

सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Participant Handbook

Sector Furniture and Fittings

Sub-Sector Wooden Furniture

Occupation Production-Wooden Furniture

Reference ID: FFS/Q0104, Version 1.0 NSQF level: 4

> Lead Carpenter Wooden Furniture

Published by



VIKAS® PUBLISHING HOUSE PVT. LTD.

E-28, Sector-8, Noida-201301 (UP) Phone: 0120-4078900 • Fax: 0120-4078999 *Regd. Office:* 7361, Ravindra Mansion, Ram Nagar, New Delhi-110055 Website: www.vikaspublishing.com • Email: vocational@vikaspublishing.com

All Rights Reserved

First Edition, August 2018 ISBN 978-93-5271-242-7

Printed in India

Copyright © 2018



Furniture & Fittings Skill Council

Address: 407-408, 4th Floor, DLF City Court, MG Road, Sikanderpur

Gurugram-122002, Haryana, India Email: info@ffsc.in Phone: +91 124 4513900

Disclaimer

The information contained herein has been obtained from sources reliable to Furniture and Fittings Skill Council. Furniture and Fittings Skill Council disclaims all warranties to the accuracy, completeness or adequacy of such information. Furniture and Fittings Skill Council shall have no liability for errors, omissions, or inadequacies, in the information contained herein, or for interpretations thereof. Every effort has been made to trace the owners of the copyright material included in the book. The publishers would be grateful for any omissions brought to their notice for acknowledgments in future editions of the book. No entity in Furniture and Fittings Skill Council shall be responsible for any loss whatsoever, sustained by any person who relies on this material. The material in this publication is copyrighted. No parts of this publication may be reproduced, stored or distributed in any form or by any means either on paper or electronic media, unless authorized by the Furniture and Fittings Skill Council.





Shri Narendra Modi Prime Minister of India







Certificate

COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

FURNITURE & FITTINGS SKILL COUNCIL

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role / Qualification pack: "Lead Carpenter Wooden Furniture" QP No. "FFS/Q0104, NSQF Level 4"

 Date of Issuance:
 July 12th, 2017

 Valid up to:
 July 12th, 2020

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

æ

Authorised Signatory (Furniture & Fittings Skill Council)

Acknowledgements -

Furniture & Fittings Skill Council (FFSC) would like to express its gratitude to all the individuals and institutions, who contributed in different ways towards the preparation of this "Participant Handbook". Without their contribution, it could not have been completed. Special thanks are extended to those, who collaborated in the preparation of its different modules. Sincere appreciation is also extended to all who provided peer review for these modules.

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

This participant handbook is dedicated to the aspiring youth, who desire to achieve special skills, which would serve as lifelong assets for their future endeavours.

About this book -

This participant handbook is designed for providing skill training and /or upgrading the knowledge level of the Trainees to take up the job of an "Lead Carpenter Wooden Furniture" in the Furniture & Fittings Sector.

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

- FFS/N0106 Plan and organize woodwork to meet expected outcome
- FFS/N0107 Make furniture
- FFS/N8601 Ensure health and safety at workplace
- FFS/N8501 Maintain work area, tools and machines
- FFS/N8801 Work effectively with others
- FFS/N5703 Carry out lock installation activities
- FFS/N5704 Perform lock repairing and servicing



Table of Contents

S.No	Modules and Units	Page No
1.	Introduction	1
	Unit 1.1 - The Scope of the Furniture & Fittings Industry	3
	Unit 1.2 - The Training Program	6
	Unit 1.3 - The Roles and Responsibilities of a Lead Carpenter	10
2.	Understanding the Organizational Context/Company/Employer (FFS/N0106)	17
	Unit 2.1 - Knowledge of Wood and Other Materials Used in the Organisation	19
	Unit 2.2 - Tools, Machines and Equipment	39
3.	Maintenance of Work Area, Tools and Machines (FFS/N8501)	67
	Unit 3.1 - Safety and Maintenance of Tools	69
	Unit 3.2 - Safety and Maintenance of Workshop	76
4.	Ensuring Health and Safety at Workplace (FFS/N8601)	83
	Unit 4.1 - Dealing with Potential Hazards	85
	Unit 4.2 - Personal Protective Equipment (PPE)	101
	Unit 4.3 - Personal Health and Hygiene	104
5.	Dealing with Emergencies (FFS/N8601)	111
	Unit 5.1 - Responding to Emergency Situations	113
6.	Interaction with Seniors (FFS/N8801)	117
	Unit 6.1 - Seeking Assistance and Clarification	119
7.	Work Effectively with Others (FFS/N8801)	121
	Unit 7.1 - Communication Skills	123
	Unit 7.2 - Working in an Organization	128
8.	Work Assessment & Planning for Making the Wooden Furniture (FFS/N0106)	135
	Unit 8.1 - Basic Mathematical Skills	137
	Unit 8.2 - Measuring and Calculating the Wood	145
	Unit 8.3 - Technical Drawing	153



S.No	Modules and Units	Page No
9.	Cutting, Shaping and Inspection of the Wood (FFS/N0107)	161
	Unit 9.1 - Furniture and Other Woodwork	163
	Unit 9.2 - Preparation – Marking, Cutting, Shaping, and Trimming	174
10.	Assembling the Different Components of the furniture (FFS/N0107)	207
	Unit 10.1 - Woodworking Joints	209
	Unit 10.2 - Fasteners and Other Fittings	218
	Unit 10.3 - How to Make Basic Wooden Structures	229
	Unit 10.4 - Finishing the Wooden Structure	246
11.	Review Post Completion (FFS/N0107)	259
	Unit 11.1 - Post-Completion Review	261
12.	Carry Out Lock Installation Activities (FFS/N5703)	263
	Unit 12.1 - Main Types of Locks and Units Assembled	265
	Unit 12.2 - Functioning And Types Of Various Doors/Windows	272
	Unit 12.3 - Different Tools and Equipment	275
	Unit 12.4 - Technique of Fixing The Lock on the Door	291
13.	Perform Lock Repairing and Servicing (FFS/N5704)	321
	Unit 13.1 - Process of Operating Different Locks	323
	Unit 13.2 - Method to Check Warranty of Lock	325
	Unit 13.3 - Troubleshooting for Lock Installers	328
	Unit 13.4 - Handling and Storage of Different Tools and Equipment	349
	Unit 13.5 - Quality Assurance for Lock Installer	355
	Unit 13.6 - Waste Disposal, Cleaning and Maintenance	358



S.No	Modules and Units	Page No
14.	Employability & Entrepreneurship Skills	361
	Unit 14.1 - Personal Strengths & Value Systems	365
	Unit 14.2 - Digital Literacy: A Recap	381
	Unit 14.3 - Money Matters	386
	Unit 14.4 - Preparing for Employment & Self Employment	394
	Unit 14.5 - Understanding Entrepreneurship	402
	Unit 14.6 - Preparing to be an Entrepreneur	424







सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

FURNITURE & **1. Introduction**

- Unit 1.1 The Scope of the Furniture & Fittings Industry
- Unit 1.2 The Training Program
- Unit 1.3 The Roles and Responsibilities of a Lead Carpenter



FITTINGS SKILL COUNCIL

– Key Learning Outcomes 🕎

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

- 1. Discuss the Indian furniture industry, growth drivers, and market structure
- 2. Identify the employment opportunities in the industry
- 3. Evaluate the benefits of the training program
- 4. Discuss various types of carpentry
- 5. Define the roles and responsibilities of a lead carpenter
- 6. Analyse the career progression of a lead carpenter
- 7. Assess the essential skills of a carpenter

UNIT 1.1: The Scope of the Furniture & Fittings Industry

- Unit Objectives 🎯

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

- 1. Discuss an overview of the furniture industry in India
- 2. Assess the key growth drivers in the furniture industry
- 3. Analyse the market structure of the industry
- 4. Evaluate the employment opportunities in the industry

1.1.1 The Furniture & Fittings Industry in India

The furniture industry in India has been growing very fast over the last few years. The entry of international brands, the concept of good living and better lifestyle, and changing consumer preference have been driving the furniture and fittings market in India. The number of offices and hotels has been increasing rapidly due to consistent growth in sectors like tourism and hospitality, IT-ITeS, telecom, retail and real estate. This, in turn, has been driving a steadily increasing demand of furniture.

The international furniture industry research and consulting firm, CSIC Milano, has recognised India as the fourteenth largest furniture market in the world. The Indian furniture industry is estimated at around Rs 350 billion. Around eighty-five percent of the country's production comes from regional and small-size firms, which fall under the unorganized sector and the remaining fifteen percent comes from the organized sector comprising the furniture and fittings sector's leading manufacturers, importers, and dealer/distributors. According to the World Bank, the organized furniture industry is expected to grow by twenty percent a year in India. The marked development of the Indian furniture industry is encouraging the leading foreign brands to join hands with Indian furniture brands.



Fig. 1.1.1.1: Assorted Furniture Products

1.1.2 The Structure of the Indian Furniture Market

The Demand for Furniture in India

- Demand for furniture in India surged at 12% annual rate over 2009-2012, and in 2013 it increased at a rate of 15%
- The market is turning into an organized segment and this transition is marked by increasing customer preference for readymade and branded furniture
- Preference is tilting towards high-end, low-maintenance, quickly installable products, with customisation options



Fig. 1.1.2.1: The Demand for Furniture in India – For the Period 2009-2017 (Source: The Economic Times)

 Simple and contemporary designs are preferred over heavy and complex traditional furniture



Indian Furniture – Material-wise Market Share



Indian Furniture – Consumer-wise Market Share



Fig. 1.1.2.3: Market Share in India as per the Area of Consumption

The Domestic Furniture Market

- Domestic/home furniture accounts for about 65% of the furniture market
- Manufacturers catering to this segment try differentiating on the basis of design, variety, and price
- Demand of furniture, of international standards, is limited to the larger cities
- Upper middle-class families focus on design and quality and price is not a major factor for them



Commercial furniture segment caters to the office space market and the hospitality industry

The Commercial Furniture Market

•

1.1.3 Employment Opportunities in Indian Furniture Industry

The Indian furniture industry manufactures and exports high-quality furniture. This industry offers a wide range of employment opportunities. The furniture industry in India employs a total of 300,000 workers approximately.

Some leading Indian furniture brands are Godrej & Boyce Manufacturing Co. Ltd., Furniturewala, Zuari, Yantra, Renaissance, N R Jasani & Company, Furniture Concepts, Durian, Kian, Millenium Lifestyles, Truzo, Featherlite, etc.

UNIT 1.2: The Training Program



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

- 1. Summarise the objectives of the training program
- 2. Comply with the ground rules of attending the training

- 1.2.1 An Overview of the Training Program

The furniture industry has been growing consistently for quite some time and hence, the demand of carpenters as well. In addition to hard work and dedication, one requires a basic training to become an efficient carpenter. That is why this training program has been designed.

This program will help you develop your knowledge and understanding of:

- The furniture industry in India
- The job roles and responsibilities of a carpenter
- Materials to be used in woodwork
- The hand and power tools to be used in woodwork
- Measuring, cutting, trimming and assembly of wood
- Calculation of quantity of the material as per the technical drawings or instructions
- Types of furniture
- Furniture-making process
- Maintenance and safety of tools and machines
- Keeping the workplace clean, safe, and secure
- Core professional and technical skills required to perform the lead carpenter's duties efficiently



Fig. 1.2.1.1: Various Furniture Models



Fig. 1.2.1.2: Various Hand Tools for Woodwork

1.2.2 Objectives of the Training Program

After completing this training program, you will have the skills to:

- Work in a workshop or as an independent lead carpenter
- Perform your job efficiently
- Work in a safe and secure manner
- Adhere to safety and security guidelines
- Comply with all guidelines and policies of the organisation/workshop
- Maintain a safe, hygienic and secure working environment
- Use and maintain tools and machines appropriately
- Choose the appropriate material and tools required for the job



Fig. 1.2.2.1: Carpentry Work

- Calculate the quantity of material and time required for completing the job
- Practise the correct furniture-making method
- Report safety hazards, conditions, or unsafe practices at workplace
- Maintain professional workplace relationship
- Demonstrate the right attributes for the job
- Practise personal and workplace hygiene

1.2.3 Ground Rules

All the participants are expected to follow certain ground rules, which will facilitate an efficient learning environment. These rules are:

- Arrive and start on time
- You are expected to participate in all workshop activities
- Keep your mobile phone switched off or in silent mode
- Follow the timelines; if the break given to the participants is of fifteen minutes, everybody has to be in the training room within the stipulated duration
- Raise all doubts in the class and do not discuss with your fellow participants
- Listen actively and respect others when they are talking
- Ask questions if you do not understand a given concept

_	F۵	ercise 📝	
	Ch	oose the correct answer-	
-	1.	The key factors to the growth of In	dian furniture industry are:
		a) Changing lifestyle	b) Development in real estate
		c) Increasing demand of offices	d) All of above
	2.	Which type of furniture is manufac	tured the most?
		a) Plastic moulded furniture	b) Wood furniture
		c) Steel furniture	d) Cane furniture
	2	Multicher einer einer die under die Geweiterung	
:	3.	which segment demands furniture	e the most?
		a) Office	b) Hotel
		c) Home	d) Hospital

UNIT 1.3: The Roles and Responsibilities of a Lead Carpenter

Unit Objectives 🦉

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

- 1. Discuss the requisites of carpentry work
- 2. Summarise the importance of carpentry work
- 3. Define the job roles of a lead carpenter
- 4. List the responsibilities of a lead carpenter
- 5. Evaluate the skills essential for a lead carpenter

- 1.3.1 The Meaning of Carpentry -

The homes we live in and the furniture we use would not have been made without the skilled trade known as carpentry. Carpentry is the activity or skill of building items from wood, like table, chair, bed, window, door, cupboard, roof, flooring, etc. Carpentry involves cutting, shaping and putting together materials for building houses, offices, and furniture. It is an ancient skill, which has now evolved, in terms of technology, by the introduction of specialised tools, equipment, and material. Wood or timber is the main material used in carpentry, although there are many other materials that are now widely used in carpentry.



Fig. 1.3.1.1: Carpentry Tools

1.3.2 Types of Carpentry Image: Carpentry image: Carpentry image: Carpentry image: Carpentry image: Carpentry Fig. 1.3.2.1: Types of Carpentry Rough Carpentry

Rough carpentry refers to the type of carpentry that does not require a fine finish. This includes making the structural parts of the house that need to be simple, like the posts, rafters and beams, roofing and framing. Rough carpentry does not need finesse because the parts are going to be covered anyway. Rough carpentry is typically performed outdoors on construction sites.

Finish Carpentry

Finish carpentry, on the other hand, refers to the making of furniture, inlays, decking, flooring, staircases, making and installing of windows and doors, and mouldings and trims. As the name suggests, finish carpentry is the work that is going to be seen from the outside. Since this is going to be what people would see, finish carpenters are expected to make their work as neat, clean and as finely-detailed as possible. Their work is often performed in a workshop, though some finish carpenters travel to construction sites to fit and install trim, cabinets, and other items.



Fig. 1.3.2.2: Rough and Finish Carpentry

1.3.3 Definition of Lead Carpenter –

A lead carpenter is a skilled craftsman who works with wood. Following blueprints or detailed drawings, or instructions provided by the furniture designer or the supervisor. A lead carpenter builds, assembles, installs and repairs fixtures and structures that are usually made of wood. A lead carpenter may also work with other materials such as plastic, fibre glass, or dry wall. Some lead carpenters pre-fabricate cabinets and other structures in workshops or factories, while others work on construction sites, cutting, joining, and installing structural elements.

1.3.4 The Responsibilities of a Lead Carpenter

A lead carpenter is responsible for designing, building and repairing fixtures, furniture, and other items using different types of wood. He:

- Collects and follows technical drawings or instructions from the furniture designer or the supervisor
- Prepares sketches as per the customer's requirements, in case of absence of technical drawing
- Selects the materials and calculates the quantities of material as per technical drawings or instructions from the supervisor
- Measures and puts marks on wood and other materials using different methods
- Cuts, trims and shapes the wood using hand and power tools
- Smoothens the wood by planing or shaving it
- Checks the level, flatness, and smoothness of workpieces
- Prepares templates and jigs for cutting the material
- Sharpens the tools, if required
- Makes workpieces ready using different types of wood joints

- · Assembles ready workpieces together using adhesive and fasteners as per specifications
- · Checks the assembled piece of furniture for defects or damages
- Gives appropriate finishing to workpieces by pasting laminate or veneer, edge banding, by applying hard putty, etc.
- Installs accessories to the finished item, such as locks, handles, knobs, bolts, etc.
- Installs the finished item to the site
- Reports any safety hazard or risk at workplace to the supervisor



Fig. 1.3.4.1: Use of Hand Tools

A lead carpenter is also responsible for:

- Working safely
- Maintaining and using tools safely
- Keeping the workplace neat, safe, and secure
- Performing all tasks efficiently
- Keeping records of materials, work orders, etc.

1.3.5 The Lead Carpenter's Workplace —

Depending on their job duties, carpenters may work either indoors or outdoors. Rough carpentry activities are done outdoors, while finish carpentry jobs are done in workshops or factories. Lead carpenters work on physically demanding tasks. They have to lift heavy materials and prolonged standing, climbing, bending, and kneeling often are necessary. They often have to climb and stand on ladders. So they have to be physically fit and strong. Since lead carpenters use sharp and heavy equipment, they should be safety-conscious and follow workshop safety standards at all time.

1.3.6 Skills and Qualities of a Lead Carpenter

Carpentry requires training, which involves the acquisition of both knowledge and physical practice. An efficient lead carpenter should have technical knowledge and skills to perform well. Some basic technical skills are:

- Reading technical drawings
- Reading the measuring tools
- Measuring and marking material
- Cutting material using cutting tools
- Checking level, plumb and square of the work done
- Driving screws and nails, drilling, hammering, etc.

In addition to essential technical knowledge and skills, a lead carpenter should also possess certain soft skills, or personal qualities, namely:

- Good communication skill
- Detail-oriented nature
- Good hand and eye coordination
- Physical fitness
- Good sense of personal hygiene
- Honesty
- Ability to work in a team
- Trustworthy
- Ability to solve problems
- Hard-working nature
- Punctuality
- Courteous and dedicated nature

In this training program, you will be trained in technical and professional skills essential for an efficient lead carpenter.

1.3.7 Career Path of Lead Carpenter -

There are good job opportunities for trained and skilled lead carpenters. A trained and skilled lead carpenter can work independently. An experienced lead carpenter can become a carpentry supervisor or a project manager in future. You may also become an independent contractor and work with furniture manufacturers, retailers, or service companies. Carpentry is a hand skill. The more you will practice, the more you will be skilled in this art. You require hard work, dedication, determination, and honesty towards your job. Dedication and hard work displayed in your work will prove that you have the necessary passion and drive to succeed at the next level.

- Exercise			
Cr	loose the correct answer –		
1.	Rough carpentry work includes –		
	a) Making door frames	b) Making a structure for partition	
	c) Making a chair	d) a and b	
2.	Finish carpentry work includes –		
	a) Making moldings	b) Making a chair	
	c) Making bed and side table	d) All of above	
3.	A carpenter's job does not include	_	
	a) Plane the wood	b) Read technical drawings	
	c) Check vehicles in a complex	d) Saw the wood	
4.	A furniture carpenter cannot make	_	
	a) Wooden chair	b) Wooden doors and windows	
	c) Iron gate	d) Wooden staircase	
5.	What personal qualities should an efficient carpenter have?		
	a) Honesty	b) Hard work	
	c) Dedication to work	d) All of above	





सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

2. Understanding the Organizational Context/Company/ Employer

Unit 2.1 - Knowledge of Wood and Other Materials Used in the Organisation

Unit 2.2 - Tool Planning and Material Gathering in the Organisation



FURNITURE ତ FITTINGS

KILL COUNCIL



– Key Learning Outcomes 🕎

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

- 1. Discuss the properties of wood and other materials
- 2. Use various carpentry tools, machines, and equipment
- 3. Demonstrate the process of maintaining the work area, tools, and machines

UNIT 2.1: Knowledge of Wood and Other Materials Used in the Organisation

Unit Objectives

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

- 1. Discuss the properties of wood
- 2. Analyse the types, natural characteristics of wood
- 3. Analyse the grain patterns of wood
- 4. Identify the types of hardwood and softwood
- 5. Evaluate plywood, boards and other materials for carpentry
- 6. Define the methods of sawing

2.1.1 Wood – The Most Popular Material used for Furniture

Wood is a natural resource, which has always been a popular choice for making furniture. It is one of the most commonly used materials in wood carpentry projects, and almost any type of wood can be used to build furniture.

Many varieties of wood are available, and each one has its own properties, unique characteristics and qualities. The type of wood determines the beauty and strength of the finished piece.



Fig.2.1.1.1: Wood Sample

2.1.2 Structure of Wood -

Wood is obtained from trees. The cross section of a tree shows the following features, in succession, from the outside to the center:

- Bark and cambium layer
- Wood (sapwood and heartwood)
- Pith, which is the small central core

The pith and bark are excluded from the finished timber. Only sapwood and heartwood are used as finished timber. Sapwood is lighter in colour as compared to heartwood.

Annual rings

Most species of trees produce annual growth rings. The growth rings, when exposed by conventional methods of sawing, reflect the grain or characteristic pattern of the wood.

Medullary rays

Medullary rays extend radially from the pith of the log toward the circumference. They produce the flake effect in quartersawn timber.



- 2.1.3 Types of Wood -

The wood produced by trees can be classified into:

- Hardwood
- Softwood

Generally, hardwood is denser than softwood, but some variants of hardwood are softer than a few variants of softwood.

Both hardwood and softwood are used for various structural to decorative applications. Both are extremely popular in the furniture industry.

Hardwood

Most carpenters love to work with hardwood. The variety of colours, texture, and grain patterns makes beautiful and interesting-looking furniture.

Hardwood comes from broad-leaved trees (deciduous trees that drop their leaves every year and produce seeds). Hardwood trees are very slow growing trees and this tends to make them produce dense wood. That is why items made of hardwood are more likely to withstand years of wear and tear. Hardwood is usually much darker in colour. Hardwood has lovely, attractive grains and are used for making fine and high-quality furniture, decks, flooring, and decorative woodwork. Hardwood is usually expensive. Examples of hardwood include alder, balsa, beech, hickory, mahogany, maple, oak, teak, and walnut.

Softwood

Softwood is not weaker than hardwood. Softwood is easier to work with than hardwood. Softwood comes from conifer trees (trees that have needles and do not produce seeds). Softwood is usually lighter in colour. Softwood often comes from very tall and straight trees, and are better suited for construction work in the form of planks, poles, and so on. Since most coniferous trees grow fast and straight, softwood is generally less expensive than hardwood. Examples of softwood include pine, spruce, cedar, fir, and larch.

2.1.4 Natural Characteristics of Wood –

Wood is the product of nature, which has numerous colours, grain patterns, and other natural characteristics. Colour and grain patterns are the primary factors influencing the appearance of wood. Other characteristics such as stains, burls, and insect damage also have an effect. All characteristics are variable, not only in different commercial groups of wood, but within a given species.

The natural causes of colour variation within a species are influenced by many factors. Soil types, minerals, water levels, available sunlight, temperature, and genetic composition, contribute to colour variation. Grain variation, like colour variation, is also influenced by many factors. These factors include tree size, growth rate, climate changes, site conditions, genetics, bird, insect, and fire damage.

Some common natural grain patterns -

Burl grain: Burl grain is common in most species and is also known as curly grain, burly grain, fiddleback or figure wood. Burl grain is a swirl or twist in the wood that occurs near a knot but does not contain a knot over 1/8" in diameter.



Tiger stripe/Cross fire: This unique grain pattern is also called zebrawood. It is a distorted grain pattern that resembles the stripes of a tiger. It is common in red and white oak, and maple. Tiger stripe is most often found with burl grain. Wood with this grain characteristic is often quite dense.



Ray flecking: Ray flecking is visible in hardwood species that are quartersawn and have rays. Red oak and white oak are the most noted ones for this characteristic.



Bird's eye: Bird's eye is a small area in the wood where the fibres are contorted to form circular figures that resemble birds' eyes on the surface of the board. It is common in hard maple.



Cat's paw: It is a wood characteristic that has the shape of a cat's paw caused by pin knots. It is most common in cherry.



2.1.5 Defects of Wood —

One of the biggest challenges of working with wood is to work within the constraints of wood. Various abnormal conditions and features of wood reduce its economic value. These features are termed as defects. Defects in wood may either just reduce its utility or render it entirely valueless. Some pose a serious structural weakness in the wood, while others do a little more than spoil its appearance.

Defects in wood can be broadly classified into two categories, which are as follows:

- Natural defects
- Seasoning defects

2.1.5.1 Natural Defects -

Knots: Knots are common types of natural defects. Knots vary in size, shape, structure, and colour. Knots spoil the appearance and reduce the strength properties of wood. It also aggravates the seasoning defects and makes woodwork difficult.

Sound knot: A sound knot, also known as a tight knot, is completely solid, with no portion of the knot movable. It is as hard as the surrounding wood and shows no signs of decay.



Unsound knot: An unsound knot, also known as a loose knot, has a portion that will move readily.



Pin knot: A pin knot is a small, sound, and tight knot.



Knot cluster: A knot cluster is a group of small knots.



Rot: Rot (also known as decay) is the decomposition of a substance by fungi. Incipient rot is rot in its early stages and usually noticeable only by slight wood discoloration or bleaching. Advanced decay causes the wood to become soft.



Heart shakes: Heart shakes are usually the results of disease or over-maturity of the tree. The shakes radiate from the centre of the log and are caused by internal shrinkage.



Cup or ring shakes: Cup shakes, also known as ring shakes, are caused by a separation of the annual rings and are usually due to a lack of nutrient or twisting of the tree in high winds. In bad cases, economic conversion of the log is very difficult.



Star shakes: Star shakes are radial cracks that occur around the outside edges of the log. They are caused by shrinkage at the outside while the middle remains stable. This happens because the log has been left too long before conversion.



Mineral streak: A darkened or discoloured wood area, caused by minerals that the tree extracts from the soil, results in mineral streak. Mineral streak appears blackish-blue, running parallel with the grain.

Mineral stain: Mineral stain appears as a dark, blotchy area with undefined boundaries. It can turn an entire board darker in color.



- 2.1.5.2 Seasoning or Drying Defects -

Poor seasoning can cause wrapping in wood. Warp means any defect in lumber that deforms a board's shape. A board may be distorted in one of four ways, namely, cupped, sprung, bowed or twisted.



Cup: The board remains flat in length and on edge but curves across its width, away from the heart.



Bow: The board remains flat in width and on edge but curves along the length, like a straight road descending a hill.



Spring: The board remains flat in width but curves along the length, like a river going around a bend.



Twist: The board curves along both length and width like a propeller.

2.1.6 Conversion of Wood -

Conversion is the sawing of a log into boards or planks ready for use by the carpenter. How the wood is converted directly affects its usefulness. Mainly there are three types of methods to saw the wood log that determine the grain pattern of the board. These are:

Plain Sawing (Flatsawn): Plain sawing is the most common method of sawing and consequently most variants of timber are plain-sawn. This method provides the widest boards and least waste; therefore, it is the most economical. Flatsawn timber has growth rings at angles of 0 to 45 degrees to the wide surface of the timber.

Quarter Sawn: This method of sawing produces relatively narrow boards and creates more waste. For these reasons (and the additional handling involved), quarter-sawn lumber is much more expensive than plain-sawn. Quartersawn timber has growth rings at angles of 45 to 90 degrees to the wide surface of the timber.

Rift Sawing: Rift sawing is very similar to quarter sawing, and has the same advantages and limitations. This method of sawing accentuates the vertical grain and minimizes the flake. Riftsawn timber has growth rings at angles of 30 to 60 degrees to the wide surface of the timber.



2.1.7 Seasoning of Wood -

Wood from newly felled trees contains a high proportion of moisture in the form of sap, which is made of water and minerals drawn from the soil. Most of this water has to be removed by some form of drying, which is called seasoning. The main reasons for seasoning are :

- To make sure that shrinkage occurs before the wood is used
- To make sure that the moisture content of the wood is below the 'dry rot' safety line of 20 percent
- To make sure that dry wood is use
- Seasoned wood is less likely to split or get distorted
- Wet wood will not accept glue, paint, or polish

The wood should be dried to a moisture content that is similar to the surrounding atmosphere in which it will be used. There are two main methods of seasoning wood –

Air seasoning: For air drying the wood is stacked in a pile in open-sided, covered sheds, which protect the wood from rain but still allow a free circulation of air. A moisture content of 18–20 percent can be achieved in a period of 2–12 months.

Kiln seasoning: The most common type of wood that is used is kiln seasoned. If done correctly, the moisture content of the wood can be reduced without causing wood defects. Depending on the size of the wood, the duration of time the wood needs to stay in the kiln varies between two days and six weeks.

2.1.8 Types of Hardwood and Their Characteristics -

Mahogany:

- It is reddish-brown in colour
- It is very strong and durable
- It resists to warping, shrinkage and swelling
- It is used for making cabinets, dining table sets, tables, desks, and other items



Oak:

- It comes in two basic varieties red and white.
- It is strong and bends easily.
- It is resistant to warping, shrinkage, and swelling.
- It is used for making cabinets, book shelves, desks, and outdoor furniture.



Maple:

- It is immensely strong and hard
- It shrinks moderately.
- It is used for making solid wood furniture like bedside tables, console tables, and wall shelves.



Sheesham:

- It is known as Indian rosewood.
- It has a golden-brown colour.
- It is highly durable and resistant to termites.
- It is mostly used for making solid wood furniture like wardrobes, cabinets, bedroom furniture, coffee tables, console tables, etc.



Teak:

- It comes in shades of medium-dark brown or in a pale yellow colour.
- It is a hard and moisture-resistant wood.
- It is resistant to warping, cracking, decay and termites.
- It is highly stable and durable
- It is an ideal choice for making furniture.
- It comes in many variety Ghana teak, ivory teak, burma teak, etc.
- It is used for making cupboards, cabinets, bed, tables, chairs, paneling, door-window frames, doors, flooring, outdoor furniture, etc.



Ash:

- It is whitish in colour.
- It is straight-grained, very tough, and flexible.
- Although tough, ash works with machines quite well, and has a reasonably smooth finish.
- It can be glued, stained, and polished, and takes nails and screws well.
- It is used for furniture, boat building, sports equipment, tool handles, etc.



Beech:

- It is light colour wood.
- It is hard, close grained and durable with a fine texture.
- It works fairly well by both hand and machine.
- It takes glue, stains and polish well.
- It is used for Furniture, kitchen utensils, wood block floors, etc.



Rosewood:

- It is dark reddish-brown to more golden-brown hues.
- It is close-grained, strong and durable.
- It is hard to work with.
- It has an appealing fragrance.
- It is used for making solid wood furniture like cabinets, tables, desks, cupboards, etc.



Walnut:

- It has a rich brown colour.
- It is highly durable and resistant towards warping and shrinking.
- It is easy to work with.
- It is used for making coffee tables, side tables, dining tables, book shelves, and wall paneling.



Cherry:

- It has slight reddish hue, to richer shades of reds and browns over time.
- It has a close-grain pattern.
- It is easy to work with.
- It is strong, durable and resistant to warping.
- It is used for making solid wood furniture like shelves, cabinets, tables, etc.

Miranti:

- It requires little maintenance.
- It is easy to work with.
- It is durable and resistant to termites.
- It is used for making door/window frames, shutters, etc.



Sapele:

- It is harder than mahogany with similar strength properties to oak.
- It works fairly well with hand and machine tools, but the interlocked grain is often troublesome in planing and moulding.
- It is used for furniture, veneer, etc.



Mango:

- It is lighter than most other variants of hardwood such as oak or teak.
- It is strong and dense.
- It has an attractive grain pattern.
- It is used for making bedroom furniture, cupboards, tables, entertainment units, book shelves, kitchen cabinets, and console tables.



Salwood:

- It looks like teakwood and heavier than teakwood.
- It is quite resistant to termites.
- It is strong and durable.
- It should be avoided for furniture making.
- It is used for making door-window frames.



2.1.9 Types of Softwood and their Characteristics

Cedar:

- It is a reddish wood with aromatic smell.
- It is a lightweight and highly durable wood.
- It is very easy to work with.
- It has uniform texture.
- It is resistant to insects and decay.
- It is used for making storage chests, decorative panels, etc.



Pine:

- It is extremely popular wood.
- It varies from cream to yellow-brown.
- It has uniform grains.
- It is easy to work with.
- It is not as durable as other types of wood.
- It is resistant to shrinkage, swelling and warping.
- It is widely used for making indoor and outdoor furniture, moldings, and paneling.



Redwood:

- It has a reddish tint.
- It is a lightweight and durable wood.
- It is easy to work with.
- It is resistant to insects and decay.
- It is used for making indoor and outdoor furniture, fencing, paneling, etc.



Larch:

- It varies from yellow to a medium reddish brown.
- Its grain is generally straight or spiralled
- It is moderately durable w.r.t decay resistance.
- It is used for veneer, utility poles, fence posts, flooring, boat building, and construction timber.



2.1.10 Manufactured Wood -

Wood is also available in the form of sheets, which are manufactured in factories and are less expensive than boards of wood. These sheets are available in different sizes and thicknesses.

Let us take a look at them:

Plywood:

- It is widely used for making shelves, cupboards, cabinets, doors, paneling and partitions.
- It is made by bonding together a number of thin layers of softwood or hardwood.
- There are always an odd number of layers, like 3, 5, 7, etc.
- Each layer is at a right angle to the grain of the other layer.
- The available sizes are 8'x4', 8'x3', 7'x4', 7'x3', 6'x4', and 6'x3'.
- The available thicknesses are 2.5 mm, 4 mm, 6 mm, 8 mm, 10 mm, 12 mm, 19 mm, and 25 mm.
- It can be finished by pasting wood veneer or formica on it or by painting it.
- One-side or two-side pre-finished plywood is also available.
- It comes in many grades water and boil proof (exterior grade), interior plywood, shuttering plywood and marine plywood.



Blockboard or commercial board:

- It is used for making shelves, cupboards, cabinets, doors, panelling, and partitions.
- It is composed of softwood strips (up to about 25mm wide) placed edge to edge and sandwiched between two layers of hardwood, and then bonded under high pressure.
- The available sizes are 8'x4', 8'x3', 7'x4', 7'x3', 6'x4', and 6'x3'.
- The available thicknesses are 19 mm and mm.
- One-side or two-side pre-finished blockboards are also available.



Chipboard:

- It is made by bonding together wood particles with an adhesive under heat and pressure to form a rigid board.
- It is available in a number of densities normal, medium and high-density.

- Normal density is fairly soft and is used for making pin-up boards.
- It is not suitable for outdoor because it tends to soak up water.
- Available size 8'x4'.
- Thickness 12 mm to 25 mm.
- Pre-finished chipboard is also available.





Veneer:

- It is made up of narrow (25 to 100 cm) strips of wood glued edge to edge on 4 mm thick plywood.
- Some veneers have no backing on them and are called raw veneers.
- It is a good alternate of wood.
- Available size normally 8'x4'.
- Thickness 4 mm and 6 mm.
- It is used to give finish to a piece of furniture.
- There are many various types of veneer raw veneer, paperback veneer, natural veneer, dyed veneer, recon veneer, artificial veneer.



MDF:

- It is made from powdered wood bonded with glue and compressed to form the sheets.
- It is quite soft and very easy to work with.
- It is also known as pressed wood or reconstructed wood.
- Thickness 3 mm to 25 mm.



Tips 🖳

While purchasing plywood or blockboard, always remember -

- Check IS 303 mark on plywood.
- Plywood is available in two grades (1) MR Grade Moisture resistant and (2) BWR Grade Boiling water Resistant. It is also called BWP Boiling Water Proof.
- Check **IS 1659** on blockboards. Check the grade also (1) MR Grade and (2) BWR/BWP Grade.
- Some plywood/blockboard manufacturers are Duro, Decowood, Durian, Greenply, Century, Euro, Dolby, Red Rose, etc.

2.1.11 Other Materials —

Drywall:

- It is also known as plasterboard, wallboard, or gypsum board.
- It is a panel made of gypsum plaster pressed between two thick sheets of paper.
- It is used to make interior walls and ceilings.
- Available size 6'x4', 8'x4', 10'x4', 12'x4'.
- Thickness 6 mm and 25 mm.



Decorative laminate or Formica:

- It is artificially made and looks like wood.
- It is also available in fancy designs.
- It is easy to maintain but exposure to water may result in warping or ballooning.
- It is pasted on plywood or blockboard by using glue.
- Available size –8'x4.
- Thickness 0.8 mm to 1.5 mm.



Fiber glass sheet:

- It is a fiber reinforced plastic sheet, in which glass fiber is used.
- It is available in plain, corrugated, coloured, pattern sheets.
- It is highly strong and durable, and light in weight.



Tips 🖳

- Store wood/plywood/board in a dry and well-ventilated place.
- Do not keep wood in direct contact with floor.
- Keep wood in a rack or shelves horizontally.
- If possible, stack plywood/board sheets horizontally.
- If space is limited, plywood/board sheets can be stored in racks to rest against the backboard.
- For sheet materials with decorative sides, the face sides should be placed against each other.
- Keep formica sheets carefully, so that they do not get scratched and break.

- Practical 🖄

- Go to your classroom's material section and know the different types of wood.
- Look at plywood, blockboard and other types of boards and know them.
- Based on wood properties, list down types of wood to be used in various household woodwork.
- Observe different types of wood defects.

- E)	kercise 🗷 –					
Choose the correct answer –						
1.	Which of the following is not hardwood –					
	a) Teak	b) Mahogany	c) Walnut	d) Redwood		
2.	Which of the following is not softwood –					
	a) Cedar	b) Rosewood	c) Redwood	d) Pinewood		
3.	Which of the following is not wood –					
0.	a) Oak	b) Miranti	c) Cherry	d) Fiber glass sheet		
4						
4.	a) Exterior grade	b) Interior grade	c) Chipboard	d) MDF		
	,	,	-, -	- /		
5.	How can a blockboard be finished?					
	a) By pasting formica on it		b) By painting it			
	c) By pasting wood	veneer on it	d) All of above			
6.	Look at the nictures given below and make right nairs with their names –					
	Plywood					
			, iywood			
			Chipboard			
			Plackbaard			
			BIOCKDOALO			

UNIT 2.2: Tool Planning and Material Gathering in the Organisation

- Unit Objectives 🦉

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

- 1. Identify the hand tools used in furniture making
- 2. Identify the power tools used in furniture making

2.2.1 Tools and Machines -

Like every trade, woodworking has its tools. Any good carpenter knows that the right tool for the project is very critical in manufacturing a quality end product in a timely manner. These tools help to make furniture in easier, faster, and more accurate manner.

There are mainly two types of tools -

- Hand tools
- Power-operated tools

A carpenter should have full knowledge of these tools to become an efficient wood furniture carpenter. Let us know about these tools.

