.1 - Workplace Hazards

Unit 6.2 - Fire Safety

Unit 6.3 - First Aid

Unit 6.4 - Waste Management

ELE/N1002

Key Learning Outcomes

By the end of this module, participa ts will be able to:

1. Discuss job-site hazards, risks and accidents
2. Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials
3. Describe how to interpret warning signs while accessing sensitive work areas
4. Explain the importance of good housekeeping
5. Describe the importance of maintaining appropriate postures while lifting heavy objects
6. List the types of fire and fire extinguishers
7. Describe the concept of waste management and methods of disposing of hazardous waste
8. List the common sources of pollution and ways to minimize them
9. Elaborate on electronic waste disposal procedures
10. Explain how the administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning and also administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock

UNIT 6.1: Workplace Hazards

Unit Objectives

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

- Discuss job-site hazards, risks and accidents
- Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials
- Describe how to interpret warning signs while accessing sensitive work areas
- Explain the importance of good housekeeping
- Describe the importance of maintaining appropriate postures while lifting heavy objects
- Explain safe handling of tools and Personal Protective Equipment to be used.

6.1.1 Workplace Safety

Workplace safety is important to be established for creating a safe and secure working for the workers. The workplace has to be administered as per the rules of the Occupational Safety and Health Administration (OSHA). It refers to monitoring the working environment and all hazardous factors that impact employees' safety, health, and well-being. It is important to provide a safe working environment to the employees to increase their productivity, wellness, skills, etc.

The benefits of workplace safety are:

- Employee retention increases if they are provided with a safe working environment.
- Failure to follow OSHA's laws and guidelines can result in significant legal and financial consequences.
- A safe environment enables employees to stay invested in their work and increases productivity.
- Employer branding and company reputation can both benefit from a safe working environment.

6.1.2 Workplace Hazards

A workplace is a situation that has the potential to cause harm or injury to the workers and damage the tools or property of the workplace. Hazards exist in every workplace and can come from a variety of sources. Finding and removing them is an important component of making a safe workplace.

Common Workplace Hazards

The common workplace hazards are:

·Biological: The threats caused by biological agents like viruses, bacteria, animals, plants, insects and also humans, are known as biological hazards.

- **Chemical:** Chemical hazard is the hazard of inhaling various chemicals, liquids and solvents. Skin irritation, respiratory system irritation, blindness, corrosion, and explosions are all possible health and physical consequences of these dangers.
- **Mechanical:** Mechanical Hazards comprise the injuries that can be caused by the moving parts of machinery, plant or equipment.
- **Psychological:** Psychological hazards are occupational hazards caused by stress, harassment, and violence.
- **Physical:** The threats that can cause physical damage to people is called physical hazard. These include unsafe conditions that can cause injury, illness and death.
- **Ergonomic:** Ergonomic Hazards are the hazards of the workplace caused due to awkward posture, forceful motion, stationary position, direct pressure, vibration, extreme temperature, noise, work stress, etc.

Workplace Hazards Analysis

A workplace hazard analysis is a method of identifying risks before they occur by focusing on occupational tasks. It focuses on the worker's relationship with the task, the tools, and the work environment. After identifying the hazards of the workplace, organisations shall try to eliminate or minimize them to an acceptable level of risk.

Control Measures of Workplace Hazards

Control measures are actions that can be taken to reduce the risk of being exposed to the hazard. Elimination, Substitution, Engineering Controls, Administrative Controls, and Personal Protective Equipment are the five general categories of control measures.

- **Elimination:** The most successful control technique is to eliminate a specific hazard or hazardous work procedure or prevent it from entering the workplace.

- **Substitution:** Substitution is the process of replacing something harmful with something less hazardous. While substituting the hazard may not eliminate all of the risks associated with the process or activity, it will reduce the overall harm or health impacts.

- **Engineering Controls:** Engineered controls protect workers by eliminating hazardous situations or creating a barrier between the worker and the hazard, or removing the hazard from the person.

- **Administrative Controls:** To reduce exposure to hazards, administrative controls limit the length of time spent working on a hazardous task that might be used in combination with other measures of control.

- **Personal Protective Equipment:** Personal protective equipment protects users from health and safety hazards at work. It includes items like safety helmets, gloves, eye protection, etc.

6.1.3 Risk for a Drone Technician

A drone technician may require to repair the propeller, motor and its mount, battery, mainboards, processor, booms, avionics, camera, sensors, chassis, wiring and landing gear. A technician may face some risks while repairing the drones' equipment.

- The technician is susceptible to being physically harmed by propellers.
- Direct contact with exposed electrical circuits can injure the person.
- If the skin gets in touch with the heat generated from electric arcs, it burns the internal tissues.
- Major electrical injuries can occur due to poorly installed electrical equipment, faulty wiring, overloaded or overheated outlets, use of extension cables, incorrect use of replacement fuses, use of equipment with wet hands, etc.

6.1.4 Workplace Warning Signs

A Hazard sign is defined as 'information or instruction about health and safety at work on a signboard, an illuminated sign or sound signal, a verbal communication or hand signal.'

There are four different types of safety signs:

- Prohibition / Danger Alarm Signs
- Mandatory Signs
- Warning Signs
- And Emergency

1. Prohibition Signs: A "prohibition sign" is a safety sign that prohibits behaviour that is likely to endanger one's health or safety. The colour red is necessary for these health and safety signs. Only what or who is forbidden should be displayed on a restriction sign.

Fig. 6.1.1. Prohibition arning Signs

2. Mandatory Signs:

Mandatory signs give clear directions that must be followed. The icons are white circles that have been reversed out of a blue circle. On a white background, the text is black.

Fig. 6.1.2. Mandatory Signs

3. Warning Signs

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

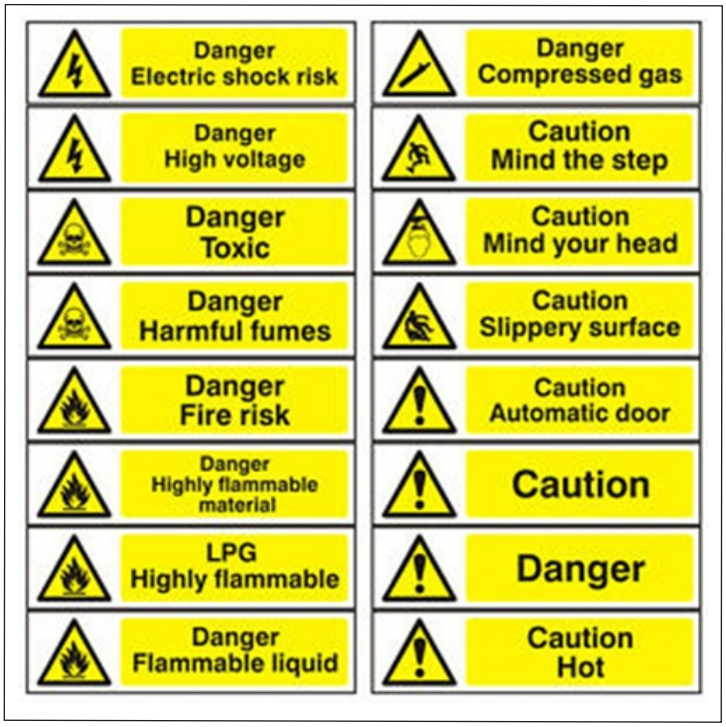


Fig. 6.1.3. Warning Signs

4. Emergency Signs

The locationor routes to emergency ffacilitieare indicated by emergency signs. These signs have a green backdrop with a white emblem or writing.These signs convey basic informaatioand frequently refer to housekeeping, company procedures, or logistics.

Fig. 6.1.4. Emergency Signs

6.1.5 Cleanliness in the Workplace

Workplace cleanliness maintenance creates a healthy, efficient and productive environment for the employees. Cleanliness at the workplace is hindered by some elements like cluttered desks, leftover food, waste paper, etc. A tidy workplace is said to improve employee professionalism and enthusiasm while also encouraging a healthy working environment.

Benefits of cleanliness in the workplace:

1. Productivity: Cleanliness in the workplace can bring a sense of belonging to the employees, also motivating and boosting the morale of the employees. This results in increasing their productivity.
2. Employee Well-being: Employee well-being can be improved by providing a clean work environment. Employees use fewer sick days in a workplace where litter and waste are properly disposed of, and surfaces are cleaned regularly, resulting in increased overall productivity.
3. Positive Impression: Cleanliness and orderliness in the workplace provide a positive impression on both employees and visitors.
4. Cost saving: By maintaining acceptable levels of cleanliness in the workplace, businesses can save money on cleaning bills and renovations, which may become necessary if the premises are not properly kept.

Reasons for Cleaning the Workplace

- Cleaning of dry floors, mostly to prevent workplace slips and falls.
- Disinfectants stop bacteria in their tracks, preventing the spread of infections and illness.
- Proper air filtration decreases hazardous substance exposures such as dust and fumes.
- Light fixture cleaning improves lighting efficiency.
- Using environmentally friendly cleaning chemicals that are safer for both personnel and the environment.
- Work environments are kept clean by properly disposing of garbage and recyclable items.

6.1.6 Lifting and Handling of Heavy Loads

Musculoskeletal Injuries (MSIs), such as sprains and strains, can occur while lifting, handling, or carrying objects at work. When bending, twisting, uncomfortable postures and lifting heavy objects are involved, the risk of injury increases. Ergonomic controls can help to lower the risk of injury and potentially prevent it.

Types of injuries caused while lifting heavy objects:

- Cuts and abrasions are caused by rough surfaces.
- Crushing of feet or hands.
- Strain to muscles and joints

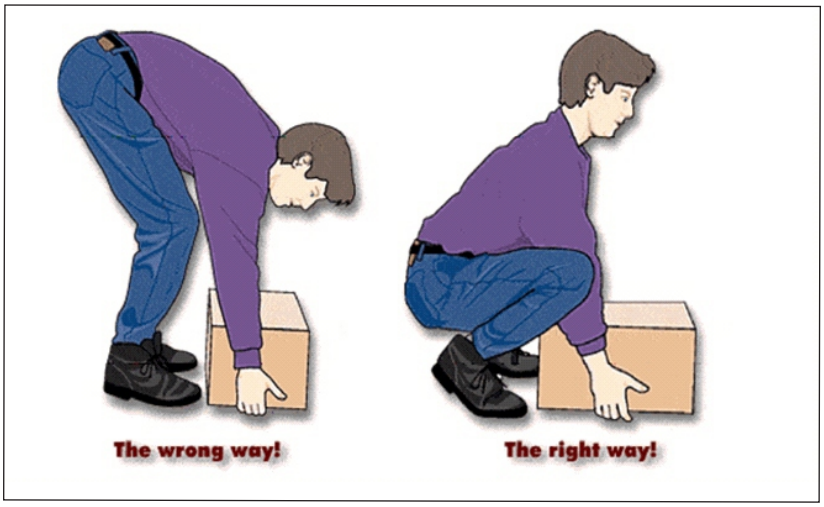


Fig. 6.1.5. Lifting loads echnique

Preparing to lift

A load that appears light enough to bear at first will grow increasingly heavier as one carries it further. The person carrying the weight should be able to see over or around it at all times.

The amount of weight a person can lift, depends on their age, physique, and health

It also depends on whether or not the person is used to lifting and moving hefty objects.

