



Participant Handbook

Sector
Food Processing

Sub-Sector
Multi-Sectoral

Occupation
Processing

Reference ID: **FIC/Q9007, Version 2.0**
NSQF level 4



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**Multi Skill Technician
(Food Processing)**



Shri Narendra Modi
Prime Minister of India

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



Certificate

COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

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FOOD INDUSTRY CAPACITY AND AND SKILL INITIATIVE (FICSI)

for

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This participant handbook is dedicated to all the aspiring youth who desire to achieve special skills which would be a lifelong asset for their future endeavors and help them make a bright career in the Food Processing Sector.

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1. Prepare and Maintain Work Area and Process Machineries for production of final products



Unit 1.1- Materials and equipments used in the cleaning along with methods of cleaning and maintenance of the work area

Unit 1.2- Common detergents and sanitizers used in cleaning work area and machineries

Unit 1.3- Preparing the Work Area before Starting Production

Unit 1.4- Maintenance procedures and their types

Unit 1.5 Process of preparing tools and equipments prior to the production along with minor repairs



Key Learning Outcomes

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

1. State the material and equipment used in the cleaning and maintenance of the work area
2. State the common detergents and sanitizers used in cleaning work area and machineries
3. State the methods of cleaning and sanitation
4. Perform the process of preparing the work area for scheduled production
5. Describe the functions to be carried out before starting production
6. State the different types of maintenance procedures
7. Conduct minor repairs and faults in process machineries
8. Prepare the machines and tools required for production

Unit 1.1 Materials and equipment used in the cleaning along with methods of cleaning and maintenance of the work area

Unit Objectives

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

1. List various methods of cleaning and sanitation
2. List various tools used for sanitation and cleaning
3. List various pre requisites for effective cleaning and sanitization of equipment and facilities;
4. Explain general procedure for cleaning and disinfection
5. State various precautionary measures to be taken while cleaning and sanitization

1.1.1. CIP (Cleaning In Place)

Cleaning of food contact surfaces and other surfaces

Proper cleaning is essential in any food producing plant. The purpose of cleaning is to remove all visible soil from equipment surfaces to ensure proper sanitation and sterilization of surfaces. A consistently good result from a production operation can also only be expected if the equipment is clean. Food soil stuck to surfaces or penetrated into materials can cause inefficient production and increase the risk of microbial infection. Therefore, the cleaning of a plant and its equipments must be carried out with attention to detail. The design and installation of these cleaning equipments are of great importance. The wet cleaning of equipment involves three basic steps:

1) Pre-rinsing

Pre-rinsing is the removal of loosely adhering residues from plant surfaces with water. It is conducted as soon as production is completed to prevent soil from drying on the surfaces. A sustained period of rinsing is needed to ensure complete removal. Rinsing is essential. It can remove as much as 95% of the soil. Much more detergent is used if there is no rinsing.

2) Cleaning

Cleaning is accomplished by process of manual cleaning or cleaning-in-place, or circulating hot detergent solutions through process lines and tanks for the appropriate length of time.

3) Final Rinsing

Clean water is used to remove the last traces of residues and detergent. The quality of this water is important for physical, chemical and microbiological reasons.

1.1.2. Materials and equipment used in the cleaning and maintenance of the work area:

1.1.2.1. Manual cleaning for non-food contact surfaces:

Industrial gloves and brushes must be available for manual cleaning. Mild chemicals are used with pH between 4 and 9). It is difficult to achieve consistent results because the human factor is involved in manual cleaning. Motivation through training, supervision and proper education are required.

1.1.2.2. Mechanical Cleaning Equipments

The purpose of mechanical equipment is to make easy cleaning. Unfortunately industry do not have universal cleaning machine. Further operations like cleaning by vacuum, scrubbing and pressure washing need different machines. Below indicated mechanical cleaning tools are used for floor and other surface cleaning.



1.1.2.3. Vacuum cleaners

In case of Vacuum cleaners, there is great variety in capacity, size, and design. Some pick up dry matter, most industrial machines are appropriate for both wet and dry dirt. Generally vacuum cleaners operate with mains electricity, but now-a-days few models work from batteries. Some are petrol-driven types with fitted seat and steering wheel.



1.1.2.4. Scrubbers and polishers

Scrubbers are normally designed to use only on floors, since general models depend on the weight and size of machine to keep rotating brush, or brushes, in contact with surface to be cleaned. They are more useful where huge areas of floor need scrubbing but, for good results, a smooth floor is necessary. Floors that are engaged with equipment and machinery are obviously less readily cleaned.



1.1.2.5. Steam cleaners

These machines are particularly useful for heavy duty rinsing and cleaning. Some of the designs have built-in generators for steam; others require a source of steam externally from utility. These machines can be dangerous if not operated properly.