2.2.2 Measuring Tools -

Measuring tape

- It is an important hand tool for the woodworker.
- It is used to measure big pieces of wood.
- You should have a retractable one that is at least 25 feet long. Any longer than that, and you will start having problems getting it to roll back up.
- You should make sure that the "hook" or tab at the end of tape is firmly attached, with no give. When it gets loose, you will have at least 1/8" variation in your measurements. This can add up to some severe accuracy problems in the long run.



Rule

- Rule is the most common and the best-known piece of measuring equipment, for measuring linear distance.
- Least count for Rule is normally 1 millimeter and 1/8 inch (normally one side has Centimeters and other side has inch scale).



Protractor

• A protractor is a circular or semicircular tool for measuring an angle or a circle.



Wing compass

- It is a two-legged tool and the ends of these legs are pointed.
- It is used to mark arcs and circles etc.
- It is made up of steel.



Caliper

This tool is required to take indirect measurements. Measurements taken by this tool is read on the steel rule or steel tape. They are of two types –

- 1. Outside caliper: With this caliper, the outside measurement of wood or any object, such as the diameter of the round object, length and width etc. of the flat object is measured. It has rounded end points.
- 2. Inside caliper: With the help of this caliper, the internal measurements such as the diameter of the holes, slits etc. are taken. It has two legs, which are twisted outside.

Vernier Calliper Vernier Calliper is in instrument which is used to calculate even 0.01 difference in the woodworking. Try square • It is a L-shaped tool used to mark or check the right angle (90°) of the wood. It is made of steel or wood. ٠ It has two main parts– 1) Blade 2) Stock • Blade Stock Miter square It looks like a try square but instead of 90°, the angles of 45° and 135° angle can be measured from • this. **Bevel square** It is used to check or move not only the right angle but also different angle. • It is used to make the layout or move the angles of the dovetail, side rails of the chairs, louvered ٠ door, chamfer, etc.



2.2.3 Marking tools -

Pencil

- It is used to mark cutting lines on wood.
- It is also used to make drawing and write measurements.
- Normally 2H pencils are used, which are very hard and can write or mark almost on any surface.



Scratch Awl

- It is a tool, which is used for layout and point making.
- It is used to sacribe a line.
- It is a steel spike which marks a fine groove on wood.



Marking Gauge

- It is used for marking parallel lines on wood.
- Stock and beam are its main parts. Stock is made of wood. It has a sqaure hole in which wooden beam is sliding. Stock has hole at one end. A thumb screw is fitted in it which controls beam.
- There is a pin at one end of beam which makes marking on wood.



Mortise Gauge

- It is a very common tool for marking on beam.
- It is made of a fence like support, which can be locked and moved on a beam for marking.



Divider

- It is a two-legged tool and the ends of these legs are pointed.
- It is used to lay out an arc circle or step off division on a line.
- It is made up of steel.



Trammel point

- The Trammel point is used to draw big circles and to mark big arcs.
- It is a long thin wooden baton or steel rod on which there are two pointed sliding points.
- These pointed sliding points are tightened at the length according to the radius of the circle or arc by knurled screw.
- An arc or circle is drawn by keeping one point at the center.



Marking Knife

- A good utility knife is another asset for the woodworker.
- There are many different kinds, but the kind that uses disposable blades is the most common.
- The woodworker uses the utility knife when cleaning out mortise joints or scribing wood, as well as many other uses.



Chalk Line or Marking Thread

- This is used to mark the straight line.
- Since sometimes the wall size is bigger where marking cannot be done by hand then this marking thread is used.



2.2.4 Planing tools







Fig. 2.2.4.2: Parts of a wooden plane

Jack plane

- This is a common type of planer and with the help of this planer only the surface of the wood is planed.
- Its length varies from 14 inch to 18 inch and the width of its cutter blade is 13/4 inch to 21/4 inch and over the cutter blade, there is a cap iron which is fixed with a bolt.
- Cutter blade is fixed at an angle of 45° to 48°.



Smoothing Plane

- It is also known as cleaning planer.
- It is used on the wood after jack planer has done planning.
- The wood looks neater after it is used for planing.
- Its length is from 6 inches to 9 inches. The width of its cutter blade is from 13/4 inches to 2 inches.
- Its blade is set from 45° to 50° angle.



Trying plane

- This planer is also known as the Jointer planer.
- It is used to plane the edge of the long wood.
- Its length ranges from 20 inches to 28 inches.
- All of its parts are similar to those of Jack planer.



Plough plane

- It is also known as grooving plane.
- Its length varies from 6 inches to 10 inches. The width of its cutter blade is from 1/8 inch to 5/8 inches, which can be adjusted according to the size of grooving.
- This planer is used to make a slot or a groove parallel to the wood.



Rabbet plane

- This planer is used to make rabbet in the wood.
- The length of this planer is from 7 inches to 9 inches, the width of cutter blade is from ½ inch to 1½ inch.



Spokeshave

- The spokeshave, is held horizontally by two symmetrical handles in line with the cutting edge of the iron.
- It has a very short sole, either flat, concave, or convex.
- It is used for smoothing curved surfaces.



Moulding Planer

- The moulding planer shape is similar to smoothing plane.
- The bottom sole of this moulding plane is designed so as the cutter blade is also designed to create moulding in the wood.



- 2.2.5 Cutting tools —

Rip Saw-

- It is used to cut the wood along the grain.
- The length of these saw ranges from 24 inches to 28 inches.
- In these saws, there are 4 to 7 teeth in an inch.



Cross cut Saw

- It is used to cut the wood across the grain.
- The length of these saw ranges from 24 inches to 28 inches.
- In these saws, there are 4 to 7 teeth in an inch.



Rip saw teeth

The rip saw is designed for cutting with the grain and cuts on push stroke. The front face of rip teeth has an angle of 80; the back angle is 520. Rip teeth are filed straight across the face and give the appearance of a series of chisel edges.

Cross-cut saw teeth

The cross-cut saw is designed for cutting across the grain and cuts on the push stroke. The front face of cross-cut teeth have an angle of 150; the back angle is 450. The beveling of the edges of the teeth of about 150 gives the appearance of a series of knife-like points which makes for easy identification of a cross-cut saw.

How a rip saw cuts

Rip teeth cut like vertical chisels. First on one side of the set small pieces of wood are cut loose across the grain and pushed out. Then on the other side, the tooth following plows out a similar particle.

How a cross-cut saw cuts

The teeth first score the wood like points of two parallel knife blades as the saw is drawn across the grain. Then the edges of the teeth begin paring the groove which is formed and clear the sawdust from the kerf.

Hand saw or Panel saw

- It is a combination of Rip Saw and Cross Cut Saw.
- It is a small saw in length. Its length normally ranges from 12 inches to 18 inches.
- There are 6 to 9 teeth in one inch. It works more precisely since teeth per inch are more.



Back or Tenon saw

- These saws are commonly used to cut tenon or shoulders of tenon.
- Its blade has equal front width and back width. There is an iron or metal strip at the back of these saws, which does not allow it to fold.
- These saws are 10 inches to 16 inches long.
- There are 8 to 10 teeth in an inch.



Dovetail saw

- It is used to cut the dovetail joint and socket.
- This saw is similar to the Tenon saw but the blade of this saw is very thin.
- The length of this saw is less than the length of Tenon saw. Its length is from 8 inches to 12 inches.
- There are 14 to 16 teeth in an inch.



Compass saw

- This saw is used to cut wood pieces spherically.
- The blades of this saw have lesser width. In one inch there are 8 to 12 teeth.
- The length of these saws ranges from 10 inches to 14 inches and the width of the blades is less at the toe end.



Fret saw

- The width of the blade of this saw is very less (about 5 millimeter) and the length is from 5 inches to 6 inches.
- This saw can cut small curves in wood very easily. This saw is mostly used in carving.
- The teeth are very fine.
- This saw has a straight handle.



Coping saw

- This saw is used to make curves in the wood.
- The blade of this saw is very thin and of a lesser width. The blade is screwed on the frame at both ends and can be replaced if broken.
- The length of the blade is about 6 inches.



Key Hole saw

- This saw is used to cut keyholes in wooden doors .
- The width of the blade ranges from 3 millimeter to 10 millimeter and the length is from 6 inches to 8 inches.
- This is very rarely used nowadays.



Bow saw

- This is a saw with a frame and a straight handle.
- The shape of this saw resembles the English alphabet "H".
- The width of the blade is from 3 millimeter to 10 millimeter and the length ranges from 12 inches to 16 inches.
- This saw is used to make the curve in the wood.



- 2.2.6 Chipping tools —

Firmer chisel

- It is used by applying pressure or hitting lightly with the Mallet.
- This chisel is used to clean already created mortise, holes or grooves.
- Its Blade is about 6 inch long and 1/8 inch to 1.5 inch wide.
- The cutting angle of its blade is 30°.



Bevel chisel

- It is similar to Firmer chisel. The difference is only that the edges of this chisel are tapered.
- They are used to clean groove, mortise and to make dovetail.
- The width of its blade is about 1/8 inch to 1.5 inch.



Paring chisel (long chisel)

- The length of this chisel is 8 inch to 10 inch.
- This chisel is similar to Firmer Chisel or Bevel Chisel. The difference is only that this chisel is long.
- The width of its blade is ½ inch to 1.25 inch.
- They are used to clean long and deep mortise.



Chopping Chisel (wider chisel)-

- These chisels are wider.
- The width of the blade is 1.5 inch to 2.25 inch.
- All its parts are similar to those of Firmer Chisel.



Mortise Chisel

- These chisels are used to cut the mortise.
- The width of its blade is less at cutting edge and more towards shoulder. It is tapered in shape.
- The handles of these chisels are very strong. A metal ring is attached to the ends of these handles so that the handle does not break on applying a heavy blow.
- The thickness of its blade is more than its width. Its width is 1/8 inch to 3/4 inch.



Socket Chisel

- It is used to make big mortise.
- There is a socket instead of a tang attached to its shoulder, into which the handle is fitted.
- This chisel is longer and stronger than Mortise Chisel.
- The width of its blade is 1/8 inch to 1.5 inch.



Gouges

- Gouges are used to make round or curved mouldings.
- Its blades are curved inside and its cutting angle is inside or outside. Its cross section is circular.



Ball Peen Hammer

- The peen of this hammer is like a ball.
- It is used to drive the nail on wooden surface.



Claw Hammer

- It is used to drive and pull out nails on wooden surfaces.
- On one end of its head are claws, therefore, it is called claw hammer.



Cross Peen Hammer

- The peen of this hammer is V-shaped towards head.
- This hammer is used to drive the nail in the corners of wood.



Straight Peen Hammer

- The peen of this hammer is parallel to the handle.
- It can be used where cross peen hammer cannot be used.
- It is used more in sheet metal works.



Mallet

- This is a type of hammer made of wood or rubber.
- It is used to drive other tools like chisel or adjust the blade of plane.



- 2.2.7 Boring and Drilling tools -

Brad Awl

- It has only two parts blade and handle.
- It is used on soft wood to make shallow holes and screw holes. By applying pressure to the handle, holes are made.



Gimlet

It is used to make deep holes of 10 millimeter to 50 millimeter diameter.

It has a handle. It is around 2 feet long. Its tip is helical and then shack has twists up to 3 inch to 5 inch.



Auger

- It is used to make big and deep holes to insert bolt etc.
- The shack is twisted up to considerable length. Its tip is also helical.
- To make a hole in the wood, wood is kept on the ground and Auger is moved towards a single direction. As hole is cut, wood filings come out automatically.



Hand Drill

It is used to make holes up to 12 mm in wood.

It is made of iron and there is a gear wheel attached to it having teeth. It has a handle, by moving which, drill chuck is rotated. It has two handles. One handle is held firmly and another handle is rotated.



Country Drill

- It is used only in India.
- A wooden stick with a rope attached to it.
- It is made of wood.



Plain Brace

- There is a crank in this hand drilling chuck. By rotating the crank the drill chuck rotates.
- The U crank is made of iron or steel.
- There is a handle in the middle and a head knob at the top. This knob is pressed with one hand and the handle is rotated with the other hand. Drill bit is fixed in the jaws of drill chuck.



Drill Bits

- Drill bits are cutting tools used to remove material to create holes, almost always of circular crosssection.
- Drill bits come in many sizes and shape and can create different kinds of holes in many different materials.

- In order to create holes drill bits are attached to a drill, which powers them to cut through the workpiece, typically by rotation.
- The drill will grasp the upper end of a bit called the shank in the chuck.

Expansion Bit

- There is an adjustable cutter. By adjusting it, holes of many shapes can be made.
- There is a helical centre point which makes footing for making a hole.
- Holes of 12 millimeter to 75 millimeter diameter can be made on the wood with it.



Expansion Bit

Countersunk Bit

- It is used to make a hole to fit countersunk bit.
- To get the head of the screws in the same level of the wood, its cutting edge is conical in shape and cutting flutes are made on it.
- They are available in 6 to 20 millimeter size.



Countersunk Bit

Hole cuter

• This is used for install circular lock and is fixed in drill chuck of Drill machine.



Hole cuter

Hinge boring drill bit

- This bit is used for fixing concealed hinges.
- This is used with dia 35 millimeter.



Hinge boring drill bit

Auger bit

It is used to make shallow wide holes.

In the centre of the bit there is a helical point, which becomes footing for making a hole in the wood.

Its spur or scriber which is on the edge of the hole to be made makes a marking. Then the cutter completes the hole.

It is available in sizes varying from 3 to 50 millimeter.





Frostener bit

- It makes precise, flat-bottomed holes in wood, in any orientation with respect to the wood grain.
- The bit includes a center point which guides it throughout the cut.
- The cylindrical cutter around the perimeter shears the wood fibers at the edge of the bore, and also helps guide the bit into the material more precisely.



Frostener bit

- 2.2.8 Testing tools -

Spirit level

- It is used to check level of vertical and horizontal surfaces.
- When this is placed on a vertical or horizontal surface, if the bubble is at the center position, it means that the surface is perfectly level.



Plumb bob

- It is used to check level of vertical surfaces.
- It is conical in shape and made of iron or metal.



Try square

• It is used to check flatness and squareness of a wood piece.



Miter square

• This is used to measure the 45° angles of wood piece



Water level pipe

- This is transparent 1/2 inch thick long pipe, which is filled with water.
- It is used to check the level of a horizontal surface.



Straight edge

- This is used to check the straightness of long wood pieces.
- It also helps to give guideline to cut straight.



2.2.9 Holding tools -

Bench Vice

- This vice is always fitted in the working bench.
- It is used to hold the wood in place while sawing, cutting, splitting and planing, chiseling, etc.
- It has two jaws, one of which is fixed and the other is movable.



G-Clamp

- The frame of it resembles the English alphabet 'G'.
- It is used for small tasks.
- It is used to hold pieces of wood together while working. It is also used to hold the wood on workbench while working with chisel.



Bar Clamp

- This clamp is long. Its length is from 2 feet to 7 feet.
- Big frames and models are glued and clamped in it.
- It is made of bar steel and there are equidistant holes in it.



2.2.10 Other helping tools —

Miter box

• It is used to cut wood at an angle.



Pincer

- It is used to pull out nails from wood and cut wires and nails.
- It is made of iron. Before using it to pull out nails from a wooden surface, a piece of wood should be kept below the nose of it so that the wooden surface does not get damaged.



Screwdriver

- It is used to drive or loosen the screws.
- The head of the Philips screws are of the shape of the plus sign (+).



Nail set

• It is used to set the head of a nail lower than the surface of the wood.



Saw Setter

• This is the instrument, which is used for tuning of saw blades.



Oil Stone

• This is used to sharpen chisels and the blades of smoothing planes.



File

It is used to smoothen surfaces and edges.



Cabinet scraper

• It is used to make surface flat and smooth.



Wrecking bar

• It is used to pull out nails from wooden surfaces.



Bench hook

• A bench hook holds a piece of wood firmly in position on a workbench while it is cut.

Work bench

- It is a waist height table and is used to give support while cutting, chiseling, or planing the wood.
- Generally, bench vice is attached to it.
- It has a lower shelf where tools or material can be kept.
- The length of this bench is 8 feet. Its width is 3 feet and height is 2' 6". Its size can be reduced or increased as per nature of the work.



Saw horse

- It is used to support the wood or board while cutting with saw.
- It can be used as a base of a worktable on sites.



2.2.11 Portable power-operated tools -

Jigsaw

- It is used for straight cutting as well as round and zig zag cuttings.
- This machine has thin and long blades which move up and down when the machine is powered on. The teeth are bent downwards and there is a strong handle for gripping the machine.



Circular saw

• It is used to cut large piece of wood or board straight.



Power drill

• It is used to drill holes in the wood.



Router

• It is used to shape surfaces and edges of wood piece.



Planer

- This machine can be used in smoothing of wooden blocks as well as in taking out the fillings.
- This can be used in smoothing woods as well as in rebating and chamfering.



Nail Gun

• A nail gun or nailer is a type of tool used to drive nails into wood.



Palm Sander

- It is used to make surface smooth using sand paper.
- They usually move in a circular pattern, or back and forth.



Random Orbital Sander

- A random orbital sander is improved version of 'palm sander'.
- The random orbital sander uses hook and loop (velcro) to fasten the sanding disks to the sanding pad.


Compound Miter Saw

• It is used to cut the wood at an angle.



2.2.12 Table power-operated tools

Table saw

- This is a permanent fixture in woodworking shop.
- It is used to rip, miter, shape, square, groove, and join.



Band saw

- It is used for cutting precise shapes and curves.
- It is a powerful tool when cutting rabbets and tenons.
- You can also rip small pieces of wood and even make your own laminate strips with a band saw.





Drill Press

- The drill press delivers the precise and accurate large-diameter holes.
- The depth of the hole can be set. This is especially useful when a number of holes are needed to drill, all to the same depth.
- The drill press also allows to use forstner bits, hole saws, and spade bits.



Surface Planer

• It is used to cut the wood at an angle.



Workshop Vacuum Cleaner

• You may not think of a vacuum cleaner as a woodworking tool, but as soon as you start working with saws, sawdust will start flying in air and into your eyes. This is much like the home vacuum cleaner. You just take a hose with you from one room to the other, plug it in, and the vacuum does its job, taking everything to the central vacuum receptacle.



Notes	

Exercise Choose the correct answer: 1. Which of the following tools is not used to measure the wood -a) Measuring tape b) Rule c) Caliper d) Handsaw 2. Which of the following tools is not used to mark on the wood a) Marking gauge b) Screwdriver c) Bevel gauge d) Wing compass 3. Which of the following tools is used to check the accuracy of wood a) Chisel b) Jack planer c) Compass saw d) Try square 4. Which of the following is not a type of saw – b) Dovetail saw d) Pigeontail saw a) Cross-cut saw c) Tenon saw 5. Which of the following is not a type of power tool – a) Band saw b) Coping saw c) Circular saw d) Zig saw 6. What tools are used to cut the wood? a) Saw b) Chisel c) Screwdriver d) a and b 7. Pincer is used for a) Pulling nails from wood b) Cutting nails c) Cutting wires d) All of above 8. Oil stone is used for a) Sharpening chisel and cutting blades b) Boring c) Keeping oil d) Striking 9. Which plane should be used for good finishing at wooden surface? a) Trying plane b) Smoothing plane c) Jack Plane d) Compass Plane



सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

FURNITURE & FITTINGS SKILL COUNCIL

3. Maintenance of Work Area, Tools and Machines

Unit 3.1 - Safety and Maintenance of Tools Unit 3.2 - Safety and Maintenance of Workshop





– Key Learning Outcomes 💆

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

- 1. Operate tools, machines, and equipment safely
- 2. Perform maintenance operations at the workshop
- 3. Demonstrate the steps of sharpening a straight cutting edge, a gouge, and a handsaw

UNIT 3.1: Safety and Maintenance of Tools



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

- 1. Demonstrate various methods of maintaining hand and power tools
- 2. Implement various techniques of handling hand and power tools safely
- 3. Practise sharpening straight cutting edges, gouges, and handsaws

3.1.1 Importance of Maintenance of Tools

If tools are not maintained in proper way, a carpenter's work becomes very difficult. Poorly maintained tools can damage wood or other materials, costing time and money. Properly maintained tools reduce the risk of accidents for you and your co-workers. Besides knowing the best and safest techniques of using tools, a lead carpenter must know how to maintain and store tools to get the most out of them so that they can make your work more professional and efficient.

The condition of woodworking tools is important to the quality of the work you do. If tools are working correctly and efficiently, they not only add to the satisfaction of your efforts, but also ensure your safety. It is very important to set up a routine maintenance program to assure everything is running correctly, tools are correctly sharpened, instrument calibration are true, and tools are clean. Proper care will keep them running efficiently, help in maintaining their new tool look, and increase their life span.

3.1.2 Safety and Maintenance of Tools –

General tips:

- Keep the tools in their designated places
- After completing the job, clean the tools properly before storing them
- Oil the movable parts of the measuring tools, such as callipers, divider, compass to avoid stock-up
- Ensure that sand does not get inside the case of pull-push rule to avoid wearing off of the graduations
- Keep chisels in the plastic end cover
- Rub metal tools occasionally with an oiled cloth to keep them free of rust
- Follow the manufacturer's instructions to clean power tools

Dos:

- Always use the right tool for the job
- Always use personal protective equipment
- While giving your colleague a sharp tool, hold the edge in your hand and the handle to other person
- Keep the sharp tools in designated place only
- Check power tools before using them for broken plug or poor condition of the cord
- Always sharpen the blades of plane or chisel before using them

Don'ts:

- Do not keep hand tools on machine
- Do not keep sharp tools in your pocket
- Do not use calliper as tongs
- Do not wipe off edges of the steel pull-push rule with bare hands to avoid injury
- Do not use power tools near water, inflammable gas, or oil
- Do not touch power tools while they are working
- Do not use power tools with wet hands
- Do not talk while working with tools

Maintenance of Power Tools

Power tools require little maintenance if stored in a clean, dry, protected area, keeping dust and debris away, and protecting them from the elements. A few guidelines directing the proper maintenance of power tools have been given below.

- Make sure that the cord is free of cuts or abrasions. You can also check the switch to see if it is properly connected to allow current to flow to the motor.
- Some power tools, including routers, have a pair of brushes that might need to be repaired or replaced as they wear down over time.
- Double check that chucks and bits are proper tightened.
- Keep tools in their case when not in use and make sure there is a proper storage place for those tools that do not have a protective case.
- Check electronic components for sustained damage, wheel and bearings function.
- Proper lubrication is important for proper operation and of the tools.
- Worn out drive belts can cause amplified vibration and slippage and will tend to break.
- Always protect your tools from moisture and extremes in temperature, exposure to moisture causes corrosion on unprotected metal surfaces.
- Use tools as they are intended, tools are usually made for specific purposes, when they are subjected to misuse and stresses they weren't designed, they will often brake down and fail to work correctly.

Power Requirement of Power Tools

Power tools feed on amps. The amps, or amperage, reflect the amount of electricity that the motor draws. Though most power tools use 15 amps but some require more. The nameplate, located on the tool body or motor housing, indicates just how much amperage the tool will need or draw the electricity under full load. The nameplate also indicates if any tools that can be wired to run on 240 volts instead of 120.

3.1.3 Sharpening of Cutting Edges -

New blades of planes or chisels come with a bevel of 25° on the cutting edge, which must be sharpened to 300 before use.



Fig. 3.1.3.1: Before a) and b) after sharpening the blade

Sharpening of plane and chisel blades is done by hand using an oilstone or a whetstone. It can be done by machine. Here we will learn how to sharpen a blade manually in correct way.

3.1.4 Steps of Sharpening a Straight Cutting Edge

Things needed

- Oilstone or wetstone
- Oil or water
- Sharpening guide (optional)
- Plane or chisel blade



STEP 1: Put oil on oilstone or water on wetstone.



STEP 2: Hold the blade in both hands. Position the blade's grinding angle flat on the stone and raise the back up.



STEP 3: Slowly move the blade forwards and backwards.



STEP 4: Turn the blade and draw it towards you once or twice to remove the burr.



STEP 5: Inspect the blade. If you can still see a dull white line, repeat step 3.



3.1.5 Steps of Sharpening a Gouge

Things needed

- Gouge slip
- Oil or water
- Stone file
- Gouge



STEP 1: Wet the gouge slip with oil or water. Rest the blade of gouge in the curved surface of gouge slip.Put your fingertips in the pod opposite the bevel to help feel the angle. Move the blade forwards and backwards.



STEP 2: After finishing the bevel, use a round stone file to remove the burr from the cutting edge of the gouge. Lightly stroke the concave surface of the pod with the file.



3.1.6 Steps of Sharpening a Handsaw

Saw require periodic sharpening, so that they can cut the wood without damaging it.

Things needed

- Vice
- Triangular file
- Flat file
- Saw set
- Saw



STEP 1: Place the saw blade in the vice with the teeth facing up.



STEP 2: Run mill file all the way across the top of the teeth of saw, applying light pressure.



STEP 3: This topping will create flats of differing sizes indicating the higher and lower teeth on the saw.



STEP 4: Place the teeth in a saw set and bend the teeth straight.



STEP 5: Run a triangular saw file along the teeth in a smooth horizontal motion.

STEP 6: Switch side of the saw and repeat step 5.



- Practical

- Discuss with trainer the safe procedures, while using an oilstone or wet stone.
- Sharpen the plane blade using oilstone/wetstone.
- Sharpen the saw.

Exercise

1.	Which tool is used to sharpen the blade of chisel ?						
	a) Oilstone	b) Sandpaper	c) Wetstone	d) a and c			
2.	The blade of a plane is sharpened to the angle of –						
	a) 250	b) 450	c) 300	d) 550			
3.	What tools are nee	ded to sharpen the saw	?				
	a) Saw set	b) Triangular file	c) Flat file	d) All of above			
4.	After completing the job, you should –						
	a) Keep chisel in the plastic end cover						
	b) Leave all the tools on working table						
	c) Keep all the tools in a cupboard or a box						
	d) a and c						
5	All nower tools sho	uld be-					
5.	a) Kept in their cases back after completing the work						
	b) Inspected regularly for plugs and cords						
	c) Kept in their cases, when they are not being used						
	d) All of above						

UNIT 3.2: Safety and Maintenance of Workshop

- Unit Objectives 🧕 🎯

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

- 1. Demonstrate the process of organising and cleaning the workshop
- 2. Manage proper storage of wood, ply board, etc.
- 3. Practise ways of reducing waste
- 4. Demonstrate proper waste disposal techniques

3.2.1 Benefits of an Organized and Clean Workshop -

Different activities in a wood workshop generate a lot of dust and waste. That is why it is very important to keep workshop neat, clean and organized on day-to-day basis. Benefits of a clean and organized workshop are –

- Prevention from hazards
- Healthy work environment
- Ease of work
- Timely completion of work in efficient manner
- Time saving
- Reduction of the waste of material

A good workshop should have -

- Clean and even floors
- Fresh air and adequate light
- Good ventilation
- Comfortable temperature
- Free from hazards
- Arrangements for disposing of waste
- Clean toilet and washbasin
- Clean drinking water
- Fire extinguisher



3.2.2 Keeping a Workshop Organized

Organize workshop in such way, that you get -

- Enough space to move around safely
- Enough space for storage of materials and tools
- Enough space to work and use materials and tools

Always remember

- Keep your workshop neat and clean.
- Stack the material neatly so that it will not fall when taking from the stock.
- Do not store any material in the way, so that there is no hindrance in walking or working.
- Do not allow clutter to get accumulate at workplace.
- Store the tools in their right place.
- Keep fire extinguisher at the place where anyone can reach easily.



3.2.3 Keeping a Workshop Clean -

As we know wood carpentry workshop is full of dust, due to various cutting and finishing activities. If you clean the place, immediately after cleaning dust will accumulate on the cleaned surface. Despite this, we should regularly clean the work area. Workshop must be cleaned in the morning before starting the work and before leaving the work in the evening.

Regular cleaning will limit the dust accumulation and cleaning of machines and tools will ensure their long and trouble-free life.

One of the methods for cleaning could be making a checklist of all the places to be cleaned along with frequency of cleaning. It will ensure regular cleaning of the places, which we want to clean.



Storage of wood

- Do not keep wood in direct contact with floor.
- Keep wood in a rack or shelves horizontally.
- Store offcut wood pieces according to their sizes.
- If space is limited, build overhead storage.

Storage of plywood/board

- Do not keep sheets of plywood/ board in direct contact with floor.
- If possible, stack sheets horizontally.
- Do not lean sheets against the wall, as it makes them bow.
- If space is limited, they can be stored in racks against the backboard.
- There should be enough space around the sheet for easy loading and removal.
- For sheet materials with decorative sides, the face sides should be placed against each other.
- Store all left over pieces separate from main stock.
- Store offcut pieces according to their sizes.



Storage of tools: Tool storage is totally up to carpenter's personal style. But, it is always good to build locking cabinets or open shelves. A toolbox may be a good solution to store hand tools, and a tackle box can be used for fasteners.

However, you can choose any method to organize your tools and accessories, only remember one thing that your time on task is aided when you can find all of your tools on time. Keeping the fasteners sorted and easily accessible may save precious time during project. It's also easier to take care of expensive tools and machines when you have easy access to it.

Always remember

- Sharp tools such as chisel should be stored in plastic cover.
- All tools should be stored in a box or cupboard.
- When not in use, tools should be securely locked away to avoid theft.
- Tools should be cleaned and oiled with appropriate lubricant before storing. It will keep them safe from rust.
- Ensure the tool storage location is free from water ingress, which may cause rust to metal part and damage to wood also.



3.2.4 Waste Handling -

In carpentry workshop or on site, many types of waste generate, such as -

- Wood dust
- Small pieces of wood, plywood or board
- Packaging materials, such as cardboard box, paper, plastic sheet, etc.
- Adhesive plastic containers

How to handle waste

As an efficient carpenter, it is your duty to reduce the waste. You should keep certain things in your mind –

- Order only the amount you need for the job.
- Buy adhesive and hardware in bulk to reduce packaging waste.
- Before starting new job, check for off-cuts and use them.
- Ensure materials are stored properly so that they do not get damaged.
- Fix a place in the workshop for collecting the waste.
- Segregate very small pieces of wood. They can be used for bonfire in winter.
- Collect wood dust and wood fragments in one place and send them for recycling
- Although wood chips are biodegradable, but it is restricted to dump in land filling. There are approved government sources for handling wood chips. It should be handed over to them.

- E1	vercise						
1.	a) Efficient work	b) Time saving					
	c) Provention from bazards	d) All of these					
	c) Frevention noni hazarda	d) All of these					
2.	A wood workshop should not have -	_					
	a) Inadequate light	b) Fire extinguisher					
	c) Improper ventilation	d) a and c					
3.	Wood should be stored –						
	a) In a dry and well-ventilated place	b) Horizontally in a rack					
	c) On bearers on the floor	d) All of these					
4. The type of waste generated in a wood workshop is							
	a) Wood dust	b) Small pieces of plywood					
	c) Peels of vegetables and fruits	d) a and b					





सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

FURNITURE & FITTINGS SKILL COUNCIL

4. Ensuring Health and Safety at Workplace

Unit 4.1 - Dealing with Potential Hazards Unit 4.2 - Personal Protective Equipment (PPE)

Unit 4.3 - Personal Health and Hygiene



FFS/N8601

– Key Learning Outcomes 🕎

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

- 1. Compare risks and hazards
- 2. Classify hazards
- 3. Practise dealing with potential hazards
- 4. Use personal protective equipment
- 5. Practise personal hygiene measures

UNIT 4.1: Dealing with Potential Hazards



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

- 1. Identify potential hazards and risks at workshop or site
- 2. Practise dealing with potential hazards and risks
- 3. Practise preventive measures to minimize the potential hazards and risks
- 4. Practise treating common injuries by giving first-aid

4.1.1 Potential Hazards at the Workshop -

Woodworking involves various activities, such as sawing, chiseling, etc. Many sharp tools, saws, electric-powered tools are used to carry out these activities. Hence, level of safety hazards is high in woodworking. It is very easy to recognize those hazards that cause immediate and traumatic injury – blades that cut fingers and limbs, wood chips and fragments that fly into eyes, loose clothing or long hair that catches in whirling machinery, muscle strains from heavy lifting. But there are also hidden dangers in woodworking. These include wood dust, sap and oils, mold and fungus, vibration, and noise.

As an efficient carpenter, it is your duty to try and avoid accidents from occurring at workshop or site. You should be aware of the hazards and risks and preventive measures work practices. Using safe work practices will lower the frequency of accidents and serious injuries.

Some common hazards and risks are given below.

4.1.2 Slips, Trips and Falls -

Causes



- Water, grease, or spillage on the floor
- Tools or material lying in walkways and passageways.
- Cables across the way
- Improper use of equipment. For example placing ladder on uneven floor
- Poor maintenance. For example broken ladder
- Bad lighting
- Not using personal protective equipment. For example not wearing rubber or non-slip sole shoes
- Working without safety belt at heights
- Not reporting your supervisor about faulty equipment.

Preventive Measures-



working at heights



Wear safety belt and helmet while Never use broken or faulty equipments



Follow correct and proper way of using ladder



wear shoes.



Do not wear slippers or sandals; Avoid stretching cables across the way



Never leave tools or materials in walkways or passageway



Never leave floor wet



Clean the floor immediately after Keep workshop organized and anything spills



clean



Never leave big openings unsecured on sites



Secure big openings by blocking them with wood



Report maintenance faults to your supervisor

4.1.3 Cuts -

Causes



- Using dull saw or chisel •
- Incorrect way of using sharp tools. For example keeping your hand in front of the blade •
- Not using clamps while working with chisel or saw
- Not using push block or push stick while cutting small piece of wood on table saw or planer •
- Incorrect way of using power cutting tools •
- Blade of power cutting tools are not guarded •
- Not having proper training of operating power cutting tools •
- Poor maintenance of hand and power cutting tools •
- Not keeping sharp tools back in their designated places •
- Poor housekeepin. For example nails lying on the floor
- Not using personal protective equipment. For example not wearing shoes or gloves •

Preventive measures



Always sharpen the blades of chisel, or saw, or plane before using them



Never keep your hand in front of blade while working with chisel or saw or power cutting tools



Keep your hand at a safe distance Hold the saw in correct angle from the handsaw





Use clamps while working with chisel or saw



Use safety guards on power cutting tools



Hold power cutting tools in correct way



Never hold sharp tools pointing towards your body



equipments



Always wear personal protective Never leave loose nails or tools Keep tools and nails, screws in on floor



their designated place

4.1.4 Eye Injury ——

Causes

- Not wearing personal protective equipment while working with saw or chisel. For example not • wearing safety glasses
- Not disposing of of wood dust regularly in correct way •

Preventive measures



sawing or cutting with chisel



Always wear safety goggles while Clean workshop at intervals and dispose wood dust regularly

4.1.5 Electrical Shocks -



Causes

- Using power tools near water
- Damaged cables or wires
- Using power tools with wet hands
- Socket is in ON position when plugging anything into it •
- Pulling the cord to remove plug from socket

Preventive measures



Never use frayed cords or wires



Make sure socket is in OFF position when plugging in



Never use power tools near water or with wet hands



socket



Check for broken plug or broken Do not put wires directly into socket; use plug



Do not pull the cord to remove plug from socket

4.1.6 Personal Injury –



Causes

- Lifting excessive weight
- Incorrect methods of lifting, pushing, pulling and carrying objects
- Lifting heavy objects for prolonged period

Preventive measures



Do not bend to lift heavy objects



Use correct techniques to lift heavy objects



Take help from other person or use trolley to carry heavy objects

4.1.7 Fire –

Causes

- Poor housekeeping. For example not disposing of wood dust or wood fragments regularly
- Smoking inside the workshop
- Broken socket and plug or frayed wires of power of tools
- The use of one socket for many plugs
- The practice of not reporting your supervisor for faulty tool and equipment

Preventive measures



Do not smoke within working environment



Do not use broken sockets and plugs or frayed wires



Do not insert many plugs in one socket



Do not block emergency or exit doors



Dispose wood dust regularly



Report your supervisor for faulty tools/equipments

4.1.7.1 Types of Fire ______

Not all fires are the same. Different fuels create different fires and require different types of fire extinguishing agents. You should know the different classes or types of fire in order to deal with fire accidents. Mainly, fire is classified into five classes -



Class A

Class A fires are fires in ordinary combustibles such as wood, paper, cloth, trash, rubber and plastics.



Class B

Class B fires are fires in flammable liquids such as gasoline, petroleum oil, and paint. Class B fires also include flammable gases such as propane and butane. Class B fires do not include fires involving cooking oils and grease.



Class C

Class C fires are fires involving energized electical equipment such as motors, transformers, and appliances. Remove the power and the Class C fire becomes one of the other classes of fire.



Class D

Class D fires are fires in combustible metals such as potassium, sodium, aluminum, and magnesium.



Class K

Class K fires are fires in cooking oils and greases such as animals fats and vegetable fats.

- 4.1.7.2 Types of Fire Extinguishers



Sand



Water



Foam





4.1.7.3 How to use Fire Extinguishers

Remember PASS

Pull the Pin at the top of the extinguisher. The pin releases a locking mechanism and will allow you to discharge the extinguisher.

Aim at the base of the fire, not the flames. This is important - in order to put out the fire, you must extinguish the fuel.

Squeeze the lever slowly. This will release the extinguishing agent in the extinguisher. If the handle is released, the discharge will stop.

Sweep from side to side. Using a sweeping motion, move the fire extinguisher back and forth until the fire is completely out. Operate the extinguisher from a safe distance, several feet away, and then move towards the fire once it starts to diminish. Be sure to read the instructions on your fire extinguisher - different fire extinguishers recommend operating them from different distances.



4.1.7.4 Know your Fire Extinguisher Code

Different types of fire require different types of fire extinguishing agents. Some types of fire extinguishing agents can be used on more than one class of fire. Others have warnings where it would be dangerous for the operator to use a particular fire extinguishing agent.

CLASS	Α	В	В	С	D	K
PICTURE SYMBOL						₩ ₩
Түре	Common Combustibles Solids (wood, paper, cloth, etc.)	Flammable liquids Gasoline and solvents	Flammable gases Propane	Live electrical equipment Computers, fax machines	Combustible Metals Magnesium, Lithium, Titanium	Cooking Media Cooking oils and fats
Water	Yes	× No	× No	× No	× No	X. No
Foam	Yes	Yes	No	X. No	× No	Yes (ABF Foam Only)
Dry Powder	Yes	Yes	Yes	Yes	× No	No
M28/L2	× No	No	No	× No	Yes	X No
Carbon Dioxide CO2	× No	Yes	× No	Yes	× No	No
Wet Chemical	Yes	X No	× No	× No	× No	Yes

4.1.8 Wood Dust ——



The sawing and planing action or using drill machine generates high level of dust, which is called wood dust. It can be damaging for the health. Breathing in wood dust can damage lungs. It can also cause eye injuries. Wood dust can also cause skin allergies and irritation from direct contact. Contact with the dust of many woods can cause conjunctivitis (eye n) hav favor asthma coughing, and other respiratory diseases. Wood dust can eatch fire

inflammation), hay fever, asthma, coughing, and other respiratory diseases. Wood dust can catch fire easily, that is why workshop should be cleaned at intervals.