Common Causes of Back Injuries

The Most Common Causes of Back Injuries are:

1) **Inadequate Training:** The individual raising the load receives no sufficient training or guidance.
2) **Lack of awareness of technique:** The most common cause of back pain is incorrect twisting and posture, which causes back strain.
3) **Load size:** The load size to consider before lifting. If the burden is too much for one's capacity or handling, their back may be strained and damaged.
4) **Physical Strength:** Depending on their muscle power, various persons have varied physical strengths. One must be aware of their limitations.
5) **Teamwork:** The operation of a workplace is all about working together. When opposed to a single person lifting a load, two people can lift it more easily and without difficulty. If one of two people isn't lifting it properly, the other or both of them will suffer back injuries as a result of the extra strain.

Techniques for Lifting Heavy Objects

Technique	Demonstraton
1. Ensure one has a wide base of support before lifting the heavy object. Ensure one's feet are shoulder-width apart, and one foot is slightly ahead of the other at all times. This will help one maintain a good balance during the lifting of heavy objects. This is known as the Karate Stance.	
2. Squat down as near to the object as possible when one is ready to lift it, bending at the hips and knees with the buttocks out. If the object is really heavy, one may wish to place one leg on the floor and the other bent at a straight angle in front of them.	

3. Maintain proper posture as one begin to lift upward. To do so, one should keep their back straight, chest out, and shoulders back while gazing straight ahead.	
4. By straightening one's hips and knees, slowly elevate the thing (not the back). As one rises, they should extend their legs and exhale. Lift the heavy object without twisting the body or bending forward.	
5. Do not lift bending forward.	
6. Hold the load close to the body.	

7. Never lift heavy objects above the shoulder	
8. Use the feet (not the body) to change direction, taking slow, small steps.	
9. Set down the heavy object carefully, squatting with the knees and hips only.	

Table 6.1.1 Techniques for lifting he vy objects

[3]*Source:https://ww .braceability.ccom/blogs/articles/7-prop-heavavy-liftinechniques*

6.1.7 Safe Handling of Tools

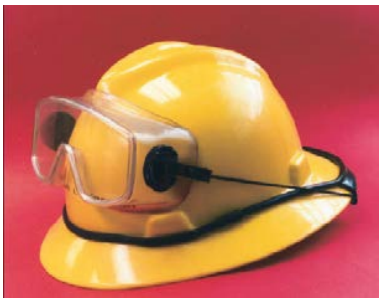
Workers should be trained on how to use tools safely. When tools are misplaced or handled incorrectly by workers, they can be dangerous. The following are some suggestions from the National Safety Council for safe tool handling when they are not in use:

- Never carry tools up or down a ladder in a way that makes it difficult to grip them. Instead of being carried by the worker, tools should be lifted up and down using a bucket or strong bag.
- Tools should never be tossed but should be properly passed from one employee to the next. Pointed tools should be passed with the handles facing the receiver or in their carrier.
- When turning and moving around the workplace, workers carrying large tools or equipment on their shoulders should pay particular attention to clearances.
- Pointed tools such as chisels and screwdrivers should never be kept in a worker's pocket. They can be carried in a toolbox, pointing down in a tool belt or pocket tool bag, or in hand with the tip always held away from the body.
- Tools should always be stored while not in use. People below are put in danger when tools are left sitting around on an elevated structure, such as a scaffold. In situations when there is a lot of vibration, this risk increases.

6.1.8 Personal Protective Equipment

Personal protective equipment, or "PPE," is equipment worn to reduce exposure to risks that might result in significant occupational injuries or illnesses. Chemical, radiological, physical, electrical, mechanical, and other job dangers may cause these injuries and diseases.

PPE used for protection fom the following injuries are:

Injury Protecton	Protecton	PPE
Head Injury Protecton	Falling or flying objects, stationary objects, or contact with electrical wires can cause impact, penetration, and electrical injuries. Hard hats can protect one's head from these injuries. A common electrician's hard hat is shown in the figure below. This hard hat is made of nonconductive plastic and comes with a set of safety goggles.	
Foot and Leg Injury Protecton	In addition to foot protection and safety shoes, leggings (e.g., leather) can guard against risks such as falling or rolling objects, sharp objects, wet and slippery surfaces, molten metals, hot surfaces, and electrical hazards.	 
Eye and Face Injury Protecton	Spectacles, goggles, special helmets or shields, and spectacles with side shields and face shields can protect against the hazards of flying fragments, large chips, hot sparks, radiation, and splashes from molten metals. They also offer protection from particles, sand, dirt, mists, dust, and glare.	

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

Table 6.1.2. Personal protective equipment

Notes

UNIT 6.2: Fire Safety

Unit Objectives

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

1. List the types of fire and fire e extinguiss.

6.2.1 Fire Safety

Fire safety is a set of actions aimed at reducing the amount of damage caused by fire. Fire safety procedures include both those that are used to prevent an uncontrolled fire from starting and those that are used to minimise the spread and impact of a fire after it has started. Developing and implementing fire safety measures in the workplace is not only mandated by law but is also essential for the protection of everyone who may be present in the building during a fire emergency.

The basic Fire Safety Responsibilities are:

- To identify risks on the premises, a fire risk assessment must be carried out.
- Ascertain that fire safety measures are properly installed.
- Prepare for unexpected events.
- Fire safety instructions and training should be provided to the employees.

6.2.2 Respond to a Workplace Fire

- Workplace fire drills should be conducted on a regular basis.
- If one has a manual alarm, they should raise it.
- Close the doors and leave the fire-stricken area as soon as possible. Ensure that the evacuation is quick and painless.
- Turn off dangerous machines and don't stop to get personal items.
- Assemble at a central location. Ascertain that the assembly point is easily accessible to the employees.
- If one's clothing catches fire, one shouldn't rush about it. They should stop and descend on the ground and roll to smother the flames if their clothes catch fire.

6.2.3 Fire Extinguisher

Fire extinguishers are portable devices used to put out small flames or minimise their damage until fire-fighters arrive. These are maintained on hand in locations such as fire stations, buildings, workplaces, public transit, and so on. The types and quantity of extinguishers that are legally necessary for a given region are determined by the applicable safety standards.

Types of fire extinguishers are:

There are five main types of fire extinguishers:

1. Water.
2. Powder.
3. Foam.
4. Carbon Dioxide (CO2).
5. Wet chemical.

1. **Water:** Water fire extinguishers are one of the most common commercial and residential fire extinguishers on the market. They're meant to be used on class-A flames.

2. **Powder:** The L2 powder fire extinguisher is the most commonly recommended fire extinguisher in the Class D Specialist Powder category, and is designed to put out burning lithium metal fires.

3. **Foam:** Foam extinguishers are identified by a cream rectangle with the word "foam" printed on it. They're mostly water-based, but they also contain a foaming component that provides a quick knock-down and blanketing effect on flames. It suffocates the flames and seals the vapours, preventing re-ignition.

4. **Carbon Dioxide (CO2):** Class B and electrical fires are extinguished with carbon dioxide extinguishers, which suffocate the flames by removing oxygen from the air. They are particularly beneficial for workplaces and workshops where electrical fires may occur since, unlike conventional extinguishers, they do not leave any toxins behind and hence minimise equipment damage.

5. **Wet Chemical:** Wet chemical extinguishers are designed to put out fires that are classified as class F. They are successful because they can put out extremely high-temperature fires, such as those caused by cooking oils and fats.

Notes

UNIT 6.3: First Aid

Unit Objectives

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

1. Explain how the administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning
2. Explain how to administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock.

6.3.1 First Aid

First aid is the treatment or care given to someone who has sustained an injury or disease until more advanced care can be obtained or the person recovers.

The aim of first aid is to:

- Preserve life
- Prevent the worsening of a sickness or injury
- If at all possible, relieve pain
- Encourage recovery
- Keep the unconscious safe.

First aid can help to lessen the severity of an injury or disease, and in some situations, it can even save a person's life.

6.3.2 Need for First Aid at the Workplace

- In the workplace, first aid refers to providing immediate care and life support to persons who have been injured or become unwell at work.
- Many times, first aid can help to lessen the severity of an accident or disease.
- It can also help an injured or sick person relax. In life-or-death situations, prompt and appropriate first aid can make all the difference.

6.3.2 Need for First Aid at the Workplace

In the workplace, first aid refers to providing immediate care and life support to persons who have been injured or become unwell at work.

Many times, first aid can help to lessen the severity of an accident or disease.

It can also help an injured or sick person relax. In life-or-death situations, prompt and appropriate first aid can make all the difference.

6.3.3 Treating Minor Cuts and Scapes

Steps to keep cuts clean and prevent infectionsand scars:

- **Wash Hands:** Wash hands first with soap and water to avoid introducing bacteria into the cut and causing an infection. One should use the hand sanitiser if one is on the go.
- **Stop the bleeding:** Using a gauze pad or a clean towel, apply pressure to the wound. For a few minutes, keep the pressure on.
- **Clean Wounds:** Once the bleeding has stopped, clean the wound by rinsing it under cool running water or using a saline wound wash. Use soap and a moist washcloth to clean the area around the wound. Soap should not be used on the cut since it may irritate the skin. Also, avoid using hydrogen peroxide or iodine, as these may aggravate the wound.
- **Remove Dirt:** Remove any dirt or debris from the area. Pick out any dirt, gravel, glass, or other material in the cut with a pair of tweezers cleaned with alcohol.

6.3.4 Heart Atack

When the blood flow carrying oxygen to the heart is blocked, a heart attack occurs. The heart muscle runs out of oxygen and starts to die.

Symptoms of a heart attack can vary from person to person. They may be mild or severe. Women, older adults, and people with diabetes are more likely to have subtle or unusual symptoms.

Symptoms in adults may include:

- Changes in mental status, especially in older adults.
- Chest pain that feels like pressure, squeezing, or fullness. The pain is most often in the centre of the chest. It may also be felt in the jaw, shoulder, arms, back, and stomach. It can last for more than a few minutes or come and go.
- Cold sweat.
- Light-headedness.
- Nausea (more common in women).
- Indigestion.

- Vomiting.
- Numbness, aching or tingling in the arm (usually the left arm, but the right arm may be affected alone, or along with the left).
- Shortness of breath
- Weakness or fatigue, especially in older adults and in women.

First Aid for Heart Attack

If one thinks someone is experiencing a heart attack, they should:

- Have the person sit down, rest, and try to keep calm.
- Loosen any tight clothing.
- Ask if the person takes any chest pain medicine, such as nitro-glycerine for a known heart condition, and help them take it.
- If the pain does not go away promptly with rest or within 3 minutes of taking nitro-glycerine, call for emergency medical help.
- If the person is unconscious and unresponsive, call 911 or the local emergency number, then begin CPR.
- If an infant or child is unconscious and unresponsive, perform 1 minute of CPR, then call 911 or the local emergency number.

Notes

UNIT 6.4: Waste Management

Unit Objectives

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

1. Describe the concept of waste management and methods of disposing of hazardous waste.
2. List the common sources of pollutionand ways to minimize them.
3. Elaborate on electronic waste disposal procedures.

6.4.1. Waste Management and Methods of Waste Disposal

The collection, disposal, monitoring, and processing of waste materials is known as waste management. These wastes affect living beings' health and the environment. For reducing their effects, they have to be managed properly. The waste is usually in solid, liquid or gaseous form.

The importance of waste management is:

Waste management is important because it decreases waste's impact on the environment, health, and other factors. It can also assist in the reuse or recycling of resources like paper, cans, and glass. The disposal of solid, liquid, gaseous, or dangerous substances is the example of waste management.