1.1.2.6. Crate washing machines

Where big numbers of similar type of containers like crates, require cleaning, crate washers are used. It is also effective and labour saving. They generally work on sequence of rinsing, washing, and rinsing. Detergents suitable for operation need to be standardized as per condition of crates. In such set-up at least one step in the sequence involves the use of hot water.



1.1.2.7. Foam cleaning machines

- This technique of cleaning through foam allows detergent to be delivered as foam. It has advantage for increasing the time of contact between dirt and detergent. It is equally suitable for horizontal, vertical or inverted surfaces. It is easy to check where the foam has not been applied and is suitable for cleaning parts of machinery not accessible by hand.
- Wherever steam or water cleaners are used, all electrical equipment should be totally enclosed and waterproof.



1.1.2.8. The precautionary measures for Cleaning and Sanitization

The precautionary measures to be taken before cleaning of any equipment/machine are as follows:

- Obtain a Work Permit before carrying out any equipment internal cleaning activity in respective section as per SOP.
- All energy sources are de-energized before carrying out cleaning activity.
- Use appropriate PPE (Mask, gloves, goggles, safety belts, ladder, etc.) People required to enter into a vessel/equipment should wear a safety belt, mouth cover, hair-net, helmets, dedicated safety shoes or new shoe covers.
- Always clean the equipment first and then the floors
- If the cleaning process requires man entry into the vessel/equipment, ensure that the Confined Space Entry permit / Cold Work permit (as the case may be) has been received and all due safety measures have been taken.
- Equipment generally used for fat rich products must be cleaned according to the schedule, or cleaned within a week irrespectively.
- All equipment shall be stored when not in use in a clean and dry place that prevents contamination.
- The temperature of detergent solution in manual cleaning shall be such that it does not affect the hands of user.
- Wherever manual cleaning is involved, it is recommended that the hands and eyes of the operator be adequately protected by the use of gloves, goggles, etc.

1.1.3. Cleaning Parameters

1.1.3.1. During cleaning, five critical parameters should be controlled:

- Chemical type
- Chemical concentration
- Contact between the chemical and the processing equipment
- Contact time
- Contact temperature

1.1.3.2. Tips to Conduct CIP in a process:

- Use the right vessels for the right process
- Use the right cleaning and sanitizing solutions
- Ensure correct flow rate
- Ensure all connections are clean
- Monitor and verify the entire process

1.1.3.3. Sequencing of Cleaning during CIP in a food Industry:

CIP programs of plant vary according to the temperature of the surface to be cleaned.

- CIP programs for circuits with heated surfaces.
- CIP programs for circuits with no heated surfaces.

The major distinction between both of them is that circulation of acid must be incorporated in the CIP program for circuits with heated surface to eliminate encrusted protein and salts from the surfaces of heat-treatment equipment.

The sequence for CIP cleaning is as follows:

- a. Recover product residue from drainage
- b. Remove non-retrievable residue with water or compressed air
- c. Rinse for 10 minutes with hot water(50-60°C)
- d. Circulate alkaline detergent (0.5-1.5 % solution) at 75 °C for 30 minutes
- e. Rinse with warm water (50 °C) for 5-8 minutes
- f. Circulate acidic detergent (0.5-1.0 % solution) at 75 °C for 20 minutes
- g. Rinse with warm water (50 °C) for 5-8 minutes
- h. Use thermal disinfection (90-95°C) and cooling for 10 minutes or chemical disinfection with a suitable sanitizer

1.1.4. Clean-Out-Of-Place (COP)

COP is conducted at a cleaning station. This method involves dismantling of the equipment. In this process, equipment and units are scrubbed with soap in COP tanks. After this, the tanks are rinsed again to remove residual detergent or chemicals. Equipment and units are reassembled and sanitized once more with heat treatment or sanitizing agent.

1.1.5. Sterilizing-In-Place (SIP)

SIP is the process by which food-processing equipment is sanitized after the CIP process. It helps to eliminate any residual microbiological contamination.

SIP is a combination of three processes viz. sterilization, disinfestations, and sanitization.

Sterilization

== Uses steam or hot water

Disinfestation

== Uses disinfectants or chlorine solution

Sanitization

== Uses soap solution or washing soda

Unit 1.2 Common detergents and sanitizers used in cleaning work area and machineries

Unit Objectives:

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

- List the common detergents and sanitizers used in cleaning work area and machineries
- List Pre-requisites for effective cleaning and sanitization
- Types of detergents used in cleaning
- What should be quality of water used for cleaning
- State various precautionary measures to be taken while cleaning and sanitization

1.2.1 Pre-requisites for effective cleaning and sanitization

The main purpose of cleaning of food processing equipments after production is to remove all residues. Residues provide harbourage for growth of microbes that affect product keeping quality and which may cause disease to consumers. Further, excessive soil build up will be unfavourable to those processes where heat transfer is involved.