Wood dust can be recycled and it can also be used as fuel.

Preventive measures







Send wood dust for recycling

Wear safety glasses and dust mask

Clean workshop regularly

4.1.9 Noise _____



Woodworking machines generate a lot of noise. Short exposure can result in temporary hearing loss and continued exposure can result in permanent hearing damage.

Preventive measures



Wear ear plugs or ear muff while using power machines



Inspect to ensure all parts are correctly working. Maintain them regularly



Report your supervisor for faulty power tools

4.1.10 Safety Precautions and Measures -

Personal safety precautions

- Do not wear loose clothes.
- Do not wear wrist watch, ring or chain, while working with tools.
- If you have long hair, tie them back.
- Always use personal protective equipment.

Tools safety precautions

- Use tools only when you have practiced to operate them in proper way.
- Operate the power tools or machine only when you are fully trained to use them.
- Operate the power tools or machine only when you have permission or instructions.
- Before using the tools check that all components are fixed properly in proper place.
- Check power tools before using them for broken plug, broken socket, switches or poor condition of the cord.
- Make sure that machine is in OFF position when it is not being used.
- Do not use tools when you are tired and sleepy.
- If you are not feeling comfortable in using the power tools, take advice or help from your supervisor.
- Do not talk while working with tools.
- Choose right tool for the job.
- When you are not using tools, keep them in a locked cupboard or box to avoid the chance of theft.
- Report your supervisor for damaged or broken tools and equipment.
- Report your supervisor for potential hazards and accidents.

Housekeeping safety precautions

- Always keep workshop neat, clean and organized.
- Stack the material neatly that it should not fall.
- Always keep Fire extinguisher at the place easy to reach in emergency.
- Do not block exits.
- Make a fixed place for trash.

Always remember

- Always know safety rules and guidelines, and follow them. Carelessness can cause accidents and may be harmful for you or your co-worker. Always take precautions and use safe work practices to minimize the accidents. You should not bypass any safety procedure.
- Normally all organizations have their emergency procedures. You should read the procedure carefully. Any emergency situation should be dealt as per the procedure. However, you should also apply common sense, while dealing with emergency, as per situation.

4.1.11 First-aid -

Generally, all organisations have their policy for emergency. They are used in the organisation and one should know and understand the same. The employees are expected to follow the guidelines and understand the signs which have been shown below:



This sign is indicator to for using in case of any fire in the organisation



This sign indicates for exit in case of any emergency.



This sign indicates for only authorized persons



This sign indicates for no smoking as injurious to health.



This sign indicates for high voltage and one should stay away.



This sign indicates for always to use safety guard while operating machines.

4.1.12 Dealing with Accidents —



4.1.13 First-aid

First aid is used at accidents to help an injured person until he receives medical treatment.



In case an accident does occur, you should know the location of the First Aid Box and be able to use it.

In the case of an accident where someone requires first aid you should contact the designated "first aid person", i.e. the person who is trained to give first aid treatment.

You should know the basic treatments for minor injuries in case you have to treat someone or yourself.

Basic things in first-aid box

Top shelf: An asthma inhaler to counteract allergic reactions to fumes and to exotic-wood dust; sharp scissors for cutting bandages; adhesive tape.for bandaging; an elastic bandage for securing dressings.

Middle shelf: Needles for splinter removal are stored in sterile alcohol; splinter tweezers, precise enough to pick up a single hair; 4-in. by 4-in. gauze pads for bandaging; assorted adhesive strips for small boo-boos; clean plastic bag for amputated parts; sterile rolled gauze for bandaging; butterfly bandages for drawing together larger lacerations.

Bottom shelf: Providone-iodine solution for killing germs; eyewash and cup; small mirror for eye inspections; instant ice packs to reduce swelling or for transporting amputated parts to the hospital; latex gloves for eye examinations.



- 4.1.14 Treating Minor Injuries



Abrasions and small cuts

Clean wound with soap and water. Apply antibiotic cream or Providoneiodine solution. Bandage and check dressing daily. See your doctor if there are signs of infection: increased redness, pus or red lines running from wound.



Splinters

Remove with sharp, pointed tweezers. (They should be sharp enough to pick up a single hair.) If splinter is completely under the skin, expose splinter end with sewing needle doused in alcohol, and then remove with tweezers.



Lacerations

Clean wound with soap and water. Assess damage: If laceration is gaping or more than 1/4 in deep seek emergency help. Otherwise, apply pressure to stop bleeding. Close wound with butterfly closures or adhesive strips. Check dressing daily.



Fractures

Signs include extreme pain, swelling, bruising and an inability to move an adjacent joint. If you have any of these signs, you should be seen by a doctor to see whether you need an X-ray to evaluate for a fracture.



Amputations

Apply pressure to wounded area with clean bandage. Don't panic. Call for help. Raise wounded area above heart. Wrap amputated appendage in plastic bag. Keep appendage cool, not directly on ice. Sit in a chair near door, and await help.



Eye injuries

Look in mirror to assess eye. If foreign matter is embedded in the eye, go to the emergency room. If foreign matter is on the surface, flush it with water, or use eye wash and cup. For chemical splashes, flush with running water for five to 10 minutes. If it hurts too much to open your eye, go to the emergency room.



Fumes and dust

If you feel dizzy or are having trouble breathing, leave the area, and go to fresh air. If normal breathing doesn't return in 15 minutes, go to the emergency room.


Tick the right picture or pictures –

1. The causes of fire are –



2. What is the cause for cut in hand in workshop -



3. What should be done, when an accident happens –







4. In case of fire in the wood, which fire extinguisher should be used -



Sand







 $\rm CO_2$

UNIT 4.2: Personal Protective Equipment (PPE)



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

1. Demonstrate the correct use of PPE

4.2.1 Defining Personal Protective Equipment -

A carpenter may face many risks while working with wood in workshop or site, such as flying wood fragments, noise, wood dust, nails lying on the floor, sharp tools, etc. Personal protective equipment safeguard you from work place hazards and help to minimize the risks and hazards.

As an efficient carpenter, it is your duty that you should take care of your personal safety and also safety of your co-workers in the workshop or site. You should take every possible safety precautions to avoid accidents and hazards. One of the most important precautions is wearing personal protective equipment. Never forget to wear or use personal protective equipment at work.

4.2.2 Types of Personal Protective Equipment -

Different jobs require different types of PPE – the protection needed while using a circular saw is different from the protection needed building a gable end. Some body parts need more protection than others! Each piece of PPE must be suitable for the job and used properly.



Head protection

- The most commonly used PPE in woodworking is the safety helmet.
- This is used to protect the head from falling objects and knocks, and risk of head bumping.
- It has an adjustable strap to ensure a snug fit.
- Some safety helmets come with attachments for ear defenders or eye protection.
- Safety helmets are meant to be worn directly on the head and must not be worn over any other type of hat.



Hand protection

- Safety gloves are used to protect hands from cuts.
- There are several types of safety gloves and the correct type must be used for the task at hand.

• To make sure you are wearing the most suitable type of glove for the task, you need to look first at what is going to be done and then match the type of glove to that task.

• Example - wearing lightweight rubber gloves to move glass will not offer much protection, so leather gauntlets must be used. Plastic-coated gloves will protect you from certain chemicals.



Eye protection

- Eye protection is used to protect the eyes from wood dust and wood fragments.
 - They must be used while working with saw, or chisel, or plane.
 - The three main types are:



Safety goggles— they are made of a durable plastic and used when there is a danger of dust getting into the eyes or a chance of impact injury

Safety spectacles– these are also made from a durable plastic but give less protection than goggles. This is because they do not fully enclose the eyes and only protect from flying debris



Facemasks— it is also made of durable plastic, facemasks protect the entire face from flying debris.

Hearing protection

- Hearing protection is used to prevent damage to the ears caused by very loud noise.
- There are several types of hearing protection available, but the two most common types are earplugs and ear defenders.



Earplugs– these are small fibre plugs that are inserted into the ear and used when the noise is not too severe. Before inserting earplugs, make sure that your hands are clean. Never use plugs that have been used by somebody else.



Ear defenders— these are worn to cover the entire ear and are connected to a band that fits over the top of the head. They are used when there is excessive noise. They must be cleaned regularly.



Foot protection

- Safety boots or shoes are used to protect the feet from falling objects and to prevent sharp objects such as nails from injuring the foot.
- They also protect feet from slipping.



Respiratory protection

- Respiratory protection is used to prevent the worker from breathing in any dust or fumes that may be hazardous.
- The main type of respiratory protection is the dust mask.
- Dust masks are used when working in a dusty environment.
- They are lightweight, comfortable and easy to fit.
- They should be worn by only one person and must be disposed of at the end of the working day.

4.2.3 Maintaining and Storing PPE

It is important that PPE is well maintained. The effectiveness of the protection it offers will be affected if the PPE is damaged in any way. Maintenance includes –

- Cleaning
- Examination
- Replacement
- Repair and testing

The wearer may be able to carry out simple maintenance (such as cleaning), but more intricate repairs must only be carried out by a competent person. Where PPE is provided, adequate storage facilities for PPE must also be provided for when it is not in use, unless the employee may take PPE away from the workplace (e.g. footwear or clothing).

Storage may be simple (e.g. pegs for safety helmets) and it needs not be fixed (e.g. a case for safety glasses). Storage should be adequate to protect the PPE from contamination, loss, damage, damp or sunlight. Where PPE may become contaminated during use, storage should be separate from any storage provided for ordinary clothing.

PPE must be maintained regularly.

You must remember

- After completion of work, PPE should be stored in its place.
- Make sure PPE is suitable for the nature of work and any hazard associated.
- The PPE must be inspected for defects before using them.
- Report its loss or any fault in it to your supervisor.



Choose the right personal protective equipment and write in the blank-

(Safety helmet, Safety shoes, Safety glasses, Dust mask, Ear plugs, Gloves)













UNIT 4.3: Personal Health and Hygiene

- Unit Objectives 🙆

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

- 1. Summarise the importance of maintaining personal health and hygiene
- 2. Practise maintaining a clean and hygienic personal appearance and health
- 3. Practise healthy habits to stay away from diseases

4.3.1 Importance of Personal Hygiene -

Hygiene is defined as a set of practices performed for the preservation of health. In simple words, proper personal hygiene means taking care of every aspect of your body, from keeping it clean to looking your best. Your personal, social and professional worlds are all affected by your hygiene habits.

Hygiene is more than simply being clean. Practicing personal hygiene helps you to live a healthy lifestyle. Personal hygiene helps to prevent people from catching or spreading forms of disease or illness. Your health depends on your personal hygiene. Maintaining a high level of personal hygiene helps to increase a person's confidence and self-esteem. If your body is clean and taken care of externally, it automatically helps you to feel good internally too.

4.3.2 Wash Your Hands -



Hand hygiene is essential for being healthy. The commonest way we establish contact with things around us is by using our hands. Dirty hands can lead to skin allergies, food poisoning, etc. Washing hands can prevent the spread of germs from one person to another or from one part of your body to another. One must take special care to keep them neat, clean and bacteria free.

Always remember

- Wash your hands with soap and water.
- Do not clean hands with white spirit, thinner, petrol, or turpentine.
- Wash thoroughly and in the gaps between your fingers.

Wash your hands

- After visiting to the toilet
- After coughing or sneezing
- Blowing your nose
- Before handling food
- After handling food
- After disposing of trash
- After touching a wound
- After touching or playing with pets or any animal

4.3.3 Good Hygiene Practices –

Maintaining personal hygiene is very important for you. Your personal hygiene not only affects you, it affects others too! Good hygiene practices include regularly and thorough washing of the person's body, hair, hands, as well as brushing and flossing teeth, caring for gums and keeping the feet clean. These are certain easy and day-to-day routines, which when incorporated, help to improve the state of one's personal cleanliness.

Oral hygiene

Accumulation of food in the mouth can cause problems ranging from bad breath to dental caries. For removal of food particles and oral hygiene, certain steps are to be followed –

- Brush your teeth at least twice a day
- Floss at least once each day, for inter-dental care
- Use a tongue scraper to keep your tongue clean
- Use a mouthwash whenever you go out
- Drink a lot of water to keep the mouth moist and to remove any foul odour.



Skin hygiene

Every day you are exposed to dust, smoke, pollution, bacteria, road grime, workplace dust and dirt, etc. If you carry dirt on your body or if you have not showered for some time, bacteria will start growing on you in this dirt. The bacteria on your skin makes your body stale and your body begins to give out a bad odour, which is not pleasant for you or your co-workers.

- Shower, bath or wash your body thoroughly with soap and water
- Take bath once or twice a day
- Use a moisturiser or oil to keep the skin supple and well-oiled
- Avoid sharing towels

Hair hygiene

While considering personal hygiene, the hair is neglected. The hair gets dirtier than the body. For this reason, attention must be given to hair.

- Wash your hair every day, with soap or shampoo
- Comb your hair
- Oil your hair regularly

Nail hygiene

- Clean your nails by thoroughly removing dirt from them.
- Trim your nails often and preferably, keep them short.

Feet hygiene

The most neglected part of the body are the feet. Ways to keep your feet clean are as follows :

- Wash your feet with warm water and soap.
- Scrub the heel of your foot with a pumice stone to prevent it from cracking
- Powder your feet before putting on socks to prevent perspiration and resultant smell.

Your clothing hygiene

- Change your clothes regularly
- Do not re-wear your clothes without washing them. It is harmful for people who perspire profusely.
- Wash your clothing in a good detergent with lukewarm water.
- Dry your clothing, perhaps in the sun
- Do not share underwear with anyone

Use Clean Bed Linen

Be sure to change your bed linen each week. It is not necessary that your linen should be costly, but your sheets and pillows should be kept clean. Air your bedding out regularly; once per week.

4.3.4 Keep Yourself Fit —

Carpentry work is physically demanding. A carpenter has to lift and pull heavy materials. Prolonged standing, climbing, bending, and kneeling often are necessary. A carpenter often has to stand on ladders. So carpenter has to be physically fit and strong. Keeping the weight in check and ensuring proper exercise will keep you fit and happy.

To become fit and strong, you should-

- Do cycling
- Do swimming
- Do yoga
- Do weight-lifting
- Go for morning-evening walk
- Exercise regularly

4.3.5 Eat Healthy Food –

Apart from personal cleanliness and regular exercises, one should have balanced and healthy diet in order to become fit. Balanced and healthy diet gives energy to the body and keeps muscles working.

Follow healthy eating habits -

- Always eat home-made food
- Avoid oily food
- Always eat freshly cooked food
- Avoid junk food like burgers, cold drinks, etc.
- Eat lot of vegetables and fruits
- Drink lot of water



4.3.6 Avoid Bad Habits

Bad habits like smoking, drinking alcohol and addiction to tobacco and gutkha have a negative effect on your health and appearance. Drinking alcohol leads to cancer, heart disease, failure of kidney. Smoking causes bad odours, stained teeth, chronic coughing, yellow fingernails and mouth cancer. These bad habits can be detrimental to your work ability. For healthy life keep yourself away from these bad habits.



- 4.3.7 AIDS/HIV Awareness -

The full form of AIDS is Acquired Immuno Deficiency Syndrome. AIDS is caused by HIV (Human immunodeficiency Virus). It is the last stage of the HIV infection. If a person is HIV positive, he/she is suffering from AIDS.

AIDS is not a disease like cancer or malaria, but is a condition that weakens a person's ability to fight diseases (immune system). There are no medicines or vaccines for AIDS so far. The treatment and medicines which are available in the market are expensive and have side effects.

AIDS not only affects you, but also has severe impact on family and friends. Even one mistake is enough to get HIV positive.



Always Remember

- AIDS has no cure but can be prevented, therefore be cautious of it, not afraid of it.
- Be faithful to your partner and always use condom while making any sexual contact.
- Take blood only after checking proper medical certificates.
- Do not discriminate HIV positive people.

- Notes 🗐	

- Ex	xercise 📝 ———	
Ch	oose the correct answer –	
1.	What should be done to maintain p	hysical fitness?
	a) Wake up late	b) Eat junk food
	c) Exercise only once in a week	d) None of these
2.	What should be done to maintain p	personal hygiene?
	c) Always wear clean clothes	d) All above
3.	Which of the following can be cons a) Green vegetables c) Fruits	idered healthy food? b) Burger d) a & c



सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape



5. Dealing with Emergencies

Unit 5.1 - Responding to Emergency Situations





– Key Learning Outcomes 🕎

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

- 1. Demonstrate the process of handling emergency situations
- 2. Summarise things to be done during emergency situations

UNIT 5.1: Responding to Emergency Situations



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

- 1. Assess emergency situations
- 2. Demonstrate the process of handling emergency situations

5.1.1 Defining Emergency

An emergency can be defined as "a serious, unexpected, and often dangerous situation requiring immediate action."

5.1.2 Evaluating Emergency Situations -

- One must remain calm and composed during an emergency situation because stress during an emergency complicates things and confuses a person.
- One must critically and rationally think and evaluate the severity of the emergency and determine, what requires to be done on immediate basis.
- One must look for additional help by calling up the emergency toll free number, which would help the caller reach an official or 'dispatcher'.
- The emergency dispatcher aims at providing immediate and appropriate help, depending on the nature and degree of emergency.
- One must help the dispatcher by answering his/her questions and providing the dispatcher with the accurate location and nature of emergency.
- It is recommended that one should call from a GPS-equipped phone, so that the dispatcher is able to track the location, even if the caller is unable to speak.
- One must determine the nature of the emergency, i.e. if it is a medical, mental health or behavioural emergency.
- One must assess the immediate threats, for example, in case a person is severely injured from a running machine, the machine must be turned off immediately to prevent others from getting hurt as well.

5.1.3 Handling Emergency Situations

- Extremely high casualties must be reported to the occupational health and safety committee (OHSC).
- One must move farther from the emergency spot and help others do the same.
- Evacuation plans must be adopted and escape routes must be taken.
- Secondary hazards must be eliminated or mitigated, at least. For example, a car accident involves the risk of a violent explosion and fire outbreak resulting from spilled fuel.
- One must help the other victims and take appropriate measures to help the specially abled ones.
- One must never feel guilty if nothing can be done to help the others.

- Once the emergency team arrives, it must be provided with all required and relevant information.
- In case nothing can be done to mitigate the severity of the situation, one must provide support to the others by comforting them, inquiring about their medical history, noting events as they occur, etc. These information may prove crucial for the emergency response team.
- A first aid kit must be used, wherever applicable.
- One must try reviving a seemingly unconscious victim by rubbing the chest, pinching the earlobes, providing Cardiopulmonary Resuscitation (combination of chest compression and artificial respiration)
- One must avoid moving a severely injured victim and provide only the basic first aids.
- Only the emergency services can properly handle and move such victims.

5.1.4 Things to Do During Emergencies

Ask yourself the following questions:

- Is the scene safe for you to enter?
- What happened exactly?
- What is the casualty?
- What is the category and nature of the emergency?
- Is the accident fatal for the victim?
- Is anyone else available at the place to help?

Do the following if the victim is conscious and injury is not fatal:

- Ask for the victim's consent to administer first aid.
- Put on appropriate PPE (personal protective equipment), if possible.
- Interview the victim to ask basic medical questions, so that accurate information may be provided to the emergency medical team, once it arrives.
- Conduct a thorough check for undetected injuries.
- Administer appropriate care and technique.

If the victim is unconscious, try reviving the person by addressing him / her, rubbing shoulders, hands or the sole of feet.

Fetch the AED (automated external defibrillator) and use it, along with artificial respiration.

Practical 🎽

Briefly explain, to your family member or friend, the steps you would adopt to assess an emergency.

– Ex	xercise 📝 ————	
Ch	oose the correct option:	
1.	Which of the following can be classified as e	emergency?
	a) A road accident	b) A terrorist attack
	c) A group of people falling sick	d) A case of electrocution
2.	Which of the following questions should yo a) Is the scene safe for you to enter?	u ask yourself during an emergency?
	b) Is the accident fatal for the victim?	
	c) Would you get late for work if you help th	ne victim(s)?
	d) What is the category and nature of the e	mergency?
3.	The term AED stands for: a) Automated external defibrillator c) Automated emergency defibrillator	b) Automatic extrusion defibrillator d) None of these





सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape



6. Interaction with Seniors

Unit 6.1 - Seeking Assistance and Clarification





– Key Learning Outcomes 🕎

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

- 1. Summarise the importance of seeking assistance and clarification from seniors
- 2. Demonstrate the process of seeking assistance and clarification from seniors

UNIT 6.1: Seeking Assistance and Clarification



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

1. Summarise the importance of seeking assistance from seniors

6.1.1 The Importance of Seeking Assistance

- Your supervisor is your mentor and guide at work.
- Assistance and guidance must be sought from the supervisor whenever needed.
- Ask questions to clarify doubts.

6.1.2 Seeking clarifications on work

- Question must be asked to clarify doubts and to eliminate communication gaps with one's supervisor.
- This must be done to get a clear idea about the responsibilities expected by one's supervisor.
- Have a clear idea about one's tasks helps in fulfilling targets successfully.
- Seek and obtain clarifications on policies and procedures, from the supervisor or other authorized personnel.
- If the lead assembler has doubts about the organizational policies and SOPs, they can be clarified by the supervisors or other authorized personnel.
- Address the problems effectively and report if required to immediate supervisor appropriately.
- Identify and report any possible deviations to appropriate authority.
- Receive instructions clearly from superiors and respond effectively on the same.
- Accurately receive information and instructions from the supervisor related to one's work.

6.1.3 Receiving accurate information and instructions from the supervisor

- Before starting a particular work, it is important to sit with one's supervisor and understand the task's objectives and requirements.
- The assembler must obtain necessary resources, like BOM (bill of materials), work order, specifications and instructions from the supervisor.
- He / she must also discuss the SOPs (standard operating procedures) involved in the operations, if any.
- Brief should be also taken on the tools and equipment required for accomplishing the work, and the precautionary measures in using the same.
- The assembler must also receive brief regarding the potential risks and hazards involved in the work and how to assess them.

- Practical 🖄

List a few queries that you would like to clarify with your senior/supervisor at work.

Exercise

Choose the correct option:

Which of the following is not the responsibility of the carpenter while seeking clarification on work?
a) Sit with the supervisor and understand the task's objectives and requirements

b) Seek and obtain clarifications on policies and procedures, from the supervisor or other authorized personnel

c) Obtain useful information from the human resources

- d) None of these
- 2. Which of the following cannot be asked while seeking clarification from the supervisor?a) Doubts related to necessary resources, like BOM (bill of materials), work order, specifications and instructions from the supervisor
 - b) Why did the supervisor not assign you your favourite project?
 - c) Standard operation procedures
 - d) All of these



सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape



7. Work Effectively with Others

Unit 7.1 - Communication Skills Unit 7.2 - Working in an Organization



FFS/N8801

– Key Learning Outcomes 🕎

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

- 1. Evaluate the importance of communication
- 2. Identify the methods of communication
- 3. Practise effective communication
- 4. Describe the hierarchy and escalation process
- 5. Comply with organisational rules
- 6. Evaluate the importance of team work
- 7. Practise completion of work on time
- 8. Analyse the importance of professional skills

UNIT 7.1: Communication Skills



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

- 1. Evaluate the importance of communication
- 2. Identify the methods of communication
- 3. Demonstrate skills of communicating effectively

7.1.1 Defining Communication -



Communication is the two way process of exchanging of thoughts, messages or information.

In simple words, communication is a way of passing on information from one person to another. Communication is very important in all areas of life. One will need to communicate well at work. What would happen, if someone could not understand something you had written or said? For example – if you do not

practise the right communication between you and the client, or supervisor, or co-workers, the work will not get finished in time, or you can choose wrong materials.

7.1.2 Methods of Communication ———

There are many different ways of communicating with others. Each method has some good points and some bad points. Generally, these methods fit into four categories –

- Verbal communication
- Written communication
- Non-verbal communication
- Electronic communication

7.1.3 Verbal Communication

Carpenters face situations requiring verbal communication. For example :









Voice chat on internet

• Talk to suppliers to order materials or compare prices

- Interact with other carpenters to discuss work schedule, safety concerns, and to share new ideas related to job
- Communicate with clients, architects, or design consultants to receive direction on new project plans
- Communicate with your supervisor or client to report on work progress and troubleshoot problems
- Speak with manufacturer representatives, in person and by phone, to discuss problems with equipment and materials
- Interact with clients, architects, or design consultants to discuss new ideas and potential changes.

Speech has certain characteristics which affect the message that is being spoken -

- Volume loud speech may sound dominating, while a quiet speech cannot be heard.
- Tone use warm tones without sounding over-friendly. Cool tones are very un-welcoming.
- Pace fast speech is not easy to follow. Speak at a reasonable pace so that the other person has a chance to understand.

Always Remember

- Maintain positive relationships with professionals in the furniture industry, such as other carpenters, suppliers, etc.
- Keep your clients informed of work progress to prevent stressful situations.
- Ensure that your oral communication is positive and professional. Avoid using inappropriate language or slang terms when communicating with other professionals and with your clients.

7.1.4 Written Communication

Written communication can be carried out by:









A carpenter faces some situations at work requiring written communication. For example -

- Project plans
- Job estimates
- Purchase orders for materials
- Work diaries
- Records of hours worked
- Accident reports
- Meeting notes

For example - After examining a potential project, write a estimate that includes the description of material to be used, cost of materials and labor, estimated time to complete the job, etc. Check all figures and details carefully. Errors can result in expensive mistakes. Give a copy of written estimate to a potential client and keep a copy for yourself. If the client gives you the job, the job estimate will help you create a contract with the client.

7.1.5 Non-verbal Communication

Non-verbal communication does not include speaking or writing. There are two types of non-verbal communication –

- Signs and symbols
- Gestures and expressions

Signs and symbols

For example - Pictures, notices, or signboards, or even photographs, sketches and paintings.



Gestures and expressions

Hand signs, facial expressions, body postures or body language help to convey a message. It is said that when we talk to someone face to face, only 10 percent of our communication is verbal, the rest of communication is body language and facial expressions.

If you are aware of your own body language and know how to use it effectively, you can add extra meaning to what you say.



While talking to client or supplier

- Smile gently; do not frown.
- Do not keep your legs or hands crossed.
- Do not keep your hands in pockets.
- Do not stroke your fingers on chin.
- Do not scratch your head.
- Stand straight; do not lean against wall.

• Do not fidget with mobile phone or pencil.

- Face the other person and make eye contact.
- Do not stand very close to other person; maintain the distance.
- Dress in clean clothes, comb your hair, do not use strong perfume.

• Do not speak loud.



- 7.1.6 Electronic Communication -



Electronic communication is becoming more and more common and easy with the advances in technology. Electronic communication can take many forms such as text messages, e-mail, voice mail and fax. It is now even possible to send and receive e-mails via mobile phones anywhere in the world.

Messages can be relayed instantly between you and client through electronic communication. Electronic communication can be effective for submitting job estimates and progress reports to clients, or send purchase order for material supplies.

Although electronic communication is fast and convenient, it's not always appropriate when dealing with clients. Make the effort to speak with clients regularly, because it communicates your desire to deliver high-quality work.

- 7.1.7 Active Listening -



Active listening is an important aspect of effective communication. It is about forming better relations with co-workers, clients and suppliers, and providing better quality service to your clients.

While talking to client, supplier or co-workers –

- Give your full attention to the speaker.
- Do not let your mind wander or getting distracted by things going on around you.
- Show interest in what the speaker is saying.





- Avoid interruptions or attempts to disagree with the speaker.
- Take action on what has been said. If necessary, make notes.
- Do not yawn while someone is speaking. It might suggest that you are bored or tired.
- Do not look at the time repeatedly as it might suggest you are bored or in a hurry.

- **7.1.8 Reading** —

During carpentry work, there are many situations when you need reading. For example -



- Reading project specifications to understand what is required for a project
- Reading manual books of tools and machines
- Reading installation manuals of furniture hardware and fittings
- Reading safety manuals
- Reading magazines to learn about furniture technological advancements, such as new materials and methods

Exercise

Choose the correct answer -

- 1. What are the types of communication?
 - a)
 - b)
 - c)
 - d)
- 2. Verbal communication can be carried out by
 - a) E-mail
 - b) Phone conversation
 - c) Letters
 - d) Fax
- 3. A carpenter should have writing skill, so that he can
 - a) Submit job estimate to client
 - b) Write purchase order for material supply
 - c) Keep record of hours worked
 - d) All of these

UNIT 7.2: Working in an Organization



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

- 1. Discuss the hierarchy and escalation process
- 2. Comply with rules and procedures of an organisation
- 3. Summarise the importance of team work
- 4. Manage work on time

7.2.1 Health, Safety, and Security Policies

Every organization has its own policy related to health, safety and security. Every employee has to follow these policies and procedures.

A policy is a written statement, usually comprising three elements -

- A statement section (often a single page) detailing how safety will be managed and that demonstrates the organization's commitment to health and safety
- An organization section that details where responsibilities are allocated and how employees fit into the overall safety management system
- An arrangements section that contains details of how specific activities and functions are managed

This arrangements section could include such matters as risk assessments, fire safety, first aid, accident reporting, electrical safety, work equipment, hazardous substances, manual handling and other workplace issues.

In larger organizations the arrangements section may refer to other documents, such as safety manuals or safe systems of work.

7.2.2 Organization Hierarchy and Escalation

Every organization has hierarchy matrix, which decides reporting structure. It helps in smooth flow of information and maintains order in organization. Without hierarchy, it is very difficult to manage organization.

Example of a typical hierarchy in an organization -

Any person in organization should escalate his/her issues to the person he/she is reporting, i.e. supervisor. However, companies encourage direct escalation to higher levels in some in cases, like –

- Breach of code of conduct
- Women harassment
- Racial discrimination
- Misbehaiour by supervisor, co-workers, etc.



7.2.3 Working in a Team

When a carpenter collaborates with other carpenters and makes a team, then the work itself becomes easier and can be carried out with more efficiency and skill. Being a part of a team will help you -

- Complete the assigned job on time
- Complete big projects efficiently
- Satisfy client by delivering high-quality work on time
- Get more projects in future
- Solve the problems easily
- Get more chances to learn new things
- Maintain the workplace safely
- Develop your interpersonal skills, such as speaking and listening
- Identify your own strengths and weaknesses

Effective Ways of Working in Team

- Since there are many carpenters in the team, it is very important to interact with each other effectively
- Ask other's opinions about a subject before you present yours
- Be prepared; think before speaking
- Address one issue at a time
- Use a positive or neutral tone of voice
- Focus on the issue, not the person



- Avoid blanket, know-it-all statements, loaded words and hyperbole
- Keep your cool and don't lose your temper
- Show an interest in the other person's views and feelings
- Don't hide your feelings, but keep your emotions under control
- Present concrete specifics instead of overriding generalizations
- Back up your opinions with a few important key points
- Portray what seems like an individual problem as a mutual concern
- Avoid a hidden agenda and the potential to politicize an issue
- Find the areas of agreement as the basis for collaboration
- Follow organization's rules and procedures to become an example for the team

7.2.4 Planning and Managing the Work

To project your positive image as an efficient carpenter, you should complete and deliver the job in estimated time. Client feels satisfied when he gets his work done in time and by completing job in time, you also can pay attention to your other projects.

Normally the working duration is 8 hours in any organization. The more you utilize this time, the more you can gain out of it.

Precautions while talking

- Always fix a time when meeting someone.
- Always select a place which is very comfortable.
- Always try to talk on the events rather than on personal issues.
- While discussing never get excited and angry.

While listening

- Rather than getting into argument please get into a habit of listening.
- Never interpret between the talks.
- While talking try to speak when the other person has finished our thought.
- Do not hesitate to ask a question to improve your knowledge.

Disagreement and agreement

- One should try to understand the topic to be discussed.
- Always take the views of your opponent for a better understand.
- Always try to come to a final decision.

Give preference to disputes

• Disputes can be settled with discussions

Planning for Disputes

- Always start the topic which is to be settled.
- Always keep your future in mind.
- Carry out discussions in such a way that you are able to connect in near future also.

Execute Your Plan

- Never conclude the discussion until and unless you have come to a solution.
- Always think positive and work in a cooperative manner.

Make Success Your Strength

- Try to work in such a way that you always get success
- Always appreciate the job of your colleagues and teammates
- Try to appreciate the job of teammates even though it is very small

7.2.5 Work Schedule and Time Management -



As a professional carpenter, one should have a positive approach then only you will be able to deliver the goods to your clients on time. In this way, you will be able to concentrate more on the project.

Generally, working in an organisation one gets only 8 hours and one should try to give the maximum output.

To complete the job in time, you should-

- Give a time-line to complete the job
- Set a goal for yourself
- Prioritize your workplace
- Make a to-do list
- Organize your workplace
- Motivate yourself to work towards your goal
- Keep your concentration and focus at your work
- Do not chat on phone during work hours
- Do not gossip with your co-worker while working
- Do not take long tea or lunch break

How to plan a typical working day

Planning: You need to plan in advance. Every morning before starting the work, all pending work should be reviewed, like total nos. of parts to be cut, assemblies to be done, furniture to finish, etc.

Resource arrangement: Once planning is done, then you need to review the resources required for completing the tasks, like required material, required tools and equipment, additional manpower, support from supervisor, etc.

Execution: After arranging the resources, the plan needs to be executed, i.e. work as per planning.

Intermittent review: One of the important activities is review of progress against plan. Without review it is difficult to know whether work is being done on time or not. While reviewing if you realize that you are running behind schedule, you can ask for extra help to expedite the work in time.

Handover: Once your job is complete, you need to handover the activity to next person in chain. For example, you need to inform the person who is responsible for the next activity so that he can perform his activity on furniture.

Final review :This is the review which you need to do at the end of the day. It is important to find out what went right and what went wrong. You can plan differently for the things which went wrong.

- 7.2.6 Solving the Problems



A carpenter may face many problems while on the job. For example, measurements taken on site may be different from measurements given on the technical drawing, or faulty materials or tools, or shortage of materials etc.

You should to be able to recognize the problem and come up with a quick and effective solution for solving it within your limit. If things are not in your control, report your supervisor or chief carpenter.

- 7.2.7 Making the Right Decision



One good professional skill you must have is the skill to make right decisions. As an efficient carpenter, you are responsible to deliver high quality work. At workplace, you will have to make many decisions about choosing right material and tools for job, choosing right joint for making furniture, or choosing safe way of working.

- 7.2.8 Updating Skills and Knowledge -



The furniture industry is experiencing rapid changes due to technological advancements. Manufacturers keep introducing new materials, new tools new finishes, new hardware and new fittings. As an efficient carpenter, you should be aware of new techniques. Some manufactures also organize training sessions to introduce new tools and new techniques. You should be in touch with all these to enhance your skills and knowledge.

– Exercise 团

Choose the correct answer -

- 1. What are the benefits of working as a team member?
 - a) Work gets completed in time
 - b) Client gets high quality work
 - c) Client gets satisfied
 - d) All of above
- 2. If you want to complete your job in time, you should
 - a) Gossip with your friend on phone during work hours
 - b) Take rest for two hours after lunch break
 - c) Go for a walk with your friends
 - d) None of above
- 3. To deliver something new to your client, you should
 - a) Have knowledge about new techniques
 - b) Know about new materials available in the market
 - c) Be aware of new trends of market
 - d) All of above


सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

8. Work Assessment & Planning for Making the Wooden Furniture

Unit 8.1 - Basic Mathematical Skills Unit 8.2 - Measuring and Calculating the Wood Unit 8.3 - Technical Drawing



FURNITURE ତ FITTINGS

KILL COUNCIL



– Key Learning Outcomes 💆

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

- 1. Perform requisite measurements at work
- 2. Interpret technical drawings

UNIT 8.1: Basic Mathematical Skills



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

- 1. Identify basic methods of calculation
- 2. Identify the different shapes
- 3. Calculate area and perimeter of different shapes

8.1.1 Importance of Mathematics

As a wood furniture carpenter, you should have basic knowledge of mathematics so that you can do woodworking activities, such as measuring and estimating the materials, or drawing shapes on wood, etc. in an effective way. You will be needing mathematics to –

- Read the technical or working drawings
- Calculate the quantity of materials based on technical drawing
- Understand the measurement systems
- Measure and mark the wood correctly

8.1.2 Methods of Calculation

0.1.2 WEUK						
There are many me	ethods used fo	or calculation.	Mainly four me	thods are used	d the most. Th	iey are –
1. Addition						
Examples –						
				769		
	24	69	108	942	55.5	125.25
	+ 36	+ 42	+ 27	+ 83	+ 35.5	+ 335.75
	60	111	135	1794	90.0	461.00
2. Subtraction						
Examples –						
	91	761	9013	8219	66.25	225.75
	_ 73	- 538	- 5638	- 578	- 35.50	- 135.75
	18	223	3375	1794	30.75	90.00
3. Multiplication						
Examples –						
			11	35		5.3
			x 11	x 20		x 2.5
	15	36	11	00	6.5	265
	_ x 3	_x 9_	_11x	_70x	x 2_	<u>106x</u>
	45	324	121	700	13.0	13.25

4. Division				
Examples –				
	100÷2 =	2952 ÷ 12 =	28812 - 6 =	382 ÷ 4 =
	$2 \boxed{\begin{array}{c} 50 \\ 100 \\ \underline{-10} \\ 00 \end{array}}$	$ \begin{array}{r} 246 \\ 12 \overline{\smash{\big)}2952} \\ -24 \\ \overline{55} \\ -48 \\ \overline{72} \\ -72 \\ \overline{0} \end{array} $	$ \begin{array}{r} 4802 \\ \hline 28812 \\ -24 \\ 48 \\ -48 \\ 012 \\ -12 \\ 0 \end{array} $	$ \begin{array}{r} 95.5 \\ 4 \overline{\smash{\big)}382} \\ -36 \\ 22 \\ -20 \\ 20 \\ -20 \\ 0 \end{array} $

- Exercise	2					
Solve the follow	ving sums –					
1.	42 + 63	96 24	265 + 324	621 + 105	245 413 + 320	
2.	221 - 56	745 37	542 407	350 114	264 156	
3.	527 x 3	461 x 5	868 x 12	380 x 55	794 x 7	
4.	696 x 2	82 x 9 981 x 6	8 274 x 74	340 x 35		
5.	15 ÷ 5	48 ÷ 6 80 ÷ 10	84 ÷ 7	36 ÷ 12		
6.	21_357	25 625	11_396	15_3825		

– 8.1.3 Basic Shapes –

Have you ever noticed that the things, which we see and use everyday, have some shapes. For example, a ruler which you use, or a pencil you write with are straight. Windows and doors are rectangle in shape. Wheel, coins are round.

Let us have a look at some basic shapes -

Circle: A circle is a simple closed shape. It is the set of points in a plane that are equidistant from a fixed point (the centre).



Oval: An oval is a closed shape, which is like an ellipse or like the shape of the egg of a hen.



Triangle: A triangle is a closed figure with three sides. The sum of the interior angles in a triangle must be 180°.



Square: A square is a flat shape with four sides. All four sides have equal length and every interior angle is a right angle (90°).



Rectangle: A rectangle is a flat shape with four sides, where every interior angle is a right angle (90°). Opposite sides are parallel and of equal length.