When it comes to trash management, there are numerous factors to consider, including waste disposal, recycling, waste avoidance and reduction, and garbage transportation. Treatment of solid and liquid wastes is part of the waste management process. It also provides a number of recycling options for goods that aren't classified as garbage during the process.

6.4.2 Methods of Waste Management

Non-biodegradable and toxic wastes, such as radioactive remains, can cause irreversible damage to the environment and human health if they are not properly disposed of. Waste disposal has long been a source of worry, with population increase and industrialisation being the primary causes. Here are a few garbage disposal options.

1. **Landfills:** The most common way of trash disposal today is to throw daily waste/garbage into landfills. This garbage disposal method relies on burying the material in the ground.
2. **Recycling:** Recycling is the process of transforming waste items into new products in order to reduce energy consumption and the use of fresh raw materials. Recycling reduces energy consumption, landfill volume, air and water pollution, greenhouse gas emissions, and the preservation of natural resources for future use.

3. **Composting:** Composting is a simple and natural bio-degradation process that converts organic wastes, such as plant remnants, garden garbage, and kitchen waste, into nutrient-rich food for plants.
4. **Incineration:** Incineration is the process of combusting garbage. The waste material is cooked to extremely high temperatures and turned into materials such as heat, gas, steam, and ash using this technology.

6.4.3 Recyclable, Non-Recyclable and Hazardous Waste

1. **Recyclable Waste:** The waste which can be reused or recycled further is known as recyclable waste.
2. **Non-recyclable Waste:** The waste which cannot be reused or recycled is known as non-recyclable waste. Polythene bags are a great example of non-recyclable waste.
3. **Hazardous Waste:** The waste which can create serious harm to the people and the environment is known as hazardous waste.

6.4.4 Sources of Pollution

Pollution is defined as the harm caused by the presence of a material or substances in places where they would not normally be found or at levels greater than normal. Polluting substances might be in the form of a solid, a liquid, or a gas.

- **Point source of pollution:** Pollution from a point source enters a water body at a precise location and can usually be identified. Effluent discharges from sewage treatment plants and industrial sites, power plants, landfill sites, fish farms, and oil leakage via a pipeline from industrial sites are all potential point sources of contamination.

  Point source pollution is often easy to prevent since it is feasible to identify where it originates, and once identified, individuals responsible for the pollution can take rapid corrective action or invest in longer-term treatment and control facilities.
- **Diffuse source of pollution:** As a result of land-use activities such as urban development, amenity, farming, and forestry, diffuse pollution occurs when pollutants are widely used and diffused over a large region. These activities could have occurred recently or in the past. It might be difficult to pinpoint specific sources of pollution and, as a result, take rapid action to prevent it because prevention often necessitates significant changes in land use and management methods.

Pollution Prevention

Pollution prevention entails acting at the source of pollutants to prevent or minimise their production. It saves natural resources, like water, by using materials and energy more efficiently.

Pollution prevention includes any practice that:

- Reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal;
- Reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants (these practices are known as "source reduction");
- Improved efficiency in the use of raw materials, energy, water, or other resources, or Conservation is a method of safeguarding natural resources.
- Improvements in housekeeping, maintenance, training, or inventory management; equipment or technology adjustments; process or method modifications; product reformulation or redesign; raw material substitution; or improvements in housekeeping, maintenance, training, or inventory control.

6.4.5 Electronic Waste

Lead, cadmium, beryllium, mercury, and brominated flame retardants are found in every piece of electronic waste. When gadgets and devices are disposed of illegally, these hazardous compounds are more likely to contaminate the earth, pollute the air, and leak into water bodies.

When e-waste is dumped in a landfill, it tends to leach trace metals as water runs through it. The contaminated landfill water then reaches natural groundwater with elevated toxic levels, which can be dangerous if it reaches any drinking water bodies. Despite having an environmentally benign approach, recycling generally results in international shipment and dumping of the gadgets in pits.

Some eco-friendly ways of disposing of e-waste are:

- Giving back the e-waste to the electronic companies and drop-off points
- Following guidelines issued by the government
- Selling or donating the outdated technology-based equipment
- Giving e-waste to a certified e-waste recycler

Exercise

1. Name all five types of fire extinguishers.
2. Explain PPE in brief.
3. List the common workplace hazards.
4. Fill in the blacks:
   i. A "_____ sign" is a safety sign that prohibits behaviour that is likely to endanger one's health or safety.
   ii. _____ entails acting at the source of pollutants to prevent or minimise their production.
   iii. _____ is the treatment or care given to someone who has sustained an injury or disease until more advanced care can be obtained or the person recovers.
   iv. The threats caused by biological agents like viruses, bacteria, animals, plants, insects and also humans, are known as _____.
   v. The workplace has to be administered as per the rules of the _____.

Notes

Skill India
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सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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

ESSCI

7. Employability & Entrepreneurship Skills

Key Learning Outcomes

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

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

44. Discuss the main types of bank accounts
45. Describe the process of opening a bank account
46. Differentiate between fixed and variable costs
47. Describe the main types of investment options
48. Describe the different types of insurance products
49. Describe the different types of taxes
50. Discuss the uses of online banking
51. Discuss the main types of electronic funds transfers
52. Discuss the steps to prepare for an interview
53. Discuss the steps to create an effective Resume
54. Discuss the most frequently asked interview questions
55. Discuss how to answer the most frequently asked interview questions
56. Discuss basic workplace terminology
57. Discuss the concept of entrepreneurship
58. Discuss the importance of entrepreneurship
59. Describe the characteristics of an entrepreneur
60. Describe the different types of enterprises
61. List the qualities of an effective leader
62. Discuss the benefits of effective leadership
63. List the traits of an effective team
64. Discuss the importance of listening effectively
65. Discuss how to listen effectively
66. Discuss the importance of speaking effectively
67. Discuss how to speak effectively
68. Discuss how to solve problems
69. List important problem solving traits
70. Discuss ways to assess problem solving skills
71. Discuss the importance of negotiation
72. Discuss how to negotiate
73. Discuss how to identify new business opportunities
74. Discuss how to identify business opportunities within your business
75. Explain the meaning of entrepreneur
76. Describe the different types of entrepreneurs
77. List the characteristics of entrepreneurs
78. Recall entrepreneur success stories
79. Discuss the entrepreneurial process
80. Describe the entrepreneurship ecosystem
81. Discuss the purpose of the Make in India campaign
82. Discuss key schemes to promote entrepreneurs
83. Discuss the relationship between entrepreneurship and risk appetite
84. Discuss the relationship between entrepreneurship and resilience
85. Describe the characteristics of a resilient entrepreneur
86. Discuss how to deal with failure
87. Discuss how market research is carried out
88. Describe the 4 Ps of marketing

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

UNIT 7.1: Personal Strengths & Value Systems

Unit Objectives

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

1. Explain the meaning of health
2. List common health issues
3. Discuss tips to prevent common health issues
4. Explain the meaning of hygiene
5. Discuss the purpose of Swacch Bharat Abhiyan
6. Explain the meaning of habit
7. Discuss ways to set up a safe work environment
8. Discuss critical safety habits to be followed by employees
9. Explain the importance of self-analysis
10. Discuss motivation with the help of Maslow's Hierarchy of Needs
11. Discuss the meaning of achievement motivation
12. List the characteristics of entrepreneurs with achievement motivation
13. List the different factors that motivate you
14. Discuss the role of attitude in self-analysis
15. Discuss how to maintain a positive attitude
16. List your strengths and weaknesses
17. Discuss the qualities of honest people
18. Describe the importance of honesty in entrepreneurs
19. Discuss the elements of a strong work ethic
20. Discuss how to foster a good work ethic
21. List the characteristics of highly creative people
22. List the characteristics of highly innovative people
23. Discuss the benefits of time management
24. List the traits of effective time managers
25. Describe effective time management technique
26. Discuss the importance of anger management
27. Describe anger management strategies
28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management

7.1.1 Health, Habits, Hygiene: What is Health?

As per the World Health Organization (WHO), health is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." This means being healthy does not simply mean not being unhealthy – it also means you need

to be at peace emotionally, and feel fit physically. For example, you cannot say you are healthy simply because you do not have any physical ailments like a cold or cough. You also need to think about whether you are feeling calm, relaxed and happy.

Common Health Issues

Some common health issues are:

- Allergies
- Asthma
- Skin Disorders
- Depression and Anxiety
- Diabetes
- Cough, Cold, Sore Throat
- Difficulty Sleeping
- Obesity

Prevent Health Issues

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

- Eating healthy foods like fruits, vegetables and nuts
- Cutting back on unhealthy and sugary foods
- Drinking enough water everyday
- Not smoking or drinking alcohol
- Exercising for at least 30 minutes a day, 4-5 times a week
- Taking vaccinations when required
- Practicing yoga exercises and meditation

How many of these health standards do you follow? Tick the ones that apply to you.

1. Get minimum 7-8 hours of sleep every night. ☐
2. Avoid checking email first thing in the morning and right before you go to bed at night. ☐
3. Don't skip meals – eat regular meals at correct meal times. ☐
4. Read a little bit every single day. ☐
5. Eat more home cooked food than junk food. ☐
6. Stand more than you sit. ☐
7. Drink a glass of water first thing in the morning and have at least 8 glasses of water through the day. ☐

8. Go to the doctor and dentist for regular check-ups. ☐
9. Exercise for 30 minutes at least 5 days a week. ☐
10. Avoid consuming lots of aerated beverages. ☐

What is Hygiene?

As per the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases." In other words, hygiene means ensuring that you do whatever is required to keep your surroundings clean, so that you reduce the chances of spreading germs and diseases.

For instance, think about the kitchen in your home. Good hygiene means ensuring that the kitchen is always spick and span, the food is put away, dishes are washed and dustbins are not overflowing with garbage. Doing all this will reduce the chances of attracting pests like rats or cockroaches, and prevent the growth of fungus and other bacteria, which could spread disease.

How many of these health standards do you follow? Tick the ones that apply to you.

1. Have a bath or shower every day with soap – and wash your hair with shampoo 2-3 times a week. ☐
2. Wear a fresh pair of clean undergarments every day. ☐
3. Brush your teeth in the morning and before going to bed. ☐
4. Cut your fingernails and toenails regularly. ☐
5. Wash your hands with soap after going to the toilet. ☐
6. Use an anti-perspirant deodorant on your underarms if you sweat a lot. ☐
7. Wash your hands with soap before cooking or eating. ☐
8. Stay home when you are sick, so other people don't catch what you have. ☐
9. Wash dirty clothes with laundry soap before wearing them again. ☐
10. Cover your nose with a tissue/your hand when coughing or sneezing. ☐

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

Your Score

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

7-14/20: Not bad, but there is scope for improvement! Try and add a few more good habits to your daily routine.

14-20/20: Great job! Keep up the good work! Your body and mind thank you!

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

Swachh Bharat Abhiyan

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

What are Habits?