1.2.2 Good Quality Water

- a) The water used at food processing plant shall specify to IS 10500.
- b) Only clean and potable water, along with proper facilities for storage as well as distribution shall be utilized for production purpose.
- c) Storage tanks for water shall be cleaned as per schedule and records of such cleaning shall be maintained in prescribed register.
- d) Non potable water can be used only for cleaning and steam production of non-food processing equipment, firefighting & refrigeration equipment.
- e) Worker must understand potable and non-portable water pipe lines.

1.2.3 Types of chemicals

Chemicals used in cleaning can be simple or formulated cleaning detergents. If formulated cleaning detergents are used, supplier recommendations must be followed fully. The chemicals used depends on

1.2.4 The soil type.

- Chlorinated alkalis are used for cleaning protein oils
- Chemicals with high alkalinity (NaOH, KOH) are used for removing carbohydrate soils.

Table 3.2.1: Detergent solutions are recommended by BIS

Purpose	Detergent solution	Quantity per 1000 g
For general use	Tri-sodium phosphate Wetting agent	850g/1000 g 100g/1000 g
For aluminium utensils	Tri-sodium phosphate, sodium met silicate, Wetting Agent	650g/1000 g 200g/1000 g 150g/1000 g
Cleaning In Place (CIP)	Caustic	1-1-2%

- * Wetting agent: Acinol-N, Idet-10, Teepol, or equivalent compound
Maintain strength of detergent solution between 0.8% - 1%.

1.2.5 Chemical concentration

- The chemical concentration of the detergent depends on the kind of soil to be removed.
- Heated surfaces often require higher concentrations than cold ones.
- Also, when dosing equipment is used, the concentration of detergent should be adjusted so as not to interfere with the proper functioning of the machinery.
- A conductivity measurement with a guarding and recording function is sometime required.
- Semi-automatic and manual cleaning units are used in heat exchangers cleaning
- Either a dosing device should be constructed or a premix of ready to use detergents solution must be prepared in sufficient amounts (For cleaning the circuits).

1.2.6 Contact between the chemical and processing equipments

- A good turbulent flow is required between the circulating liquid and inner surface of pipes. To remove sediment and trapped air.
- Due to flow restrictions and a special "cleaning pump" may be necessary.
- A spray device is also required after every two meters in horizontal tanks.

1.2.7 Exposure Time

- It is different for both, alkaline clean and acid clean surface.
- Acid clean usually takes a less time than alkaline clean.
- Pre-rinse and intermediate rinse and final rinses take about five to ten minutes.

1.2.8 Contact Temperature

- The temperature of the pre rinse should be above the fat melting points, but below the denaturation temperature for proteins.
- Cleaning utilizes chemicals. All chemical reactions are very much temperature dependent.

1.2.9 Microbiological Load

- Sanitizer activity depends upon the type of micro-organism present.
- Spores are more resistant than vegetative cells.

1.2.10 Disinfection

Disinfection of food contact surfaces may be carried out by means of:

- Steam – After the condensate reaches the temperature of 850 C, steaming should be done for 10- 12 minutes.
- Hot water - Hot water at 80oC (to avoid salt deposition, soft water should be used) for minimum 20 minutes in circulation cleaning for 15 minutes, at 850C.

Table 1.2.1: Types of cleaners and sanitizing agents used in food industry

Cleaning agents	Used for	Risk	Safety measure
Hypochlorite's like potassium hypochlorite, sodium hypochlorite, and calcium hypochlorite	Cleaning stainless steel food contact surfaces	Leads to corrosion	Ensure pH and concentration levels are maintained
Liquid chlorine	Internal cleaning of stainless steel equipment and vessels	Leads to corrosion	Ensure concentration levels are maintained
Hydrogen peroxide	Killing bacterial spores, pathogens, spoilage organisms, and other microorganisms	Has a strong odour	Use in well-ventilated and open spaces
Ozone	Cleaning food-contact and non-food-contact surfaces like equipment, walls, floors, drains, conveyors, tanks, and other containers; Killing microbes	No risk involved since it leaves no residue	Safe to use

1.2.11 Storage of Sanitizers and Disinfectants

Sanitizers and disinfectants are packed and labelled in a proper manner. They are kept in a safe area within the storeroom. The cleanliness of this area is maintained at all time

1.2.12 Precautionary measures during Cleaning and Sanitization

The precautionary measures to be taken before cleaning of any equipment/machine are as follows;

- Obtain a Work Permit before carrying out any equipment internal cleaning activity in respective section as per SOP.
- All energy sources are de-energized before carrying out cleaning activity.
- Use appropriate PPE (Mask, gloves, goggles, safety belts, ladder, etc.) People required to enter into a vessel/equipment should wear a safety belt, mouth cover, hair-net, helmets, dedicated safety shoes or new shoe covers.
- Always clean the equipment followed by floors cleaning
- If the cleaning process requires human entry into the vessel/equipment, ensure that the Confined Space Entry permit / Cold Work permit (as the case may be) has been received and all due safety measures have been taken.
- Equipment used for handling raw and perishable food products must be cleaned and disinfected after each process.
- Equipment handling products high in fat (butter, ghee and cheese) must be cleaned after the process.
- All equipment shall be stored when not in use in a clean and dry place that prevents contamination.
- The temperature of detergent solution in manual cleaning shall be such that it does not affect the hands of user.
- Wherever manual cleaning is involved, it is recommended that the hands and eyes of the operator be adequately protected by the use of gloves, goggles, etc.