Trapezoid: A trapezoid is a shape with four sides, only two of which are parallel.



Rhombus or Diamond: A rhombus is a flat shape with four sides. All four sides have equal length, but, unlike a square, all angles are not 90°. Opposite sides are parallel, and opposite angles are equal.



Parallelogram: A Parallelogram is a flat shape with four sides. Opposite sides are parallel and equal in length.



Pentagon: A pentagon is a 5 sided shape with interior angles that add to 540°. When all angles are equal, then it is a regular pentagon, otherwise it is irregular. Regular pentagons have sides of equal length and interior angles of 108°.



Hexagon: A hexagon is a 6 sided shape with interior angles that add to 720°. When all angles are equal and all sides are equal it is regular hexagon, otherwise it is irregular. Regular hexagons have sides of equal length and interior angles of 120°.



Octagon: An octagon is a 8 sided shape with interior angles that add to 1080°. When all angles are equal and all sides are equal it is regular octagon, otherwise it is irregular. Regular octagons have sides of equal length and interior angles of 135°.



8.1.4 Calculation of Perimeter —

Perimeter

Perimeter is the distance of the boundary of a two-dimensional figure. Let us see how it is calculated. Examples –



8.1.5 Calculation of Circle -





8.1.6 Calculation of Area -

Area is calculated in square unit, like square feet or square meter. Let us know how to calculate the area.



Area of 'A' = 3 x 6 = 18 sq m Area of 'B' = 4 x 3 = 12 sq m Total area = 16 + 12 = 30 sq m OR Area of 'A' = 3 x 3 = 9 sq m Area of 'B' = 7 x 3 = 21 sq m Total area = 9 + 21 = 30 sq m



8.1.7 Angles -

When two sides meet and make a corner, it is called an angle. Unit of angle measurement is called degree. There are 360 degrees in a complete circle. Right angle means 90 degree and this angle is mostly used in furniture making.

Examples -





– Exercise 📝

Ch	oose the correct an	swer –		
1.	Why does an assist	tant carpenter need basi	c knowledge of mathen	natics?
	a) To purchase the	wood	b) To calculate the qu	antity of wood
	c) To read technica	Il drawings	d) All of above	
2.	How many sides de	oes a square have?		
	a) 6	b) 4	c) 5	d) 8
3.	How many sides do	oes a triangle have?		
	a) 8	b) 10	c) 4	d) 3
4.	Identify pentagon	_		
5.	Identify octagon –			

UNIT 8.2: Measuring and Calculating the Wood



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

- 1. Evaluate the importance of measurement
- 2. Identify the different systems of measurement
- 3. Practise reading a ruler by using both systems
- 4. Demonstrate various methods of calculating the quantity of the wood

8.2.1 What is Measurement?

Measurement is the process of obtaining the size, length, amount, or degree of something by using an instrument or device marked in standard units. The values we get by measuring an object become more useful in terms of details. For example, instead of saying that the cabinet is tall, we can specify a measurement and say that the cabinet is 6 feet high.

In woodworking, measuring is not only checking the length, width or thickness of objects but also checking of the shape, like flatness, straightness, roundness or squareness. Measurement is required for checking the accuracy of part made, as well as creating the sketch for making a part.

The Accurate measurement is the basis of good engineering and crafting practice. The accuracy of any measuring device depends on the user as much as on the design of the tool. Measuring tools are also used for inspecting a finished or partly finished product. All measuring tools are precision tools. You must take good care of them to keep them in good shape to maintain accuracy.

8.2.2 Systems of Measurement –

There are two systems of measurement:

FPS System or Imperial System

This system is a traditional system used in carpentry. It is based on the English imperial system of measure.

MKS or metric system

This system is an international decimalized system of measurement, first adopted by France in 1791. It is the common system of measuring units used by most countries in the world.

All measuring tools have metric or imperial graduations or a combination of both. One big advantage of the metric scale is that it eliminates the necessity for a range of fractional sizes. Fractions are not used in the metric system.

Unit of measures -

FPS or imperial system	MKS or metric system
Yard	Meter
Foot	Decimeter
Inch	Centimeter
	Millimeter

8.2.3 Reading of a Ruler in FPS System

Let us learn how to read a ruler in FPS system. Here is given a picture of a ruler. Look at it carefully. Inch is marked on one side of the ruler, like one inch, two inch, three inch, and so on.

After every twelve inches, foot is marked. Normally, foot is marked in black colour or it has a black circle or square around it.



The inch is divided into 16, 8, 4 and 2, equal segments. These segments are called graduations. $\frac{1}{4}$ of an inch is called quarter inch. $\frac{1}{2}$ of an inch is called half inch. Symbol used for foot is (') and for inch is ("), for example 2 feet and 4 inches are written as 2'-4".



8.2.4 Reading of a Ruler in Metric System

Now, let us read the ruler in metric system. Here is given a picture of a ruler. Look at it carefully. Centimeter is marked on one side of the ruler, like one cm, two cm, three cm, and so on. After 100 centimeters, one meter is marked. Normally, meter is marked in black colour or it has a black circle or square around it. One centimeter has 10 equal segments. These segments are called millimeters.





8.2.5 Guide Table for Unit Conversion

Below is given a table. It will help you to convert the imperial measures into metric measures and from metric measures to imperial measures.

1 foot = 12 inches

1 meter = 10 decimeters

1 decimeter = 10 centimeters

- 1 meter = 100 centimeters
- 1 inch = 25.4 millimeter
- 1 foot = 30.48 centimeters
- 1 meter = 3.28 feet
- 1 meter = 39.37 inches

Exercise

Write correct answers in the blank -

3 feet = Inch10 inches = Millimeters1.5 feet = Inch254 millimeter = Inch5 meters = Decimeter6 inches = Centimeter320 centimeters = Meter16 inches = Feet Inch6 meters = Inch1 meter = Millimeters39.37 inches = Meter2 feet 8 inches = Inch

8.2.6 Measuring the Wood -

Let us learn how to measure the wood. A piece of wood has six faces-



From End 1 to End 2 or AB = Length (L) From Edge 1 to Edge 2 or CD = Width (W) From Surface 1 to Surface 2 or EF = Thickness (T)

8.2.7 Calculating the Quantity of the Wood

It is essential to estimate or calculate the quantity of the materials required for making furniture, so that materials can be procured and cost can be estimated. Mainly, there are three methods of measuring the wood.

Running measurement - In this method, the breadth and thickness of the wood is not measured. Only the length is measured. The units of measurement in this method are running foot and running meter.

Square measurement - In this method, the length and breadth of the wood is multiplied. The thickness is not measured. The units of measurement in this method are square foot and square meter.

Cubic measurement - In this method, the length, breadth and thickness are multiplied together. The units of this method are cubic meter and cubic foot.

8.2.7.1 Running Meter/Running Foot –

In woodwork, frames of door/window are measured in running foot or running meter.

Formula –

Running foot/meter = L + W + L + W

Example –



L=24 inches = 2 feet W = 18 inches = 1.5 feet

2 + 1.5 + 2 + 1.5 = 7 Running foot

8.2.7.2 Square Meter/Square Foot –

In material, plywood or board are available in sheet form and they have fixed thicknesses. They are estimated in square foot or S.Ft. In furniture or woodwork, door/window, cabinets, cupboards, partitions, glass/mirror are generally measured in S.Ft.

Formula –





8.2.8 Measuring Method in Metric (M.K.S) System

The measurement unit in the metric system is measured in millimetre, centimetre and metre. If the measurement of any object is in different units then how will it be calculated? Let's understand the same.

1000 millimeter = 1 meter

100 centimeter = 1 meter

Square measure (square meter) = (length × width)

- 1. $\frac{\text{centimeter}}{100} \times \frac{\text{centimeter}}{100} = \text{Meter Square}$
- 2. $\frac{\text{centimeter}}{100} \times \text{meter} = \text{Meter Square}$
- 3. Meter × Meter = Meter Square
- 4. $\frac{\text{milimeter}}{1000} \times \frac{\text{milimeter}}{1000} = \text{meter square}$
- 5. $\frac{\text{centimeter}}{100} \times \frac{\text{milimeter}}{1000} = \text{meter square}$
- 6. $\frac{\text{milimeter}}{1000} \times \text{meter} = \text{meter square}$

Example:

Question-

The length of a door is 2.1 meter and the width is 90 centimetres. So what will be the measurement of the door in square meter?

Answer:

Two measurements are multiplied in square measure.

Length of the door = 2.1 meter	
Width of the door = 90 centimeter	
Therefore, = $2.1 \times \frac{90}{100} = 1.89$ square meter Cubic meter (length x width x Height)	
1. $\frac{\text{centimeter}}{100} \times \frac{\text{centimeter}}{100} \times \frac{\text{centimeter}}{100} = \text{cubic meter}$	
2. $\frac{\text{centimeter}}{100} \times \frac{\text{centimeter}}{100} = \text{cubic meter}$	
Metre × metre × metre = Cubic metre	
4. $\frac{\text{milimeter}}{1000} \times \frac{\text{milimeter}}{1000} \times \frac{\text{milimeter}}{1000} = \text{cubic meter}$	
5. $\frac{\text{centimeter}}{100} \times \frac{\text{milimeter}}{1000} \times \frac{\text{milimeter}}{1000} = \text{cubic meter}$	
6. $\frac{\text{milimeter}}{1000} \times \text{meter} \times \text{meter} = \text{cubic meter}$	
7. $\frac{\text{milimeter}}{1000} \times \frac{\text{centimeter}}{100} \times \text{meter} = \text{cubic meter}$	
Example :	
Question-	
If the length of the wood is 3 meters, width is 12 centimeters and height is 7 centimeters, then what the measurement of wood in cubic metre?	is

Answer:

Three measurements are multiplied in cubic measurement = length × width × height

Wood length = 3 metre Wood width = 12 centimeter Wood height = 7 centimeter × 3' $\frac{12}{100}$ ' $\frac{7}{100}$ = 0.0252 cubic meter

8.2.9 Method of Measurement in British (FPS) System

In the British system, the unit of measurement is in inches and feet, if an object is measured in different units, then its quantity should be calculated as explained below:

12 inches = 1 feet

Square feet (length × width)

- 1. $\frac{\text{inch}}{12} \times \frac{\text{inch}}{12}$ = Square feet
- 2. $\frac{\text{inch} \times \text{inch}}{144}$ = Square feet
- 3. Feet × Feet = Square feet

4. $\frac{\text{inch}}{12}$ × Feet = Square feet

Example:

Question:

The length of a door is 7 feet and width is 3 feet, then what will be the measure of the door in square feet?

Answer: Two measurements are multiplied in square measurement

= Length × width = Door length = 7 feet = Door width = 3 feet = 7 × 3 = 21 square feet

Cubic feet (length × width × height)

1. Feet × Feet × Feet = Cubic feet

2.
$$\frac{\text{inch}}{12}$$
, $\frac{\text{inch}}{12}$ × feet = cubic feet

- 3. inch $\times \frac{\text{inch}}{144} \times \text{feet}$ cubic feet
- 4. $\frac{\text{inch}}{12}, \frac{\text{inch}}{12}, \frac{\text{inch}}{12} = \text{cubic feet}$
- 5. inch $\times \frac{\text{inch}}{1728} \times \text{inch} = \text{cubic feet}$

Example:

Question:

If the length of the wood is 9 feet, width is 5 inches and thickness is 3 inch, then what is the measurement of wood in cubic feet?

Three measurements are multiplied in cubic measurements.

	=	length × width × height
Wood length	=	9 feet
Wood width	=	5 inch
Wood height	=	3 inch
	=	9 feet × $\frac{5 \text{ inch } \times \text{ inch}}{144}$ = 0.937 cubic feet

- Practical 🆄

Here are given some figures. Estimate the quantity of wood.



UNIT 8.3: Technical Drawing



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

- 1. Interpret the technical drawings
- 2. Identify the standard dimension of furniture
- 3. Design basic sketch of furniture

8.3.1 What is Technical Drawing? -

A technical drawing is a precise and detailed drawing of an object to be constructed. It is a medium of communication between a furniture designer, or client who conceptualizes the ideas, and a carpenter who is going to make furniture.

Technical drawings give all the information which is required to make any piece of furniture. By following technical drawings a carpenter can prepare, make and assemble the different pieces of furniture. For example, a drawing of a table tells the length, width and height of the table, joints to be used, hardware, etc. By reading technical drawings you can calculate the quantity of material, estimate the time to complete the job, and the cost.

Technical drawing generally follows very specific rules and guidelines in order to make its intent clear and avoid confusion. There are certain elements which visually communicate different purposes, such as lines, symbols, schedules, etc. Let us study them one by one.

8.3.2 Lines -

In a technical drawing certain conventional lines are used for a definite purpose. Different types of lines of different thickness are used to make a technical drawing. Some commonly used lines are –

- Full line
- Dotted line
- Section line
- Centre line
- Dimension line
- Extension line

Example –

Study the drawing of a table given below -



8.3.3 Symbols -

Certain symbols are also used in technical drawings. There are fixed symbols for door, window, furniture, bathroom fixtures, electrical points, etc.



8.3.4 Floor Plans -

Some floor plans are given below. Study them carefully.





8.3.5 Orthographic or Working Drawings

A working drawing has all necessary information required to make the furniture, such as measurements, detailed information about materials and joints. Normally, in a working drawing there are three views – plan or top view, front view and side view. Each view has the measurement written on it.



8.3.6 Isometric Drawings

An isometric drawing is a three-dimensional drawing, where all three sides of furniture are drawn. Vertical lines are drawn straight, whereas horizontal lines are drawn at 30 degree angle.



8.3.7 Sectional Drawings and Assembly Drawings

In addition to working drawing, sectional and assembly drawings are also drawn to give detailed information about making furniture, especially how to join pieces together.





– <mark>8.3.8 Schedule</mark>s —

A schedule is always given with the floor plan, which helps to take out the sizes and quantities of doors and windows.

Example -



7'-0"

D 3

2'-6" x 7'-0"

3'-0"

2'-0" x 4'-0"

W 3

Votes	





सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

9. Cutting, Shaping and Inspection of the Wood

Unit 9.1 - Furniture and Other Woodwork

Unit 9.2 - Preparation – Marking, Cutting, Shaping, and Trimming



FURNITURE & FITTINGS SKILL COUNCIL



– Key Learning Outcomes 🕎

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

- 1. Perform woodwork as required
- 2. Demonstrate marking, cutting, shaping, and trimming operations

UNIT 9.1: Furniture and Other Woodwork



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

- 1. Identify furniture and its purpose
- 2. Identify different types of furniture
- 3. Identify the other woodwork carried out by the carpenters

9.1.1 What is Furniture? -

Furniture is usually kept in a house or other building to make it suitable or comfortable for living or working in. Furniture serves a variety of different purposes. Furniture supports various human activities such as seating e.g. chairs, stools, tables and sofas, and sleeping e.g. beds. Furniture is also used to hold objects at a convenient height for work, as horizontal surfaces above the ground, such as tables and desks, or to store things e.g. cupboards and shelves. Furniture is also used as accessories for decorative purpose, such as mirrors, fireplaces, paneling, and other items complementary to an interior scheme.

9.1.2 Types of Furniture Classified by Materials -



9.1.3 Types of Furniture Classified by its Usage

– 9.1.3.1 Furniture for Seating —



- 9.1.3.2 Furniture for Sleeping -



9.1.3.3 Furniture for Entertainment



- 9.1.3.4 Furniture for Working -



- 9.1.3.5 Tables -



- 9.1.3.6 Furniture for Storing



9.1.3.7 Accessories -



9.1.3.8 Office Furniture –



- 9.1.4 Other Woodwork



Structure or framework

Doors and windows







▼ Interior flooring





Staircase and handrail





▼ Partition/drywall/wall paneling





- 9.1.5 Standard Dimensions for Furniture Design

Dimensions for cabinets, table, bed and other furniture have been standardized over the years to fit the average size person. While you can customize them to fit as per your client's needs, here's a list of commonly used dimensions to help you when planning your project.

Bed

• Height of top of mattress from floor – 16" - 24"



Chair

- The occupant should be able to sit in and get up from the chair without difficulty.
- The feet should rest flat on the floor without the knees projecting above the upper leg.
- Armrests should support the forearms without raising the shoulders.
- Half armrests enables the chair to be drawn up close to a table, or full armrests should be fit under the table apron.
- The depth of the seat should allow clearance from the front edge of the seat to the back of the occupant's leg.
- The width of the seat often tapers by 2" to 3" from the front to the rear to allow clearance for legs and clothes in front while allowing elbow room in back.
- The back of the chair is often slanted backwards for comfort up to 50 for a dining chair and 100 to 150 for a more casual chair.
- A back height of about 12" to 16" above the seat is ideal, but this guideline is often ignored for formal 'high-backed' dining chairs.
- Chair seat height: 16"-18"
- Chair seat depth: 15"-18"
- Chair seat width: 18"
- Armrest height: 7"-9" above seat
- Chair back height: 30" 44"



Sofa

- Seat depth ranges from 18" to 22" and seat height ranges from 14" to 18" (16" average).
- The seat back typically rises 15" to 18" above the seat and is usually angled backwards at up to 25 degrees.
- Upholstered seats generally slope 1" from front to back.
- Armrests generally protrude 4" to 8" above seat.
- The overall width of a two-seater sofa is about 56" to 60" 24" per person, plus 4" to 6" for each armrest. A three-seater sofa measures about 84" in overall width.



Tables

- Most tables designed for writing or dining should be 28" to 30" high with chair seats 12" lower. Leg room below the table (height from floor to bottom of table rail) should be about 26" and at least 12" for knee clearance (projection of table top beyond table leg.
- Bedside tables should not be more than 6" above the height of bed.
- Coffee table are generally 1/2 to 2/3 the length of the sofa and about the same height as the sofa seat.
- Side/End tables should be the same height or a few inches shorter than the armrest of the sofa.
- Sofa tables/console table are designed to hide the back side of a sofa that is not against a wall. They are usually 2/3 the length of the sofa and about the same height as the back of the sofa.



Determining dining table size

- For square or rectangular dining table, allow 24" of elbow room width per person.
- For round tables, allow 26" width per person for a table seating 3 to 6 people and 24" for a table seating 6 or more people.
- Add 2" to all of the above figures if armchairs will be used.

Kitchen cabinet

- Counter top height: 33"-36"
- Counter top depth: 24"-25" (1" overlap)
- Base cabinet depth: 23"-24"
- Kickspace height: 4"
- Kickspace depth: 3"
- Overhead cabinet depth: 12"-13"
- Overhead cabinet height from floor: 84"-96"
- Gap between working top and bottom of overhead cabinet: 18"-24" (24" is ideal)
- Gap between bottom of vent hood and working top: 30"


Bookshelves

- For ease of shelf access, bookcases are generally no higher than 84". Small bookcases are usually 30" to 42" high.
- The highest shelf in a bookcase should be as high as an average-sized person can comfortably reach about 72" to 78".
- If the shelf will be accessed from a sitting position, the highest shelf should not be more than 60" above the floor.
- The lowest shelf should be 3" to 4" from the floor level.
- Shelf depth is determined by the size of the items to be stored, generally within the range of 6" to 24".
- Shelf depth for a general purpose bookshelf is usually 10" to 12".
- Shelf spacing will generally range from 7" to 15" with 8" to 12" being common for bookshelves.

Buffet/Sideboard

- Height of Buffet: 36"
- Depth of Buffet: 21"-24"
- Width of Buffet: 48"-72"

Wardrobe -

- Height: 84"-96"
- Depth: 24"
- Width: 36"-48" (single wardrobe)

Stepback cabinet

- Height of unit: 72"-84"
- Height of base cabinet: 30"-36"
- Base cabinet depth: 24"
- Shelf depth: 12"
- Height of hanging rod from floor: 72"
- Hanging space for long coats and dresses: 58"-64"
- Hanging space for jackets, shirts and sarees: 32"-36"

_ F1	vercise 🖉 –							
1.	. Write the four types of furniture based on materials –							
	a)							
	b)							
	c)							
	d)							
2.	Write four types of	seating furniture –						
	a)							
	b)							
	c)							
	d)							
3.	3. Write three types of office furniture –							
	a)							
	b)							
	c)							
Ch	Choose the correct answer –							
4.	 What is the standard height of a study table? 							
	a) 24 inches	b) 33 inches	c) 30 inches	d) None of above				
5.	5. What is the length of a king size bed?							
	a) 6 feet 6 inches	b) 6 feet	c) 6 feet 3 inches	d) 6 feet 8 inches				

UNIT 9.2: Preparation – Marking, Cutting, Shaping, and Trimming

- Unit Objectives 🦾

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

- 1. Design the dimensions on the wood piece using different methods
- 2. Practise cutting the wood on marked lines using handsaw and power saw
- 3. Demonstrate the process of smoothening wood using hand planers and power-operated planers
- 4. Inspect the quality (level, smoothness, flatness, etc.) of ready wood workpieces

9.2.1 Preparing the Wood Workpieces -

To make any piece of furniture, the first step is preparing the wood. There are certain basic steps of this activity –

- 1. Marking of the dimensions on wood
- 2. Cutting the wood
- 3. Planing or shaving the wood
- 4. Inspecting the prepared wood

9.2.2 Measuring and Marking the Wood -

Measuring is the first step in woodwork. The second step is to make a mark on the measured point. The combination of the two processes—measuring and marking—forms the foundation of accurate work. If either is done incorrectly, much effort and material are wasted. Here are a few pointers that can improve the quality of your work by reducing the chance for error.

How to hold pencil while marking on workpiece

- A wood folding ruler, a tape measure and a few steel bench rulers meet most measuring needs.
- To mark from any one of these rulers, use a sharp 2H pencil, the best general marking device for woodworking. These pencils have a medium-hard lead and when properly sharpened leave a fine line that's readily visible on most surfaces.
- When marking a line with a ruler, be sure to hold the pencil at an angle so that its point meets the workpiece at the same place the ruler does. Holding the pencil perpendicular to the work surface results in the center of the pencil point being inaccurately positioned.

- 9.2.2.1 Steps of Marking a Straight Line - Method 1 eq

Tools needed -

- Measuring tape
- Pencil
- Try square





STEP 1: Set the wood or plywood/board on a flat work surface or work bench.

STEP 2: Place the hook end of the measuring tape on the end of the wood.



STEP 3: Extend the measuring tape out to the desired length.



STEP 4: Mark the length by drawing an arrow with the pencil.





- **STEP 5:** Place the try square across the wood and line it up with the arrow.
- **STEP 6:** Draw a line through the arrow, following try square.
- **STEP 7:** Draw a line on the side face of wood following the previous line. It will help to cut straight.



This method is used to mark on small pieces of wood, or mark lines for rabbet or mortise.

Tools needed

- Measuring tape
- Marking gauge
- Mortise gauge





STEP 1: Place the workpiece on a flat surface and clamp with G clamp.

STEP 2: Set fence measurement. Turn the thumb screw anti-clockwise to release the fence and stem, then move the fence along the stem until it is at the correct measurement. Turn the thumb screw clockwise to secure it in place.



STEP 3: Curl your hand around the fence and tilt it slightly in the direction you are going to mark. Then simply drag the fence along the workpiece, applying very little pressure.



Marking with Mortise gauge

Method to mark on wood with mortise gauge is same as marking with marking gauge. The distance between the fixed spur and the adjustable spur of mortise gauge is set so that it matches the width of the mortise chisel.

9.2.2.4 Steps of Marking a Circle/Arc Using Compass

This method is used to scribe a circle or an arc on smaller pieces of wood.

Tools needed

- Pencil
- Compass





STEP 1: Secure a sharp pencil in the clamp of a compass. Align the pencil lead with the compass's needle.





- **STEP 2:** Adjust the angle of the arms so that they span the full desired radius.
- **STEP 3:** Put the sharp end of a compass down firmly on wood wherever you want the centre of the circle to be. Put the pencil point gently down on the wood. Press down the needle and turn the top of the compass to draw a circle.

9.2.2.5 Steps of Marking a Circle/Arc using Trammel Heads

This method is used to scribe a big circle or an arc on bigger pieces of wood.

Tools needed

- Pencil
- Trammel heads



STEP 1: Set the wood or plywood/board on a flat work surface or work bench.

STEP 2: Insert a small pencil into the body of one of the trammel heads and tighten the clamping nut to secure it in place. The other trammel head should have the steel point installed.





STEP 3: Clamp trammel heads onto the beam. They should be separated by the same distance as the radius of the circle to be drawn.





- **STEP 4:** Position the steel point of the trammel head on workpiece where you want the centre of the circle to be.
- **STEP 5:** Holding the first trammel head, carefully pivot the trammel head with the pencil around in a single motion.
- **STEP 6:** Continue this motion until you have completed the circle.

– 9.2.2.6 Steps of Drawing Irregular Shapes on Wood 🖪



There are many ways to draw irregular shapes on wood. Some common ways are -



- **1:** Use french curves to render small details.
- **2:** Bent plastic wood makes a perfect curve. Clamp blocks to a 2x2 and spring-fit a length of 1x2 plastic wood between them. Adjust the position of the stop blocks to change the curve.





3: Wood templates are patterns or models used in the making of curved lines or irregular shapes.

For example, if you are making a set of chairs with shaped seats, legs, or back splats that are supposed to match, templates can be used as patterns to ensure that all the chairs have matching elements.

The template is laid down on the wood and the pattern is traced; then the workpiece is cut to match the master. Templates can be made from cardboard, plywood, hard-board, or scrap stock around the

workshop. They save considerable layout time and produce more consistent, accurate results.

- Tips 🖳

- Measure twice, cut once. Be careful as you cut.
- Stretch the measuring tape fully. Ensure that it should not be loose in the center.
- Take help from your assistant to hold the measuring tape for longer lengths.
- While marking with marking gauge, stop just before the end of the material so that the tool does not drop off and lose control.
- While marking with marking gauge, scribe lightly a line along the surface first and then repeat the process two or three times until an accurate scribed line can be seen.
- Make sure that the hinge at the top of the compass is tightened so that it does not slip.
- Use a beam with a measuring scale; you will easily be able to move the second trammel head to the correct position.

Notos	

9.2.3 Cutting the Wood

When wood is procured, it comes in sleepers or blocks. To start any type of woodwork, you need to cut these wood blocks or sleepers into smaller ones. For straight cut, there are mainly two types of cut –

Rip cut

When wood is cut along the grains (parallel to the grain), it is called rip cut.

Cross cut

When wood is cut across the grains (perpendicular to the grain), it is called cross cut.



9.2.3.1 Steps of Cutting Straight using Hand Saw arepsilon

Tools needed

- Measuring tape
- Pencil
- Try square
- Handsaw
- Sawhorse or
- Workbench
- Personal protective equipment (like dust mask and safety goggles)
- Dust mask and Safety goggles



- STEP 1: Clamp the wood to workbench/ sawhorse.
- STEP 2: Mark on the wood using try square and pencil.



STEP 3: Score along the guide line using a utility knife.

STEP 4: Place the blade of saw on the cutline pointing its tip down slightly.



STEP 5: Hold the wood steady with your other hand.

STEP 6: Pull the saw toward you two-three times. This way you will have a notch in the wood edge.



STEP 7: Begin to saw through the wood, back and forth, using long strokes.

STEP 8: Blow the sawdust, if you lose sight of the cutline in the sawdust.



- 9.2.3.2 Steps of Cutting using Compass Saw 🔳

Tools needed

- Pencil
- Scribing knife
- Compass saw
- G clamp & Workbench
- PPE Dust mask and Safety goggles



STEP 1: Secure the wood to be cut in a clamp.



STEP 2: Mark out the lines with pencil and then run a scribing knife along them.



STEP 3: Create a starting edge by drilling a hole inside the shape to be cut.

STEP 4: Hold the blade against the work surface.



STEP 5: Pull the saw back towards you gently in one long, slow stroke to make a notch.

STEP 6: After first cut is made continue sawing back and forth with long strokes.









STEP 1: Secure the miter box on workbench.

STEP 2: Place the wood to be cut in the miter box.

STEP 3: Position the saw in the slot made in the miter box and cut the wood.

Tips 🖳

- Keep finished surface up while cutting with hand saw.
- Avoid cutting through knots in the wood whenever possible.
- Watch your fingers. Keep them away from blade at safe distance.
- As you finish cutting, be careful not to drop the saw or wood on your leg.
- Wear dust mask and safety glasses.
- Always secure a board with clamps to the work surface before cutting through the board.
- Fasten the miter box in place so the work and box do not move while cutting.
- Make sure you're in a comfortable position when sawing, and try to stand or sit directly behind the material being cut.
- You should try to make slow, smooth strokes rather than random jerky movements.
- If you're not feeling very confident, test out your sawing technique on some scrap material.
- Do not apply excess pressure during the cut or the blade may become jammed in its cut and make further cutting or removal difficult.
- Make sure the saw blades are sharp and that handles are firmly attached.

- Notes 🖃 -	



9.2.3.4 Steps of Cutting with the Help of a Table Saw arepsilon

Getting the blade height

STEP 1: Make sure the saw is unplugged.

STEP 2: Lift the blade guard and hold the workpiece against the side of the saw blade.

STEP 3: Raise the saw blade so the gullets between the teeth just clear the top of the wood.

STEP 4: Make sure the blade guard and splitter are in place and working correctly before sawing.



Ripping a wide board

STEP 1: Line up the cut mark with the blade and adjust the rip fence until it is tight against the piece. Make sure that the line is barely on the fence side of the blade so that the kerf made by the blade is on the waste side of the line.

STEP 2: Position yourself to one side of the blade. Never stand directly in line with the blade or you risk getting injured by kickback.

STEP 3: Start the machine and use your right hand to press the workpiece down on the table and against the fence.

STEP 4: Brace your left hand on the table and use it as a guide while you propel the piece smoothly forward with your right hand.

STEP 5: As the tail of the board approaches the blade guard, you might need to use a push stick to complete the cut.

STEP 6: When the cut is done, shut off the saw so you can reach safely over the blade to remove the wood.



Ripping a Narrow Piece

STEP 1: Mark the wood and set the rip fence so the wider piece is between it and the blade.

STEP 2: Make sure the blade guard and splitter are not hung up on the rip fence. If the closely set rip fence interferes with the saw guard, don't make the cut. Rip the piece you need from a wider board instead.

STEP 3: Stand to the left of the blade and have a push stick ready. Only use a push stick designed for a table saw (check your manual for a template or buy one at a hardware store). If the push stick won't fit between the blade guard and the rip fence, don't make the cut. Rip the piece you need from a wider board instead.

STEP 4: Arrange your hands as explained in "Ripping a Wide Board," above. Push the piece forward with your right hand until the tail end approaches the table.

STEP 5: With your left hand bracing the board against the fence, pause and pick up a push stick. Use the stick to move the workpiece forward and past the blade, always pushing down and against the fence.



Crosscutting

STEP 1: You can extend the miter gauge by screwing a 2-foot piece of 1×3 to it, then pushing the extension through the saw to cut it to length.

STEP 2: When crosscutting, line up your cut mark with the saw end of the extension. (If you don't extend the miter gauge, lock the power switch and hold the workpiece against the gauge while you line up the cut mark with the blade.)

STEP 3: Move the rip fence away from the workpiece. Never use the rip fence and the miter gauge together.

STEP 4: Switch on the saw, hold the workpiece tight against the miter gauge, then push the gauge so the wood slides under the guard and past the blade.

STEP 5: Move the piece away from the blade and shut the motor off before you return the gauge.

To cut a miter, remove the extension and set the miter gauge to the angle you want. Make test cuts in scrap before cutting your workpiece.



9.2.3.5 Steps of Cutting with the Help of a Circular Saw \square

STEP 1: Unplug the saw and hold it alongside the workpiece with the blade guard retracted.

STEP 2: Loosen the depth-adjusting lever or knob and pivot the saw's base until the blade extends about $\frac{1}{4}$ to $\frac{1}{2}$ inch below the workpiece.

STEP 3: Tighten the lever or knob and it is ready to saw.

STEP 4: Support the workpiece on a bench or two strong sawhorses, overhanging enough so that the cut piece will fall.

STEP 5: Mark the side of the workpiece, then line up the blade to just leave the pencil line on the keep side.

STEP 6: Support the front of the saw shoe on the work piece, but keep the blade about an inch from the material.

STEP 7: Start the saw and allow the blade to come up to full speed before carefully pushing the saw into the workpiece.





Plywood cutting technique

Crosscutting plywood without supporting it across its entire length can cause the saw to bind or the plywood veneer to tear or splinter as the cutoff piece drops. If you're using sawhorses, simply span them with a pair of 2×4 . This will provide the support needed.



9.2.3.6 Steps of Cutting with the Help of a Jigsaw



STEP 1: Determine the size and position of the circle on the board. Use a compass and a pencil to draw the circle.

STEP 2: Place the board with the cutting area extending beyond the end of the work surface, and clamp securely in place. Drill a 3/8-inch starter hole just inside the scribed circle.

STEP 3: Position the jigsaw with the blade inside the starter hole and with the saw's shoe plate

flush with the board. Making sure the blade is not touching the board, start the saw and cut an arc to reach just inside the waste side of the scribed circle. Continue until you cut about half of the circle.

STEP 4: Find a comfortable position to avoid an unsafe or awkward cutting angle, and finish cutting the remainder of the circle.

STEP 5: Use a sanding sponge, which works well on curved surfaces, to clean up the edges.



- Tips 🖳

- Always make sure the power source is unplugged before making any adjustments to the saw.
- Always wear safety glasses and ear plug.
- Follow the safety instructions printed in saw manufacturer's manual.
- Never prop up the off-cut piece, or the material will buckle and bind the blade, causing a dangerous kickback.
- Never remove the saw from the piece while the blade is spinning.
- When making a partial cut or repositioning during a cut, wait for the blade to come to a complete stop before removing the saw from the piece. When starting up again, center the blade in the kerf and make sure the teeth are not touching any part of the material before pulling the trigger.
- Keep the saw away from your body and do not set it down until the blade stops spinning. You can release the trigger just before the blade completes the cut so the remaining material will slow the blade and minimize "coasting," which is safer and saves a little time waiting for the blade to stop.
- Keep your eyes on the guide/front of the blade all the time. This keeps you looking forward along the marked line and out of the way of flying sawdust. Make sure the base plate remains flat on the piece.
- Make several test cuts before working on your final project. Use gentle pressure when guiding the saw.
- While cutting with circular saw, don't cut wood that's supported on both ends as the cut nears completion, the board bows downward, which pinches the blade in the cut and causes the saw and/or board to buck. This is dangerous.





STEP 1: Mark on the sheet.



STEP 3: Cut the paper layer using utility knife.



STEP 5: Cut through the paper on the back side.



STEP 2: Place the T-square on sheet, lined up with markings.



STEP 4: Turn the sheet over and bend it to 90° angle.



STEP 6: Smoothen the edges with fine sand paper.

Use the keyhole saw or utility knife to cut any shape in the sheet.





- **9.2.4** Jigs

A jig is a work holding device that holds, supports and locates the workpiece and at the same time guides the cutting tool for a specific operation. A good workshop jig will hold the work accurately and safely so you can make consistent, repeatable cuts quickly. Woodworking jigs are useful for creating intricate wooden profiles.

Benefits of using jigs

- Jigs accurately manufacture duplicate parts in mass with uniform quality.
- The workpiece and tool are relatively located at their exact positions before the operation. So it reduces product cycle time.
- Jigs increase the production rate by eliminating the time and effort spent in individual marking, measuring, and positioning of workpiece on a machine and frequent checking.

Jigs can be made from 3/4 inch plywood or medium-density fiberboard (MDF), some hardwood pieces, and glue and fasteners. A jig has three parts 1) jig base 2) support and 3) stop block.

Below is given an example of a jig made to cut the tapered legs of a chair. Tapering has become a simple and safe operation with this jig.



9.2.4.1 Steps of Making a Jig and Cutting the Workpiece

STEP 1: Make a base for the jig from 3/4 inch plywood. Rip and crosscut the base to size so it is at least 6 inch wide and about 6 to 8 inches longer than the leg you want to taper.



STEP 2: Draw the taper cut on the leg work-piece, extending the line across the adjacent face and end of the leg. You need to determine exactly where the blade will enter and leave the wood. Clamp the leg to the jig base and to the workbench in a way that the taper line aligns with the edge of the base.



STEP 3: Cut a straight, flat piece of scrap to make the support the same length as the leg. Set the support against the leg, and fasten it to the base with a few countersunk wood screws.



STEP 4: Attach a stop block to the jig that butts against the end of the leg. Fasten it with a couple of screws.



STEP 5: Make two mounting blocks for the toggle clamps from scrap the same thickness as the leg. Fasten the blocks behind the support and near the ends of the leg. Screw the clamps to the blocks and adjust the rubber bumpers on the clamps.



STEP 6: To prepare for cutting, set the jig on the saw and raise the blade until the teeth are about 1/4 inch above the top of the leg. Hold the jig against the rip fence, and adjust the fence so the edge of the jig is flush with the inside edges of the blade teeth. Lock the fence and pull the jig back so it is clear of the blade.



STEP 7: Start the saw, and feed the jig along the fence to rip the taper. Keep your hands behind the jig support throughout the cut.



STEP 8: To taper the other face, tape the cutoff piece back in place, and flip the leg in the jig so the offcut face is up. Adjust the clamp bumpers and clamp the piece, and make the second taper cut.



STEP 9: Now run the tapered faces over the jointer to remove the blade marks, and scrape or sand them smooth.





• Be sure to hang this jig on the wall safely where it is easy to find and modify the next time you need it.

- Notes 🖃 -	

9.2.5 Planing the Wood

Jointing and planing – these two are the necessary steps in any furniture making process. Planing means shaving thin and uniform strips from a piece of rough wood using hand plane or power-operated planer. It is done to flatten, reduce the thickness of the wood workpiece, and create a smooth, level surface by removing high spots. It is also done to clean the edges of the wood and make sure the edges of the wood workpiece are squared.

9.2.5.1 Steps of Planing the Wood using Hand Plane

Tools needed

- Oilstone
- Marking gauge
- Jack/Smoothing plane
- Workbench
- PPE Dust mask and Safety goggles



STEP 1: Sharpen the blade of plane on oilstone.



STEP 2: Adjust the angle of the blade with the help of mallet.



STEP 3: Mark on the side of the wood using marking gauge.



STEP 4: Transfer to mark.



STEP 5: Fix the wood tightly into a vise.

STEP 6: Hold the plane with both hands. Push the plane forward smoothly over the surface of the wood.

STEP 7: Continue the smooth, forward motion of the stroke right to the end of the piece of wood. Tilt the front of the plane up and away from the wood when drawing it back to make the next stroke. Repeat it until chamfer disappears.





9.2.5.2 Steps of Planing the Wood using Power Planer

STEP 1: Begin by resting the front shoe of the planer flat on the wood without letting the blade touch the work.

STEP 2: Start the tool, let the motor reach full speed, then ease the plane into contact with the work and push it steadily forward.



STEP 3: Keep your initial pressure on the front grip as the planer enters the workpiece.

STEP 4: Balance hand pressure between the tool handle and front knob as both planer soles contact the work.