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

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

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

Some bad habits that you should quit immediately are:

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

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

7.1.2: Safety: Tips to Design a Safe Workplace

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Use ergonomically designed furniture and equipment to avoid stooping and twisting
- Provide mechanical aids to avoid lifting or carrying heavy objects
- Have protective equipment on hand for hazardous jobs
- Designate emergency exits and ensure they are easily accessible
- Set down health codes and ensure they are implemented
- Follow the practice of regular safety inspections in and around the workplace
- Ensure regular building inspections are conducted
- Get expert advice on workplace safety and follow it

Non-Negotiable Employee Safety Habits

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Immediately report unsafe conditions to a supervisor
- Recognize and report safety hazards that could lead to slips, trips and falls
- Report all injuries and accidents to a supervisor
- Wear the correct protective equipment when required
- Learn how to correctly use equipment provided for safety purposes
- Be aware of and avoid actions that could endanger other people
- Take rest breaks during the day and some time off from work during the week

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

7.1.3 Self-Analysis – Attitude, Achievement Motivation

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

can better understand yourself by taking a deep look at what motivates you, what your attitude is like, and what your strengths and weaknesses are.

What is Motivation?

Very simply put, motivation is your reason for acting or behaving in a certain manner. It is important to understand that not everyone is motivated by the same desires – people are motivated by many, many different things. We can understand this better by looking at Maslow's Hierarchy of Needs.

Maslow's Hierarchy of Needs

Famous American psychologist Abraham Maslow wanted to understand what motivates people. He believed that people have five types of needs, ranging from very basic needs (called physiological needs) to more important needs that are required for self-growth (called self-actualization needs). Between the physiological and self-actualization needs are three other needs – safety needs, belongingness and love needs, and esteem needs. Theseneeds are usually shown as a pyramid with five levels and are known as Maslow's Hierarchy of Needs.

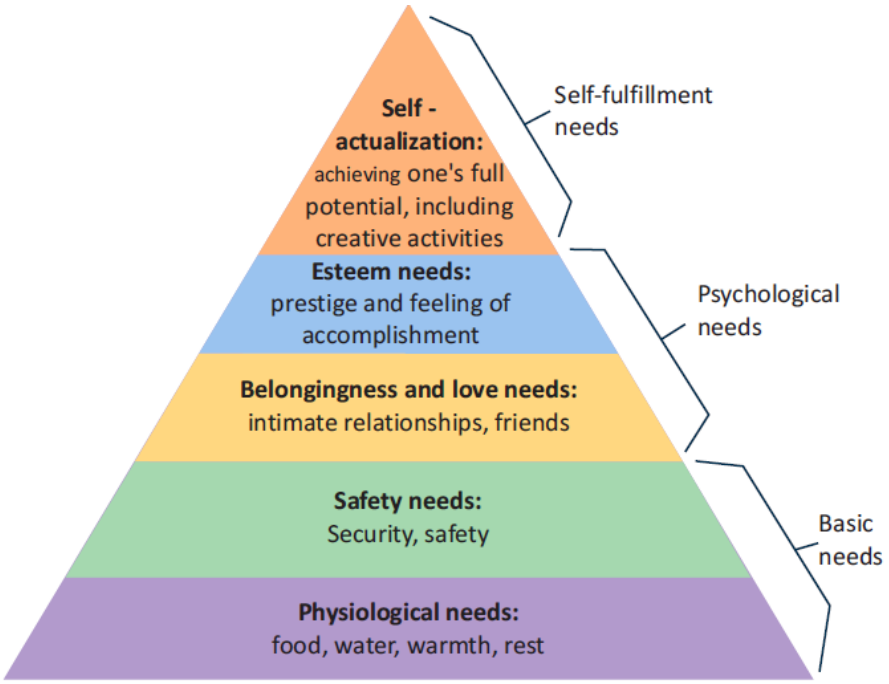

Fig. 7.1.1: Maslow's Hierarchy of Needs

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

Rupa comes from a very poor family. She never has enough food, water, warmth or rest. According to Maslow, until Rupa is sure that she will get these basic needs, she will not even think about the next level of needs – her safety needs. But, once Rupa is confident that her basic needs will be met, she will move to the next level, and her behaviour will then be

motivated by her need for security and safety. Once these new needs are met, Rupa will once again move to the next level, and be motivated by her need for relationships and friends. Once this need is satisfied, Rupa will then focus on the fourth level of needs – her esteem needs, after which she will move up to the fifth and last level of needs – the desire to achieve her full potential.

Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfilment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'. The level of motivation achievement in a person differs from individual to individual. It is important that entrepreneurs have a high level of achievement motivation – a deep desire to accomplish something important and unique. It is equally important that they hire people who are also highly motivated by challenges and success.

What Motivates You?

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

I am motivated by:

_____

_____

_____

_____

Characteristics of Entrepreneurs with Achievement Motivation

Entrepreneurs with achievement motivation can be described as follows:

- Unafraid to take risks for personal accomplishment
- Love being challenged
- Future-oriented
- Flexible and adaptive
- Value negative feedback more than positive feedback
- Very persistent when it comes to achieving goals
- Extremely courageous
- Highly creative and innovative
- Restless - constantly looking to achieve more
- Feel personally responsible for solving problems

Think about it:

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

What is Attitude?

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

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

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

How to Cultivate a Positive Attitude?

The good news is attitude is a choice. So, it is possible to improve, control and change our attitude, if we decide we want to!

The following tips help foster a positive mindset:

- Remember that you control your attitude, not the other way around
- Devote at least 15 minutes a day towards reading, watching or listening to something positive
- Avoid negative people who only complain and stop complaining yourself
- Expand your vocabulary with positive words and delete negative phrases from your mind
- Be appreciative and focus on what's good in yourself, in your life, and in others
- Stop thinking of yourself as a victim and start being proactive
- Imagine yourself succeeding and achieving your goals

What Are Your Strengths and Weaknesses?

Another way to analyse yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses. Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Strengths	Weaknesses

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

7.1.4 Honesty & Work Ethics: What is Honesty?

Honesty is the quality of being fair and truthful. It means speaking and acting in a manner that inspires trust. A person who is described as honest is seen as truthful and sincere, and as someone who isn't deceitful or devious and doesn't steal or cheat. There are two dimensions of honesty – one is honesty in communication and the other is honesty in conduct.

Honesty is an extremely important trait because it results in peace of mind and builds relationships that are based on trust. Being dishonest, on the other hand, results in anxiety and leads to relationships full of distrust and conflict.

Qualities of Honest People

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

1. They don't worry about what others think of them. They believe in being themselves – they don't bother about whether they are liked or disliked for their personalities.
2. They stand up for their beliefs. They won't think twice about giving their honest opinion, even if they are aware that their point of view lies with the minority.
3. They are think skinned. This means they are not affected by others judging them harshly for their honest opinions.
4. They forge trusting, meaningful and healthy friendships. Honest people usually surround themselves with honest friends. They have faith that their friends will be truthful and upfront with them at all times.
5. They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves.

Let's look at how being honest would lead to great benefits for entrepreneurs.

- **Honesty and customers:** When entrepreneurs are honest with their customers it leads to stronger relationships, which in turn results in business growth and a stronger customer network.
- **Honesty and employees:** When entrepreneurs build honest relationships with their employees, it leads to more transparency in the workplace, which results in higher work performance and better results.

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

What are Work Ethics?

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

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

These guidelines are typically outlined in a company's employee handbook.

Elements of a Strong Work Ethic

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

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

How to Foster a Good Work Ethic?

As an entrepreneur, it is important that you clearly define the kind of behaviour that you expect from each and every team member in the workplace. You should make it clear that you expect employees to display positive work ethics like:

- **Honesty**: All work assigned to a person should be done with complete honesty, without any deceit or lies.
- **Good attitude**: All team members should be optimistic, energetic, and positive.
- **Reliability**: Employees should show up where they are supposed to be, when they are supposed to be there.
- **Good work habits**: Employees should always be well groomed, never use inappropriate language, conduct themselves professionally at all times and so on.
- **Initiative**: Doing the bare minimum is not enough. Every team member needs to be proactive and show initiative.
- **Trustworthiness**: Trust is non-negotiable. If an employee cannot be trusted, it's time to let that employee go.
- **Respect**: Employees need to respect the company, the law, their work, their colleagues and themselves.
- **Integrity**: Each and every team member should be completely ethical and must display above board behaviour at all times.
- **Efficiency**: Efficient employees help a company grow while inefficient employees result in a waste of time and resources.

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

7.1.5 Creativity & Innovation: What is Creativity?

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

Characteristics of Highly Creative People

Some characteristics of creative people are:

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

What is Innovation?

There are many different definitions of innovation. In simple terms, innovation means turning an idea into a solution that adds value. It can also mean adding value by

implementing a new product, service or process, or significantly improving on an existing product, service or process.

Characteristics of Highly Innovative People

Some characteristics of highly innovative people are:

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

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

7.1.6 Time Management: What is Time Management?

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

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

Benefits of Time Management

Time management can lead to huge benefits like:

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

Not managing time effectively can result in undesirable consequences like:

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

Traits of Effective Time Managers

Some traits of effective time managers are:

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

Effective Time Management Techniques

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

- Plan out your day as well as plan for interruptions. Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- Put up a “Do Not Disturb” sign when you absolutely have to complete a certain amount of work.
- Close your mind to all distractions. Train yourself to ignore ringing phones, don’t reply to chat messages and disconnect from social media sites.
- Delegate your work. This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- Stop procrastinating. Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- Prioritize. List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- Maintain a log of your work activities. Analyse the log to help you understand how efficient you are, and how much time is wasted every day.
- Create time management goals to reduce time wastage.

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

7.1.7 Anger Management: What is Anger Management?

Anger management is the process of:

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

Anger management does not mean suppressing anger.

Importance of Anger Management

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

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

This is why anger management, or managing anger appropriately, is so important.

Anger Management Strategies

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

Strategy 1: Relaxation

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

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

5. Picture a relaxing moment (this can be from your memory or your imagination)
6. Follow this relaxation technique daily, especially when you realize that you're starting to feel angry.

Strategy 2: Cognitive Restructuring

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

Strategy 3: Problem Solving

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

Strategy 4: Better Communication

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

Strategy 5: Changing Your Environment

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

Tips for Anger Management

The following tips will help you keep your anger in check:

- Take some time to collect your thoughts before you speak out in anger.
- Express the reason for your anger in an assertive, but non-confrontational manner once you have calmed down.
- Do some form of physical exercise like running or walking briskly when you feel yourself getting angry.
- Make short breaks part of your daily routine, especially during days that are stressful.
- Focus on how to solve a problem that's making you angry, rather than focusing on the fact that the problem is making you angry.

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

7.1.8 Stress Management: What is Stress?

We say we are 'stressed' when we feel overloaded and unsure of our ability to deal with the pressures placed on us. Anything that challenges or threatens our well-being can be defined as a stress. It is important to note that stress can be good and bad. While good stress keeps us going, negative stress undermines our mental and physical health. This is why it is so important to manage negative stress effectively.

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress

- Constant worry
- Rigid thinking
- Unrealistic expectations
- Pessimism
- Negative self-talk
- All in or all out attitude

External causes of stress

- Major life changes
- Difficulties with relationships
- Having too much to do
- Difficulties at work or in school
- Financial difficulties
- Worrying about one's children and/or family

Symptoms of Stress

Stress can manifest itself in numerous ways. Take a look at the cognitive, emotional, physical and behavioural symptoms of stress.

Cognitive Symptoms

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

Emotional Symptoms

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

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

Tips to Manage Stress

The following tips can help you manage your stress better:

- Note down the different ways in which you can handle the various sources of your stress.
- Remember that you cannot control everything, but you can control how you respond.
- Discuss your feelings, opinions and beliefs rather than reacting angrily, defensively or passively.
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed.
- Devote a part of your day towards exercise.
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large amounts of sugar.
- Plan your day so that you can manage your time better, with less stress.
- Say no to people and things when required.
- Schedule time to pursue your hobbies and interests.
- Ensure you get at least 7-8 hours of sleep.
- Reduce your caffeine intake.
- Increase the time spent with family and friends.