Unit 1.3 Preparing the Work Area before Starting Production

Unit Objectives

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

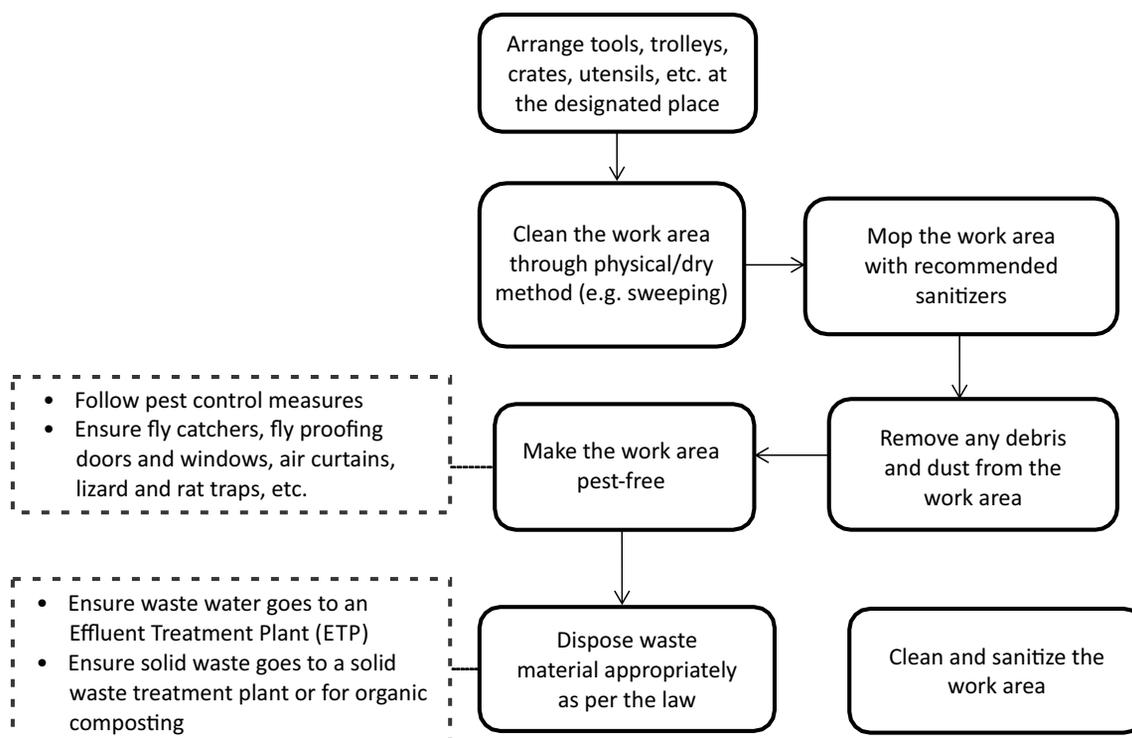
- Know the process of cleaning the Work area before starting production
- Explain the Process of preparing the work area for scheduled production
- Explain the Process of cleaning tools and equipments
- Conduct safety and hygiene checks of machineries and equipment's for production process