STEP 5: As you push the tool off the work, apply greater control to 'catch' the rear handle. Avoid overreaching at the end of a pass; the front shoe will drop off the wood and let the blades take an uneven bite off the end of the wood (called 'snipe').



Tips 🖳

- Wear goggles to protect eyes from chippings and a face/dust mask to prevent breathing in dangerous dust particles.
- The wood workpiece must be placed level and firmly in the vice.
- Plane in the direction of the wood grain.
- While using hand plane, make sure that little of the blade is sticking out off the bottom of the plane. Too much of the blade will make using the plane very difficult and it may damage the surface of the wood.
- Always use a sharp blade.
- Unplug the power planer before you change blades or make any repairs and adjustments to the tool.
- Change blades before they get so dull that they create smoke or fine powder as you plow through the work. Forcing the planer like this harms the motor.

- Resharpen or replace both blades at the same time. This maintains cutter head balance and ensures quality cuts.
- Blades that are not mounted squarely on the cutter head cause the tool to vibrate. Double-check mounting bolts for tightness before running the planer.
- Always read the manufacturer's instructions very carefully and follow them.
- Make sure that the mains cable cannot be tripped over or that it causes a hazard in anyway.
- Fit an extraction bag to the planer. This will collect most of the dust and chippings.

- 9.2.5.3 Steps of Preparing a Square Wood Workpiece

STEP 1: Join one surface.

STEP 2: Join an adjoining surface square to the first.

STEP 3: Mark the both jointed surfaces.

STEP 4: Plane the remaining surfaces parallel to the jointed surfaces. Plane both remaining surfaces with the same thickness adjustment. Do not change thickness.



9.2.6 Working with Wood Chisel

A sharp wood chisel can cut mortises, shave rough surfaces, chop out corners and scrape off glue. Below are given different techniques to use the chisel.

Technique 1: Mortise cuts

- Start mortises by outlining the area with a mortise gauge.
- Face the bevel side down.
- Push or tap the back of chisel by hammer to remove thin slices.

Technique 2: Paring cut

- Pare thin slices of wood to flatten the bottom of an open mortise.
- Keep the unbeveled back of the chisel flat on the wood.
- For easier slicing, pivot the chisel as you cut to move the blade in an arc.

Technique 3: Chopping cut

- Chop out large amounts of wood by slicing off small amounts with each cut.
- Strike the chisel with a hammer and chop down about ½ inch.
- Chisel from the end to remove the piece before continuing.

Technique 4: Chop and pare

- Cut a groove, or dado by first sawing along both edges to the desired depth.
- Break out the wood in the middle with the chisel.
- Space the chisel cuts about ½ inch apart.

Technique 5: Scraping

- Scrape glue joints or other imperfections from wood by holding the blade at a right angle to the wood with the back of the chisel facing you.
- To remove thin shavings, support the blade with your fingers and press down while you draw the chisel towards you

Tips 🖳

- Chiseling with the grain can sometimes have disastrous results. If the grain runs deeper into the wood, it will direct the chisel too deep. Stop and chisel from the opposite direction if you feel this happening.
- When you are shaving into a piece of wood, face the bevel down. When you are flattening a cut and have access from the side, face the bevel up and hold the back of the chisel tight to the surface.
- Chisel out dados and other more precise joints a little at a time with a series of shallow cuts rather than driving the chisel too deep.
- Use a hammer or mallet for rough work or press with the heel of your hand for lighter cutting chores or finer cuts.
- Scraping requires a perfectly flat, sharp edge. The chisel tip should scrape cleanly without leaving scratch marks in the wood.

9.2.7 Cutting Edge Geometry

The point of the tool presses against the wood fibers with enough force that they break, separating into two pieces. A cutting edge concentrates all the force driving the tool at its point. And because a sharp edge contacts only a small amount of the wood surface, the resistance is confined to a tiny area. The keener the point, the smaller the resistance and the smaller the force required to cut. The wood fibers separate along a narrow line described by the path of the tool, and the cut surface appears smooth and even (figure 1). A blunt or dull tool contacts a larger surface area. Consequently, there is more resistance and it requires more force to cut. The fibers fail along a wider, poorly defined line, and the cut is ragged (figure 2).



The angle at which the tool is sharpened, the angle at which it attacks the wood, and the shape of the cutting edge also determine how a tool cuts.

Tool angle

Every cutting edge has a leading face and a trailing face. The angle between the two is the tool angle — the smaller the angle, the less force required to cut. Small tool angle reduce the "wedge effect' of the tools — they displace less material as they are driven into the wood and therefore require less force. But if the angle is too small, there's too little metal to buttress the cutting edge and it wears quickly. It may even break or buckle.



Cutting angle

The angle at which the cutting edge meets the wood — the cutting angle — is measured from an imaginary line perpendicular to the wood surface. This, more than any other angle, controls how the tool cuts. At a large cutting angle, it lifts the wood fibers as it cuts them; at a small cutting angle, the tool compresses the fibers, then shears them off.

Clearance angle

The angle between the trailing face and the work is the clearance angle. The size of this angle is not particularly important as long as there is one. Without a clearance angle, the cutting edge will not contact the wood.



When you drive a cutting tool through wood, it lifts and compresses the wood fibers. The force required depends on the cutting angle and the amount of wood removed. As the angle grows smaller, you must either use more force or remove less wood.

– Notes 🔳 –



STEP 2: If you can see the light between try square and surface of the wood, it means that wood is not properly planed.



STEP 3: To check the accuracy of planing, steel ruler can also be used.



Always hold the try square or steel ruler straight.



Practical 🖄

- Take a piece of wood and mark half inch wide line on it using marking gauge.
- Practice to cut a piece of wood using hand saw.
- Take a piece of plywood and draw a circle on it. Cut this circle using compass saw.
- Practice to shave a piece of wood.




सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

10. Assembling the Different Components of the furniture

Unit 10.1 - Woodworking Joints

- Unit 10.2 Fasteners and Other Fittings
- Unit 10.3 How to Make Basic Wooden Structures
- Unit 10.4 Finishing the Wooden Structure



FURNITURE & FITTINGS SKILL COUNCIL



- Key Learning Outcomes 🕎

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

- 1. Design different types of wood working joints
- 2. Use fasteners like nails and screws
- 3. Apply the right adhesives for the right application
- 4. Identify different fittings used in furniture
- 5. Design wooden structure by joining different workpieces together
- 6. Practise rendering basic designs of chair, bed, cabinet
- 7. Apply the technique of pasting the veneer or laminate
- 8. Demonstrate the process of pasting veneer or laminate on wood board
- 9. Demonstrate the process of installing wooden and PVC edge bands
- 10. Apply hard putty to finish the surface of wood

UNIT 10.1: Woodworking Joints



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

- 1. Identify different types of woodworking joints
- 2. Demonstrate the process of making woodworking joints
- 3. Use the right joint for the right application

10.1.1 Defining Woodworking Joints

Woodworking joints is the spot where two or more pieces of wood are joined together to form a structure. Each joint has its own strength and appearance. That is why different types of joint are used for different purpose. Adhesive, glue, or fasteners such as nails, screws, bolts are used to increase the strength.

A joint must

- Support the weight of the structure, or external weight
- Not make wood weak
- Let the wood move to expand and contract
- Provide enough surfaces for glue and fasteners

There are many types of woodworking joints; some can be made easily and the others are quite difficult to make, but the practice will make you perfect.

Woodworking joints can be divided into three categories, depending on the functions they perform -

- Lengthening To increase the length
- Widening To increase the width
- Framing To terminate or to change direction

Always remember

- Know the right joint to use
- Know how to make that joint in the correct way
- This joint is the easiest and the weakest joint.
- Use of dowel pins, biscuits, splines or pocket holes can reinforce this joint.
- It is used to make simple boxes or structures.







- 10.1.2 Miter Joint _____

- This joint is similar to butt joint, except that two pieces of wood are joined together at an angle of 450.
- Dowel pins, biscuits, Splines or pocket holes can be used to reinforce this joint.





Dowel miter joint









Spline miter joint



- 10.1.3 Dovetail Joint -

- This joint is probably the strongest joint.
- Two parts of wood are interlocked.





- 10.1.4 Finger Joint —

- This joint is also called box joint.
- It is similar to a dovetail joint except that the pins are square and not angled.





10.1.5 Dado Joint —

- A rectangular groove is cut in one piece into which the end of another piece fits.
- Dado is cut across the grains of wood. It is mostly used to make shelves.







10.1.6 Half Lap Joint _____

- A half lap joint consists of two members notched to half thickness and lapped on each other with the face flush.
- It can be done in different ways.



- 10.1.7 Rabbet Joint ______

A rabbet is a recess cut out of the end or edge of a board. When a piece is butted into a rabbet, it is called a rabbet joint.



10.1.8 Tongue and Groove Joint _____

A rectangular groove is cut in one piece into which the projection of another piece fits. It is used to make table tops, flooring.



- 10.1.9 Bridle Joint _____

This joint is also called open mortise and tenon joint. It is very easy and quick to make.



10.1.10 Mortise and Tenon Joint

This joint is one of the strongest joints. it is used to make door and window frames.



10.1.10.1 Steps of Making a Mortise and Tenon Joint

STEP 1: Laying Out the Joint

- Proper layout is just as important as the cutting and shaping to follow. A perfectly shaped tenon that's the wrong size or shape is no accomplishment at all.
- The tenon should be between one third and one half of the thickness of the stock from which it is made.
- Set mortise gauge to the chosen tenon thickness, positioning the points so that it will score a pair of lines that distance apart. Then set the block on the gauge so that the lines will be drawn equidistant from the sides of the stock. Mark off the shoulder lines, too, where the stock is to be trimmed above and below the tongue.





TL Length of Tenon RW Width of Rail



MD Depth of Mortise

STEP 2: Cutting the Tenon

• Cut the tenon using back saw.



STEP 3: Cutting the Mortise

- The mortise depth should be roughly three times the thickness of the tenon. Cut it using mortise chisel and mallet.
- Make sure the workpiece is properly secured to the table with a clamp. In cutting accurate mortises, it is essential that the sides of the chisel be square to the stock.



STEP 4: Fastening the Joint

- Glue is often used to connect mortise-and-tenon joints, as are dowels driven through the joint. A combination of both is the strongest.
- Before applying the glue, clamp the joint together dry to be sure the fit is just right. Drill out the holes for the pins or dowels, disassemble, and apply the glue. Clamp the pieces together, and insert the dowels, leaving them protruding from both sides of the joint. Scrape off any visible excess glue from the surface of the wood being joined.
- After the glue has set, remove the clamps and cut off the dowels, using a sharp chisel or a flush saw.

10.1.11 Other Joints -

To hold many pieces together, two extra pieces is fixed to the back of the pieces, or across the ends. These pieces are called cleats. They are fastened with screws, or nails.



- E)	ercise Ӣ –						
Choose the correct answer							
1.	Which joint should a) Dovetail joint	be used to make a pictu b) Biscuit miter joint	re frame? c) Butt joint d) Brid	le joint			
2.	Which joint should a) Half lap joint	be used to join legs of a b) Miter joint	chair with seat frame? c) Mortise and tenon jo	pint d) Finger joint			
3.	Which joint should a) Bridle joint	be used to make door fr b) Dowel miter joint	ame? c) Butterfly joint	d) Tongue and groove joint			
4.	Which joint should a) Rabbet joint	be used to make flooring b) Tongue and groove j	g? oint c) Dovetail join	t d) Miter joint			
5.	What joint should b a) Dado joint	e used to make shelves b) Butt joint	? c) Dovetail joint	d) All of above			

UNIT 10.2: Fasteners and Other Fittings



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

- 1. Identify different nails and screws
- 2. Identify the adhesives used in furniture
- 3. Identify different types of hinges and channels
- 4. Identify the hardware used in furniture

- 10.2.1 Fasteners -

To give extra strength to joint, some fasteners are used, such as nails, screws etc. Always remember to choose right nails and screw for good results. When choosing a fastener you must consider certain factors, which include:

- What strength must the fastener have?
- Where will the fastener be used?
- Will the fastener need to be removed at a later stage?

10.2.1.1 Nails -

Nails consist of a head and shank and are inserted by a hammer or mechanical tool. There are several types, made from either ferrous or non-ferrous metal. Ferrous metals contain iron and will therefore rust unless protected. The carpenter must decide on the most appropriate nail for the required application.

Round wire nail: Round wire nails are available in sizes from 25 mm to 150 mm. They should not be driven below the surface of the timber and are relatively easy to remove. They are used for low-quality work where they will not be seen such as roofing and studwork.



Oval wire nail: Oval wire nails are available in sizes from 25 mm to 150 mm. They are manufactured from ferrous metal and can be punched below the surface of the timber. They are less likely to split the grain of the timber and are usually used for higher-quality work than the round wire nail.



Angular ring nail: Annular ring nails are available in sizes from 20 mm to 75 mm and are also sherardised (the process of coating iron and steel substrates with zinc by heating the substrates in the presence of zinc dust) to prevent rusting. These nails are similar to round wire nails but feature a series of rings along the shank that makes them much harder to remove, and also provides a stronger hold.



Headless nail: Lost head or headless nails are available in sizes from 40 mm to 75 mm. The head can be punched below the surface of the timber for concealment.



Panel nail: Panel pins are available in sizes from 20 mm to 40 mm. They are easy to punch below the surface, causing little damage to the face of the work. They are used for fine applications. Variations include sherardised and brass versions that resist rust, and veneer pins for extra fine work.



Tack: Tack nails are mostly used in upholstery work. They are used to fix fabric, leather, rexin, etc.



10.2.1.2 Screws -

Most modern screws are computer designed. Like a nail, screws consist of a head and a shank. However, the shank is threaded and designed to pull the fastener into the material into which it is being inserted. Screws are manufactured from both ferrous and non-ferrous materials and are defined by:

- Head type
- Length, measured from the tip to the part of the head that will be flush with the work surface, ranging from 12 mm to 150 mm
- Gauge (the diameter of the shank), ranging from 2 mm to 6.5 mm

Once again, it is the carpenter's responsibility to choose the correct screw for the application in which it is being used.

Countersunk screw

Screws with countersunk heads are used when the screw has to be flush with the work or below it.

Raised head screw

Raised head screws are usually used for attaching metal components such as door handles.

Round screw

Round heads are usually used for attaching sheet material to timber that is too thin to countersink.

Mirror screw

Mirror screws have a thread within the head to which a decorative dome can be attached. As the name suggests, these are used mainly for fixing mirrors.



10.2.2 Fittings -

There are some fittings which are used to assemble the ready wood structures together. These fittings hold structure in such a way that one structure can be opened or closed. They are hinges, drawer runner, sliding fittings, etc.

10.2.2.1 Hinges -

Butt hinges: These hinges have two flaps joined together by a pin. They are mostly used in doors and windows.



Piano hinges: They are thin-stripped hinges and the width of the flaps is less. They are long and can be cut as per requirement. These hinges are used in wardrobes, cabinets, beds etc.



Parliament/Butterfly hinges : The shape of these hinges resemble the English letter "H". By using these hinges, the doors and windows can be opened at a length from the frame.



T hinges: The shape of these hinges resembles the English letter "T". One flap of this hinge is like the Butt Joint and the other flap is long and oblique. These hinges are used in flapped or planked doors or in heavy doors.



Concealed hinges: These hinges are widely used in the modern age. They are mostly used in wardrobes, cabinets, modular furniture etc. After using this, wall catchers and magnets are not required.



10.2.2.2 Runner -

Generally drawer runners/ channels are known as Telescopic runners. The runner is mounted on the drawer for smooth operation. The runners are mounted on the side of the drawer and also on the base of the drawer. The application of the drawer are 1) Part Extension runner, where only partial drawer is openable, 2) Full Extension runner ,the whole drawer is openable and 3) over extension runner, the drawer is openable beyond the carcase.

Ball bearing runner: These runners are mounted on the side wall of the drawers. The runner have ball bearings for the smooth operations and are visible on opening of the drawer. These runners are available in different size from 250 mm to 900 mm. The runner requires 25.4 mm on the side while fixing.

Roller runner: These runners are comparatively cheaper thus are used in the furniture especially office furniture. These runners are mounted on the side base of the drawers and are visible on opening of the drawer. These runners are available in the market 250 mm to 900 mm.

Under mount runner: These drawer runners are mounted under the base and are not visible during the movement of the drawer. The runners are available in part extension and full extension and are auto closing. These runners are available in soft close mechanism.



10.2.2.3 Sliding Channel —

These sliding mechanism is used for sliding doors and windows. These runners are top hung and a guide rail in bottom for smooth mechanism. These channels are available for different weight carrying capacity.



10.2.2.4 Plug Fixings -

Nails and screws can be used to fix components to masonry. However, the carpenter must first plug the masonry, which can either be done using a plugging chisel or an electric drill. If a plugging chisel is used carpenters can make their own plugs from wood, but this is time-consuming and not commonly done now. When using an electric hammer drill to plug a wall, several plug types are available.

All of these work on the same principle. A plastic segmented sleeve fits snugly into a hole that has been pre-drilled. A screw is then inserted into the plastic sleeve that pushes the segments apart to grip the side of the hole.



10.2.3 Accessories

An accessory is a thing that can be added to pieces of furniture in order to make it more useful, versatile, or attractive.

- 10.2.3.1 Door Bolts (Tower Bolts) ———

Door bolts are used to close doors and windows from inside. They are available in different designs.

Tower bolt: It is made of metal. It has a totally straight bar called Shute, which closes the door bolt. It is bent on one end. This bar or Shute slides on a strip. One end of the door bolt is fitted on the side of the frame. This is called a staple. The other end is fitted on the door, which is the main part of the door bolt. They are available from 4 inches to 24 inches in length.

Flush Bolt: This bolt is fit equally as per the surface of the door or window. It is available from 2 inches to 8 inches in length.

Slide Bolt: This bolt is small in size and used in small doors and ventilators.



10.2.3.2 Locks ———

To close a door temporarily, different types of locks are used. For securing the house, it is necessary to put locks on the doors. There are different types of locks:

Pad lock: These locks are of the hanging types. This type of lock is used in doors having L Drop, J Bolt and Hasp & Staple.

Mortise Lock: It is a lock which is set within the body of a door in a recess or mortise, as opposed to one attached to the door surface. It has a separate handle that controls the lock's latch bolt through a hole. The keyhole is also in the handle.

Cylinder lock: A cylindrical lock is designed to be installed through the door with a knob or lever on either side that retract the latch when turned or depressed.

Rim Lock: These locks are fitted inside the room. Mainly it is used on main door of the house. These locks are similar to Mortise Locks, but they don't have handles.

Drawer Lock: In these kinds of locks, a slot is cut in the upper side of the surface. From the outside only the keyhole is visible.



10.2.3.3 Handles and Knobs — — —

Handle: Handles are used to open doors and windows. Basic handles are available in sizes ranging from 4 inches to 12 inches in length. They are made of iron, steel, brass or other metals. They are available in different designs. They are of different types like chest handles, drawer handles, flush handles etc. They can be customized also.

Knob: Often knobs are used in place of handles. They look very nice. They are used in wardrobe doors, drawers and cabinet doors. These screws are tightened twice. They are made of iron, brass, glass or other metals.



10.2.3.4 Catchers and Stoppers -

Catchers: They are used to keep wardrobe or cabinet doors closed. They are of different types, like magnet catcher, ball catcher.

Door stoppers & Window stoppers: They are used to keep door or window open. They hold the door or window at their places.



- 10.2.3.5 Other Accessories



D-Bracket: This bracket is used for fixing glass shelves and is available in different sizes



10.2.4 Adhesives –

There are many woodworking joints which can be made without using adhesives. For example, mortise and tenon joint, dovetail joint. But the use of adhesive can reinforce the joint.

Poly-vinyl adhesive emulsion (PVA)

It is a synthetic resin adhesive in the form of a milky white viscous paste and is ready to use. It gives very strong bond and it is resistant to water and heat. It is used to bond wood, plywood, laminates, veneers, particle board, block board/hard board, MDF to each other. This adhesive is available in the market under the brands named Fevicol, Vemicol, etc. It can be applied with brush, roller or spreader.



Solvent Rubber Adhesive (SR)

It is synthetic rubber based adhesive. It is used to bond the surfaces where it is difficult to apply pressure. It is used specially for bonding vertical laminates to wood and plywood. It is also used for bonding rubber, rexine, leather, foam, fibre, metal, glass, ceramic, canvas, etc. It is applied using a brush or a spatula.

Always keep in mind that adhesive should be used in correct way. All adhesives are neither suitable for exterior job nor for all types of materials. Follow the instructions of manufacturer while using adhesive.



- F)	ercise 🕜 –								
Ch	Choose the correct answer and write in the blank:								
1.	1 is a widely used wood screw.								
	a) Counter-sunk Sci	rew	b) Philips head Screw						
	c) Round head Scre	2W	d) All of above						
2.	Concealed hinge is used in								
	a) Cabinet	b) Windows	c) Main Door	d) None of above					
3.	Which of the follow	ving is an accesso	ory?						
	a) Pad Lock	b) Jack Plane	c) Hammer	d) Chisel					
4.	Rim locks do not ha	Rim locks do not have handles – is this statement correct or incorrect?							
	a) Correct	b) Incorrect							
5.	Mortise lock is fitte	Nortise lock is fitted in door by cutting a mortise – is this statement correct or incorrect?							
	a) Correct	b) Incorrect							

UNIT 10.3: How to Make Basic Wooden Structures

Unit Objectives 🙆

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

- 1. Demonstrate the procedure of making a wooden structure
- 2. Design basic wooden structures using different methods

10.3.1 Procedure of Making Furniture

In this unit you will learn how to make some basic structures by assembling the prepared wood workpieces together. These basic structures are used in any form in every type of furniture.

Let us see these basic steps to make the furniture -

- STEP 1: Reading technical drawings
- STEP 2: Estimating the quantity of materials as per drawing
- STEP 3: Measuring and cutting the workpieces as per drawing
- STEP 4: Shaving the wood workpieces
- STEP 5: Assembling the prepared workpieces using woodworking joints, and fasteners and adhesive
- STEP 6: Giving finish to the ready structure by pasting veneer or laminate and edge banding
- STEP 7: Inspecting the ready item for any error or damage
- STEP 8: Installing the furniture at site



10.3.2 Chaukaht of Door (Single Rabbet Chaukhat)

Tools needed

- Pencil
- Measuring tape
- Marking gauge
- Try square
- Saw
- Chisel
- Mallet

- Rabbet or shoulder plane
- Smoothing plane
- Workbench
- Bar clamp
- Fevicol
- Personal protective equipment



STEP 1: Read technical drawing. STEP 2: Estimate the quantity of wood. Size to be prepared – $3'-0'' \ge 4 \frac{1}{2}'' \ge 2 \frac{1}{2}'' \ge 1$ no. $7'-0'' \ge 4 \frac{1}{2}'' \ge 2 \frac{1}{2}'' \ge 2$ nos. Quantity of wood (C. Ft.) – $3'-0'' \ge 4 \frac{1}{2}'' \ge 2 \frac{1}{2}'' \ge 1 = 0.24$ c. ft. $7'-0'' \ge 4 \frac{1}{2}'' \ge 2 \frac{1}{2}'' \ge 2 = 1.1$ c. ft. Total = 1.34 c. ft.

- STEP 3: Mark the required sizes on wood and cut them with saw.
- STEP 4: Plane all pieces of wood using smoothing plane.
- STEP 5: Check the accuracy of pieces of wood using try square.





STEP 7: Mark on pieces for rabbet using marking gauge.

STEP 8: Make rabbet using rabbet plane and check the accuracy using try square.



STEP 9: Assemble them again and check using try square.

STEP 10: Apply fevicol and tighten them in bar clamp.

STEP 11: Fix a temporary support at the open side of chaukhat, so that it remains in right angle.

STEP 12: Finish the joints using plane.

STEP 13: Install ready chaukhat in wall using hold fast.





Tips 🖳

- Wear personal protective equipment.
- Clamp the wood while using saw and plane.
- Add ½"- 3/8" extra to all measurements, so that you can get desired size after planing the wood.
- Place small pieces of wood or plywood between clamp and wood to avoid dents in wood.
- Wipe off extra fevicol immediately.

10.3.4 Chaukaht of Window

Tools needed

- Pencil
- Measuring tape
- Marking gauge
- Try square
- Saw
- Chisel
- Mallet
- Rabbet or shoulder plane
- Smoothing plane
- Workbench
- Bar clamp
- Fevicol
- Personal protective equipment





STEP 1: Read technical drawing.

STEP 2: Estimate the quantity of wood.

Size to be prepared – 4'-0" x 4 ½" x 2 ½" x 4 nos. 4'-0" x 4 ½" x 3" x 1 no. Quantity of wood (C. Ft.) – 4'-0" x 4 ½" x 2 ½" x 4 = 1.25 c. ft. 4'-0" x 4 ½" x 3" x 1 no = 0.375 c. ft. Total = 1.625 c. ft.

STEP 3: Mark the required sizes on wood and cut them with saw.

STEP 4: Plane all pieces of wood using smoothing plane.

STEP 5: Check the accuracy of pieces of wood using try square.



- STEP 6: Assemble all pieces together using bridle joint and mortise and tenon joint, and check.
- STEP 7: Mark on pieces for rabbet using marking gauge.
- STEP 8: Make rabbet using rabbet plane and check the accuracy using try square.
- STEP 9: Assemble them again and check using try square.
- STEP 10: Apply fevicol and tighten them in bar clamp.
- STEP 11: Finish the joints using plane.
- STEP 12: Install ready chaukhat in wall using hold fast.





- 10.3.5 Steps of Making Panel Door 🛛 🖻

Tools needed

- Pencil
- Measuring tape
- Marking gauge
- Try square
- Saw
- Chisel
- Mallet
- Plane
- Hammer
- Workbench
- Bar clamp
- Fevicol
- Personal protective equipmets



STEP 1: Read technical drawing.

STEP 2: Estimate the quantity of wood.

Size to be prepared –

1. Stile (A) - 7'-0" x 4" x 1 ½" x 2 nos.

- 2. Top rail (B) 3'-0" x 4" x 1 $\frac{1}{2}$ " x 1 no.
- 3. Lock rail (C) 3'-0" x 5 ½" x 1 ½" x 1 no.
- 4. Bottom rail (D) 3'-0" x 8" x 1 ½" x 1 no.

Quantity of wood (C. Ft.) – 1. 7'-0" x 4" x 1 ½" x 2 = 0.6 2. 3'-0" x 4" x 1 ½" x 1 = 0.125 3. 3'-0" x 5 ½" x 1 ½" x 1 = 0.17 4. 3'-0" x 8" x 1 ½" x 1 = 0.25 5. 2'-5" x 2'-2 ½" x 1" x 1 = 0.44 6. 2'-5" x 3'-6" x 1" x 1 = 0.72 Total = 2.6 C.ft.



- STEP 3: Cut all pieces as per drawing.
- STEP 4: Plane all pieces using smoothing plane.
- STEP 5: Check the accuracy of pieces of wood using try square.
- STEP 6: Assemble all pieces together using bridle joint and mortise and tenon joint, and check.
- STEP 7: Apply fevicol and tighten them in bar clamp.
- STEP 8: Finish the joints using plane.
- STEP 9: Install ready door with chaukhat using hinges at site.







STEP 2: Estimate the quantity of wood.



- Size to be prepared –
- 2'-0" x 2 ½" x 1 ½" x 2 nos.
- 1'-6" x 2 ½" x 1 ½" x 2 nos.
- Quantity of wood (C. Ft.) -
- 2'-0" x 2 ½" x 1 ½" x 2 = 0.11 c. ft.
- 1'-6" x 2 ½" x 1 ½" x 2 = 0.08 c. ft.
- Total = 0.19 c. ft.
- STEP 3: Cut all pieces as per drawing.
- STEP 4: Plane all pieces using smoothing plane.
- STEP 5: Check the accuracy of pieces of wood using try square.
- STEP 6: Assemble all pieces together using bridle joint and mortise and tenon joint, and check.
- STEP 7: Mark on pieces for rabbet for glass using marking gauge.
- STEP 8: Make rabbet using rabbet plane and check the accuracy using try square.
- STEP 9: Assemble them again and check using try square.
- STEP 10: Apply fevicol and tighten them in bar clamp.
- STEP 11: Finish the joints using plane.
- STEP 12: Make mouldings for glass fixing.
- STEP 13: Position the glass in rabbet and fix the molding using headless nails.
- STEP 14: Install ready shutter with cabinet using hinges.

Mortise and Tenon joint -







Exercise

Calculate the sizes and quantity of the material as per the drawing given on previous page -

Piece A –
Piece B –
Piece C –
Piece D –
Piece E –






10.3.11 Round Table

X

Tenon Leg

-<u>"</u>[0

- 1'-4" -

k



·····	
	· · · · · · · · · · · · · · · · · · ·

UNIT 10.4: Finishing the Wooden Structure



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

- 1. Demonstrate the process of finishing an assembled wooden structure
- 2. Practise pasting veneer or laminate on wood surface
- 3. Demonstrate the process of finishing board edges by pasting

10.4.1 Finishing

Before giving the item for polishing, the last step of furniture making is finishing of the ready wooden structure. This process includes –

- Pasting of wood veneer or decorative laminate on plywood or block board
- Fixing wooden or PVC lipping on the edges of plywood or block board (edge banding)

10.4.2 Steps of Pressing Two Ply Veneer Sheets

STEP 1: Cut 2 ply veneer sheet half inch oversize from the size of plywood or board with the help of saw.

STEP 2: Apply Fevicol on surface of plywood or board.

STEP 3: Also apply Fevicol on the back of veneer sheet.

STEP 4: Let Fevicol dry for some time.

STEP 5: Position the veneer piece on plywood or board and press it.





STEP 6: Starting from the centre, press it towards outer end using long strokes with a roller or a rubber scraper (see top right).

STEP 7: Press it giving equal pressure, so that there is no air left between plywood or board and veneer.

STEP 8: Clamp them together or keep them under pressure for 24 hours.

STEP 9: Next day after removing the clamps, trim the extra veneer using plane.

· Tips 🖳

- Clean both the surfaces to be bonded. Make sure that the surfaces are free from dust, dirt, oil, etc.
- Excess adhesive pressed outside the joints should be wiped with a wet cloth.
- In case one surface is more porous than other, the adhesive should be applied first on the less porous surface.

10.4.3 Matching Veneer -

Matching veneer is an art which requires a lot of precision and detailing. Pieces of veneer can be pasted in different direction of grains to make beautiful patterns. These designs are preferred for table tops and doors.



10.4.4 Steps of Pressing Decorative Laminate

STEP 1: Lightly sand the surface of board.



STEP 2: Place the sheet of formica on a flat and even surface.



STEP 3: Mark the measurement on the back of the sheet and cut it using utility knife.



STEP 4: Apply adhesive on the back of formica sheet and board using a rubber spatula or a brush.



STEP 5: Position formica on board and start pressing it from one side.



STEP 6: Press it with long strokes with the help of a roller.



STEP 7: Tape it with painter's tape or masking tape and Clamp them together.

STEP 8: Remove the tape and trim and shape the edges with a fine file.



Tips 🖳

- Clean both the surfaces to be bonded. Make sure that the surfaces are free from dust, dirt, oil, etc.
- Laminates that are smooth or slippery on the reverse should be roughened.
- Durability of bond is likely to be affected if excess adhesive is applied.
- In case of highly porous surfaces, it may be necessary to apply a second coat of adhesive after allowing the first one to dry for 15 minutes.
- For a large surface, insert wooden pegs between the laminate and plywood at one or two places. Only after proper adjustment remove the pegs.
- Apply even pressure in order not to leave any air bubbles between the surfaces.
- Once positioned, do not shift the laminate, as the adhesive film should not be broken.
- Leave a little excess laminate so that cutting off along the sides is possible if the laminate is not placed properly.

10.4.5 Edge Banding-

To give finishing to the exposed edges of plywood or board, a thin strip called lipping or nosing is pressed on edges. This process is called edge banding. Edging hides the rough exposed edges of board and make furniture look beautiful. Edging also helps the veneer not to chip off from edges. It secures the edges.



10.4.5.1 Steps of Installing Wooden Edge Banding

STEP 1: Apply fevicol on edging and edge of board.



STEP 2: Position the edging on edge of board and press it. Headless nails can also be used.



STEP 3: Drive the nails below the surface using a nail set.



STEP 4: Clamp them together. Use miter joint at corners.



STEP 5: Scrap off excess partially hardened glue without damaging the finished surface.



STEP 6: Trim the extra edging carefully. Make sure finished surface does not get damaged while trimming.



10.4.5.2 Steps of Installing PVC Edge Banding 🖻

STEP 1: Position the PVC edging on the edge of board and press it with hot iron.



STEP 2: Press on the edging with a smooth block of wood.



STEP 3: Cut the extra length of edging using utility knife.



STEP 4: Trim the excess edging using chisel without damaging the finished surface.



10.4.6 Postforming-

Postforming is the process of making flat sheets of laminate fold smoothly over the rounded edge of board. This process is done by the machines.



10.4.7 Some Reference Designs for Wood Edging-



10.4.8 Inspecting the Ready Furniture

Surface: Check the surface of assembled piece for any crack, hole, scratch or damage. It needs to be repaired by applying hard wood putty on the surface. Check for any chipping or peeling of veneer. Smooth it with sand paper.

Joints: Check for any error in joints. A joint should not be loose. To avoid this, use good quality of nails, screws and adhesive. All pieces should match without leaving any gap between them.

Edges: Check for any sharp edges. It may cause harm the person who will use the furniture. Smooth them by sanding edges.

Protruding nails: All nails should be driven into the wood. Sink the heads under the surface of wood using nail set. Fill the hole with hard putty.

Adhesive: Scrape off any visible excess glue from the surface of the wood being joined.

Balance: Check assembled piece for balance. It should be stable on level floor.

Functioning: Check all drawers or shutters of a cabinet. They should run smoothly and without noise.

10.4.9 Steps of Applying Hard Putty 🖃

Hard putty is used to finish furniture. It helps in covering holes, cracks and gaps in joints. This is made of ground chalk or raw linseed oil. This is form of very fine powder, which is mixed with water and paste is made. It is applied to required place in paste form. After some time (depending on manufacture), it gets hard.

Step 1: mix powder with water and make a paste as per manufacturer's instructions.



Step 2: fill holes and cracks with putty paste using rubber scraper and let it dry.



Step 3: remove the excess filler with a plastic scraper or a smooth, round-edged putty knife.



Tips 🖳

- Be careful not to damage the wood.
- Allow the putty to dry completely and lightly sand with the grain.

·	

10.4.10 Fixing the Accessories-

Once a piece of wood furniture is completely finished, polish work starts. After polishing the furniture, accessories are installed by the carpenter, such as









Door and furniture locks



Door closer

- Tips 🖳

- Follow the manufacturer's instructions to install the accessories.
- Get these accessories approved by the client.
- Keep in touch with the market regularly, as accessories with new and advanced techniques are available in the market.

– E)	kercise Ӣ –						
1.	The edges of chipb	oard can be finis	hed by	using –			
	a) Veneer	b) Wood edgin	g	c) PVC edging		d) b and c	
2.	The surface of bloc	kboard can be fi	nished	by –			
	a) Pasting veneer o	on it	b) Pas	ting formica on it			
	c) Painting it		d) All	of above			
_						_	
3.	What should one d	lo, if there is a sn	nall crac	ck in the surface of	wood	?	
	a) Leave like that		b) App	oly hard putty			
	c) Paint it		d) Noi	ne of above			
4.	Edge banding is do	ne before pressi	ng the v	eneer on board. Is	this tr	ue or false?	
	a) True	b) False					
F	Adhasiya shayld h	a applied only an	board	to proce the formic		vic true or folco?	
э.	Autresive should be	b) Falso	i Dogla	to press the formic	a. 15 th	is true of laise?	
	aj irue	b) Faise					





सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

11. Review Post Completion

Unit 11.1 - Post-Completion Review



FURNITURE & FITTINGS SKILL COUNCIL



– Key Learning Outcomes 🕎

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

- 1. Perform post-completion review
- 2. Modify your work based on post-completion review

UNIT 11.1: Post-Completion Review



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

- 1. Examine the furniture and fitting post-completion
- 2. Practise onsite modifications and touch-up post-completion, if needed
- 3. Demonstrate the process of cleaning the work area after completing work
- 4. Implement the feedback provided by customers and the supervisor

11.1.1 Conducting Post-Completion Review

Post-Completion Check

It is important for lead carpenters to check the quality of the completed work. Defects resulting from any human error must be rectified before delivering the completed work to the customer.

Look out for visual quality, in the completed workpiece, related to:

- measurement
- steadiness
- overall finish
- placement
- levelling
- configuration
- functioning

Let us explain each of the above parameters.

- Measurement and configuration Check if your work meets all dimensional requirements as per the work order.
- Steadiness Check if your work is durable. Ensure that you use the best-quality wood and other raw materials, within the sanctioned budget, so that the customer receives good-quality and highly durable furniture. Also, use appropriate finishing techniques and ensure that the furniture is free of rust, flakes, and pests.
- **Overall finish** Check if the finish is appropriate in terms of looks, smoothness, and other aspects of visual quality. Apply apt finishing techniques and materials if you are dissatisfied with the finish.
- **Placement and levelling** Check, with the help of appropriate tools, if the furniture is level and appropriately placed.
- **Functioning** Check, before installation, if the furniture is functioning in the desired way. For example, a door should open exactly in the way and direction it is supposed to.





सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

12. Carry Out Lock Installation Activities

- Unit 12.1 Main Types of Locks and Units Assembled
- Unit 12.2 Functioning And Types Of Various Doors/ Windows
- Unit 12.3 Different Tools and Equipment
- Unit 12.4 Technique of Fixing The Lock on the Door



FURNITURE & FITTINGS SKILL COUNCIL



– Key Learning Outcomes 💆

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

- 1. Discuss an overview of the job role
- 2. Explain the main types of locks and their units
- 3. Illustrate the functioning and types of various doors / windows
- 4. Underline the use of different tools and equipment
- 5. Demonstrate the technique of fixing the lock on the door

UNIT 12.1: Main Types of Locks and Units Assembled

- Unit Objectives 🙆

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

- 1. Identify the main types of locks
- 2. Identify the different parts of a lock

12.1.1 Main Types of Locks ———

A **Lock** is a mechanism for keeping a door, window, cover or a container fastened and secure, with the help of a key.

In simpler terms, the Lock is a mechanism or device to keep something secured. This control access to authorised people by keeping a door fastened. This normally gets operated with the help of a key.

Due to many innovations based on different requirements, we have plenty of choices in Locks. We will understand in detail different types of locks and their working principle.

The main types of locks are:

- Pad Lock
- Rim Lock
- Mortise Lock
- Dead Bolt Lock
- Cylindrical Lock
- Furniture Locks
- Lever Handle Locks
- Interchangeable Core Locks
- Vending Locks
- A. Pad Lock



Fig. 12.1.1.1: Pad Lock

The Pad Lock is the simplest type of lock and is detachable. These can be used at various places and interchanged as and when required. The common variants are:

- The common variants are:
 - o Key operated, which can be further subdivided into the following variants:
 - Key retaining

- Non-key retaining
- Combination or Numbered, which comprises numbers and open when a specific combination of numbers are entered.
- Since these are detachable, no separate installation process is needed. It comes in 5,6,7 and 8 levers. Generally, it is used in the Rolling Shutters in shops, Grill Doors and doors having AL-Drop, J-Bolt and Hasp & Staple.