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

UNIT 7.2: Digital Literacy: A Recap

Unit Objectives

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

1. Identify the basic parts of a computer
2. Identify the basic parts of a keyboard
3. Recall basic computer terminology
4. Recall the functions of basic computer keys
5. Discuss the main applications of MS Office
6. Discuss the benefits of Microsoft Outlook
7. Discuss the different types of e-commerce
8. List the benefits of e-commerce for retailers and customers
9. Discuss how the Digital India campaign will help boost e-commerce in India

7.2.1 Computer and Internet basics: Basic Parts of a Computer

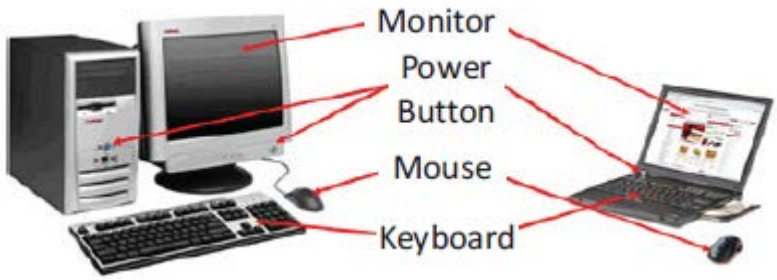


Fig.7.2.1. Parts of a Computer

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

Basic Parts of a Keyboard

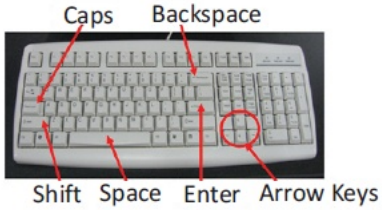


Fig.7.2.2. Parts of a Keyboard

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

Basic Internet Terms

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

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

7.2.2 MS Office and Email: About MS Office

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

Most Popular Office Products

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

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

Why Choose Microsoft Outlook?

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

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

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

7.2.3 E-Commerce: What is E-Commerce?

E-commerce is the buying or selling of goods and services, or the transmitting of money or data, electronically on the internet. E-Commerce is the short form for "electronic commerce."

Examples of E-Commerce

Some examples of e-commerce are:

- Online shopping
- Online auctions
- Online ticketing
- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- **Business to Business (B2B)**: Both the transacting parties are businesses.
- **Business to Consumer (B2C)**: Businesses sell electronically to end-consumers.
- **Consumer to Consumer (C2C):** Consumers come together to buy, sell or trade items to other consumers.
- **Consumer-to-Business (C2B)**: Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A)**: Online transactions conducted between companies and public administration.
- **Consumer-to-Administration (C2A)**: Online transactions conducted between individual and public administration.

Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and

information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.
Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.

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

UNIT 7.3: Money Matters

Unit Objectives

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

1. Discuss the importance of saving money
2. Discuss the benefits of saving money
3. Discuss the main types of bank accounts
4. Describe the process of opening a bank account
5. Differentiate between fixed and variable costs
6. Describe the main types of investment options
7. Describe the different types of insurance products
8. Describe the different types of taxes
9. Discuss the uses of online banking
10. Discuss the main types of electronic funds transfers

7.3.1 Personal Finance – Why to Save? Importance of Saving

We all know that the future is unpredictable. You never know what will happen tomorrow, next week or next year. That's why saving money steadily through the years is so important. Saving money will help improve your financial situation over time. But more importantly, knowing that you have money stashed away for an emergency will give you peace of mind. Saving money also opens the door to many more options and possibilities.

Benefits of Saving

Inculcating the habit of saving leads to a vast number of benefits. Saving helps you:

- **Become financially independent**: When you have enough money saved up to feel secure you can start making your choices, from taking a vacation whenever you want, to switching careers or starting your own business.
- **Invest in yourself through education**: Through saving, you can earn enough to pay up for courses that will add to your professional experience and ultimately result in higher paying jobs.
- **Get out of debt**: Once you have saved enough as a reserve fund, you can use your savings to pay off debts like loans or bills that have accumulated over time.
- **Be prepared for surprise expenses:** Having money saved enables you to pay for unforeseen expenses like sudden car or house repairs, without feeling financially stressed.
- **Pay for emergencies**: Saving helps you deal with emergencies like sudden health issues or emergency trips without feeling financially burdened.
- **Afford large purchases and achieve major goals**: Saving diligently makes it possible to place down payments towards major purchases and goals, like buying a home or a car.
- **Retire**: The money you have saved over the years will keep you comfortable when you no longer have the income you would get from your job.

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

7.3.2 Types of Bank Accounts, Opening a Bank Account

Types of Bank Accounts

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

- Current Accounts
- Savings Accounts
- Recurring Deposit Accounts
- Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Saving Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details (name, address, phone number, date of birth, gender, occupation, address)
- Method of receiving your account statement (hard copy/email)
- Details of your initial deposit (cash/cheque)
- Manner of operating your account (online/mobile banking/traditional via cheque, slip books)

Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual need to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

- Passport
- Driving License
- Voters' Identity Card
- PAN Card
- UIDAI (Aadhar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!

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

7.3.3 Costs: Fixed vs Variable: What are Fixed and Variable Costs?

Fixed costs and variable costs together make up a company's total cost. These are the two types of costs that companies have to bear when producing goods and services. A fixed cost does not change with the volume of goods or services a company produces. It always remains the same.

A variable cost, on the other hand, increases and decreases depending on the volume of goods and services produced. In other words, it varies with the amount produced.

Differences Between Fixed and Variable Costs

Let's take a look at some of the main differences between fixed and variable costs:

Criteria	Fixed Costs	Variable Costs
Meaning	A cost that stays the same, regardless of the output produced.	A cost that changes when the
Nature	Time related.	Volume related.
Incurred	Incurred irrespective of units being produced.	Incurred only when units are produced
Unit cost	Inversely proportional to the number of units produced	Remains the same, per unit.
Examples	Depreciation, rent, salary, insurance and tax	Material consumed, wages, commission on sales and packing expenses

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

7.3.4 Investment, Insurance and Taxes: Investment

Investment means that money is spent today with the aim of reaping financial gains at a future time.

The main types of investment options are as follows:

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

Insurance

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

Life Insurance

Life Insurance deals with all insurance covering human life.

Life Insurance Products

The main life insurance products are:

- **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.
- **Endowment Policy:** This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- **Unit-Linked Insurance Plan (ULIP):** Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.
- **Money Back Life Insurance:** While the policyholder is alive, periodic payments of the partial survival benefits are made during the policy tenure. On the death of the insured, the insurance company pays the full sum assured along with survival benefits.

- **Whole Life Insurance:** It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products

The main general insurance products are:

- **Motor Insurance:** This can be divided into Four-Wheeler Insurance and Two-Wheeler insurance.
- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.
- **Travel Insurance:** This can be categorized into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- **Home Insurance:** This protects the house and its contents from risk.
- **Marine Insurance:** This insurance covers goods, freight and cargo against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes – Direct Taxes and Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable. Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.
- **Capital Gains Tax:** This tax is payable whenever you receive a sizable amount of money. It is usually of two types – short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.
- **Securities Transaction Tax:** This tax is added to the price of a share. It is levied every time you buy or sell shares.
- **Perquisite Tax:** This tax is levied 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

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

7.3.5 Online Banking, NEFT, RTGS etc.: What is Online Banking?

Internet or online banking allows account holders to access their account from a laptop at any location. In this way, instructions can be issued. To access an account, account holders simply

Internet banking can be used to:

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

Electronic Funds Transfers

Electronic funds transfer is a convenient way of transferring money from the comfort of one's own home, using integrated banking tools like internet and mobile banking. Transferring funds via an electronic gateway is extremely convenient. With the help of online banking, you can choose to:

- Transfer funds into your own accounts of the same bank.
- Transfer funds into different accounts of the same bank.
- Transfer funds into accounts in different bank, using NEFT.
- Transfer funds into other bank accounts using RTGS.
- Transfer funds into various accounts using IMPS.

NEFT

NEFT stands for National Electronic Funds Transfer. This money transfer system allows you to electronically transfer funds from your respective bank accounts to any other account, either in the same bank or belonging to any other bank. NEFT can be used by individuals, firms and corporate organizations to transfer funds between accounts.

In order to transfer funds via NEFT, two things are required:

- A transferring bank
- A destination bank

Before you can transfer funds through NEFT, you will need to register the beneficiary who will be receiving the funds. In order to complete this registration, you will require the following information:

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

RTGS

RTGS stands for Real Time Gross Settlement. This is a real-time fund transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. Th e transferred amount is immediately deducted from the account of one bank, and instantly credited to the other bank's account. The RTGS payment gateway is maintained by the Reserve Bank of India. The transactions between banks are made electronically. RTGS can be used by individuals, companies and firms to transfer large sums of money. Before remitting funds through RTGS, you will need to add the beneficiary and his bank account details via your online banking account. In order to complete this registration, you will require the

- Name of the beneficiary
- Beneficiary's 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.

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

To transfer money through IMPS, the you need to:

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

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

1. Link his mobile number with his respective account

2. Receive the MMID from the bank

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

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

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

Differences Between NEFT, RTGS & IMPS

Criteria	NEFT	RTGS	IMPS
Settlement	Done in batches	Real-time	Real-time
Full form	National Electronic Fund Transfer	Real Time Gross Settlement	Immediate Payment Service
Timings on Monday – Friday	8:00 am – 6:30 pm	9:00 am – 4:30 pm	24x7
Timings on Saturday	8:00 am – 1:00 pm	9:00 am – 1:30 pm	24x7
Minimum amount of money transfer limit	₹1	₹2 lacs	₹1
Maximum amount of money transfer limit	₹10 lacs	₹10 lacs per day	₹2 lacs
Maximum charges as per RBI	Up to 10,000 – ₹2.5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs ₹15 above 2 – 5 lacs ₹25 above 5 – 10 lacs ₹25	above 2 – 5 lacs ₹25 above 5 – 10 lacs ₹50	Up to 10,000 – ₹5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15

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

UNIT 7.4: Preparing for Employment & Self-Employment

Unit Objectives

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

1. Discuss the steps to prepare for an interview
2. Discuss the steps to create an effective Resume
3. Discuss the most frequently asked interview questions
4. Discuss how to answer the most frequently asked interview questions
5. Discuss basic workplace terminology

7.4.1 Interview Preparation: How to Prepare for an Interview?

The success of your getting the job that you want depends largely on how well your interview for that job goes. Therefore, before you go in for your interview, it is important that you prepare for it with a fair amount of research and planning. Take a look at the steps to follow in order to be well prepared for an interview:

1. **Research the organization that you are having the interview with.**
   - Studying the company beforehand will help you be more prepared at the time of the interview. Your knowledge of the organization will help you answer questions at the time of the interview, and will leave you looking and feeling more confident. This is sure to make you stand out from other, not as well informed, candidates.
   - Look for background information on the company. Ty and find an overview of the company and its industry profile.
   - Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.
   - Note down any questions that you have after your research has been completed.
2. **Think about whether your skills and qualifications match the job requirements.**
   - Carefully read through and analyse the job description.
   - Make a note of the knowledge, skills and abilities required to fulfil the job requirements.
   - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.
3. **Go through the most typical interview questions asked, and prepare your responses.**
   - Remember, in most interviews a mix of resume-based, behavioural and case study questions are asked.
   - Think about the kind of answers you would like to provide to typical questions asked in these three areas.
   - Practice these answers until you can express them confidently and clearly.