1.3.1 Process of Preparing the Work Area before Starting Production

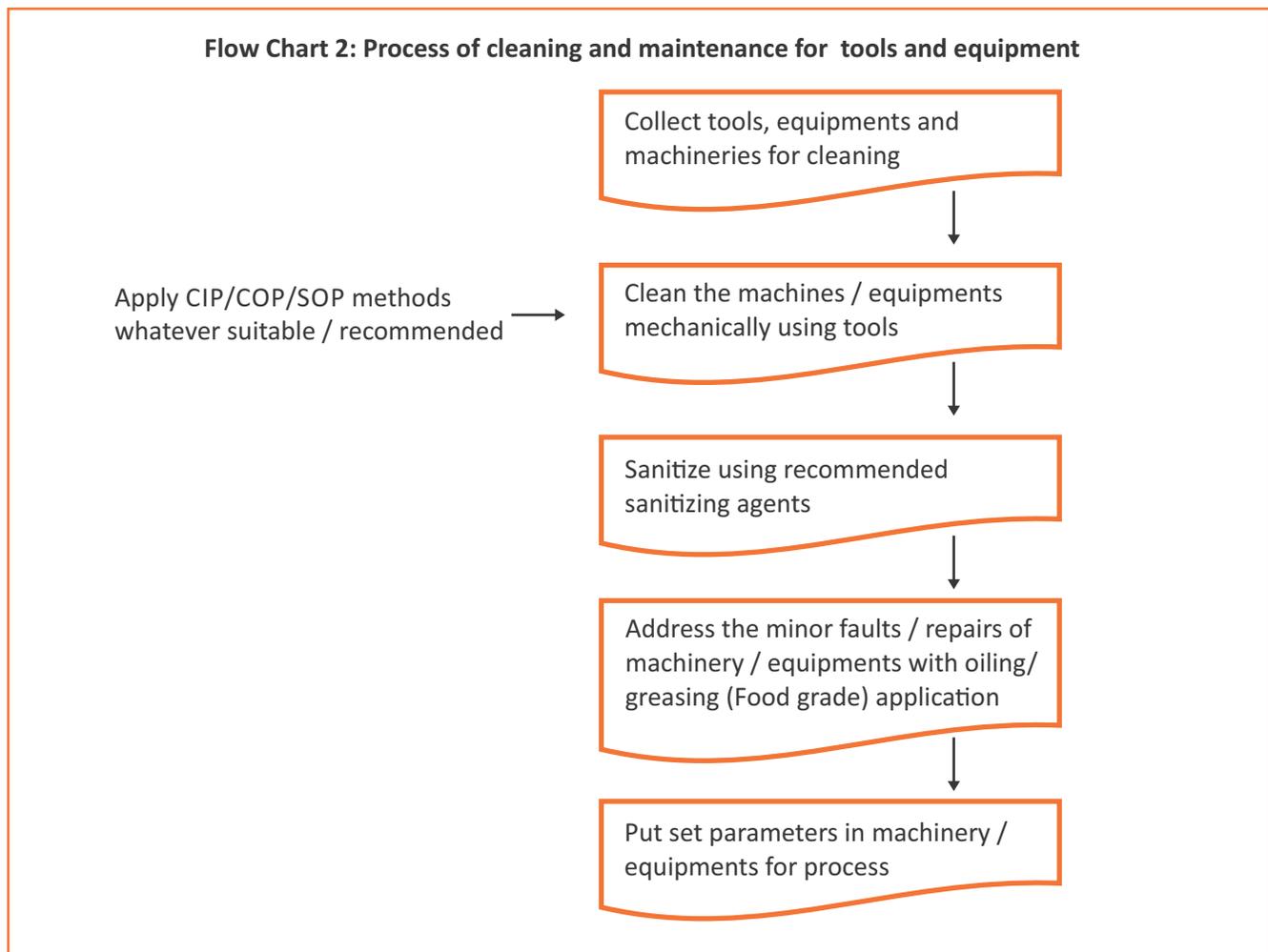
As per food safety norms, all food processing premises should follow high standards of hygiene and cleanliness in order to prevent contamination of products.

The following chart explains the process of cleaning the work area before production. The dotted boxes explain pest-control measures and methods used for waste material disposal in detail.

Flow chart 1: Process of Cleaning Workplace area before starting production



Flow Chart 2: Process of cleaning and maintenance for tools and equipment



1.3.2 Following are the functions of Preparing of workplace area for Scheduled production

- Raw materials and finished product should move between different stages in a process without crossing paths. This decrease the risk of contaminating final product, as well as, reducing the likelihood of accidents during operation.
- There should be enough space to separate storage of raw-materials, ingredients, packing materials and finished goods.
- Toilet should be located away from the processing area by two doors or in a separate building.
- Food production premises should have sufficient space for the intended scale of operation and include:
 - space for storage of raw material
 - space for production
 - space for weighing and inspecting incoming material
 - space for packaging and storage of products
 - space for maintenance & repair of equipments
 - first aid box, sand buckets and fire extinguishers

1.3.3. Safety and hygiene checks of the work area and processing machineries before production

- ✓ Ensure the work area, floors, walls and drains are cleaned
- ✓ Ensure the availability of utilities (power back up, hot water, steam, compressed air etc.), measurement and control devices (temperature, weighing machine, pressure gauge etc.)
- ✓ Ensure the waste materials are disposed properly



- ✓ Ensure all the equipment's and tools are cleaned, sanitized and ready for operation
- ✓ All metal equipment's and tools are air dried after cleaning
- ✓ Material handling equipment's (conveyor systems, forklifts etc.) and storage facility (crates, bins cold storage etc.) are available for operation



1.3.4. Performance check on machines and equipment's

- ✓ Ensure the equipment's disassembled for cleaning are reassembled
- ✓ Equipment's are calibrated wherever necessary
- ✓ Monitor the control panel of the machineries and ensure the process parameters are set as per the standards
- ✓ Ensure all the regulatory keys are in working condition



1.3.5. Functions of preparing workplace area for Scheduled production

As per food safety norms, all food processing premises should follow high standards of hygiene and cleanliness in order to prevent contamination of products.