B. Rim Lock

Rim Locks are installed at the edge of Door. These can be used for main doors as well as internal doors. The main variants are:

- o Night Latch
- o Twin Bolt
- o Tribolt
- o Verti Bolt (used even on double leaf doors)



Fig. 12.1.1.2: Rim Lock

C. Mortise Lock

These Locks are fitted inside the Door, and remain hidden. Since we need to build a Mortise (a hole or dent cut in a manner so that it receives a projection from another part, and the parts are joined securely together) in the door to fit such locks, these are called Mortise Locks.



Fig. 12.1.1.3: Mortise Lock

The parts of a Mortise Lock are:

- o Body
- o Cylinder
- o Lever

The common variants are:

o Lever Mortise Lock



Fig. 12.1.1.4: Lever Mortise Lock

o Euro Profile Mortise Lock



Fig. 12.1.1.4: Euro Profile Mortise Lock

D. Dead Bolt Lock

Dead Bolt Locks are generally fitted on the Main Door. These locks house in the grooves made in door and not protruded outside. Due to this special design, it is not very easy to break them.

The common variants are:

Variant Name	Features	Image
Single Cylinder Dead Bolt	 This variant has a Key Cylinder outside and a Rosary or Thumbturn inside. Since it is not lockable from inside, there is a security threat, if someone has access to house from the window or some other way. In that case this can be opened from inside without the key. 	

Variant Name	Features	Image
Double Cylinder Dead Bolt	 This variant overcomes the security issues with the Single Cylinder variant. This lock is lockable from the inside as well. However, this variant runs the chances of the residents getting trapped inside the house in case of Fire and other emergencies, if key is not available at that very moment. 	
Lockable Thumbturn Dead Bolt	 This type of lock is a hybrid of the above two variants. This lock can be opened from the inside when people are available in house and can be locked also when everybody is outside. This feature is very useful when people leave the house for prolonged duration. Thus, even if somebody gets access inside, the lock cannot be opened from inside without the key. This variant is, hence, highly 	

E. Cylindrical Lock

- Cylindrical or Knob Locks are very much in use on the Main door or internal doors, in combination with the Dead bolt.
- You must never use these locks alone for main door, since these locks involve Knobs, which are protruded outside.
- In case of any attempt of breaking such locks, it is very easy to break them away with a common hammer or similar kind of tool.
- Once the knob outside is broken, the lock is completely open.
- These locks should be used for internal doors only, like Intermediate doors, Toilets doors and office doors.

The main components of Cylindrical locks are:

- o Knob with or without key hole
- o Latch
- o Deadlocking Mechanism
- o Locking Mechanism

The common variants are:

Variant Name	Features	Image
Keyless	 This variant is not provided with any locking mechanism with the help of a key. This only come with a Deadlock mechanism, which keep the door locked till the time somebody rotates the lock and opens the door. 	
Keyed	 These types of locks come with the feature of locking with a key. However, these locks should not be used for important security purposes These should only be used where there is no security threat, like internal doors. 	

F. Furniture Locks

- These are light duty locks and used in Table or Almirah drawers and for several other purposes.
- The common variants are:



Fig. 12.1.1.5: Furniture Lock

G. Lever Handle Locks



Fig. 12.1.1.6: Lever Handle Lock

- These locks are generally used in internal doors in offices.
- These are convenient to open, due to the lever design, which is easier to hold and move down.
- These are available in both left hand and right hand designs for left side or right side opening doors.

H. Interchangeable Core Locks



Fig. 12.1.1.7: Interchangeable Core Lock

- These locks have the special feature of easy replacement of complete lock mechanism.
- These locks have two types of keys. One is used for opening and closing the lock.
- With another key, the complete lock Mechanism can be taken out and can be replaced by new lock set.
- Due to this feature, there is no need of changing the complete lock, in case you want to change the lock. These kind of locks can be installed in special housing cases only.

I. Vending Locks



Fig. 12.1.1.8: Vending Lock

- These locks are used in Vending machines.
- These locks can be taken out completely.
- The common variants are:
 - o The one is with spring latch, which can be locked without key
 - The other one require key for locking

12.1.2 Different Parts of a Lock

A door lock has typically 3 parts:

- Cylinder (Lock Body)
- Bolt or Latch
- Box or Strike Plate

A. Cylinder (Lock Body)

- The lock body or the cylinder is the main part of a lock.
- The lock body is the place where the key is inserted.
- When it is locked, the cylinder engages a series of spring-loaded pins, which keep the cylinder from turning.
- When a key is inserted, the pins attached to the spring go upward.
- The reverse happens when it is unlocked.
- The uneven edge of the key pushes the spring and the pins go up or down according to the direction of the movement of the spring.

B. Bolt or Latch

- This is the metal extension within the door which locks the door.
- There are two types of latches available in the market: Spring Bolt and Deadbolt.
- Spring bolt is a latch that is connected to the spring of the lock. The spring remains in a compressed state when the door is locked. When the door is opened, the compression of the spring decreases; allowing the door to open.
- Deadbolt has no spring inside the lock. When the door is slammed, the latch gets closed. This is considered to be a better option as a lock in comparison to the spring bolt.

C. Box or Strike Plate

- The bolt extends from the cylinder into a small square shaped hole, called the "Box".
- It is designed to hold the bolt securely in the doorframe when the lock is engaged.
- The metal, which extends from the cylinder to the box, is known as Strike Plate.
- This is an added prevention to the lock system.

UNIT 12.2: Functioning And Types Of Various Doors/Windows

Unit Objectives 🦉

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

- 1. Define a door and its functions
- 2. Identify and describe the various parts of a door
- 3. Inspect the different types of door functions
- 4. Inspect the different types of lock and the types of door to install them in
- 5. Identify the type and alignment of lock as per functioning of door

12.2.1 Defining a Door and its functions

A Door is defined as a "a hinged, sliding, or revolving barrier at the entrance to a building, room, or vehicle, or in the framework of pieces of furniture, like the cupboard". Door is a key feature of any building, whether it is a home or commercial building. It is provided for controlling access to that building/room, for air circulation and light.

The common functions of Door are:

- Serving a connecting links between the different external and internal points of a building
- Enabling air circulation, ventilation and light
- Enabling views outside
- Serving as barrier to noise
- Controlling the flow of traffic

12.2.2 Parts of a Door

The various parts of a common Door are:

- Rail: A horizontal wood piece running parallel to Door
- Stile: A vertical wood piece joining two rails together
- Back Set: This is the distance between the opening edge of the door to the center of the key hole
- Door Thickness: Thickness of the door is measured at the door edge.





Fig. 12.2.2.1: Door Thickness and Back Set

12.2.3 Different Types of Door Functions

Based on the use, there are many types of doors available in the market. Also, there is an effect of time on door evolution. Due to aesthetic or personal choice, some people are still using doors developed and used during ancient time. Based on operation doors as of following types –The common functions of Door are:

Type of Door	Features	Image
Inward Opening	If you are standing inside of the room and door panel gets open inside the room, then it is called Inward Opening Door.	
Outward Opening	If you are standing inside of the room and door panel gets open outside the room, then it is called Outward Opening Door.	
Sliding	These types of doors slide in horizontal direction. These are very good in saving space. This are normally mounted in channel, or in suspended in rack.	
Rotating	These typically consist of three or four doors that hang on a central shaft and rotate around a vertical axis within a cylindrical enclosure. These doors allow large number of people to pass in and out.	
Left Hand Side Opening	If you are standing outside the room and door is installed with hinges on your left side, then it is called Left Hand Side Opening Door.	
Right Hand Side Opening	If you are standing Outside of the room and door is installed with hinges on your Right side, then it is called Right Hand Side Opening Door.	

12.2.4 Different Types of Lock (Left Hand and Right - Hand Locks) and the Types of Door to Install Them In

Lock Type	Description	Door Type
Left Hand Lock	If the hinges are on the left, you have a left handed door. You will need a left handed (LH) lock.	Left Hand Side Opening
Right Hand Lock	If the hinges are on the right, you have a right handed door. You will need a right handed (RH) lock.	Right Hand Side Opening

12.2.5 The Type and Alignment Of Lock as per – Functioning of Door

Type of Door	Position of Hinge	Alignment of Lock
Inward Opening	On the left of the Door	Left
	On the right of the Door	Right
	On the left of the Door	Left
Outward Opening	On the right of the Door	Right
Left Hand Cide Opening	On the left of the Door	Left
Left Hand Side Opening	On the right of the Door Right	Right
Right Hand Side Opening	On the left of the Door	Left
Mgne Hana Side Opening	On the right of the Door	Right

UNIT 12.3: Different Tools and Equipment

- Unit Objectives 🧕

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

- 1. Underline the basics of different tools and equipment
- 2. Demonstrate the method to handle tools and equipment safely and the health and safety implications of not doing so
- 3. Describe the process of operating different machines

12.3.1 Different Tools and Equipment

Different types of tools and equipment are used to install locks. Below is a chart comprising the most important tools for lock installation. The common functions of Door are:

Tool	Description	Image
Tool Box	A Tool Box prevents tools and equipment from getting scattered around and becoming unorganised.	
Peen Hammer	 Hammer is a striking tool, widely used tool to drive nails inside the work piece (For example: piece of furniture / metal). The various parts of a Simple Hammer are: Handle: It is made of strong wood and Hammer is fitted into its eyehole Eye Hole: The hole that is made to fit the handle in it Peen: It is the upper part of the head of a hammer, which is used in various jobs such as riveting, bending etc. Face: The flat part of the head which is used to apply a blow Wedge: To fit the handle in the eye hole tightly, wedge is used 	

Tool	Description	Image
Nail Puller	Nail puller is an extended part of certain hammers. Nail pullers is attached to the opposite of a hammer which has "V" shape to pull a nail out of the work piece.	
Measuring Tape	Measuring tape is the tool which has measuring readings in meter, centimetre or millimetre to mark a certain area for lock installation.	B 1000 2 3
Carpenter Pencil	Carpenter pencil is a form of marking tool. The pencil is used to mark the area to be cut/ drilled on the wood. Generally, the lead of a carpenter pencil is stronger than the normal pencils.	NUMBER OF STREET
Utility Knife	Utility knives refer to the folding or fixed blade knives that are used for cutting holes, scraping pencil and delicate crafting. Utility Knife is used for cleaning mortise joints or marking on wood.	WISS R
Standard Screw Drivers	Screw Driver is used for tightening or loosening the screws. The shank of the Standard Screwdriver is made of a steel rod and handle is made of wood or insulated material.	
Heavy Duty Screw Driver	This screwdriver is used for heavy work. A spinner is needed, to rotate the shank of this screwdriver.	Sec. Sec.

Tool	Description	Image
Philips Screw Driver	This Screw driver head has shape plus sign (+). The screw having head of same shape are tighten or loosen by such screw driver.	
Various Saws	A variety of saws are used to carry out activities like rough cutting, curved cutting, straight cutting, fine cutting etc. Common varieties include: • Rip saw • Cross cut saw • Panel saw • Tenon saw • Fret saw • Key hole saw • Circular Saw • Band Saw • Hole Cutter Saw	Common Hand SawCorrelationCorrelationCircular SawCircular SawCorrelation <t< td=""></t<>
Nail Pouch	This can be worn at the waist and contains all the nails, tools and screws required for installation. It can hold hammers, pincers as well as small parts of locks.	STANLEY
Portable Ladder	Portable ladders are light, folding ladders that can be taken from one place to the other place easily.	

Tool	Description	_Image
Hinges	 Hinges are types of connectors, which is installed between two objects. For example, a hinge is attached between a door and the door frame. Hinges allow door to open to a definite angle. It clamps the furniture with the frame. The common types of hinges are: Butt Hinge Piano Hinge Parliament Hinge Spring Hinge Concealed Hinge Flag Hinge Back Flap Hinge Auto Hinge 	AutorImage<
Tool	Description	Image
--------	---	--------------------
		000 mm
		Auto Hinge
	A screw is a cylindrical rod carved with one or more helical or advancing spiral threads, as a lead screw or worm screw. It has a head and a point.	Flat
	 include: Flat head screw Round head screw Raised head screw Square head screw Phillips or Cross head screw 	Pound Hood
Screws		
		Raised Head
		T.
		Crossed Head
		A REAL PROPERTY OF
		Philips Screw

Tool	Description	Image
	These are manual tools that are used to bore holes to fit wood screws and dowels. Common Drillers are:	
	Bradawl - It is used on soft wood and when shallow holes and screw holes are to be done. Gimlet - It has a helical tip and is used to make deep holes of 10 mm to 50 mm diameter. Auger - It has a helical tip and	Bradawl
Drillers	is used to make big and deep holes to insert bolt etc. into it. The shack is twisted up to considerable length. Centre Bit - It is used to make shallow wide holes. In the	Gimet
	centre of the bit there is a helical point, which becomes footing for making a hole in the wood. Expansion Bit - An adjustable cutter is there in this wit. By adjusting it, holes of many	Auger
	shapes can be made. Counter Sink Bit - It is used to make a hole to fit countersink bit. To get the head of the screws in the same level of the wood, its cutting edge is conical in shape and cutting flutes are made on it.	Centre Bit Counter Sink Bit
Spirit / Water Levelling	Spirit or water levelling tools have flat surfaces to minimize the quantity of bubbles after spirit or water application. These are used to measure the straightness and proper state of a vertical or horizontal surface. Such tools are	
	made of wood or aluminium and have two spoil level tubes – one vertical and the other horizontal, which are filled with spirit. The tube is not filled completely with spirit due to which a bubble forms. When this is placed on a vertical or horizontal surface, if the bubble is at the center position, it means that the	(C C C

Tool	Description	Image
Studs	Stud is ornamental extension which covers the nail-head or any sharp piercing. One end of a stud is attachable to the nail and the other end is blunt, which covers the sharp piercing.	
Jacks	Jack is used to lift heavy metals or body a bit from the working plane (floor or bench). To install a lock, the door or window should be lifted from the floor level. Jack serves the purpose of lifting the door from the ground.	
Connectors	These are also made of Steel. It is used to connect two wood parts in such a way that can be separated later on, if needed.	
Chisels	Chisels are tools that are used to remove waste materials complex carving. Chisels are of three types; Light Duty Chisels, Heavy Duty Chisels and Special Chisels. Light Duty Chisels include: • Firmer Chisel • Bevel Chisel • Paring / Long Chisel • Chopping Chisel (wider chisel) Heavy Duty Chisels include: • Mortise Chisel • Socket Chisel	Bevel Face Blade Handle Shoulder Ferrul Steel Hoop Cutting Angle 30 Bevel Chisel Paring Chisel
	Special Chisels, or Gouges, are used in round moulding and curving. The blades are bent inside and the cutting angle is inside or outside. Its cross section is circular.	Chopping Chisel

Tool	Description	Image
Drillers	 These are manual tools that are used to bore holes to fit wood screws and dowels. Common Drillers are: Bradawl - It is used on soft wood and when shallow holes and screw holes are to be done. Gimlet - It has a helical tip and is used to make deep holes of 10 mm to 50 mm diameter. Auger - It has a helical tip and is used to make big and deep holes to insert bolt etc. into it. The shack is twisted up to considerable length. Centre Bit - It is used to make shallow wide holes. In the centre of the bit there is a helical point, which becomes footing for making a hole in the wood. Expansion Bit - An adjustable cutter is there in this wit. By adjusting it, holes of many shapes can be made. Counter Sink Bit - It is used to make a hole to fit countersink bit. To get the head of the screws in the same level of the wood, its cutting edge is conical in shape and cutting flutes are made on it. 	Image: Street of the street
Floor Guard	Floor Guard is used to protect the floor. For example, if the lock installer has to drill or chisel door, he/ she must use floor guard to protect the floor. Otherwise, drilling and chiselling can damage the floor.	
Tapes	Tapes are used to adjoin two parts tightly. These tapes have adhesive on one side of which being the bodies to adhere	

12.3.2 Method to Handle Tools and Equipment Safely and the Health and Safety Implications of Not Doing So

Method to handle Tools and Equipment safely

A. Safe Handling of Powered Tools

- Before Using
 - Appropriate measures should be taken to inspect the tool and the power supply. If the tool or any part / accessory is found defective, it must be either replaced immediately or removed from service and tagged appropriately as "Out of Service for Repair".
 - o Care should be taken that no defective tool must be used at any point of time.
 - o All repair and maintenance work must be accomplished by licensed and experienced persons.
 - o Before operating Powered Tools, the Instruction Manual must be read thoroughly.
 - The guidelines and recommendations (by manufacturer) must be stringently followed, as per the Instruction Manual or Directions of Use.
 - The tools must be grounded adequately with the help of a three-pronged plug (equipped with relevant 3-wired colour coded cord) and double insulation. This helps in preventing electric shocks.
 - All powered tools must be checked with a continuity tester or a Ground Fault Circuit Interrupter (GFCI), for effective grounding.
 - o Powered tools must be switched off before connecting them to a power supply.
 - o Powered tools must be switched off before connecting them to a power supply.
- While Using
 - Issues, like a tool getting heated too soon or appearance of sparks, must be inspected and rectified by a licensed electrician only.
 - o All power cords must be kept clear of tools and the path along which the tool will operate.
 - Approved extension cords, with proper specifications, power requirement (for the tool) and dimensions must be used, to prevent overheating and fraying of the cord.
 - o Outdoor work must be done with the help of outdoor extension cords labelled with "W-A" or "W".
 - o Cords must be suspended over the work area to mitigate trips and falls.
 - Octopus connections must be avoided by deploying a power bar or power distribution, comprising multiple receptacle plugs.
 - While unplugging the tool from the socket, the plug must be pulled gently and not the cord. Forcibly pulling the cord leads to fraying and subsequent risk of electric shocks.
 - The entire work area must be kept dry and away from heat, sharp edges and oil, to avoid damage of insulation.
 - o Cords, instead of knots, may be looped, using a twist lock plug.



Fig. 12.3.2.1: Different Power Tools

B. Safe Handling of Hand Tools

- The user must ensure that he / she is adequately trained in the secure usage of hand tools.
- Appropriate and accurate choice must be made on the right tool for the task.
- The user must deploy the correct techniques of handling and using the hand tools thus selected for the task.
- The user must operate hand tools by keeping the wrist straight.
- Hand tools must be thoroughly inspected before use and must be repaired immediately or replaced, whenever necessary.
- The user must ensure that handles of axes, hammers, saws and chisels must fit tightly into the head of the tool, to avoid accidental injuries.
- One must always pull on pliers or wrench.
- Worn jaws of pliers, pipe tools and wrenches must be replaced immediately.
- All hand tools must be kept in a robust toolbox, in a clean and dry place, away from the work area.
- While using hand tools, one must wear appropriate PPE, according to the types of hazards involved in the task. This includes protective gloves of appropriate material, heavy aprons, safety goggles and face shields.
- When not in use, sharp and cutting tools must be covered with appropriate sheaths to avoid injuries.



Fig. 12.3.2.2: Different Hand Tools

C. Safe Storage of Tools and Equipment

The basic idea behind Safe Tool storage is:

- They should not touch with each other, hence no damage to edge or tool
- They should not get rusty
- They should not get lost or taken away without knowledge (in case of team environment)
 - **Edge or Tool Protection:** The storing location of tool should be such that one tool should not touch with other tool. Since Edge of Tool is very brittle (due to hardness), it is prone to damages very easily. Hence proper edge cover should be used. If edge covers are not available, then edge should be wrapped in Cloth.
 - **Rust Protection:** Every time after using the tool, it should be cleaned and oiled with appropriate lubricant before storing. It will keep them safe from rust. We also need to ensure the storage location is free from water ingress, which may cause rust to metal part and damage to wood also.

D. Perform basic safety checks before operation of all machines, tools and electrical equipment

- A Lock Installer must perform basic safety checks before operating all equipment as a part of the Standard Operating Procedures.
- Before starting with the basic safety checks, one must go through the Instruction Manual, Manufacturer's Recommendations and Directions of Use thoroughly.
- These documents are essential because one can find detailed and stepwise instructions about the maintenance and operating procedures as well as emergency shutdown and tag-out mechanisms in them.
- In case a machine or tool is marked with a lock or tag, it must not be removed and not used.
- Machines and tools, that are floor or bench-mounted, must be anchored or firmly clamped to a robust foundation, before maintenance operations.
- In case a machine does not have safety valves or guards on, one must not operate that for maintenance purpose.
- Check out for frayed out electric cables or loose live prongs in plugs.
- Ensure that power supply is off, before one starts maintenance operations.

E. Tools Maintenance

Maintaining the tools is very important work for any Carpenter. With little knowledge and investment you can keep your tools maintained, which will give good return in terms of uptime.

- **Purpose of Tool Maintenance:** The purpose of Tool Maintenance is very obvious; your tool should be in workable condition all the time. Practising some maintenance of tools' cutting edges and alignment of machines will ensure tool good condition and world class quality.
- **Maintaining Sharpness:** For cutting, it is necessary that your all tool should remain in perfect sharpness. For that, you need to timely inspect your tools for sharpness and should take appropriate action based on the sharpness of edge.
- Hand Tools: Chisel, Gouges and Planes come in this category. You should have sharpening system for sharp the tool to correct shape and then you can do manual sharpening with oil stone for getting the perfect edge.
- Alignment: Normally, machines remain perfectly aligned till the time somebody is making some changes in them. But due to inherent vibration during working it is inevitable that its parts will get misaligned. Using any Power tool in misalignment is very dangerous. First it will not give you desired result for cutting or any other operation the machine is made for. Also it may cause accident due to misalignment.
- **Circular Saw:** It is important to inspect the Saw blades every now and then. After sometime you will come to know the frequency of getting blade blunt (in number of hours of use). Then you can simply sharp them whenever they cross those many hours of working. It is always wiser to invest little more on quality spares. Good quality blades require re-sharpening less frequent. End of the day you will save money in low frequency of sharpening.
- **Drill Bits:** Drill bits also get blunt. You can do two thing for getting quality output. one, buy good quality bits even with some extra cost. Two, get the drill bit sharpening system installed, if your usage of drill bit is very high.



Fig. 12.3.2.3: Different types of Driils

- Cleaning of Saw Blades: It is very common to have pitch stuck to saw blade, whether it is power saw of hand saw. Due to that extra heat is generated, which damage the edge sharpness. Apart from that this becomes the reason of excessive vibration, which deteriorate quality if cut. There are some special cleaner available in market, which can be used for removing the pitch. The Pitch removers increase life of tool and also give long life to sharpness. In this way you save money on sharpening and replacement of blades.
- Working Surfaces: With Tool condition, it is also necessary to have good working surface. Working surface should be free from any rust or wood pitch. You can use some good quality special chemical which are designed for keeping these surfaces free from all this.
- **Tips for Tool Maintenance:** There are few tips which you can follow for keeping your tools and equipment up to date and in perfect condition.
 - Always clean your machine before leaving your workplace. Note down any issue noticed while machine cleaning. Self-machine cleaning gives very good opportunity to know any abnormality in machine.
 - Always inspect your machine before starting the operation. There might be some breakage in tool or blade, which might cause a serious accident.
 - Make plan for blade re-sharpening based on previous experience. You can keep one spare blade sharpened for replace. That will increase up time of your machine.
 - Make plan for machine oiling and other minor repair. Keep on adding any minor repairs you had to do in between, in this repair plan. Adhere to that plan. This preventive maintenance plan shall ensure 100% uptime of your machine.

The Health and Safety implications of not handling tools properly

Tools and equipment, if not stored, used and maintained properly, may turn out to be extremely hazardous for the health and safety of Lock Installers.

- Hazards from Power Tools: Common accidents, leading to major cuts, abrasions, lacerations, amputations, electrocution, burns and fractures
- Such accidents take place from:
 - o Touching the cutting, drilling, or grinding components
 - o Getting caught in moving parts
 - o Suffering electrical shock due to improper grounding, equipment defects, or operator misuse
 - o Being struck by particles that normally eject during operation

- o Touching hot tools or work pieces
- o Falling in the work area
- Being struck by falling tools
- Hazards from Hand Tools: Hand tools range from hammers, mallets, scissors, razors, saws, and knives to pruners, chisels, and snips. While these tools are very different and can be used for a wide variety of jobs, they have some common hazards and safety precautions. Hazards include deep cuts, lacerations, amputation, etc.

Such accidents take place from:

- o Failure to use the right tool
- Failure to use a tool correctly
- o Failure to keep edged tools sharp
- o Failure to replace or repair a defective tool
- Failure to store tools safely

- 12.3.3 Process of Operating Different Machines

A. Process of operating Drilling Machine:

Drilling can be done using various drilling machines such as hand drills, drill bits etc. Hand drill is the most common used drilling machine to make holes/ bores on the door for lock installation.

The steps involved in operating a Drilling machine are:

- Mark the work area for drilling with the help of a carpenter pencil and measuring tape
- Set the work piece tightly between the clamps of a vice
- Place the tip of the drilling blade on the markings made for drilling
- Grasp the steady handle tightly; do not lose your grasp while drilling
- Grasp the other handle (operating handle) with the other hand. This wheel needs to be turned while drilling
- Turn the operating handle gently to make bore on the wooden surface
- Give pauses after regular intervals to clean the waste from the drilled hole
- Drill till the desired depth is reached
- Finally clean the hole carefully for further activities

Other than hand drills, power drills are also widely used. This is less time-consuming and accurate method of drilling. A power drill is operated manually; however, the rotation of the wheel is controlled by electric source. Once the trigger is pressed, the drilling blade starts rotating. The rotation of the drilling blade create bore on the wall/ furniture.

B. Choose Appropriate Drill Blades, Depending On The Thickness Of The Door

Before starting with the Drilling operations, a Lock Installer must select the appropriate Drill blade, commonly known as "Drill Bit". One of the most important criteria for selecting drill bits is the thickness of the door on which the hole must be drilled.

Length / Thickness of Door - Determines how much deep or thick the hole must be bored

Bit Name	Characteristics	Image
Centre Bit	It is used to make shallow wide holes. In the centre of the bit there is a helical point, which becomes footing for making a hole in the wood. Its spur or scriber which is on the edge of the hole to be made makes a marking. Then the cutter completes the hole. It is available in sizes varying from 3 to 50 mm.	
Expansion Bit	An adjustable cutter is there in this wit. By adjusting it, holes of many shapes can be made. There is a helical centre point in it as well, which makes footing for making a hole. Holes of 12 mm to 75 mm diameter can be made on the wood with it.	
Counter Sink Bit	It is used to make a hole to fit countersink bit. To get the head of the screws in the same level of the wood, its cutting edge is conical in shape and cutting flutes are made on it. They are available in 6 to 20 mm size.	
Hinge Boring Drill Bit	This bit is used for fixing concealed hinges and mostly this is used with diameter 35 mm.	35mm O Free

C. Drill Appropriate Holes On The Door Using The Drill Machine

Drilling appropriate holes on the door depends on the below factors:

• **Type of Point required** - Determines if the Drill Bit is to be applied for heavy duty or general drilling operations



Fig. 12.3.3.1: Different Drill Bits

• Material of the Drill Bit - The material constructing the bit

Material	Applications
High Speed Steel (HSS)	General purpose, carbon steel, ferrous and nonferrous metals
Cobalt	Stainless steel, armour plating, and other harder metals
Carbide	Difficult or abrasive materials like cast iron, fibreglass, and nonferrous metals

• Bit Coating - The coating provided to the bit to reduce drilling friction and improve tool life

Material	Applications
Black Oxide	Most common coating type. Helps retain drilling lubricants. Not recommended for nonferrous metals like aluminium.
Tin coated	Titanium Nitride provides extra lubrication at the drill point, for higher drilling speeds and longer tool life.
TiAIN (Titanium - Aluminium nitride alloy) coated	Titanium Aluminium Nitride, most effective when higher drill speeds and feed rates are required. Works well on stainless steel, titanium, ferrous metals, and high temperature alloys.
Bright finish	No surface coating. Flutes are polished for improved chip removal. Works well for nonferrous materials like aluminium.

D. Process of operating Chisel:

Chisels are tools that are used to remove waste materials complex carving. The steps involved in operating a chisel are:

Bevel Edge Chisel (Commonly used to remove waste from Dovetail Joint)

- o Place the wooden frame or furniture piece firmly on the work bench
- Hold the handle of the chisel and place the bevelled edge on the woodwork
- o Place the chisel at an angle with the woodwork
- Tap on the top of the chisel with a mallet. Do not use excessive power to remove waste. It will damage the work piece
- o Take out the chisel on a regular basis and remove the waste product
- o Keep on chiselling till the desired result is achieved

• Mortise Chisel (Mostly used to cut deep mortis)

- o Make an outline on the woodwork with a marking knife for chiselling
- o Place the chisel on the outline with a slightly slanting angle
- o Tap on the top of the wooden handle of the chisel. These chisels can endure hard blows as well
- Make a series of shallow chisel cuts perpendicular to the surface
- o Tap the back of the chisel to remove wooden slices
- o Control the depth and breadth of the cut by lowering and raising the handle
- o Continue chiselling till the desired depth and shape are achieved

• Firmer Chisel (Generally used for rough and heavier work)

- o Place the woodwork on the workbench
- Fix the edge of the chisel firmly against the woodwork
- o Tap shortly and rapidly on the handle of the mallet to make slices
- o Remove the slices (chips) on a regular interval
- o Keep on chiselling till the desired result is achieved

UNIT 12.4: Technique of Fixing The Lock on the Door

Unit Objectives 🦉

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

- 1. Describe the tool kit used in installation of locks
- 2. Demonstrate how to install and fix various types of locks on the door

12.4.1 Tool Kit for Lock Installation

Apart from regular Tools, A Lock Technician require some special tools for installing Lock. This kit contains-

- Pilot Drill
- Cutter Holder (Shank)
- Cutter Blade Range (from 15.5 to 55 millimetre) 12 nos.

Pilot Drill is used for making pilot hole in the door. Due to this pilot hole it becomes easy to place the shank, while making bigger hole. Shank is a Cutter holder, which hold all 12 types of cutter as and when required. Tip diameter of shank is equal to diameter of Pilot Drill. Cutter are used for making bigger hole to install lock body in door. Cutter lengths are in incremental, according to normal lock diameter available in market. This diameter starts from 15.5 millimetre and goes up to 55 millimetre.

A Lock technician should always take good care of this kit, since without any of the kit tool it is very difficult to install the lock.

12.4.2 Process Flow for Fixing the Lock on the Door

The process flow for fixing the lock on the door is given below:

Phase - 1: Identify the type of lock as per the design and functioning of the door / window

Phase - 2: Place the lock marker if provided in the lock set on the designated location

Phase - 3: Place the front portion of the lock with the logo upward, in the front part of the door phase - 4: place the lock retainer plate on the other side of the door

Phase - 5: Secure the lock retainer on the other portion of the door with lock fixing screws with screwdriver

Phase - 6: Place the latch assembly on the door frame as per the alignment of lock on the door

Phase - 7: Mark the area latch assembly unit using a marker

Phase - 8: Make chippings on the door using a chisel to ensure the latch fits in the door

Phase - 9: Secure the latch with screws

Phase - 10: Ensure lock body is aligned in accordance with door latch

Phase - 11: Make necessary adjustments if the lock and the latch is not aligned

Phase - 12: Check functioning of lock by using the key

- 12.4.3 Steps Involved for Installation of Locks on the Door

After getting an overview on the process flow, let us now describe the steps involved in the installation of the common types of lock:

A. Night Latch

Sl. No.	Step	Image
01	Stand inside the room of the door on which lock is to be fitted.	
02	Fold the marker along the dotted line and place at the edge of the inner side of the Door panel.	Manual Andrewson Andre Andrewson Andrewson An
03	Take a Center Punch for Marking on points given in marking sheet.	The ALL ALL ALL ALL ALL ALL ALL ALL ALL AL
04	Mark at points A, B and C using a center punch.	and the second se
05	Drill 12mm deep and 3mm diameter holes at point A, B and C.	
06	Inspect the hole made by drill	Q2 649 Q

SI. No.	Step	Image
07	Now make a pilot hole at point 'C' as shown.	, , ,
08	Drill the hole to complete depth of door	
09	Use pilot hole as a guide and make 52 mm diameter hole from the outer side, using Point C as Center Point	
10	Drill the cutter up to 20 mm deep.	
11	Drill a 11mm diameter through hole at points A and B	

l. No.	Step	Image
12	Drill a 17mm diameter through hole at center B, while doing so the points may cut each other. This is how the through hole will look like from inside.	Ę
13	This is how the through hole will look like from outside.	
14	Ensure correct key hole position before inserting the lock in hole.	
15	Insert the round portion of the lock from outside keeping the key hole in correct position.	
16	Place the lock retainer plate from inside of the door.	

SI. No.	Step	Image
17	Tight the retainer plate with the help of lock fixing screw.	
18	Check the screw length against thickness of Door.	
19	If the thickness of the door is slightly less it can be adjusted by cutting the screws accordingly.	
20	Cut the flat strip such a way it projects only about 5 mm from lock retaining plate.	
21	Insert the lock in hole.	
22	Place the latch assembly from the inside of the door.	

l. No.	Step	Image
23	It should be placed in such a way the flat strip goes smoothly into the slot on the back portion of the latch assembly.	
24	By holding the lock in the same position, mark around the flange for the latch assembly.	
25	Mark for screw holes also.	
26	Drill two flange holes.	
27	Make the recess for the flange in such way that the flange is flushed with the surface.	
28	Now place the latch assembly on the recess and check whether it is ok.	

SI. No.	Step	Image
29	Now fix the latch assembly on the door using screws.	
30	Now place the receptacle on the door frame, aligning it with the height of the lock body.	000
31	For marking, it is advisable to place the receptacle slightly lower to take care of door sag in future.	
32	Mark the outline of the receptacle flange and receptacle hole. Note: If the gap between the door and the frame is more than 3mm, then the making of recess on the door frame should be avoided.	000
33	Now tighten the receptacles using screws on the door frame.	H

SI. No.	Step	Image
34	Once lock installation is complete, check functioning of lock using the keys.	
35	This is how the door will look from outside after installation of the Night Latch.	

B. Rim Lock



Installation Position of Rim Lock on Door

SI. No.	Step	Image
01	Stand inside the room of the door where lock is to be fitted.	
02	Fold the marking paper along the dotted line and place at the edge of the inner side of the door panel.	Manual Andrew

SI. No.	Step	Image
03	Locate points A, B, C on Marking Paper. Mark at points A, B, C using a center punch. Take Drill machine with 3 mm Drill.	
04	Drill 12mm deep holes at point A,B and C.	
05	Now again locate Point 'A' as per Marking paper.	
06	Make a pilot hole at point 'A'.	
07	Take 30 mm diameter cutter for making a hole in door.	
08	Use pilot hole as a guide. Make the hole only half of the Door Thickness	

SI. No.	Step	Image
09	Now make the same Diameter hole from other side.	
10	Locate the shank in Plot hole and start cutting.	C.
11	Hole is made from both the sides of the door. This is intentionally done to avoid any damage to the door panel.	
12	Clean the hole.	
13	Put the ultra-cylinder into the Rose.	CE CA
14	Insert the assembly into the hole from the front panel of the door.	-

Sl. No.	Step	Image
15	Now mark on the flat strip (tongue).	
16	Screw according to the thickness of the door.	
17	Insert the cylinder with rose into the hole made in the door panel.	
18	While inserting ensure the direction of key hole is correct.	+
19	Now place the lock retainer plate on the inner panel of the door.	
20	Fix it using lock fixing screw.	•

SI. No.	Step	Image
21	Ensure that the marking on the lock cover plate is aligned with marking on the spindle.	ate at
22	Follow instructions given on the sticker also.	
23	Place the latch assembly from the inside of the door.	
24	The Placement should be in such a way that the flat strip goes well into the slot on back portion of the latch assembly.	
25	By holding the lock in the same position, mark around flange.	
26	Do marking for screw holes also.	

Sl. No.	Step	Image
27	Drill two flange holes.	
28	Make the recess for the flange in such way that the flange is flushed with the surface.	
29	Now place the latch assembly on the recess made and check whether it is ok.	
30	Fix the latch assembly on the door using the help of the screws.	
31	Now place the receptacle on the door frame, aligning it with the height of the lock body	
32	It is advisable to place the receptacle slightly lower to take care of door sag in future.	

SI. No.	Step	Image
33	Mark the outline of the receptacle flange.	
34	Mark the hole of receptacle and tighten the receptacles using screws on the door frame.	
35	Once lock Installation is complete, check functioning of lock using the keys.	He he
36	This is how the door will look from outside after installation of the Rim Lock.	

C. Cylindrical Lock

SI. No.	Step	Image
01	Stand inside the room of the door where lock is to be fitted.	

Sl. No.	Step	Image
02	Place the marker at the edge of the inner side of the door. Note : The recommended height for the fitment of this look is 36 inches from the floor.	
03	Mark the center of the hole as per the marker.	CT.
04	And also mark back set on the face of the door panel and door thickness.	The star
05	Now drill a pilot hole at marked points on the face of the door panel.	in the second se
06	Then drill a pilot hole at marked points on the thickness of the door.	
07	With pilot hole as a guide bore a 54mm through hole on the face of the door panel .	

SI. No.	Step	Image
08	With pilot hole as a guide bore a 24mm through hole on the thickness of the door.	
09	Now insert the latch bolt into the 24mm through hole.	6
10	Make around the flange and lock fixing screws.	
11	As per the marking drill a hole for lock fixing screws.	00
12	Chisel the recess for the flange.	
13	Again insert the latch bolt into the 24mm through hole.	

Sl. No.	Step	Image
14	And tighten it firmly with the lock fixing screws.	
15	Now remove inner knob.	
16	It should be done pressing the spring lock inside the hole with help of strip provided.	
	Now remove the knob, cover plate and lock retainer plate.	
17		

5 I. No.	Step	Image
18	Insert the outer now from the outside of the door panel.	•
19	Align it with the latch bolt.	
20	Now fix the lock retainer plate from the inner side of the door panel.	
21	And tight it using screws.	
22	Insert the cover plate.	60
23	And press it firmly till you here a 'Click' sound.	

Sl. No.	Step	Image
24	Now insert the inner knob of the lock.	
25	And press it tightly till you here a 'Click' sound.	
26	Place the striker plate on the door frame.	
27	And mark screw holes, rectangular slot for latch bolt and recess for the striker plate.	
28	Chisel the slot for latch bolt.	
29	Recess for the striker plate.	Ī

l. No.	Step	Image
30	Now place the striker on the recess made on the door frame.	
31	And tight them with screws firmly.	
32	After completing the installation of the lock check for the smooth functioning.	
33	Check for the smooth functioning of Knob.	E
34	Check for the smooth functioning of Latch bolt.	500
35	Check for the smooth functioning of Press button.	