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

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

7.4.2 Preparing an Effective Resume: How to Create an Effective Resume?

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a résumé that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section

The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

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

Step 2: Add the Profile Summary Section

This part of your resume should list your overall experiences, achievements, awards, certifications and strengths. You can make your summary as short as 2-3 bullet points or a s long as 8-7 bullet points.

Example:

Profile Summary

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

Step 3: Include Your Educational Qualifications

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

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

Example:

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

Step 4: List Your Technical Skills

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

Example:

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

Step 5: Insert Your Academic Project Experience

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

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

Example:

Academic Projects
Project Title: *<Insert project title>*
Organization: *<Insert the name of the organization for whom you did the project>*
Platform used: *<Insert the platform used, if any>*
Contribution: *<Insert your contribution towards this project>*
Description: *<Insert a description of the project in one line>*

Step 6: List Your Strengths

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

Example:

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

Step 7: List Your Extracurricular Activities

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

Example:

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

Step 8: Write Your Personal Details

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

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

Example:

Personal Details

- Date of birth: 25th May, 1981
- Gender & marital status: Female, Single
- Nationality: Indian

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

7.4.3 Interview FAQs

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

Q1. Can you tell me a little about yourself?

Tips to answer:

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

Q2. How did you hear about the position?

Tips to answer:

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

Q3. What do you know about the company?

Tips to answer:

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

Q4. Why do you want this job?

Tips to answer:

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

Q5. Why should we hire you?

Tips to answer:

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

Q6. What are your greatest professional strengths?

Tips to answer:

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

Q7. What do you consider to be your weaknesses?

Tips to answer:

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

Q8. What are your salary requirements?

Tips to answer:

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

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

Tips to answer:

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

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

Tips to answer:

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

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

Tips to answer:

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

Q12: Do you have any questions for us?

Tips to answer:

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

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

7.4.4 Work Readiness – Terms & Terminologies: Basic Workplace Terminology

Every employee should be well versed in the following terms:

- **Annual leave:** Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- **Breaks:** Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- **Compensatory Time (Comp Time):** Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's service to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.
- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- **Curriculum Vitae (CV)/Resume:** A summary of a candidate's achievements, educational work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- **Employment Gaps:** Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- **Follow-Up:** The act of contacting a potential employer after a candidate has submitted his or her resume.
- **Freelancer/Consultant/Independent Contractor:** A person who works for him or herself for temporary jobs and projects with different employers.
- **Holiday**: Paid time-off from work.
- **Hourly Rate**: The amount of salary or wages paid for 60 minutes of work.
- **Internship**: A job opportunity offered by an employer to a potential employee, called an at the employer's company for a fixed, limited time period.

- **Interview**: A conversation between a potential employee and a representative of an order to determine if the potential employee should be hired.
- **Job Application**: A form which asks for a candidate's information like the candidate's name, details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.
- **Job Offer**: An offer of employment made by an employer to a potential employee.
- **Job Search Agent**: A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies. background, made by the and pitches intern, to work employer, in address, contact
- **Lay Off**: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- **Leave**: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- **Letter of Acceptance**: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- **Letter of Agreement**: A letter that outlines the terms of employment.
- **Letter of Recommendation**: A letter written for the purpose of validating the work skills o f a person.
- **Maternity Leave**: Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor**: A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- **Minimum wage**: The minimum wage amount paid on an hourly basis.
- **Notice**: An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.
- **Offer of Employment**: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract**: A contract of employment that continues till the employer or terminates it.
- **Overqualified**: A person who is not suited for a particular job because he or she has too m any years of work experience, or a level of education that is much higher than required f or the job, or is currently or was previously too highly paid.
- **Part-Time Worker**: An employee who works for fewer hours than the standard number of hours normally worked.
- **Paternity Leave**: Leave granted to a man who has recently become a father.
- **Recruiters/Head-hunters/Executive Search Firms**: Professionals who are paid by employers to search for people to fill particular positions.
- **Resigning/Resignations**: When an employee formally informs his or her employer that he or she is quitting his or her job.
- **Self-Employed**: A person who has his or her own business and does not work in the capacity of an employee.
- **Time Sheet**: A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

UNIT 7.5: Understanding Entrepreneurship

Unit Objectives

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

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

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

Entrepreneurs and Entrepreneurship

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

Importance of Entrepreneurship

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

Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common.

They are all:

- Extremely passionate about their work
- Confident in themselves
- Disciplined and dedicated
- Motivated and driven
- Highly creative
- Visionaries
- Open-minded
- Decisive

Entrepreneurs also have a tendency to:

- Have a high-risk tolerance
- Thoroughly plan everything
- Manage their money wisely
- Make their customers their priority
- Understand their offering and their market in detail
- Ask for advice from experts when required
- Know when to cut their losses

Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

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

Types of Enterprises

As an entrepreneur in India, you can own and run any of the following types of enterprises:

Sole Proprietorship

In a sole proprietorship, a single individual owns, manages and controls the enterprise. This type of business is the easiest to form with respect to legal formalities. The business and the owner have no separate legal existence. All profit belongs to the proprietor, as do all the losses the liability of the entrepreneur is unlimited.

Partnership

A partnership firm is formed by two or more people. The owners of the enterprise are called partners. A partnership deed must be signed by all the partners. The firm and its partners have no separate legal existence. The profits are shared by the partners. With respect to losses, the liability of the partners is unlimited. A firm has a limited life span and must be dissolved when any one of the partners dies, retires, claims bankruptcy or goes insane.

Limited Liability Partnership (LLP)

In a Limited Liability Partnership or LLP, the partners of the firm enjoy perpetual existence as well as the advantage of limited liability. Each partner's liability is limited to their agreed contribution to the LLP. The partnership and its partners have a separate legal existence.

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

7.5.2 Leadership & Teamwork: Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means not asking someone to do something that you wouldn't willingly want to do yourself. Leadership is about figuring out what to do in order to win as a team, and as a company. Leaders believe in doing the right things. They also believe in helping others to do the right things. An effective leader is someone who:

- Creates an inspiring vision of the future.
- Motivates and inspires his team to pursue that vision.

Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

1. **Pragmatism:** This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.
2. **Humility:** This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.
3. **Flexibility:** It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.
4. **Authenticity:** This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.
5. **Reinvention:** This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.
6. **Awareness:** This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

- Gaining the loyalty and commitment of the team members
- Motivating the team to work towards achieving the company's goals and objectives
- Building morale and instilling confidence in the team members
- Fostering mutual understanding and team-spirit among team members
- Convincing team members about the need to change when a situation requires adaptability

Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

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

6. **Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.
7. **Excellent organizational skills:** The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to measure progress and ROI.

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

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

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated. It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

How to Listen Effectively?

To listen effectively you should:

- Stop talking
- Stop interrupting
- Focus completely on what is being said
- Pay attention to the tone that is being used
- Pay attention to the speaker's gestures, facial expressions and eye movements
- Not try and rush the person

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

The Importance of Speaking Effectively

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable.

Besides this, the words spoken out loud need to match the gestures, tone and body language used. What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

How to Speak Effectively?

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should be crystal clear at all times. Use a pleasant and natural tone when speaking. Your audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.
- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.
- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be careful not to speak too slowly because this can come across as stiff, unprepared or even condescending.
- Remember to pause at the right moments.

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

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

As per The Concise Oxford Dictionary (1995), a problem is, "A doubtful or difficult matter requiring a solution"

All problems contain two elements:

1. Goals
2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve the goals.

How to Solve Problems?

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

Step 1: Identify the problem

Step 2: Study the problem in detail

Step 3: List all possible solutions

Step 4: Select the best solution

Step 5: Implement the chosen solution

Step 6: Check that the problem has really been solved

Important Traits for Problem Solving

Highly developed problem solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

Being open minded

Not panicking

Asking the right questions

Having a positive attitude

Being proactive

Focusing on the right problem

How to Assess for Problem Solving Skills?

As an entrepreneur, it would be a good idea to assess the level of problem solving skills of potential candidates before hiring them. Some ways to assess this skill are through:

1. Application forms: Ask for proof of the candidate's problem solving skills in the application form.
2. Psychometric tests: Give potential candidates logical reasoning and critical thinking tests and see how they fare.

3. Interviews: Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.
4. Technical questions: Give candidates examples of real life problems and evaluate their thought process.

What is Negotiation?

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate?

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a start-up. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only 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

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

7.5.5 Business Opportunities Identification: Entrepreneurs and Opportunities

"The entrepreneur always searches for change, responds to it and exploits it as an opportunity."
Peter Drucker
The ability to identify business opportunities is an essential characteristic of an entrepreneur.

What is an Opportunity?

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances

Common Questions Faced by Entrepreneurs

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

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

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

When is an Idea an Opportunity?

An idea is an opportunity when:

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

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

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

Ways to Identify New Business Opportunities

1. **Identify Market Inefficiencies**
   When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.
2. **Remove Key Hassles**
   Rather than create a new product or service, you can innovatively improve a product, service or process.
3. **Create Something New**
   Think about how you can create a new experience for customers, based on existing business models.
4. **Pick a Growing Sector/Industry**
   Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.
5. **Think About Product Differentiation**
   If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities Within Your Business

1. **SWOT Analysis**

   An excellent way to identify opportunities inside your business is by creating a SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats. SWOT analysis framework:

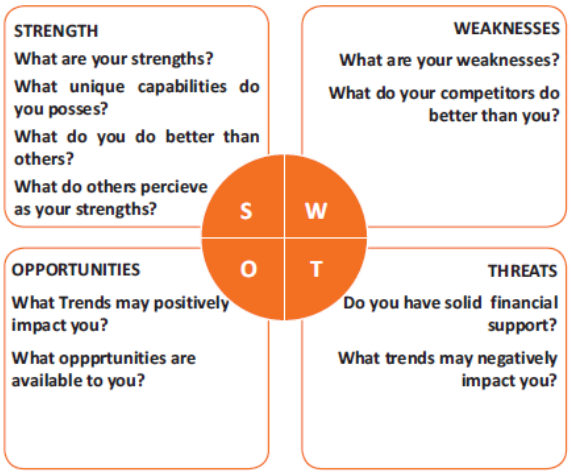


Fig.7.5.1. SWOT Analysis

Consider the following when looking for business opportunities:
By looking at yourself and your competitors using the SWOT framework, you can uncover opportunities that you can exploit, as well as manage and eliminate threats that could derail your success.

2. **Establishing Your USP**

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

Opportunity Analysis

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

To analyse an opportunity, you must:

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

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

An entrepreneur is a person who:

- Does not work for an employee
- Runs a small enterprise
- Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

1. **The Traditional Entrepreneur:** This type of entrepreneur usually has some kind of skill – they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.
2. **The Growth Potential Entrepreneur:** The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.
3. **The Project-Oriented Entrepreneur:** This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.
4. **The Lifestyle Entrepreneur:** This type of entrepreneur has usually worked as a teacher or a secretary. They are more interested in selling something that people will enjoy, rather than making lots of money.