1.3.6. Following are the functions of Preparing of workplace area for Scheduled production

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 - space for storage of raw material
 - space for production
 - space for weighing and inspecting incoming material
 - space for packaging and storage of products
 - space for maintenance & repair of equipments
 - first aid box, sand buckets and fire extinguishers

Unit 1.4 Maintenance procedures and their types

Unit Objectives

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

- State types of maintenance procedures
- State effectiveness of maintenance
- Steps to be taken care in a Food Industry

1.4.1 Types of Maintenance Procedure

Maintenance is an action of high level risk, since maintenance time and again requires working alongside operation process and closely with equipment/ machinery. In activities of and related to maintenance, divergent to normal operation, direct contact between machine and workers can't be squashed significantly, because it is an activity where workers have to be in close contact with processes as well as machinery.

Maintenance frequently involves not so usual work, tasks off from routine, and it's often carried out in exceptional conditions, such as in restricted spaces. For example: operations of maintenance usually include both disassembly and re-assembly, often involving machinery that is complicated. This can be related with a greater risk of human error, increasing the risk of accidents.

Working under pressure of time is also usual for operations of maintenance, particularly when shutdowns or high-priority repairs are involved.

Consequently, there is a greater risk of accidents that are related to maintenance activities.

There are three types of Maintenance process:

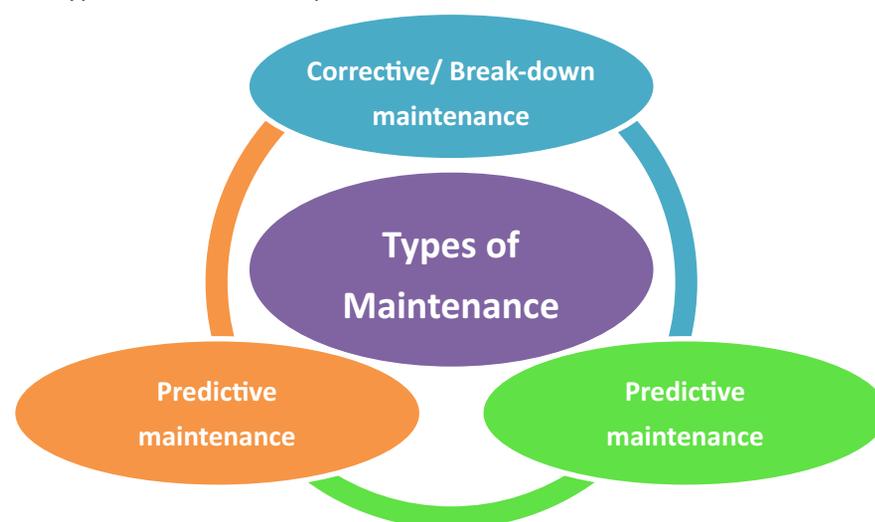


Fig 3.5 Types of maintenance procedures

1.4.1.1. Preventive maintenance

- Performing maintenance actions with the aim of preventing failures, safety violations, needless production losses, and to save original materials of fabrication
- Involves predicting the service life of important parts/equipment
- Regular inspection or diagnosis
- Parts/equipment are replaced as per manufacturers specifications
- The effectiveness of a schedule of preventive maintenance is dependent on the Root Cause Analysis
- The maintenance of history sheet also aids in early detection of troubles and increase the life of equipment.

1.4.1.2. Predictive maintenance

- 'Predictive maintenance' has been aroused from sensing and computing technology advancement
- It involves periodically inspecting, servicing, and cleaning the equipment
- It involves periodic replacing of parts to prevent sudden failure and process problems
- To monitor key parameters within a machine or system, sensors are used, and this data in conjunction with analysed historical trends to constantly evaluate the health of the system and predict a failure before it occurs e.g. on-line monitoring of bowl speed, motor current, flow-rate etc. during Clarifier/Bacteria removing clarifier operation.
- The constant monitoring of temperature of say bearings or internal motor or transformer windings would allow the technician to take suitable action even prior to the due preventive maintenance of the equipment.

1.4.1.3. Corrective/ Break-down maintenance

- Equipment's maintenance is often most expensive after its break down or malfunction.
- Involves redesigning of equipment to improve reliability
- Involves repairing of equipment after breakdown
- The worn out part of the equipment may spoil other parts and lead to multiple damage and increase repair/replacement costs.
- Higher Machine downtime and Production loss



Fig.3.4.1 Bins

Nuts, screws and bolts in boxes to be counted them before as well as after the works to prevent their entry in food.