D. Mortise Lock

SI. No.	Step	Image
01	Stand inside the room of the door where lock is to be fitted.	
02	Fold the marker along the dotted line and place at the edge of the inner side of the panel.	
03	Locate points A, B and C on Marking Paper.	
04	Mark at points A, B and C using a Center Punch.	MORTISE LOCK L & V & T WARDEL BUT WARDEL BUT WARDEL BUT WARDEL BUT
05	Draw two parallel lines 16mm apart joining the two horizontal lines in the center of the door thickness.	
06	The parallel line marking can be avoided if the Lock Technician get used to select the right blade.	

. No.	Step	Image
07	Drill a through and through holes of 16mm diameter at point A.	
08	Drill a through and through holes of 6mm diameter at point B and 4.5mm at C.	
09	Join the holes made at point B and C in such a way it becomes a key shaped hole.	
10	It becomes a key shaped hole.	?
11	Drill a 15.5mm diameter through hole at points A.	

SI. No.	Step	Image
12	Make the hole from both the sides to avoid chipping.	
13	Do marking for making Mortise.	
14	By using mortise kit as shown make an appropriate marking on edge of the door.	A
15	Drill pilot holes at all the points marked.	
16	Use the appropriate blade to make a slot.	Contraction of the second
17	Make a slot of 16 millimetre width and 65 millimetre deep as shown here.	

SI. No.	Step	Image
18	Clean it properly with Chisel.	
19	This is how the slot looks after making.	
20	Now insert the mortise lock into the slot.	
21	Mark the flange along the borders.	6
22	Mark points for the screw holes on the thickness of the door.	
23	Drill a hole for the screws and recess for the flange.	
SI. No.	Step	Image
---------	---	-------
24	The flange is flushed with the surface.	
25	Check that the angular face of the latch bolt is facing towards the door frame.	
26	Rotate it by 180 degree with the help of screw driver.	
27	Now insert the lock into the slot.	
28	Fix it with the screws.	
29	Now insert the square shank into the hole marked A.	

SI. No.	Step	Image
30	Press it fully.	
31	Place both the handle.	
32	Cover plates facing each other aligning it with the square shank.	
33	Fix the handle cover plates with the help of screws.	
34	Place the striker plate on the door frame aligning with the lock.	

SI. No.	Step	Image
35	Make appropriate markings on the door frame.	
36	Keeping striker plate slightly lower is always better this will take care of door sag in future.	
37	Make a 14 millimetre deep rectangular slots on the door frame as per the marking on the latch bolt as well as the dead bolt.	
38	Fix the striker plate with screws after making a recess to flush it with the door frame.	
39	If the gap between the door and the frame is more than 3mm, then the making of recess on the door frame should be avoided.	
40	Once the lock is fixed, check for the smooth functioning using the keys.	

SI. No.	Step	Image
41	This is how the door will lock from outside after installation of the Mortise lock.	

Summary 2

- A Lock Installer is responsible for installation of different locks on the doors, repair and service of locks, whenever required.
- A Lock is a mechanism for keeping a door, window, cover or a container fastened and secure, with the help of a key.
- The main types of locks are: Pad Lock, Rim Lock, Mortise Lock, Dead Bolt Lock, Cylindrical Lock, Furniture Locks, Lever Handle Locks, Interchangeable Core Locks and Vending Locks
- A door lock has typically 3 parts: Cylinder (Lock Body), Bolt or Latch and Box or Strike Plate
- A Lock Installer must be aware of the safe handling and storage of Hand Tools, Power Tools, Connectors, Fasteners and Consumables.
- Apart from regular tools, a Lock Technician requires some special tools for installing Lock, namely, Pilot Drill, Cutter Holder (Shank) and Cutter Blade.
- A Lock technician should always take good care of this kit, since without any of the kit tools it is very difficult to install the lock.
- Pilot Holes must be carefully marked and drilled, so that the entire installation process does not go wrong.

- Activity

- The trainer takes the students to the laboratory and gives them dismantled locks. The students identify the various units of the locks and state the functions of each.
- The trainer takes the class for a visit to a nearby Lock Repair and Servicing workshop, where they are required to observe and learn about the following:
 - o Different tools and equipment (manually operated and powered) used by Lock Installers
 - o Process of operating each tool
 - o Safety precautions undertaken while operating each tool
 - o PPE worn and used, if any
- The trainer takes the students to the laboratory and divides the class into few groups (depending on the batch size). He/she demonstrates the installation process for each type of lock discussed in class and Participant Handbook. After the demonstration, the trainer asks each group of students to repeat the same.





सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

13. Perform Lock Repairing and Servicing

- Unit 13.1 Process of Operating Different Locks
- Unit 13.2 Method to Check Warranty of Lock
- Unit 13.3 Troubleshooting for Lock Installers
- Unit 13.4 Handling and Storage of Different Tools and Equipment
- Unit 13.5 Quality Assurance for Lock Installer
- Unit 13.6 Waste Disposal, Cleaning and Maintenance



FURNITURE ତ FITTINGS

KILL COUNCIL



– Key Learning Outcomes 🗳

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

- 1. Discuss the process of operating different locks
- 2. Learn about the method to check warranty of lock
- 3. Discuss troubleshooting for Lock Installers
- 4. Discuss the quality inspection and safety procedures
- 5. Discuss the method to identify the length of the flat strip while fixing the lock on the door
- 6. Discuss methods of waste disposal, cleaning and maintenance

UNIT 13.1: Process of Operating Different Locks

- Unit Objectives 🤘



1. Demonstrate the process of operating different locks

A. How to Operate the Common Cylindrical Lock

• Operating the Keyed variant:

Locking	Press the inside Push Button and close the door
Unlocking from inside	Rotate the inside knob
Unlocking from outside, when Push Button is pressed	Use the key

• Operating the Keyless variant:

Locking	Press the Push Button from inside
Unlocking from inside	Facility provided from outside. If required, use Screw Driver in
	the outside knob slot and turn the knob

B. How to Operate the Common Night Latch

• Operating the Inside Opening variant:

Unlatching	The Lock can be unlatched from outside by key and by knob from inside
Latching	By closing the door
Safety Catch	Can be used to keep the bolt in latched or unlatched position
Deadlocking	The bolt gets automatically deadlocked each time the door is shut, thus preventing the latch bolt being forced open from outside

• Operating the Outside Opening variant

Unlatching	The Lock can be unlatched from outside by key and by knob from inside
Latching	By closing the door
Safety Catch	Can be used to keep the bolt in latched or unlatched position
Deadlocking	The bolt gets automatically deadlocked each time the door is shut, thus preventing the latch bolt being forced open from outside

C. How to Operate the Common Rim Lock

• Operating the Outside Opening variant

Latch Polt	Operable from inside by the Latch Bolt puller
	Operable from outside by the key
Deadlocking	Operable from outside by key and from inside by the knob
Safety Catch	Can be held back internally by the Safety Catch knob

• Operating the Inside Opening variant

Latah Dalt	Operable from inside by the Latch Bolt puller
	Operable from outside by the key
Deadlocking	Operable by key from both inside and outside
Safety Catch	Can be held back internally by the Safety Catch knob

D. How to Operate the Common Mortise Lock

Handle / Knob	Turn the handle / knob in order to retract the latch, if the door is unlocked
Day / Night Switch	Locks the door from outside and holds it in unlocked condition from inside, or engage to keep both sides unlocked

UNIT 13.2: Method to Check Warranty of Lock

- Unit Objectives

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

1. Examine the warranty of lock prior to initiating work service

13.2.1 Checking Warranty of Lock Prior to Initiating

Work Service

Warranty is defined as "a written guarantee, issued to the purchaser of an article by its manufacturer, promising to repair or replace it if necessary within a specified period of time". On purchase of lock, the retailer / shop provides the user with a Warranty Card, which specifies the tenure, terms and conditions of the Warranty extended to the user. The image of a common Lock Warranty card and its important parts are given below:

WARRANTY

This product offered by y) carries a warranty of 1 (one) year from the proven date of purchase. It is warranted to be free from defects in material or workmanship for a period of one year from the proven date of purchase. During this period of warranty, if the product is proved to be defective in material or workmanship, the product will be repaired or replaced or substituted by a similar product at the discretion of the Company.

Please turn over to see detailed terms and conditions of Warranty.

The proud owner of this (ai product can register this warranty with the Company by calling 24 hour a Helpline nos. 3 (from all mobiles & landlines), THE OOD 61162100 (applicable) or by sending sms¹

Please fill the details in the Warranty Card and keep safely.

3	Name:	Date of Purchase: Cash Memo No. or Invoice No.: Product: Product: Code & Model: Name & Address of Shop:	5
4	Ticket No:		

Terms and Conditions of Warranty

- This Warranty is applicable for a period of one year from the proven date of purchase. The customer should retain the warranty card (after filling the details required therein including the product code/model) along with the cash memo or invoice.
- 2. There should be no amendments /corrections on the warranty card or the cash memo/invoice.
- 3. In case repair or replacement of the product is carried out, the period of warranty would continue from the original date of purchase. The original warranty card should be returned with the defective products in case of replacement. The warranty card with the new product should be filled and kept safely by mentioning the original date of purchase.
- 4 Replaced parts/products would be the property of the company.
- To get service under this warranty, the product should be delivered to the nearest Godrej Distributor or Dealer or Authorised Service Dealer (ASD). Call Godrej Toll free Helpline 1800 209 4543 (from all mobiles & landlines), Tel.: 022 - 61163100 (standard charges applicable) to locate the nearest Godrej Distributor or Dealer or ASD.
- In case a technician is required to visit the place of installation, Call Godrej Toll free Helpline 1800 209 4543 (from all mobiles & landlines), Tel. : 022 - 61163100 (standard charges applicable) to locate the nearest Godrej Distributor or Dealer or ASD & register your request for service.
- 7. Visit charges as per the prevailing prices list, would be applicable if the location is within the municipal limits of the city/town of the Godrej Distributor or Dealer or Authorised Services Dealer. For locations outside the municipal limits of the city/town of the Godrej Distributor or Dealer or Authorised Service Dealer, traveling and other incidental expenses are payable by the customer.
- 8. Surface finish and/or shade of the product is not covered under this warranty.

In case of a product that requires installation, damage to the product or non-operation of product due to effects of weather on door and frame or sag on account of loosened hinges are not covered under this warranty.

10. Warranty on the product would not be applicable under the conditions including but not limited to:

- a) Misuse/mishandling/negligence/improper installation/improper application/improper repair/ tampering
- b) Failure to follow instructions of use.
- c) Installation with unapproved accessories.
- d) Modification to the product or removal/alteration of parts and components.
- e) Entry or seepage of liquids/oils/chemicals.
- Non-functioning of lock due to use of key other than company make or entry of foreign material in the key hole.
- g) Breakage of plastic parts.

6

- h) Damage due to accidents /fire/robbery/natural calamities.
- i) Damage due to harsh environmental conditions.
- j) Damage or incompatibility due to inappropriate operational environment, including external electro-magnetic fields, direct sunlight, high humidity and vibration (in case of electro-mechanical and electronic locks).
- k) Damage due to third party peripherals (in case of electro-mechanical and electronic locks).
- Damage due to battery leakage (in case of electro-mechanical and electronic locks).
- m) Failures or defects in consumables such as LEDs/batteries (in case of electro-mechanical and electronic locks).

 In case a product, which does not require installation, is found to be dead on arrival i.e non-operational (except for reasons as mentioned in Points 8 & 10 above), within a period of one week, the same would be replaced after verification at the sales outlet.

12. In case a product, which requires installation, is found to be non-operational (except for reasons as mentioned in Points 8, 9 & 10 above) within one week after installation, the same would be replaced after verification by the nearest Godrej Distributor or Dealer or Authorised Service Dealer (ASD). Call Godrej Toll free Helpline 1800 209 4543 (from all mobiles & landlines), Tel. : 022 - 61163100 (standard charges applicable) to locate the nearest Godrej Distributor or Dealer or ASD and registration of your request for service.

 The company reserves the right to modify the design of the products without prior notice in pursuance of its policy of continuous technical improvement.

- 14. Decision of Godrej Locks Division on the admissibility of the claim under warranty would be final and binding.
- Maximum liability under the warranty would be limited to the cost of the product. This warranty expressly excludes any claim for incidental or consequential loss or damage.
- Any representations, warranties or promises inconsistent with or in addition to the warranties contained herewith are unauthorised and shall not be binding on Godrej.
- 17. This warranty is valid in India only.
- This warranty is issued at Mumbai and Courts at Mumbai shall have exclusive jurisdiction over matters covered or flowing from this warranty.
- 19. This Company reserves its rights to amend the above terms and conditions without notice.

Fig. 13.2.1.1: Sample Warranty form

No.	Interpretation / Meaning for Lock Installer
1	The tenure, in years, over which the warranty of service is valid
2.	The modes (toll free phone number, email address, online registration, SMS services, etc.) through which the Warranty may be availed
3.	Personal Details of the consumer, who Parts of a warranty has made the purchase. This helps the company in keeping a track of purchasers.
4.	Token / ticket number issued to the consumer, while availing the service request; this is an unique number and changes with every new request. This helps the company in identifying a particular customer.
5.	Details of the product (specifications, model type, model number, barcode number, etc.), invoice / bill / cash memo number, shop or showroom address, etc. This helps the company in identifying the product, which needs repair, replacement or servicing.
6.	This section lists and explains the scenarios, under which the Warranty facility cannot be availed by the consumer.

UNIT 13.3: Troubleshooting for Lock Installers

- Unit Objectives 🞯

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

- 1. Explain troubleshooting for lock installers
- 2. Identify the different lock problems and faults
- 3. Discuss problem identification procedures
- 4. Discuss about warping in doors
- 5. Demonstrate the dismantling and assembling procedures
- 6. Explain the method of checking the lock functioning with the key

13.3.1 Explaining Troubleshooting

- Troubleshooting is a systematic and sequential approach to solve problems, used to detect and resolve issues in a unit or a system.
- In short, Troubleshooting is the process of detecting a problem, finding its root cause and then rectifying it.
- With the sole purpose of bringing back a system into operation, troubleshooting techniques also focus on preventive maintenance, so that a particular issue does not appear again and what needs to be done in case it recurs.



13.3.2 Knowledge Of Different Lock Problems / Faults

Troubleshooting is an important part of a Lock Installer's job and it is impossible without good practical knowledge of the different lock problems / faults, their root causes and remedies.

The common lock problems / faults are:

- Dead bolt
- Key does not enter the lock
- Breakage of knob spring
- Damaged lock al drop
- Bend in lever
- Turning lock cylinder
- Door lock moves slowly
- Misaligned latch
- Key is broken off and stuck in lock

	Description	
Deadbolt stuck	Deadbolt is malfunctioning and not operating the way it normally does.	
Key does not enter the lock	The key, while entering the lock slot, seems to be stuck somewhere and does not enter the lock fully.	
Breakage of knob spring		
	The Knob Spring being broken, does not allow the latch to return to its protruded state, when the knob is not being turned manually.	
Key does not work properly	Deadbolt is not engaging properly with the Strike Plate.	
	The AL Drop in the lock is misaligned, tampered, bent or broken.	
Bend in lever	A set of levers in the Lever Tumbler Lock prevents the	
	lever variants. These levers, if bent, prevents the func- tioning and movement of the locking bolt.	
Turning lock cylinder	bolt from moving into the lock. Such locks come in 3 or 5lever variants. These levers, if bent, prevents the func-tioning and movement of the locking bolt.While unlocking the door, the entire lock cylinder is turn-ing, which should not be the case.	
Turning lock cylinder Door lock moves slowly	 bolt from moving into the lock. Such locks come in 3 or 5 lever variants. These levers, if bent, prevents the functioning and movement of the locking bolt. While unlocking the door, the entire lock cylinder is turning, which should not be the case. Locks moving slower than usual and seems stuck up inside. 	
Turning lock cylinder Door lock moves slowly Misaligned latch	boit from moving into the lock. Such locks come in 3 or 5 lever variants. These levers, if bent, prevents the functioning and movement of the locking bolt. While unlocking the door, the entire lock cylinder is turn ing, which should not be the case. Locks moving slower than usual and seems stuck up inside. Latch and Strike Plate are not aligned with each other.	

13.3.3 Problem Identification Procedures

There are three stages in which a Lock Installer identifies lock problems and faults. These are:

- Detection of problem / fault by identification of symptoms
- Determination of root cause
- Resolving the problem / fault

Method To Identify Process And Product Problems:

Detection of problem can be carried out with the help of the description given in topic 2.3.2. The remaining two stages are laid down below:

Name of Problem / Fault	Root Cause (most probable)	Remedy and Steps
		Check the Set Screws
		 Cleaning and lubricating the Dead Bolt lock
		Checking the alignment of Deadbolt and Strike Plate
Deadbolt Stuck	Dirt accumulation	Dismantling both the Deadbolt and Strike Plate
	Rusting	Filing the Deadbolt
		Rechecking alignment
		 Assembling and mounting the assembly on the door
		 Operating and rechecking the Deadbolt functioning
		• Replacing Deadbolt, if the above process fails
Key does not enter the	• Dirt and Grime accumulation in	Removing the lock
lock	the lock Lock in need of lubrication 	 Blowing dust out of the inner and outer lock cylinders and pin holes with the help of canned air
		 Brushing away dirt and grime, using a scrubber or a brush
		 Blowing off the remaining dirt using canned air
		 Lubricating the lock assembly with the help of a silicon or graphite based lubricant (avoid saturation and just add lubricant sucient to ensure smooth moving of parts) Assemble and mount the
		lock assembly on the door

Name of Problem / Fault	Root Cause (most probable)	Remedy and Steps
Bend in lever	 Excess use, pressure and friction while operating the lock Internal levers of the lock geng worn out over time 	Depends on the lever to be removed
Turning lock cylinder	The Set Screws, meant to hold the cylinder in place, are loose or broken	Removing the faceplate at the door's edge
		Locating the cylinder set screws
		 Tightening the set screws by turning clockwise, so that the key slot is absolutely vertical
		Replacing the faceplate, if needed
Door lock moves slowly	The lock may be frozen or dirty; the small internal units may have worn out or are broken	Lubricating the keyhole by applying graphite-based lubricant
		Operating the lock few times to make the lubricant work
		Applying Lock "De-icers" for frozen locks, which also help in dissolving grime and dirt sediments
		Dismantling the lock as a last resort, to find out if any internal unit is jammed or broken
		Replacing the said internal units, if required
Key is broken off and stuck in the lock	Due to excess pressure while locking or unlocking, the key has broken and a broken part is stuck inside the key slot	 Trying to grip and pull the key straight out, using Pliers (Needle Nose or Long Nose)
		 Inserting a Coping Saw Blade into the key slot and trying to yank the key out
		• Removing the cylinder, as a last resort
		 Inserting a firm wire into the cam slot at the cylinder's back and pushing the key out

Name of Problem / Fault	Root Cause (most probable)	Remedy and Steps
	The knob has worn out over time	• Loosening the Set Screws on the knob's leg
		Holding the knob on the other side of the door
		• Turning the knob clockwise, till it fits firmly
Door knob is loose		• Tightening the set screws until you feel them lying on the flat side of the spindle; the knob should turn freely now
		 Removing the knob and checking the spindle, if the above does not work
		Replacing the lock, if the entire lock is worn out

- 13.3.4 Problem Identification Procedures

A. What is Warping of Door?

Warping is a condition when the door becomes twisted or distorted and becomes hard to open or close.



Fig. 13.3.4.1: Warped door

B. Why does Warping Happen?

Warping takes place due to the following reasons:

- Exposure of the door to moisture (especially during the monsoons) or excess heat
- Finishing on only one side of the door or different finishing on both sides of the door

C. How can a warped door be fixed?

A warped door can be fixed by:

- Reheating the door to dry off the accumulated moisture; this is called curing
- Applying pressure on the door to remove distortion and to realign the door to its original shape and dimensions
- Applying at least two coats of Finish on both the sides of the door

13.3.5 Assembling Procedures

Assemble the lock system after the repair as per the standard procedure

A. Assembling Cylindrical Lock



Fig. 13.3.5.1: Assembling process

1. How to place the Front Portion Of the Lock With the Logo Upward, In The Front Part Of The Door

Sl. No.	Steps	Image
1	Fixing the strike plate along with latch	
2	Fixing the interior knob with the rose, and mounting plate to the latch	
3	Testing with the key	0



3. How to mark the Area Latch Assembly Unit using a Marker



4. How to Make Chippings On The Door Using A Chisel (To Ensure The Latch Fits In The Door





Fig. 13.3.5.2: Chipping process

B. Assembling Mortise Lock



Fig. 13.3.5.3: Common Mortise Lock



Fig. 13.3.5.4: Mortise Lock - Latch Plate, Latch, Latch Screws, latch Plate Mortise



1. Technique Of Fixing The Lock On The Door





2. How to place the Lock Marker on the Designated Location



3. How to place the Front Portion Of the Lock With the Logo Upward, In The Front Part Of The Door



4. How to place The Lock Retainer Plate On The Other Side Of The Door





5. How to secure the Lock Retainer on the Other Portion of the Door (with the help of Lock Fixing Screws)



6. How to place the Latch Assembly On the Door Frame as per the Alignment of Lock On the Door



7. How to mark the Area Latch Assembly Unit using A Marker





8. How to Make Chippings On The Door Using A Chisel (To Ensure The Latch Fits In The Door)











9. How to check if the Lock Body Is Aligned With Door Latch



10. Necessary Adjustments required if The Lock And The Latch Is Not Aligned

- The first thing to do is look at the door from the inside when it is closed.
- There should be an even gap across the top and down the latch side.
- This gap occurs between the door and the frame or jamb.
- It should be about an eighth of an inch and be consistent.
- A properly aligned door will allow the lock and deadbolt to work correctly.



Fig. 13.3.5.7: How to make necessary adjustments if the Lock and the Latch is not aligned

11. How to Drill Appropriate Holes On the Door (using Drill machine) for installing Mortise Lock



12. How to Use Chisel on a Door for installing Mortise Lock







2. How to place the Front Portion Of the Lock With the Logo Upward, In The Front Part Of The Door

- Use a sharp chisel along the marked lines to establish the edges of the cut-out.
- Use a sharp chisel to remove the waste wood from the edge of the door to the depth of the endplate thickness so that the front of the endplate will be flush with the wood down the door edge.
- Offer up the lock and locate the endplate into the cut-out mark the position for the handle bar and the keyhole.
- Drill the holes for the handle bar and keyhole make the bar hole at least as big as the spindle boss on the back of the lock for the keyhole, drill the top hole and cut out the shape using a thin pad saw.
- Position the rim lock on the door and secure using screws.
- Fit the door handles and key shield on the reverse side of the door.
- The door handles have to be bar type with a small screw in the 'skirt' of each handle the square bar having holes into which the screws locate.
- Close the door and mark on the door frame the position of the top and bottom of the rim lock.
- The 'staple' (which secures the lock catch and bolt when the door is closed) may have an endplate (like the lock) which will need to be recessed in to the door frame in a similar manner as for the lock endplate.
- Position the staple on the door frame and mark around it. The architrave or moulding around the door will probably need to be cut away so that the staple will fit flat, in line with the lock and hold the door closed.



Fig. 13.3.5.8: Front portion installation process

D. Assembling Deadbolt Locks



 Image: Cylinder Deadbolt

 Image: Cylinder Deadbolt

Common Deadbolt Lock

2. Parts of Deadbolt Lock Assembly

Most basic dead bolt kits include:

- A key lock cylinder
- A deadbolt assembly
- An interior turn assembly
- A steel strike plate (typically not necessary)
- Mounting hardware





Double Cylinder Deadbolt

1. Technique Of Fixing The Lock On The Door

For installing the hardware, insert the latch assembly in the hole you drilled in the door edge and fasten it with screws after predrilling for them. Next, insert the handle set and cylindrical lock or dead bolt assembly so the spindle or tailpiece aligns with the strike assembly. Typically, screws pass through the door to hold the two lockset pieces together on opposite sides. For security, be sure exposed screw heads are on the interior side of the lockset.



- Use a hole saw to begin cutting the hole for the deadbolt. When the pilot bit on the hole saw comes through the other side of the door, stop cutting. Finish the hole from the other side of the door to prevent splinters. If your hole saw isn't deep enough to penetrate the exterior face of the door, use a standard bit to finish drilling the hole you'll use as a reference point.
- Use a 7/8" spade bit to drill a hole through the edge of the door for the bolt.
- Dry-fit the bolt into the hole, and trace around the faceplate. Use a wood chisel to mortise the area around the faceplate so that it will be flush with the door. When using the chisel, keep the bevelled side in toward the mortised area, and tap the tool deep enough to recess the faceplate. You may need a smaller chisel to mortise the rounded corners.
- Continue mortising until the faceplate fits properly. Drill pilot holes, and secure the bolt to the door with screws.
- Dry-fit the cylinder and thumb-turn plate so you'll know how the pieces fit together. Fit the exterior side onto the door first, making sure the writing is upright. Then set the interior piece in place, and align the screw holes with the mounting holes inside the lock. Fasten the deadbolt in place with screws.
- Mark the end of the bolt with lipstick or paint. Close the door, and turn the deadbolt several times to mark the doorframe. Use a 7/8" spade bit to drill two overlapping holes in the doorframe for the deadbolt.

3. Type And Alignment Of Lock As Per Functioning Of Door

- A deadbolt does not utilise spring loaded mechanisms to work the bolt, hence the term "dead".
- On exterior doors, typically 6 to 12 inches above the keyed entry (locking door handle) or handle set (handle and dead bolt combination) for added security.
- Double-cylinder dead bolts require keys to open the lock from the interior as well as the exterior. This makes it more secure.
- 4. Identification of Lock as per the Design And Functioning of the Door / Window
 - Deadbolts are useful because this mechanism allows the bolt to travel pretty far most deadbolts will go a whole inch or more into your door jamb, which makes it really hard to kick the door in.
 - Another benefit is that they are very hard to bypass by attacking the lock hardware itself. Hence they are used in main entrance doors.





Fig. 13.3.5.9: Identification process

5. Placing of the Lock Marker on the Designated Location



- Most doorknobs are 34 to 38 in. high, with dead bolts 6 to 12 in. above that.
- Decide for yourself what height is comfortable.
- When drilling new holes, tape the manufacturer's template in place with the lockset center line at the desired height.
- Determine the backset—the distance from the door edge to the knob centerline—and use the corresponding template marks.
- The backset can be 2 3/8 or 2 3/4 in.; many locksets accommodate both.
- Then drill 1/8-in. pilot holes through the door to center the 2 1/8-in. hole saw. At the door edge, use the template to drill a 2-in.-deep pilot hole for drilling for the strike or bolt.

6. Placing the Front Portion Of the Lock With the Logo Upward, In The Front Part Of The Door

- Dry-fit the cylinder and thumb-turn plate so you shall know how the pieces fit together.
- Fit the exterior side onto the door first, making sure the writing is upright.
- Then set the interior piece in place, and align the screw holes with the mounting holes inside the lock.
- Fasten the deadbolt in place with screws. Mark the end of the bolt with lipstick or paint.
- Close the door, and turn the deadbolt several times to mark the doorframe. Use a 7/8" spade bit to drill two overlapping holes in the doorframe for the deadbolt.
- Mortise the area around the hole so the strike plate will fit flush with the doorframe.
- Drill pilot holes and secure the striker plate with screws.

7. Placing the Lock Retainer Plate On The Other Side Of The Door



8. Placing the Latch Assembly On the Door Frame as per the Alignment of Lock On the Door



Insert the latch assembly in the hole you drilled in the door edge and fasten it with screws after predrilling for them with the help of a power driller.

9. Marking the Area Latch Assembly Unit using A Marker



- Once you have decided on the correct position of the handle mark a line on the door edge and using the setsquare transfer these lines to either side of the door.
- Mark the center line on the door edge, then measure the distance from the edge of the latch plate then transfer this measurement onto each side of the door.

10. Making Chippings On The Door Using A Chisel To Ensure The Latch Fits In The Door

- Using a sharp chisel remove enough material so that the latch plate will fit flush to the door.
- Again using the countersunk drill countersink both holes to allow the reverse of the plate to fit snugly into the opening.
- With a sharp chisel remove enough material for the striker plate to fit flush to the doorframe, countersink both holes and fit the plate for the final time.
- Finally using a narrow chisel removes enough stock material from within the striker plate to allow the catch fully open once the door has been closed.



11. Ensuring Lock Body Is Aligned In Accordance With Door Latch



- Partially close the door and mark out where the catch part hits the door surround.
- Open the door and offer up the striker plate to the correct position and mark the two fixing holes with a pencil.

13.3.6 Dismantle the Lock If Required To Get A Better Understanding of the Faults (Standard Procedures)

Dismantling Procedures





- Unscrew the deadbolt mounting screws from the inside of the deadbolt with a Phillip screwdriver.
- Pull the thumb turn unit away from the inside of the door, followed by the outside cylinder unit from the outside of the door.
- Remove the adapter ring with the screwdriver if there is one present.
- Remove the screws from the deadbolt latch faceplate on the side of the door with the screwdriver.
- Pull the faceplate off of the door.
- Then use the screwdriver to pull the deadbolt latch assembly out of the door.
- Unscrew the strike plate from the door jamb.
- The strike plate may be stuck to the paint so use a screwdriver to help remove the strike plate, if needed.
- Wipe the grime from your hands with a cloth rag until you have the chance to wash them.

13.3.7 Check Functioning Of Lock By Using The Key

- When you insert a key, the series of notches in the key push the pin pairs up to different levels.
- The incorrect key will push the pins so that most of the top pins are still partly in the plug and partly in the housing.
- If correct key is inserted, the pin pairs align in the same level and the door unlocks.

Step 1





Step 2



Step 3



UNIT 13.4: Handling and Storage of Different Tools and Equipment

- Unit Objectives 🤘

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

- 1. Use appropriate tools and equipment to repair the lock
- 2. Discuss the tips of storing tools appropriately

13.4.1 Use Appropriate Tools and Equipment to Be Used to Repair the Lock



The tools required in lock repair are:

• Screw driver



Standard Screw Driver



Heavy Duty Screw Driver



Phillips Screw Driver



Different Screw Driver Tips

• Screws, Nails, Studs, Nuts and Bolts



Handling Screw Drivers:

- You should always correct size of blade for tightening the screw.
- For very tight screws, set the screwdriver in screw and put maximum downward pressure on the screwdriver. You can strike the screwdriver end with a hammer. This trick normally gives desired result and the screw will become loose. You can also use this method for stripped out screws.
- Apply wax screw threads before putting them into wood. If wax is not available, you can apply soap also. It will make driving screws in wood very easy.
- If you need more driving force then use screwdriver of shorter shank.
- For getting more torque, you can use a crescent wrench on screwdriver blade.
- You can magnetize a screwdriver by striking its tip on a metal surface. This process realigns metal molecules, which makes it magnetic. It can also break screwdrivers in doing this process, so you need to be careful.
- Never use screwdriver in place of Pry Bar.


Fig. 13.4.1.1: Types of nuts and bolts

Chisel •

Bevel Face Blade



Bevel Chisel



Paring Chisel



Chopping Chisel





Socket Chisel

Special Chisels or Gouges





Handling the Flat Strip While Fixing the Lock on the Door:

Identify the Length of the Flat Strip and Screw to be	cut as per the Thickness of the Door
While cutting the flat strip and screw, hold them firmly using a cutting plier. Keep it on a sturdy surface and cut using sharp hacksaw blade.	Cutting Methous-Connector
While cutting, also make sure that the load does not fall on the joint, otherwise the joints may develop crack and break at a later stage.	Cutting Userhious - Sectors
Do not cut the flat strip and screw on an uneven surface.	utting Methods- Connector

Do not use jumper and hammer to cut the screw.	
Hold both screw and flat strip firmly while cutting.	Cutting Methods - Serews

13.4.2 Importance of Storing Tools Appropriately



Fig. 13.4.2.1: Storing Tools

- Tools should be kept in dry conditions.
- Toolboxes also make for great tool storage, offering the primary advantage of portability.
- Use silica gel packs or rust collector.
- Clean all the tools before storing them.

UNIT 13.5: Quality Assurance for Lock Installer

Unit Objectives



1. Discuss different methods of quality check during lock repair, maintenance and servicing

13.5.1 Different Methods of Quality Check

Let us consider a case, where a customer has been facing issues with the Deadbolt Lock on a door in the house. A lock installer is summoned. Below are the steps of how the Lock Installer would adhere to quality inspection during his / her visit.



A. Ensuring Proper Functioning Of The Lock Using Appropriate Methods

- Test the deadbolt by turning the twist knob to latch and unlatch the lock with the door open and then again with the door closed.
- If the twist knob lever stops in the same position for both tests, the strike plate and hole are most likely installed properly.
- If the twist knob stops short when the door is closed, the hole in the door frame has not been drilled deep enough, which could make it easier for a criminal to defeat the lock.
- Remove the strike plate from the door frame.
- Using the appropriate-sized spade bit and an electric drill, cut the hole in the door frame about 1/4 inch deeper.
- Test the latch mechanism again.
- If the twist knob stops in the same position with the door opened and closed, the hole is deep enough.
- If not, use the drill to make the hole another 1/4 inch deeper.
- Test the deadbolt latch again, if necessary.
- If the lock tests properly, re-install the strike plate and test the lock one more time to make sure the bolt is not snagging on the door frame.

B. Visually Checking The Lock For Any Fault

- A deadbolt lock is only secure when the bolt is fully extended into the door frame.
- If it is not fully extended, it is possible to unlock the door without a key.

- By inserting a key, proper functioning of the deadbolt can be checked.
- Check the hinge screws on your door.
- Over time, your door may loosen and sag, which can cause the lock latch and strike plate to become misaligned. Check if any screw is loose.
- C. Conducting Visual Inspection For Any Error Or Damages During The Repairing Process
 - When a door latch does not click into position, there is a problem in the alignment of the bolt and strike plate of the lock.
 - Loose screws can result in a loose lock.

D. Identifying The Possible Problem / Problems In The Lock As Per The Complaints Of The Customer

- While repairing, check if the alignment of the bolt and strike plate are same or not.
- All the screws must be tightened.
- The lock should work efficiently.
- The lock should fully extend to the thickness of the door.
- There is swift movement of the cylinders of the lock.

E. Identifying The Cause Of The Fault Based On The Inspection

- If the bolt and the strike plate are misaligned, the latch will not work.
- If the screws are not tight, the lock will become loose overtime.
- If the length of the deadbolt does not correspond with the thickness of the door, the lock functioning will be affected.
- If the lock is not swift, there must be technical problems in the lock.

F. Changing The Defective Component Of The Lock As Per The Organizational Procedures

After the above procedures, if the lock continues to malfunction, then, as a last resort, the lock or its specific units (as detected via inspection) must be replaced with new ones.

Components of a Single Cylinder Deadbolt Lock are:

- 1. Deadbolt Cylinder
- 2. Outside Rosette
- 3. Deadbolt Latch
- 4. Inside Rosette with Thumb turn
- 5. Socket Head Machine Screws
- 6. Deadbolt Ring (for Thinner Doors)
- 7. Latch Wood Screws



Components of a Double Cylinder Deadbolt Lock are:

1. Outside Double Deadbolt Cylinder	(7) (8)
2. Outside Rosette	6
3. Outside Deadbolt Ring (for Thinner Doors)	6
4. Deadbolt Latch	3
5. Inside Deadbolt Ring (for Thinner Doors)	
6. Inside Rosette	
7. Inside Double Deadbolt Cylinder	
8. Socket Head Machine Screws	W.
9. Latch Wood Screws	

G. Reporting The Problem To Retailer / Company if lock cannot be repaired and the problem persists As last resort, if the Lock Installer is unable to repair the lock and the problem persists, then the Lock Installer must escalate the issue to the Retailer / Company. This is documented using the below form:

XYZ Lock and Fittings Pvt. Ltd.

Name of Customer:			
Warranty ID:			
Date of Complaint:			
Issue Detected:	 Stuck Deadbolt — Key does not enter the lock Key Broken and Stick in Lock — Broken Knob Spring — Damaged AL Drop — Bend in Lever Others 		
Issue Resolved:	□ Yes □ No		
Issue Escalated to:	Name of Organization		

UNIT 13.6: Waste Disposal, Cleaning and Maintenance

– Unit Objectives 🤘

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

1. Practise and follow appropriate waste disposal, cleaning and maintenance procedures

Ensuring proper Disposal System for Waste and By-product	 Recycling old locks by converting them into metal scrap, which are, in turn, reused in lock manufacturing factories. Sharps (like nails, screws, broken keys, etc.) must be disposed in sharp containers. 	
Cleaning and maintenance procedures	 Blow dust out of the keyhole. Spray the lock cylinder and opening. Lube the lock with a dry lubricant. Use WD-40 as a short term solution. 	
Using appropriate materi- als to clean the Tools and Equipment	 Cleaning agents (like Colin) Scrubber / Brush Hydrochloric Acid Tartaric Acid Grease Removing Agents WD- 40 solution Graphite Lubricant 	Lubricant

Summary 2

- A Lock Installer must be adequately skilled in operating different locks.
- The warranty of a lock must be examined before initiating service.
- On purchase of lock, the retailer / shop provides the user with a Warranty Card, which specifies the tenure, terms and conditions of the Warranty extended to the user.
- Troubleshooting is the process of detecting a problem, finding its root cause and then rectifying it.
- The common Lock Problems / Faults are: Dead Bolt, Key does not enter the lock, Breakage of knob spring, Damaged lock AL Drop, Bend in lever, Turning Lock Cylinder, Door Lock moves slowly, Misaligned Latch and Key is broken off and stuck in lock
- The three stages of Troubleshooting are:
 - o Detection of Problem / Fault by identification of symptoms
 - o Determination of Root Cause
 - o Resolving the Problem / Fault
- Warping is a condition when the door becomes twisted or distorted and becomes hard to open or close.
- Assembly, Dismantling and Repair of locks must be done as per standard procedures.
- Tools should be kept in dry conditions.
- Toolboxes also make for great tool storage, offering the primary advantage of portability.
- All tools must be cleaned before and after use.

- Activity 🖉

- The trainer gives the students defective/faulty locks. The defects/faults in the locks are:
- Dead Bolt
- Key does not enter the lock
- Breakage of knob spring
- Damaged lock AL drop
- Door Lock moves slowly
- Misaligned Latch
- Key is broken off and stuck in lock

After visually determining the fault, students have to state the following:

- The name of the fault/defect
- Characteristics of the fault/defect
- Method to identify the fault/defect
- Remedial action and preventative maintenance
- Tools to be used for repairing the lock

– Exercise 📝

Answer the following questions:

- 1. Make a list of common problems associated with the locks.
- 2. How to check the warranty of a lock?
- 3. How should one check a lock with the help of a key?
- 4. Write down the steps of fixing lock on a door.
- 5. What are the necessary adjustments required if the lock and the latch is not aligned properly?