Characteristics of an Entrepreneur

Successful entrepreneurs have the following characteristics:

- They are highly motivated
- They are creative and persuasive
- They are mentally prepared to handle each and every task
- They have excellent business skills – they know how to evaluate their cash flow, sales and revenue
- They are willing to take great risks
- They are very proactive – this means they are willing to do the work themselves, rather than wait for someone else to do it
- They have a vision – they are able to see the big picture
- They are flexible and open-minded
- They are good at making decisions

Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling "bhajias" to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

Dr. Karsanbhai Patel

Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-to door and offered a money back guarantee with every pack that was sold. He charged Rs.3 per kg when the cheapest detergent at that time was Rs.13 per kg. Dr. Patel eventually started Nirma which became a whole new segment in the Indian domestic detergent market.

The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

Stage 1: Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.

Stage 2: Germination or Recognition. In this stage a possible solution to the identified problem is thought of.

Stage 3: Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.

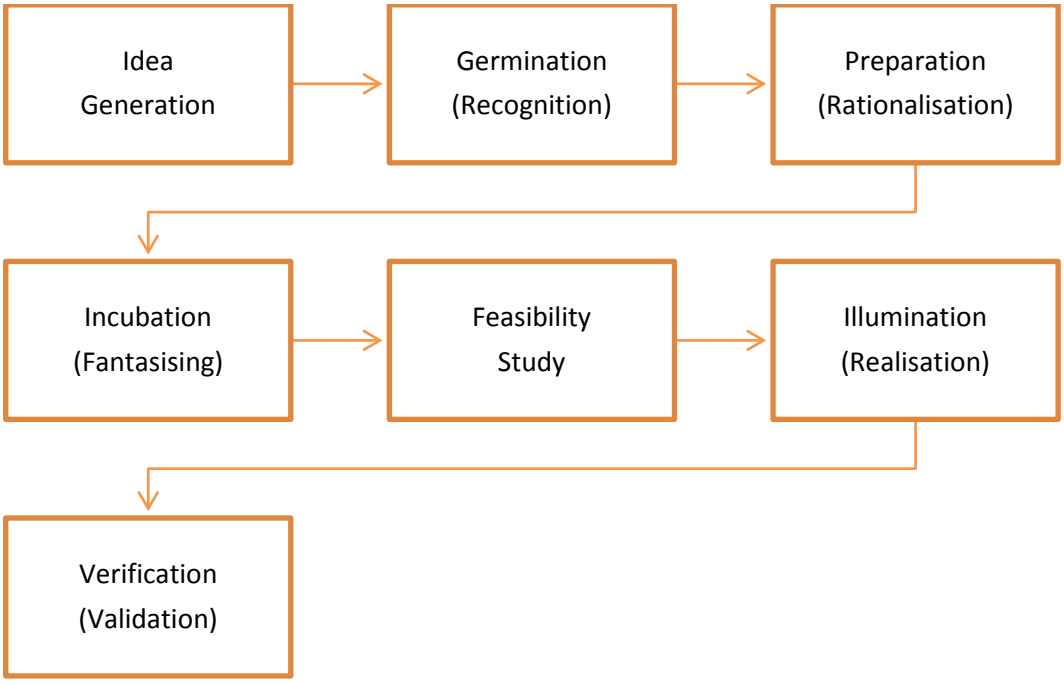
Stage 4: Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.

Stage 5: Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.

Stage 6: Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.

Stage 7: Verification or Validation. In this final stage, the idea is verified to see if it works and if it is usefu

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



Introduction to the Entrepreneurship Ecosystem

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

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

These domains indicate whether there is a strong entrepreneurship support ecosystem and what actions should the government put in place to further encourage this ecosystem.

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

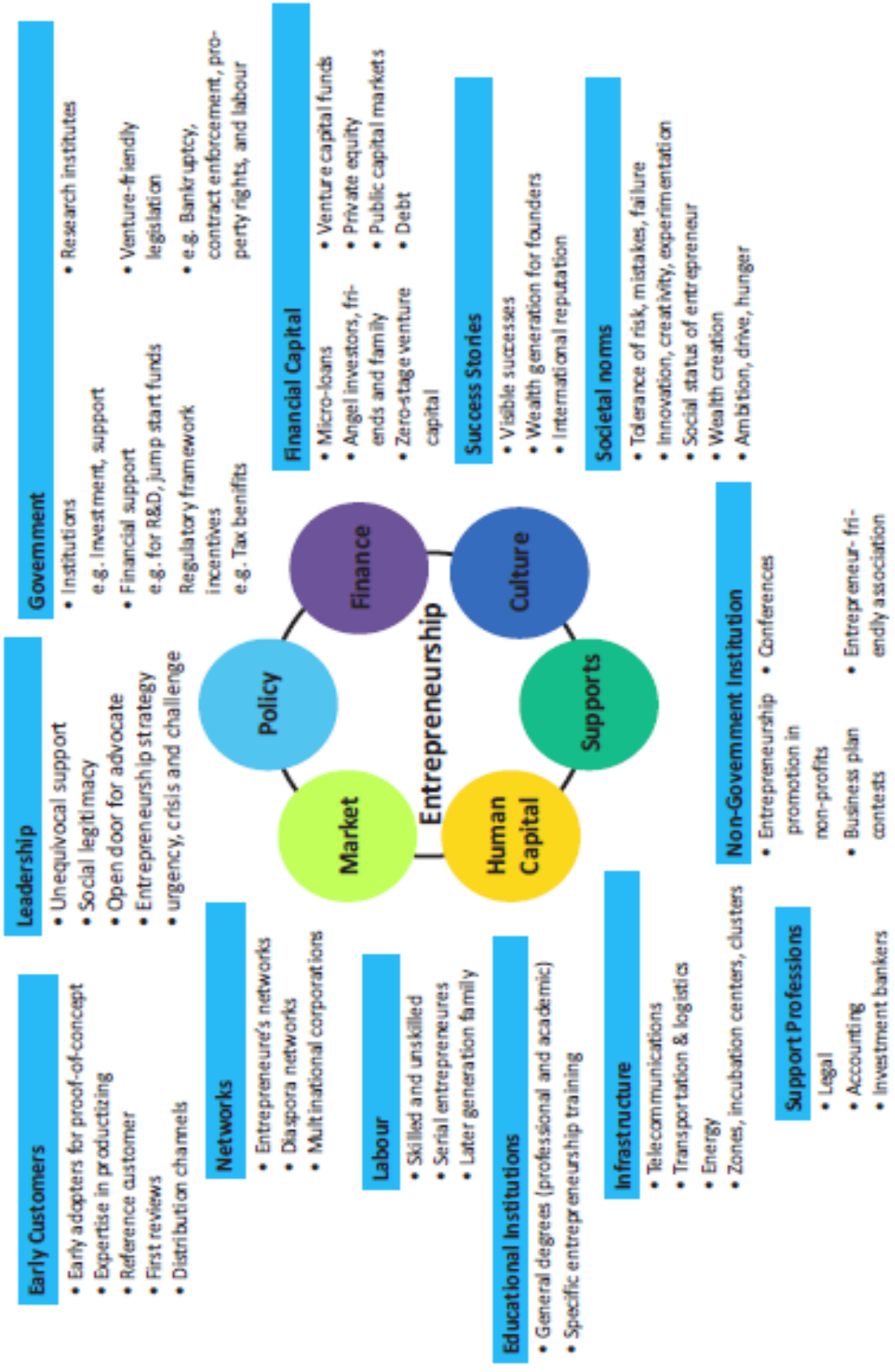


Fig.7.5.2. Entrepreneurship at a Glance

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

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

Make in India Campaign

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

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

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

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

Key Schemes to Promote Entrepreneurs

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

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

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

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

Description

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

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

Who can apply?

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

2. Stand Up India

Description

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

Who can apply?

ST, SC &Women

3. Prime Minister Employment Generation Programme (PMEGP)

Description

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

Nature of assistance

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

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

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

Who can apply?

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

4. International Cooperation

Description

The Scheme would cover the following activities:

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

Nature of assistance

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

Who can apply?

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

5. Performance and Credit Rating for Micro and Small Enterprises

Description

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

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

Nature of assistance

Who can apply?

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

6. Marketing Assistance Scheme

Description

The assistance is provided for the following activities:

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

Nature of assistance

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

Who can apply?

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

7. Reimbursement of Registration Fee for Bar Coding

Description

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

Nature of assistance

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

Who can apply?

All MSMEs with EM registration.

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

Description

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

Nature of assistance

1. Free registration for participating in trade fairs

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

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

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

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

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

Who can apply?

All MSMEs with EM registration.

9. Capital Subsidy Support on Credit for Technology Upgradation

Description

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

Nature of assistance

Financial assistance for availing credit and loan.

Who can apply?

1. Banks and financial institutions can apply to DC-MSME for availing support.
2. MSMEs need to directly contact the respective banks for getting credit and capital subsidy.

How to apply?

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

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

10. Provision of Collateral Free Credit for MSMEs

Description

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

Nature of assistance

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

Who can apply?

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

11. Reimbursement of certification fees for acquiring ISO standards

ISO 9000/ISO 14001 Certification Reimbursement.

Description

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

Nature of assistance

Reimbursement of expenditure incurred on acquiring ISO standards.

Who can apply?

MSMEs with EM registration.

12. Agricultural Marketing

Description

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

Nature of assistance

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

Who can apply?

NGOs, SHGs, companies, co-operatives.

13. Small Agricultural Marketing

Description

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

Farmers' Agriculture Business Consortium

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

Nature of assistance

Financial assistance with a ceiling of Rs.5 lakh.

Who can apply?

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

14. Mega Food Park

Description

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

Nature of assistance

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

Who can apply?

Farmers, farmer groups, SHGs.

15. Adivasi Mahila Sashaktikaran Yojana

Description

Concessional scheme for the economic development of ST women.

Nature of assistance

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

Who can apply?

Scheduled Tribes Women.

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

7.5.7 Risk Appetite & Resilience: Entrepreneurship and Risk

Entrepreneurs are inherently risk takers. They are path-makers not path-takers. Unlike a normal, cautious person, an entrepreneur would not think twice about quitting his job (his sole income) and taking a risk on himself and his idea.

An entrepreneur is aware that while pursuing his dreams, assumptions can be proven wrong and unforeseen events may arise. He knows that after dealing with numerous problems, success is still not guaranteed. Entrepreneurship is synonymous with the ability to take risks. This ability, called risk-appetite, is an entrepreneurial trait that is partly genetic and partly acquired.

What is Risk Appetite?

Risk appetite is defined as the extent to which a company is equipped to take risk, in order to achieve its objectives. Essentially, it refers to the balance, struck by the company, between possible profits and the hazards caused by changes in the environment (economic ecosystem, policies, etc.). Taking on more risk may lead to higher rewards but have a high probability of losses as well. However, being too conservative may go against the company as it can miss out on good opportunities to grow and reach their objectives. The levels of risk appetite can be broadly categorized as “low”, “medium” and “high.” The company’s entrepreneur(s) have to evaluate all potential alternatives and select the option most likely to succeed. Companies have varying levels of risk appetites for different objectives.

The levels depend on:

- The type of industry
- Market pressures
- Company objectives

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

Risk Appetite Statement

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

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired trade-off between risk and reward.
- Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience?

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

- By developing a professional network of coaches and mentors

- By accepting that change is a part of life
- By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

- A strong internal sense of control
- Ability to diversify and expand
- Strong social connections
- Survivor attitude
- Skill to learn from setbacks
- Cash-flow conscious habits
- Ability to look at the bigger picture
- Attention to detail

- Cultivate a great network of clients, suppliers, peers, friends and family. This will not only help you promote your business, but will also help you learn, identify new opportunities and stay tuned to changes in the market.
- Don't dwell on setbacks. Focus on what 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.