1.4.2 Steps to be taken care in a Food Industry

- i. Workshops for maintenance shall be separate and away from areas of production. Storage of spares, changed parts and tools shall be in dedicated rooms or lockers. Tools and spare parts, for the preparation of products that are susceptible to microbial contamination, shall be disinfected before these are carried into the production areas.
- ii. Regularly as per the instructions of the manufacturer preventive maintenance of machinery and equipment shall be performed.
- iii. The programs for preventive maintenance shall include all the devices to monitor and/or control food safety hazards and cover the maintenance procedure, frequency and identification of the person (and/or external agency) responsible for maintenance activity.
- iv. For critical food safety equipment, Internal & External calibration schedule shall be maintained.
- v. Corrective maintenance shall be conceded out in such a manner that production on adjacent lines or machine is not at risk of contamination and authentication after maintenance shall be done.
- vi. The food product safety which fixes temporarily at risk shall be removed / set permanently in a timely mode.
- vii. There is no risk of directly or indirectly contact of lubricants, heat transfer fluids or any other similar material with the product. So, these materials shall be food grade.
- viii. Records of breakdown of plant equipment's shall be properly maintained.
- ix. Control policy of loose items such as nut & bolts, nails broken pieces or smaller parts of machines shall be followed to avoid any risk of contamination in product or packaging material.

1.4.3 A sample equipment record card is presented here for an example which will have all the record related to maintenance, lubrication and change of spare parts

DESCRIPTION	(NAME OF PLANT)	MODEL	CAPACITY	SERIAL NO.	INVENTORY NO.
NAME ADDRESSES TELEPHONES TELEXES CONTACTS CONTRACTS					
MANUFACTURER			SERVICE CONTRACT COMPANIES		
DRAWING No.		SPARE PARTS SHEET No.		SERVICING MANUAL No.	
LAYOUT DRAWING No.		MAINTENANCE INSPECTION SCHEDULE No.		LUBRICATION SCHEDULE No.	
STATUTORY INSPECTIONS					
GOVERNMENT		INSURANCE		OTHERS	
ORDER No.		RECEIVED (DATE)	INSTALLED (DATE)	COMMISSIONED (DATE)	COST
DETAILS RELEVANT TO MAINTENANCE PROCEDURES					
MECHANICAL		ELECTRICAL		GENERAL	
DRIVES		MOTORS		SPECIAL TOOLS	
GEARS					
BELTS/CHAINS					
BEARINGS		OTHER APPLIANCES		LUBRICANTS	
RECORD ON THE REVERSE ALL CHANGES, ADDITIONS, MODIFICATIONS, MAJOR REPAIRS & OTHER RELEVANT INFORMATION					

Fig.3.4.1 Equipment record card (example)

Unit 1.5 Process of preparing tools and equipments prior to the production along with minor repairs

Unit Objectives

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

- State preparation of tools & equipments for production
- State importance of preparing tools and equipments
- Conduct minor repair and faults in process machineries

1.5.1 Preparation of Tools & Equipments for production

Make sure that the whole thing is in a safe and sound condition by maintenance team prior restarting the regular operations. The green light will be on as an indication for re-starting the production only after the required tests have been performed successfully by the competent staff.

Following are the mandatory requirements for starting production:

- Ensure to do careful planning, scheduling and organizing usage of equipments during production.
- Ensuring the appropriate maintenance which performed on equipment and performing as a source communications connection between companies' ground-level work and the higher executive management.
- Ensure that workplace is according to national labor standards and everyone is aware about the safety training.
- Ensure Production equipments/utensils must be thoroughly cleaned and sanitized with alcohol after use.
- Replace brushes with loose bristles
- Before starting equipment, check out product surfaces. Take out any foreign body, objects, or any extraneous matter.
- Be sure no tools and attachments are lying lose in production area.
- Report to supervisors/seniors, if you find any infestation such as pests or evidence of pests like flies, insects, mice droppings, etc.
- Scrappers for equipments and table-tops are not to be used on the floor.
- Repair worn and damaged parts immediately.
- To wipe hands, use white colored, washed cloth regularly and if it is soiled, dispose of immediately.
- In production area, no moist clothes are to be left.
- For cleaning the floor and objects that come in contact with the floor, use yellow colored clothes.
- Ensure proper installation of equipment
- Ensure periodic inspection of equipments.
- Ensure adequate lubrication of machineries
- Adjustments of machineries and equipments, If required
- Make sure that every container, trolleys including those containing rework, are appropriately

labeled and are kept covered.

- For the storage of ingredients and rework, use white or brown colored containers.
- For garbage purpose, use gray colored containers and it must be covered.
- Check out expiry dates of ingredients to make sure that fresh ingredients are used.
- Brooms and dust pans are to be placed at stations provided.
- Wipe or mop up spilled liquid food immediately
- Monitor and maintain proper temperatures of machines.
- Before starting the production, make sure that production area is clear of all tools, any contamination, and hazards.

1.5.2 Conduct minor repairs and Faults in process machineries

For the management of maintenance and operation of machineries, equipment technician is responsible. Equipment technician responsibilities comprise of managing the construction crews, ensuring the appropriate maintenance which performed on equipment and performing as a source communications connection between companies' ground-level work and the higher executive management..