सत्यमेव जयते GOVERNMENT OF INDIA MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP



Transforming the skill landscape

14. Employability & Entrepreneurship Skills

- Unit 14.1 Personal Strengths & Value Systems
- Unit 14.2 Digital Literacy: A Recap
- Unit 14.3 Money Matters
- Unit 14.4 Preparing for Employment & Self Employment
- Unit 14.5 Understanding Entrepreneurship
- Unit 14.6 Preparing to be an Entrepreneur



FURNITURE & FITTINGS SKILL COUNCIL

Key Learning Outcomes 🗳

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

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

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

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

UNIT 14.1: Personal Strengths & Value Systems



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

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

14.1.1 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

- 14.1.1.1 Tips to Prevent Health Issues 🔮

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

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

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

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

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

14.1.1.2 What is Hygiene?

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

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

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

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

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!

14.1.1.3 Swachh Bharat Abhiyan

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

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

- 14.1.1.4 What are Habits?

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

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

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

Some bad habits that you should quit immediately are:

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

- 14.1.1.5 Tips 🖳

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

- 14.1.2 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

14.1.2.1 Negotiable Employee Safety Habits

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

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

14.1.2.2 Tips 🖳

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

14.1.3 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.

14.1.3.1 What is Motivation?

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

14.1.3.2 Maslow's Hierarchy of Needs

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



Fig. 14.1.3.2.1: Mashlow'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.

14.1.3.3 Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

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

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?

- 14.1.3.4 How to Cultivate a Positive Attitude –

The good news is attitude is a choice. So it is possible to improve, control and change our attitude, if we decide we want to! The following tips help foster a positive mindset:

- Remember that you control your attitude, not the other way around
- Devote at least 13.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

14.1.3.5 What is Attitude? -

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

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

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

14.1.3.6 What Are Your Strengths and Weaknesses

Another way to analyze yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses.

Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Strengths	Weaknesses



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

14.1.4 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.

14.1.4.1 Qualities of Honest People

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

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

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

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

14.1.4.2 Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves. Let's look at how being honest would lead to great benefits for entrepreneurs.

• **Honesty and customers:** When entrepreneurs are honest with their customers it leads to stronger relationships, which in turn results in business growth and a stronger customer network.

14.1.4.3 What are Work Ethics?

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

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

- 14.1.4.4 Elements of a Strong Work Ethic

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

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

14.1.4.5 How to Foster a Good Work Ethic

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

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

- 14.1.4.6 Tips 🖳

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

- 14.1.5 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

- 14.1.5.1 Tips 🖳

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

14.1.6 Time Management

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

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

Benefits of Time Management

Time management can lead to huge benefits like:

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

Not managing time effectively can result in undesirable consequences like:

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

14.1.6.1 Traits of Effective Time Managers

Some traits of effective time managers are:

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

14.1.6.2 Effective Time Management Techniques

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

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

- **14.1.6.3** Tips 🖳

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

- 14.1.7 Anger Management

Anger management is the process of:

- 1. Learning to recognize the signs that you, or someone else, is becoming angry.
- 2. Taking the best course of action to calm down the situation in a positive way Anger management does not mean suppressing anger.

Importance of Anger Management

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

Extreme anger can:

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

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

- 14.1.7.1 Anger Management Strategies

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

Strategy 1: Relaxation: Something as simple as breathing deeply and looking at relaxing images works wonders in calming down angry feelings. Try this simple breathing exercise:

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

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

Strategy 2: Cognitive Restructuring: Cognitive restructuring means changing the manner in which you think. Anger can make you curse, swear, exaggerate and act very dramatically. When this happens, force yourself to replace your angry thoughts with more logical ones. For instance, instead of thinking 'Everything is ruined' change your mindset and tell yourself 'It's not the end of the world and getting angry won't solve this'.

Strategy 3: Problem Solving: Getting angry about a problem that you cannot control is a perfectly natural response. Sometimes, try as you may, there may not be a solution to the difficulty you are faced with. In such cases, stop focusing on solving the problem, and instead focus on handling and facing the problem. Remind yourself that you will do your best to deal with the situation, but that you will not blame yourself if you don't get the solution you desire.

Strategy 4: Better Communication: When you're angry, it is very easy to jump to inaccurate conclusions. In this case, you need to force yourself to stop reacting, and think carefully about what you want to say, before saying it. Avoid saying the first thing that enters your head. Force yourself to listen carefully to

what the other person is saying. Then think about the conversation before responding.

Strategy 5: Changing Your Environment: If you find that your environment is the cause of your anger, try and give yourself a break from your surroundings. Make an active decision to schedule some personal time for yourself, especially on days that are very hectic and stressful. Having even a brief amount of quiet or alone time is sure to help calm you down.

- 14.1.7.2 Tips for Anger Management └

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

14.1.8 Stress Management

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

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress:

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

External causes of stress:

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

14.1.8.1 Symptoms of Stress

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

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

Physical Symptoms	Behavioral Symptoms
 Aches and pain Diarrhea 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, pacing etc.

14.1.8.2 Tips for Stress Management

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. ٠
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed. ٠
- Devote a part of your day towards exercise. •
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large ٠ amounts of sugar.
- Plan your day so that you can manage your time better, with less stress. •
- Say no to people and things when required. •
- Schedule time to pursue your hobbies and interests. •
- Ensure you get at least 7-8 hours of sleep. •
- Reduce your caffeine intake. •
- Increase the time spent with family and friends. •

UNIT 14.2: Digital Literacy: A Recap

– Unit Objectives 🗌

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

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



- 14.2.1.1 Basic Parts of a Computer

- 1. Central Processing Unit (CPU): The brain of the computer. It interprets and carries out program instructions.
- 2. Hard Drive: A device that stores large amounts of data.
- **3. Monitor:** The device that contains the computer screen where the information is visually displayed.
- 4. Desktop: The first screen displayed after the operating system loads.
- 5. Background: The image that fills the background of the desktop.
- 6. Mouse: A hand-held device used to point to items on the monitor.
- 7. Speakers: Devices that enable you to hear sound from the computer.
- 8. Printer: A device that converts output from a computer into printed paper documents.
- 9. Icon: A small picture or image that visually represents something on your computer.
- **10.** Cursor: An arrow which indicates where you are positioned on the screen.
- **11. Program Menu:** A list of programs on your computer that can be accessed from the Start menu.
- **12. Taskbar:** The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.
- 13. Recycle Bin: A temporary storage for deleted files.

- 14.2.1.2 Basic Internet Terms

- The Internet: Avast, 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.

14.2.1.3 Basic Computer Keys

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

- 14.2.1.4 Tips 🖳

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

14.2.2 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:

- 1. Microsoft Word: Allows users to type text and add images to a document.
- 2. Microsoft Excel: Allows users to enter data into a spreadsheet and create calculations and graphs.
- **3.** Microsoft PowerPoint: Allows users to add text, pictures and media and create slideshows and presentations.
- 4. Microsoft Outlook: Allows users to send and receive email.
- 5. Microsoft OneNote: Allows users to make drawings and notes with the feel of a pen on paper.
- 6. 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.

14.2.2.1 Tips



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

14.2.3 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:

- Online shopping Online auctions
- Online ticketing
- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- Business to Business (B2B): Both the transacting parties are businesses.
- Business to Consumer (B2C): Businesses sell electronically to end-consumers.
- **Consumer to Consumer (C2C):** Consumers come together to buy, sell or trade items to other consumers.
- **Consumer-to-Business (C2B):** Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A):** Online transactions conducted between companies and public administration.
- **Consumer-to-Administration (C2A):** Online transactions conducted between individuals and public administration.

14.2.3.1 Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers:

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers:

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

14.2.3.2 Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.

Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.

– 14.2.3.3 Tips 🖳



2. Pay close and personal attention to your social media.

UNIT 14.3: 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

- 14.3.1 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.
- 14.3.1.1 Tips 🖳

- 1. 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.
- 2. Decide that you will not buy anything on certain days or weeks and stick to your word.

14.3.2 Types of Bank Accounts

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

- 1. Current Accounts
- 2. Savings Accounts
- 3. Recurring Deposit Accounts
- 4. Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Savings Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

- 14.3.2.1 Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details (name, address, phone number, date of birth, gender, occupation, address)
- Method of receiving your account statement (hard copy/email)
- Details of your initial deposit (cash/cheque)
- Manner of operating your account (online/mobile banking/traditional via cheque, slip books) Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual needs to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

- Passport
- Driving License
- Voters' Identity Card
- PAN Card
- UIDAI (Aadhaar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!

- 14.3.2.2 Tips 🖳

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

- 14.3.3 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.	Incurred
Incurred	Incurred irrespective of units being produced.	Incurred only when units are produced.
Unit cost	Inversely proportional to the number of units produced.	Remains the same, per unit.
Examples	Depreciation, rent, salary, insurance, tax etc.	Material consumed, wages, commission on sales, packing expenses, etc.

14.3.3.1 Tips



1. 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.

14.3.4 Investment, Insurance and Taxes

Investment

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

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

• **Venture Capital:** Venture Capital involves investing substantial capital in a budding company in return for stocks in that company.

Insurance

There are two types of insurance:

- 1. Life Insurance
- 2. Non-Life or General Insurance.

Life Insurance Products

The main life insurance products are:

- **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.
- Endowment Policy: This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- Unit-Linked Insurance Plan (ULIP): Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.
- Money Back Life Insurance: While the policyholder is alive, periodic payments of the partial survival benefits are made during the policy tenure. On the death of the insured, the insurance company pays the full sum assured along with survival benefits.
- Whole Life Insurance: It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products:

- Motor Insurance: This can be divided into Four Wheeler Insurance and Two Wheeler Insurance.
- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.
- **Travel Insurance:** This can be categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- Home Insurance: This protects the house and its contents from risk.
- Marine Insurance: This insurance covers goods, freight, cargo etc. against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes:

- 1. Direct Taxes
- 2. Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable. Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.
- **Capital Gains Tax:** This tax is payable whenever you receive a sizable amount of money. It is usually of two types short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.
- Securities Transaction Tax: This tax is added to the price of a share. It is levied every time you buy or sell shares.
- **Perquisite Tax:** This tax is levied is on perks that have been acquired by a company or used by an employee.
- **Corporate Tax:** Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

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

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

– 14.3.4.1 Tips 🖳

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

14.3.5 Online Banking, NEFT, RTGS, etc.

What is Online Banking

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

Internet banking can be used to:

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

Electronic Funds Transfers

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

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

- Transfer funds into your own accounts of the same bank.
- Transfer funds into different accounts of the same bank.
- Transfer funds into accounts in different banks, using NEFT.
- Transfer funds into other bank accounts using RTGS.
- Transfer funds into various accounts using IMPS.

NEFT

NEFT stands for National Electronic Funds Transfer. This money transfer system allows you to electronically transfer funds from your respective bank accounts to any other account, either in the same bank or belonging to any other bank. NEFT can be used by individuals, firms and corporate organizations to transfer funds between accounts.

In order to transfer funds via NEFT, two things are required:

- A transferring bank
- A destination bank

Before you can transfer funds through NEFT, you will need to register the beneficiary who will be receiving the funds. In order to complete this registration, you will require the following

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

RTGS

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

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

- Name of the beneficiary
- Beneficiary's account number
- Beneficiary's bank address
- Bank's IFSC code

IMPS

IMPS stands for Immediate Payment Service. This is a real-time, inter-bank, electronic funds transfer system used to transfer money instantly within banks across India. IMPS enables users to make instant electronic transfer payments using mobile phones through both, Mobile Banking and SMS. It can also be used through ATMs and online banking. IMPS is available 24 hours a day and 7 days a week. The system features a secure transfer gateway and immediately confirms orders that have been fulfilled.

To transfer money through IMPS, the you need to:

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

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

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

- Link his mobile number with his respective account
- Receive the MMID from the bank •

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

- The beneficiary's mobile number •
- The beneficiary's MMID ٠
- The transfer amount
- Your MPIN

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

- 14.3.5.1 Differences Between NEFT, RTGS & IMPS

Criteria	NEFT	RTGS	IMPS
Settlement	Done in Batches	Real-Time	Real-Time
Full Form	national Electronic Fund Transfer	Real Time Gross Settlement	Immediate Payment Service
Timing on Monday to Friday	8.00 am - 6.30 pm	9.00 am - 4.30 pm	24x7
Timing on Saturday	8.00 am - 7.00 p.m.	9.00 am - 1.30 pm	24x7
Minimum amount of money transfer limit	₹1	₹ 2 lacs	₹1
Maximum amount of money transfer limit	₹10 lacs	₹10 lacs per day	₹ 2 lacs
Maximum charges as per RBI	Upto 10,000 - ₹ 2.5 above 10,000 - ₹ 1 lac - ₹ 5 above 1-2 lacs - ₹ 15 above 2-5 lacs - ₹ 25 above 5-10 lacs - ₹ 25	above 2-5 lacs - ₹ 25 above 5-10 lacs - ₹ 50	Upto 10,000 - ₹ 5 above 10,000 - ₹ 1 lac - ₹ 5 above 1-2 lacs - ₹ 15

14.3.5.2 Tips



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

UNIT 14.4: 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

14.4.1 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.

- Stud^ying the company beforehand will help you be more prepared at the time of the interview. Your
 knowledge of the organization will help you answer questions at the time of the interview, and will
 leave you looking and feeling more confident. This is sure to make you stand out from other, not as
 well informed, candidates.
- Look for background information on the company. Ty and find an overview of the company and its industry profile.
- Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.
- Note down any questions that you have after your research has been completed.

2. Think about whether your skills and qualifications match the job requirements.

- Carefully read through and analyze the job description.
- Make a note of the knowledge, skills and abilities required to fulfill the job requirements.
- Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.
- 3. Go through the most typical interview questions asked, and prepare your responses.
- Remember, in most interviews a mix of resume-based, behavioral and case study questions are asked.
- Think about the kind of answers you would like to provide to typical questions asked in these three areas.
- Practice these answers until you can express them confidently and clearly.
- 4. Plan your attire for the interview.
- It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
- Ensure that your clothes are clean and well-ironed. Pick neutral colours nothing too bright or flashy.

- The shoes you wear should match your clothes, and should be clean and suitable for an interview.
- Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.
- 5. Ensure that you have packed everything that you may require during the interview.
- Carry a few copies of your resume. Use a good quality paper for your resume print outs.
- Always take along a notepad and a pen.
- Take along any information you may need to refer to, in order to fill out an application form.
- Carry a few samples of your work, if relevant.

6. Remember the importance of non-verbal communication.

- Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
- Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
- Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.

7. Make a list of questions to end the interview with.

- Most interviews will end with the interviewer(s) asking if you have any questions. This is your chance to show that you have done your research and are interested in learning more about the company.
- If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
- Some good questions to ask at this point are:What do you consider the most important criteria for success in this job?
 - How will my performance be evaluated?
 - What are the opportunities for advancement?
 - What are the next steps in the hiring process?
- Remember, never ask for information that is easily available on the company website.

- 14.4.1.1 Tips 🛓

- 1. Ask insightful and probing questions.
- 2. 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.

14.4.2 Preparing an Effective Resume

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a résumé that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section: The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

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

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

Example:

Profile Summary

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

Step 3: Include Your Educational Qualifications: When listing your academic records, first list your highest degree. Then add the second highest qualification under the highest one and so on. To provide a clear and accurate picture of your educational background, it is critical that include information on your position, rank, percentage or CPI for every degree or certification that you have listed.

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

Example:

Educetional Qualification

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

Step 4: List Your Technical Skills: When listing your technical skills, start with the skills that you are most confident about. Then add the skills that you do not have as good a command over. It is perfectly acceptable to include just one skill, if you feel that particular skill adds tremendous value to your résumé. If you do not have any technical skills, you can omit this step.

Example:

To also i		CL.:I	
lecnni	cal	SKII	IS

- Flash
- Photoshop

Step 5: Insert Your Academic Project Experience

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

Example:

Project title	Organization	Platform used
Contribution	Description	

Academic Projects Project Title: Different Communication Skills Organization: True Blue Solutions Platform used: Articilate Contribution: Content writing and graphic zisualization Description: Development of storyboards for corporate induction & training programs.

Step 6: List Your Strengths: This is where you list all your major strengths. This section should be in the form of a bulleted list.

Example:

Strengths

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

Step 7: List Your Extracurricular Activities: It is very important to show that you have diverse interests and that your life consists of more than academics. Including your extracurricular activities can give you an added edge over other candidates who have similar academic scores and project experiences. This section should be in the form of a bulleted list.

Example:

Extracurricular Activities

- Mamber of the Debate Club
- Played tennis at at national level
- Won first prizes in the All India Camel Contest, 2010

Step 8: Write Your Personal Details: The last section of your résumé must include the following personal information:

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

14.4.2.1 Tips

Example:

.

•

Personal Details

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

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

14.4.3 Interview FAQs

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

1. 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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.

11. 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.

12. 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.

– 14.4.3.1 Tips 🖳

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

- 14.4.4 Work Readiness – Terms & Terminologies

Every employee should be well versed in the following terms:

- Annual leave: Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- Breaks: Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- Compensatory Time (Comp Time): Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's services to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.

- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- **Curriculum Vitae (CV)/Resume:** A summary of a candidate's achievements, educational background, work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer made by the employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- Employment Gaps: Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- Follow-Up: The act of contacting a potential employer after a candidate has submitted his or her resume.
- **Freelancer/Consultant/Independent Contractor:** A person who works for him or herself and pitches for temporary jobs and projects with different employers.
- Holiday: Paid time-off from work.
- Hourly Rate: The amount of salary or wages paid for 60 minutes of work.
- **Internship:** A job opportunity offered by an employer to a potential employee, called an intern, to work at the employer's company for a fixed, limited time period.
- **Interview:** A conversation between a potential employee and a representative of an employer, in order to determine if the potential employee should be hired.
- Job Application: A form which asks for a candidate's information like the candidate's name, address, contact details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.
- Job Offer: An offer of employment made by an employer to a potential employee.
- **Job Search Agent:** A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies.
- Lay Off: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- Leave: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- Letter of Acceptance: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- Letter of Agreement: A letter that outlines the terms of employment.
- Letter of Recommendation: A letter written for the purpose of validating the work skills of a person.
- Maternity Leave: Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor:** A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- Minimum wage: The minimum wage amount paid on an hourly basis.
- **Notice:** An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.

- Offer of Employment: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract:** A contract of employment that continues till the employer or employee terminates it.
- **Overqualified:** A person who is not suited for a particular job because he or she has too many years of work experience, or a level of education that is much higher than required for the job, or is currently or was previously too highly paid.
- **Part-Time Worker:** An employee who works for fewer hours than the standard number of hours normally worked.
- Paternity Leave: Leave granted to a man who has recently become a father.
- **Recruiters/Headhunters/Executive Search Firms:** Professionals who are paid by employers to search for people to fill particular positions.
- **Resigning/Resignations:** When an employee formally informs his or her employer that he or she is quitting his or her job.
- **Self-Employed:** A person who has his or her own business and does not work in the capacity of an employee.
- **Time Sheet:** A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

UNIT 14.5: 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. Understand the meaning of entrepreneur
- 20. Describe the different types of entrepreneurs
- 21. List the characteristics of entrepreneurs
- 22. Recall entrepreneur success stories
- 23. Discuss the entrepreneurial process
- 24. Describe the entrepreneurship ecosystem
- 25. Discuss the government's role in the entrepreneurship ecosystem
- 26. Discuss the current entrepreneurship ecosystem in India
- 27. Understand the purpose of the Make in India campaign
- 28. Discuss the relationship between entrepreneurship and risk appetite
- 29. Discuss the relationship between entrepreneurship and resilience
- 30. Describe the characteristics of a resilient entrepreneur
- 31. Discuss how to deal with failure

14.5.1 Concept Introduction

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

14.5.1.1 Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

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

14.5.1.2 Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common. They are all:

- 1. Extremely passionate about their work
- 2. Confident in themselves
- 3. Disciplined and dedicated
- 4. Motivated and driven
- 5. Highly creative
- 6. Visionaries
- 7. Open-minded
- 8. Decisive

Entrepreneurs also have a tendency to:

- 1. Have a high risk tolerance
- 2. Thoroughly plan everything
- 3. Manage their money wisely
- 4. Make their customers their priority
- 5. Understand their offering and their market in detail
- 6. Ask for advice from experts when required
- 7. Know when to cut their losses

14.5.1.3 Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

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

14.5.1.4 Types of Enterprises

As an entrepreneur in India, you can own and run any of the following types of enterprises:

Sole Proprietorship: In a sole proprietorship, a single individual owns, manages and controls the enterprise. This type of business is the easiest to form with respect to legal formalities. The business and the owner have no separate legal existence. All profit belongs to the proprietor, as do all the lossesthe 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.

14.5.1.5 Tips 🖳



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

14.5.2 Leadership & Teamwork: Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means t 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.

14.5.2.1 Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

- 1. Pragmatism: This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.
- 2. Humility: This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.
- 3. Flexibility: It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.

- **4.** Authenticity: This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.
- 5. Reinvention: This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.
- **6. Awareness:** This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

14.5.2.2 Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

- Gaining the loyalty and commitment of the team members
- Motivating the team to work towards achieving the company's goals and objectives
- Building morale and instilling confidence in the team members
- Fostering mutual understanding and team-spirit among team members
- Convincing team members about the need to change when a situation requires adaptability

14.5.2.3 Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

14.5.2.4 Importance of Teamwork in Entrepreneurial Success -

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

- 1. Unity of purpose: All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.
- **2.** Great communication skills: Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.
- **3.** The ability to collaborate: Every member should feel entitled to provide regular feedback on new ideas.
- **4. Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.
- **5.** Visionary members: The team should have the ability to anticipate problems and act on these potential problem before they turn into real problems.
- **6. Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.
- **7.** Excellent organizational skills: The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to measure progress and ROI.

14.5.2.5 Tips

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

14.5.3 Communication Skills -

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated.

It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

14.5.3.1 How to Listen Effectively

To listen effectively you should:

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

14.5.3.2 How to Listen Effectively

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable. Besides this, the words spoken out loud need to match the gestures, tone and body language used.

What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

14.5.3.3 How to Speak Effectively

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should be crystal clear at all times.
- Use a pleasant and natural tone when speaking. Your audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.
- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.
- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be careful not to speak too slowly because this can come across as stiff, unprepared or even condescending.
- Remember to pause at the right moments.

- 14.5.3.4 Tips 🖣

- 1. If you're finding it difficult to focus on what someone is saying, try repeating their words in your head.
- 2. 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.

14.5.4 Problem Solving & Negotiation skills

As per The Concise Oxford Dictionary (1995), a problem is, "A doubtful or difficult matter requiring a solution"

All problems contain two elements:

- 1. Goals
- 2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve the goals.

14.5.4.1 How to Solve Problems

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

- Step 1: Identify the problem
- Step 2: Study the problem in detail
- Step 3: List all possible solutions
- Step 4: Select the best solution
- Step 5: Implement the chosen solution
- Step 6: Check that the problem has really been solved

14.5.4.2 Important Traits for Problem Solving

Highly developed problem solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

- Being open minded
- Asking the right questions
- Being proactive
- Not panicking
- Having a positive attitude
- Focusing on the right problem

14.5.4.3 Important Traits for Problem Solving

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:

- Application forms: Ask for proof of the candidate's problem solving skills in the application form.
- **Psychometric tests:** Give potential candidates logical reasoning and critical thinking tests and see how they fare.
- **Interviews:** Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.
- **Technical questions:** Give candidates examples of real life problems and evaluate their thought process.

14.5.4.4 What is Negotiation?

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a startup. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate

Take a look at some steps to help you negotiate:

Step 1: Pre-Negotiation Preparation: Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.

Step 2: Discuss the Problem: This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.

Step 3: Clarify the Objective: Ensure that both parties want to solve the same problem and reach the same goal.

Step 4: Aim for a Win-Win Outcome: Try your best to be open minded when negotiating. Compromise and offer alternate solutions to reach an outcome where both parties win.

Step 5: Clearly Define the Agreement: When an agreement has been reached, the details of the agreement should be crystal clear to both sides, with no scope for misunderstandings.

Step 6: Implement the Agreed Upon Solution: Agree on a course of action to set the solution in motion.



1. Know exactly what you want before you work towards getting it

- 2. Give more importance to listening and thinking, than speaking
- 3. Focus on building a relationship rather than winning
- 4. Remember that your people skills will affect the outcome
- 5. Know when to walk away sometimes reaching an agreement may not be possible

14.5.5 Business Opportunities Identification

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

Peter Drucker

The ability to identify business opportunities is an essential characteristic of an entrepreneur.

What is an Opportunity?

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances.

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

Common Questions Faced by Entrepreneurs

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

Some common questions that entrepreneurs constantly think about are:

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

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

When is an Idea an Opportunity?

An idea is an opportunity when:

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

Factors to Consider When Looking for Opportunities

- Consider the following when looking for business opportunities:
- Economic trends Changes in funding
- Changing relationships between vendors, partners and suppliers
- Market trends
- Changes in political support
- Shift in target audience

Ways to Identify New Business Opportunities

- Identify Market Inefficiencies: When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.
- **Remove Key Hassles:** Rather than create a new product or service, you can innovatively improve a product, service or process.
- Create Something New: Think about how you can create a new experience for customers, based on existing business models.
- **Pick a Growing Sector/Industry:** Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.
- **Think About Product Differentiation:** If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities Within Your Business

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. 14.5.5.1: SWOT

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.

Establishing Your USP

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

Opportunity Analysis

Once you have identified an opportunity, you need to analyze it. To analyze an opportunity, you must:

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

14.5.5.1 Tips

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

14.5.6 Entrepreneurship Support Eco-System

An entrepreneur is a person who:

- Does not work for an employee
- Runs a small enterprise
- Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

- 1. The Traditional Entrepreneur: This type of entrepreneur usually has some kind of skill they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.
- 2. The Growth Potential Entrepreneur: The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.
- **3.** The Project-Oriented Entrepreneur: This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.
- 4. The Lifestyle Entrepreneur: This type of entrepreneur has usually worked as a teacher or a office assistant. 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

14.5.6.1 Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling "bhajias" to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

Dr. Karsanbhai Patel

Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-todoor 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.

14.5.6.2 The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

- **Stage 1:** Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.
- **Stage 2:** Germination or Recognition. In this stage a possible solution to the identified problem is thought of.
- **Stage 3:** Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.
- **Stage 4:** Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.
- **Stage 5:** Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.
- **Stage 6:** Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.
- **Stage 7:** Verification or Validation. In this final stage, the idea is verified to see if it works and if it is useful.

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



- 14.5.6.3 What is an Entrepreneur?

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

An entrepreneurship ecosystem comprises of the following six domains:

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

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



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

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

- 14.5.6.4 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

14.5.6.5 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:

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

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

Under the aegis support of Pradhan Mantri MUDRA Yojana, MUDRA has already created its initial products/ schemes. The interventions have been named 'Shishu', 'Kishor' and 'Tarun' 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:

- Shishu: Covering loans upto Rs.50,000/-
- Kishor: Covering loans above Rs. 50,000/- and upto Rs.5 lakh
- 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).

Stand Up India

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

Prime Minister Employment Generation Programme (PMEGP)

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
Company Costa comp	10%	15%
General Category		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.

International Cooperation Description

The Scheme would cover the following activities:

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

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

Who can apply?:

- State/Central Government Organisations;
- Industry/Enterprise Associations; and
- Registered Societies/Trusts and Organisations associated with the promotion and development of MSMEs

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.

Nature of assistance:

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

Who can apply?: Any enterprise registered in India as a micro or small enterprise is eligible to apply.

Marketing Assistance Scheme Description

The assistance is provided for the following activities:

- Organizing exhibitions abroad and participation in international exhibitions/trade fairs
- Co-sponsoring of exhibitions organized by other organisations/industry associations/agencies
- 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 cosponsoring 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.

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.

Enabling Participation of MSMEs in State/District Level Trade Fairs and Provide Funding Support

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:

- Free registration for participating in trade fairs. The selection of participants would be done by the MSME-DIs post the submission of application.
- 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).
- 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.

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?:

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

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.

Reimbursement of certification fees for acquiring ISO standards - ISO 9000/ISO 14001 Certification Reimbursement

The Goal 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.

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.

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.

Mega Food Park Description

Mechanism to link agricultural production and market to maximize value addition, enhance farmers 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.

Adivasi Mahila Sashaktikaran Yojana Description

Concessional scheme for the economic development of ST women. **Nature of assistance:** Term loan at concessional rates upto 90% of cost of scheme. **Who can apply?:** Scheduled Tribes Women.

- 14.5.6.6 Tips



- 1. Research the existing market, network with other entrepreneurs, venture capitalists, angel investors, and thoroughly review the policies in place to enable your entrepreneurship.
- 2. 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.
- 3. Be proactive in your ecosystem. Identify the key features of your ecosystem and enrich them to ensure self-sustainability of your entrepreneurship support ecosystem.

14.5.7 Risk Appetite & Resilience

Entrepreneurship and Risk

Entrepreneurs are inherently risk takers. They are path-makers not path-takers. Unlike a normal, cautious person, an entrepreneur would not think twice about quitting his job (his sole income) and taking a risk on himself and his idea.

An entrepreneur is aware that while pursuing his dreams, assumptions can be proven wrong and unforeseen events may arise. He knows that after dealing with numerous problems, success is still not guaranteed. Entrepreneurship is synonymous with the ability to take risks. This ability, called risk-appetite, is an entrepreneurial trait that is partly genetic and partly acquired.

What is Risk Appetite?

Risk appetite is defined as the extent to which a company is equipped to take risk, in order to achieve its objectives. Essentially, it refers to the balance, struck by the company, between possible profits and the hazards caused by changes in the environment (economic ecosystem, policies, etc.). Taking on more risk may lead to higher rewards but have a high probability of losses as well. However, being too conservative may go against the company as it can miss out on good opportunities to grow and reach their objectives.

The levels of risk appetite can be broadly categorized as "low", "medium" and "high." The company's entrepreneur(s) have to evaluate all potential alternatives and select the option most likely to succeed. Companies have varying levels of risk appetites for different objectives. The levels depend on:

- The type of industry
- Market pressures
- Company objectives

For example, a startup with a revolutionary concept will have a very high risk appetite. The startup can afford short term failures before it achieves longer term success. This type of appetite will not remain constant and will be adjusted to account for the present circumstances of the company.167

Risk Appetite Statement

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

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired tradeoff between risk and reward.
- Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience?

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

• By developing a professional network of coaches and mentors

- By accepting that change is a part of life
- By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

- A strong internal sense of control
- Strong social connections
- Skill to learn from setbacks
- Ability to look at the bigger picture
- Ability to diversify and expand
- Survivor attitude
- Cash-flow conscious habits
- Attention to detail

- 14.5.7.1 Tips 💾

- 1. 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.
- 2. Don't dwell on setbacks. Focus on what the you need to do next to get moving again.
- 3. While you should try and curtail expenses, ensure that it is not at the cost of your growth.

14.5.8 Success & Failures

Understanding Successes and Failures in Entrepreneurship

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

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

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

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

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

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

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

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

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

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

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

Shyam: I would tell them to do their research and ensure that their product is something that is actually wanted by customers. I'd tell them to pick their partners and employees very wisely and cautiously. I'd tell them that it's very important to be aggressive – push and market your product as aggressively as possible. I would warn them that starting an enterprise is very expensive and that they should be prepared for a situation where they run out of money.

I would tell them to create long term goals and put a plan in action to achieve that goal. I would tell them to build a product that is truly unique. Be very careful and ensure that you are not copying another startup. Lastly, I'd tell them that it's very important that they find the right investors.

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



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

UNIT 14.6: Preparing to be an Entrepreneur

– Unit Objectives 🗌

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

- 1. Discuss how market research is carried out
- 2. Describe the 4 Ps of marketing
- 3. Discuss the importance of idea generation
- 4. Recall basic business terminology
- 5. Discuss the need for CRM
- 6. Discuss the benefits of CRM
- 7. Discuss the need for networking
- 8. Discuss the benefits of networking
- 9. Understand the importance of setting goals
- 10. Differentiate between short-term, medium-term and long-term goals
- 11. Discuss how to write a business plan
- 12. Explain the financial planning process
- 13. Discuss ways to manage your risk
- 14. Describe the procedure and formalities for applying for bank finance
- 15. Discuss how to manage your own enterprise
- 16. List important questions that every entrepreneur should ask before starting an enterprise

14.6.1 Market Study / The 4 Ps of Marketing / Importance of an IDEA

Understanding Market Research

Market research is the process of gathering, analyzing and interpreting market information on a product or service that is being sold in that market. It also includes information on:

- Past, present and prospective customers
- Customer characteristics and spending habits
- The location and needs of the target market
- The overall industry
- Relevant competitors

Market research involves two types of data:

- Primary information. This is research collected by yourself or by someone hired by you.
- Secondary information. This is research that already exists and is out there for you to find and use.

Primary research

Primary research can be of two types:

- Exploratory: This is open-ended and usually involves detailed, unstructured interviews.
- **Specific:** This is precise and involves structured, formal interviews. Conducting specific research is the more expensive than conducting exploratory research.

Secondary research

Secondary research uses outside information. Some common secondary sources are:

- **Public sources:** These are usually free and have a lot of good information. Examples are government departments, business departments of public libraries etc.
- **Commercial sources:** These offer valuable information but usually require a fee to be paid. Examples are research and trade associations, banks and other financial institutions etc.
- **Educational institutions:** These offer a wealth of information. Examples are colleges, universities, technical institutes etc.

14.6.1.1 The 4 Ps of Marketing

The 4 Ps of marketing are:

- 1. Product,
- 2. Price,
- 3. Promotion and
- 4. Place.

Let's look at each of these 4 Ps in detail.

Product

A product can be:

- A tangible good
- An intangible service

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

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

Price

Once all the elements of Product have been established, the Price factor needs to be considered. The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some questions to ask yourself are:

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

Promotion

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

Some questions to ask yourself are:

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

Place

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

Some questions to ask yourself are:

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

Importance of an IDEA

Ideas are the foundation of progress. An idea can be small or ground-breaking, easy to accomplish or extremely complicated to implement. Whatever the case, the fact that it is an idea gives it merit. Without ideas, nothing is possible. Most people are afraid to speak out their ideas, out for fear of being ridiculed. However, if are an entrepreneur and want to remain competitive and innovative, you need to bring your ideas out into the light.173

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.

- 14.6.1.2 Tips 빌

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

14.6.2 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.

14.6.3 Basic Accounting Formulas

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

- 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
- 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
 - Politika. 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 fulfill obligations to creditors if the business starts making a loss.

Formula: Debt-to-Equity Ratio = Total Liabilities/Total Equity

- 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

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:

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

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=thenumberoftimesthatinterestiscompoundedperyeart=thenumberofyearsthemoneyisinvested or borrowed for.

14.6.4 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.

Benifits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to: Increased sales
 - Identification of customer needs
 - Cross-selling of products
 - It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

14.3.4.1 What is Networking?

In business, networking means leveraging your business and personal connections in order to bring in a regular supply of new business. This marketing method is effective as well as low cost. It is a great way to develop sales opportunities and contacts. Networking can be based on referrals and introductions, or can take place via phone, email, and social and business networking websites.

The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs.

Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that. Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

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

14.6.4.2 Tips

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

14.6.5 Business Plan: Why Set Goals

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

Short-Term Goals

- These are specific goals for the immediate future. Example: Repairing a machine that has failed. Medium- Term Goals
- These goals are built on your short term goals.
- They do not need to be as specific as your short term goals.

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

Long-Term Goals

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

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan

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

A business plan typically comprises of eight elements.

14.6.5.1 Elements of a Business Plan

Executive Summary

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

Your Executive Summary should include:

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

Example: Nike's Mission Statement

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

- **Company Information:** Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.
- **Growth Highlights:** Mention examples of company growth. Use graphs and charts where possible.
- Your Products/Services: Describe the products or services provided.
- Financial Information: Provide details on current bank and investors.
- Summarize future plans: Describe where you see your business in the future.

Business Description

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

Your Business Description should include:

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

Market Analysis

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

Your Market Analysis should include:

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

Organization & Management

This section should come immediately after the Market Analysis. Your Organization & Management section should include:

• Your company's organizational structure

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

Service or Product Line

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

Your Service or Product Line section should include:

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

Marketing & Sales

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

Your Marketing section should include the following strategies:

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

Your Sales section should include the following information:

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

Funding Request

This section is specifically for those who require funding for their venture. The Funding Request section should include the following information:

- How much funding you currently require.
- How much funding you will require over the next five years. This will depend on your long-term goals.
- The type of funding you want and how you plan to use it. Do you want funding that can be used only for a specific purpose, or funding that can be used for any kind of requirement?
- Strategic plans for the future. This will involve detailing out your long-term plans what these plans are and how much money you will require to put these plans in motions.

Historical and prospective financial information. This can be done by creating and maintaining
all your financial records, right from the moment your enterprise started, to the present day.
Documents required for this are your balance sheet which contains details of your company's
assets and liabilities, your income statement which lists your company's revenues, expenses and
net income for the year, your tax returns (usually for the last three years) and your cash flow budget
which lists the cash that came in, the cash that went out and states whether you had a cash deficit
(negative balance) or surplus (positive balance) at the end of each month.

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.

14.6.5.2 Tips 🖳

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

14.6.6 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.

14.6.6.1 What Information Should Entrepreneurs Offer Banks for Funding

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- Letter(s) of Introduction: This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- Your Profile: This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- **Business Brochure:** A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- **Bank and Other References:** If you have an account with another bank, providing those bank references is a good idea.
- **Proof of Company Ownership or Registration:** In some cases, you may need to provide the bank with proof of company ownership and registration. A list of assets and liabilities may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Profit-and-Loss Account
- Cash-Flow Statement
- Projected Sales and Revenues
- Business Plan
- 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.

14.6.6.2 The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

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

The Procedure

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

- Submit your application form and all other required documents to the bank.
- The bank will carefully assess your credit worthiness and assign ratings by analyzing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.
- The bank will make a decision as to whether or not you should be given funding.



- 1. Get advice on funding options from experienced bankers.
- 2. 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.

14.6.7 Enterprise Management - An Overview

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required: Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others – realize that you cannot handle everything yourself: Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle. Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more

time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job: Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well: Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase their motivation.

Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well: Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers. This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively: Use all your skills and the skills of your employees to market your enterprise in an effective manner. You can also hire a marketing agency if you feel you need help in this area.

Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

- 14.6.7.1 Tips 🖳



- 1. Get advice on funding options from experienced bankers.
- 2. 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.

14.6.7.2 Considering Entrepreneurship

Questions to Ask Yourself Before Considering Entrepreneurship

- Why am I starting a business?
- What problem am I solving?
- Have others attempted to solve this problem before? Did they succeed or fail?

- Do I have a mentor1 or industry expert that I can call on?
- Who is my ideal customer2?
- Who are my competitors3?
- What makes my business idea different from other business ideas?
- What are the key features of my product or service?
- Have I done a SWOT4 analysis?
- What is the size of the market that will buy my product or service?
- What would it take to build a minimum viable product5 to test the market?
- How much money do I need to get started?
- Will I need to get a loan?
- How soon will my products or services be available?
- When will I break even6 or make a profit?
- How will those who invest in my idea make a profit?
- How should I set up the legal structure7 of my business?
- What taxes8 will I need to pay?
- What kind of insurance9 will I need?
- Have I reached out to potential customers for feedback

14.6.7.3 Tips

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

Footnotes:

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







Price:

"This book is provided free to students under the PMKVY (Pradhan Mantri Kaushal Vikas Yojana)."