7.5.8 Success & Failures: Understanding Successes and Failures in Entrepreneurship

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

UNIT 7.6: Preparing to be an Entrepreneur

Unit Objectives

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

1. Discuss how market research is carried out
2. Describe the 4 Ps of marketing
3. Discuss the importance of idea generation
4. Recall basic business terminology
5. Discuss the need for CRM
6. Discuss the benefits of CRM
7. Discuss the need for networking
8. Discuss the benefits of networking
9. Discuss the importance of setting goals
10. Differentiate between short-term, medium-term and long-term goals
11. Discuss how to write a business plan
12. Explain the financial planning process
13. Discuss ways to manage your risk
14. Describe the procedure and formalities for applying for bank finance
15. Discuss how to manage your own enterprise
16. List important questions that every entrepreneur should ask before starting an enterprise

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

Market research is the process of gathering, analysing and interpreting market information on a product or service that is being sold in that market. It also includes information on:

- Past, present and prospective customers
- Customer characteristics and spending habits
- The location and needs of the target market
- The overall industry
- Relevant competitors

Market research involves two types of data:

- Primary information. This is research collected by yourself or by someone hired by you.
- Secondary information. This is research that already exists and is out there for you to find and use.

Primary research

Primary research can be of two types:

- Exploratory: This is open-ended and usually involves detailed, unstructured interviews.
- Specific: This is precise and involves structured, formal interviews. Conducting specific

Secondary research

Secondary research uses outside information. Some common secondary sources are:

- **Public sources:** These are usually free and have a lot of good information. Examples are government departments, business departments of public libraries etc.
- **Commercial sources:** These offer valuable information but usually require a fee to be paid. Examples are research and trade associations, banks and other financial institutions etc.
- **Educational institutions:** These offer a wealth of information. Examples are colleges, universities, technical institutes etc.

The 4 Ps of Marketing

The 4 Ps of marketing are Product, Price, Promotion and Place. Let's look at each of these 4 Ps in detail.

Product

A product can be:

- A tangible good
- An intangible service

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

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

Price

Once all the elements of Product have been established, the Price factor needs to be considered. The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some questions to ask yourself are:

• What is the value of the product/service to customers?	• Is the customer price sensitive?
• Do local products/services have established price points?	• Should discounts be offered?
	• How is your price compared to that of your competitors?

Promotion

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

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

Place

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

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

Importance of an IDEA

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

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

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

7.6.2 Business Entity Concepts: Basic Business Terminology

If your aim is to start and run a business, it is crucial that you have a good understanding of basic business terms. Every entrepreneur should be well versed in the following terms:

- Accounting: A systematic method of recording and reporting financial transactions.
- Accounts payable: Money owed by a company to its creditors.
- Accounts Receivable: The amount a company is owed by its clients.
- Assets: The value of everything a company owns and uses to conduct its business.
- Balance Sheet: A snapshot of a company's assets, liabilities and owner's equity at a given moment.
- Bottom Line: The total amount a business has earned or lost at the end of a month.
- Business: An organization that operates with the aim of making a profit.
- Business to Business (B2B): A business that sells goods or services to another business.
- Business to Consumer (B2C): A business that sells goods or services directly to the end user.
- Capital: The money a business has in its accounts, assets and investments. The two main types of capital are debt and equity.
- Cash Flow: The overall movement of funds through a business each month, including income and expenses.
- Cash Flow Statement: A statement showing the money that entered and exited a business during a specific period of time.
- Contract: A formal agreement to do work for pay.
- Depreciation: The degrading value of an asset over time.
- Expense: The costs that a business incurs through its operations.
- Finance: The management and allocation of money and other assets.
- Financial Report: A comprehensive account of a business' transactions and expenses.
- Fixed Cost: A one-time expense.
- Income Statement (Profit and Loss Statement): Shows the profitability of a business during a period of time.
- Liabilities: The value of what a business owes to someone else.
- Marketing: The process of promoting, selling and distributing a product or service.
- Net Income/Profit: Revenues minus expenses.
- Net Worth: The total value of a business.
- Payback Period: The amount of time it takes to recover the initial investment of a business.

- Profit Margin: The ratio of profit, divided by revenue, displayed as a percentage.
- Return on Investment (ROI): The amount of money a business gets as return from an investment.
- Revenue: The total amount of income before expenses are subtracted.
- Sales Prospect: A potential customer.
- Supplier: A provider of supplies to a business.
- Target Market: A specific group of customers at which a company's products and services are aimed.
- Valuation: An estimate of the overall worth of the business.
- Variable Cost: Expenses that change in proportion to the activity of a business.
- Working Capital: Calculated as current assets minus current liabilities.
- Business Transactions: There are three types of business transactions. These are:
    - Simple Transactions – Usually a single transaction between a vendor and a customer. For example: Buying a cup of coffee.
    - Complex Transactions – These transactions go through a number of events before they can be completed. For example: Buying a house.
    - Ongoing transactions – These transactions usually require a contract. For example: Contract with a vendor.

Basic Accounting Formulas

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

1. **The Accounting Equation**: This is value of everything a company owns and uses to conduct its business.

Formula: Assets = Liability + Owner's Equity

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

Formula: Net Income = Revenues – Expenses

3. **Break-Even Point**: This is the point at which the company will not make a profit or a loss. The total cost and total revenues are equal.

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

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

Formula: Cash Ratio = Cash/Current Liabilities

5. **Profit Margin:** This is shown as a percentage. It shows what percentage of sales are left over after all the expenses are paid by the business.

Formula: Profit Margin = Net Income/Sales

6. **Debt-to-Equity Ratio:** This ratio shows how much equity and debt a company is using to finance its assets, and whether the shareholder equity can fulfil obligations to creditors if the business starts making a loss.

Formula: Debt-to-Equity Ratio = Total Liabilities/Total Equity

7. **Cost of Goods Sold**: This is the total of all costs used to create a product or service, which has been sold.

Formula: Cost of Goods Sold = Cost of Materials/Inventory – Cost of Outputs

8. **Return on Investment (ROI)**: This is usually shown as a percentage. It calculates the profits of an investment as a percentage of the original cost.

Formula: ROI = Net Profit/Total Investment * 100

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

Formula:
A = P(1 + rt); R = r * 100
Where:
A = Total Accrued Amount (principal + interest)
P = Principal Amount
I = Interest Amount
r = Rate of Interest per year in decimal; r = R/100
t = Time Period involved in months or years

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

Formula:
A = P (1 + r/n) ^ nt:
Where:
A = the future value of the investment/loan, including interest
P = the principal investment amount (the initial deposit or loan amount)
r = the annual interest rate (decimal)
n = the number of times that interest is compounded per year
t = the number of years the money is invested or borrowed for

7.6.3 CRM & Networking: What is CRM?

CRM stands for Customer Relationship Management. Originally the expression Customer Relationship Management meant managing one's relationship with customers. However, today it refers to IT systems and software designed to help companies manage their relationships.

The Need for CRM

The better a company can manage its relationships with its customers, the higher the chances of the company's success. For any entrepreneur, the ability to successfully retain existing customers and expand the enterprise is paramount. This is why IT systems that focus on addressing the problems of dealing with customers on a daily basis are becoming more and more in demand.

Customer needs change over time, and technology can make it easier to understand what customers really want. This insight helps companies to be more responsive to the needs of their customers. It enables them to modify their business operations when required, so that their customers are always served in the best manner possible. Simply put, CRM helps companies recognize the value of their clients and enables them to capitalize on improved customer relations.

Benefits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to:
  - Increased sales

  - Identification of customer needs
  - Cross-selling of products
- It results in better marketing of one's products or services
- It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

What is Networking?

In business, networking means leveraging your business and personal connections in order to bring in a regular supply of new business. This marketing method is effective as well as low cost. It is a great way to develop sales opportunities and contacts. Networking can be based on referrals and introductions, or can take place via phone, email, and social and business networking websites.

The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs. Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that.

Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

- Getting high quality leads
- 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

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

7.6.4 Business Plan: Why Set Goals?

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

Short-Term Goals

- These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

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

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

Long-Term Goals

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

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan?

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

Executive Summary

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

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

Example: Nike's Mission Statement

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

- Company Information: Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.
- Growth Highlights: Mention examples of company growth. Use graphs and charts where possible.
- Your Products/Services: Describe the products or services provided.
- Financial Information: Provide details on current bank and investors.
- Summarize future plans: Describe where you see your business in the future.

Business Description

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

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

Market Analysis

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

Your Market Analysis should include:

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

Organization & Management

This section should come immediately after the Market Analysis.
Your Organization & Management section should include:

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

Service or Product Line

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

- A description of your product/service
- A description of your product or service's life cycle

- A list of any copyright or patent filings
- A description of any R&D activities that you are involved in or planning

Marketing & Sales

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

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

Your Sales section should include the following information:

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

Funding Request

This section is specifically for those who require funding for their venture.
The Funding Request section should include the following information:

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

Financial Planning

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

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

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

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

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

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

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

Risk Management

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

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

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

7.6.5 Procedure and Formalities for Bank Finance: The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for start-ups. With numerous funding options available, entrepreneurs need to take a close look at which funding methodology works best for them. In India, banks are one of the largest funders of start-ups, offering funding to thousands of start-ups every year.

What Information Should Entrepreneurs Offer Banks for Funding?

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- Letter(s) of Introduction: This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- Your Profile: This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- Business Brochure: A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- Bank and Other References: If you have an account with another bank, providing those bank references is a good idea.
- Proof of Company Ownership or Registration: In some cases, you may need to provide the bank with proof of company ownership and registration. A list of assets and liabilities may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Cash-Flow Statement
- Business Plan
- Profit-and-Loss Account
- Projected Sales and Revenues
- Feasibility Study

Guarantees or Collaterals

Usually banks will refuse to grant you a loan without security. You can offer assets which the bank can seize and sell off if you do not repay the loan. Fixed assets like machinery, equipment, vehicles etc. are also considered to be security for loans.

The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

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

The Procedure

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

1. Submit your application form and all other required documents to the bank.
2. The bank will carefully assess your credit worthiness and assign ratings by analysing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.
3. The bank will make a decision as to whether or not you should be given funding.

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

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

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large-scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required.

Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others – realize that you cannot handle everything yourself.

Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle. Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job.

Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well.

Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase their motivation. Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well.

Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers.

This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively.

Also, hire a marketing agency if you feel you need help in this area. Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

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

7.6.7 20 Questions to Ask Yourself Before Considering Entrepreneurship

1. Why am I starting a business?
2. What problem am I solving?
3. Have others attempted to solve this problem before? Did they succeed or fail?
4. Do I have a mentor or industry expert that I can call on?
5. Who is my ideal customer?
6. Who are my competitors?
7. What makes my business idea different from other business ideas?
8. What are the key features of my product or service?
9. Have I done a SWOT analysis?
10. What is the size of the market that will buy my product or service?
11. What would it take to build a minimum viable product to test the market?
12. How much money do I need to get started?
13. Will I need to get a loan?
14. How soon will my products or services be available?
15. When will I break even or make a profit?
16. How will those who invest in my idea make a profit?
17. How should I set up the legal structure of my business?
18. What taxes will I need to pay?
19. What kind of insurance will I need?
20. Have I reached out to potential customers for feedback?

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

Footnotes:

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

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

Notes