Points to be taken care of to conduct minor repairs and faults in equipment

A technician should:

- Gratify additional fault-tolerant features such as inspection of interlock, inspection of lockout, and user-friendly, spontaneous significance show with inaccuracy messaging.
- Proper awareness about E-maintenance. Software backbone, information and communication technology for remote monitoring, and control has been integrated by E-maintenance.
- Proper cleaning & sanitization of equipments with alcohol after use.
- Proper knowledge of spare parts in machine. Spare Parts Used in the Food Industry

Following is a list of spare parts used in the food industry:

- ◆ Pipes
- ◆ Fittings
- ◆ Bolts
- ◆ Nuts
- ◆ Washers
- ◆ Bars
- ◆ Plates of different metals
- ◆ Electric components
- ◆ General engineering accessories
- ◆ Rubber gaskets for liquid food pipes
- ◆ Plate gaskets for heat exchangers
- ◆ Graphite and rubber sealing for pumps
- ◆ Electric relays
- ◆ Special bulbs

- ◆ Selected bearings
- ◆ Springs
- ◆ Automatic switches
- ◆ Aluminum capping foils
- Can be competent enough to conduct inspection, testing and adjustment of the equipments by using appropriate tools.
- Can do repair of broken spare parts.
- Should have Proper knowledge of Lubrication System of equipments. One of the major causes of equipment breakdown in the food industry is lack of lubrication. Hence, it is important to follow the following:
 - ◆ A regular lubrication schedule
 - ◆ A lubrication chart for each machine
 - ◆ A pre-defined frequency of lubrication
 - ◆ A list of places to be lubricated

Requirement for modern equipment are definite types of lubricants for different types of bearings for example, for light duty, light oil will used for high speed bearing, whereas for a heavy duty, heavier oil will used for low speed bearing.

- Can be able to watch for fire, have the proper fire extinguisher available near the equipments.
- Can disassemble & reassemble the mechanical parts after maintenance.
- Able to verify the problem in equipment & report to higher authority.
- Able to do careful planning for maintenance tasks.
- Make sure the production of food and food products is uniform and high-quality, also get rid of foreign matter and foreign body contaminants which might degrade, spoil, or damage the food material or equipment.
- Make sure for the accurate measurement, measuring instruments / equipment such as thermometers/ thermocouples, pressure gauges, weighing balances, etc. shall be calibrated periodically.
- Can be able to adjust machineries and instruments, if required.

Make sure that the whole thing is in a safe and sound condition by maintenance team prior restarting the regular operations. The green light will be on as an indication for re-starting the production only after the required tests have been performed successfully by the competent staff.

Exercise**A) Answers the objective Questions**

1. Which among the following is not a safe practice while operating machineries
 - a. Checks for faults
 - b. Overload the machine
 - c. Use proper PPE
 - d. Learn to operate machines

2. SOP stands for-----
 - a. Sanitary operating procedures
 - b. Standard operating procedures
 - c. Standard operating parameters
 - d. Sanitary operating parameters

3. Minimum Mandatory labeling of pre-packaged foods in India does not include:
 - a. Net weight
 - b. Veg/non veg logo
 - c. FSSAI registration number
 - d. Date of shipping

4. A fire bucket is filled with _____
 - a. Sand
 - b. Oil
 - c. Water
 - d. Fuel

5. Which among the following is not supposed to do if a person have burns
 - a. Flush the burned area with cool running water
 - b. Apply a light gauze bandage
 - c. apply ointments, butter, or oily remedies to the burn
 - d. get medical care

Answers the Questions

1. What are the various methods of cleaning and sanitation?
2. List various tools used for sanitation and cleaning.
3. List various pre requisites for effective cleaning and sanitization of equipment and facilities.
4. Explain general procedure for cleaning and disinfection



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Notes



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2. Sort and Grade Produce



- Unit 2.1- Overview of the Sorting and Grading
- Unit 2.2- Equipment Used in the Sorting and Grading
- Unit 2.3-Types of Produce
- Unit 2.4-Receiving and Washing the Produce
- Unit 2.5-Sorting and Grading the Produce
- Unit 2.6-Quality Analysis
- Unit 2.7-Packing, Packaging and Storage of Products
- Unit 2.8-Post Production Cleaning and Maintenance



Key Learning Outcomes

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

1. Explain the selection process in detail;
2. Explain the method of assessing the quality of produce based on physical parameters;
3. Identify the different types of rejects;
4. State the method of handling and disposing rejects as per defined procedures;
5. State the chemicals used for washing fruits and vegetables;
6. State the method of washing fruits and vegetables;
7. Demonstrate the process of receiving and washing agricultural produce;
8. Explain the standards for grades of agricultural produce;
9. Demonstrate the process of sorting and grading agricultural produce;
10. Explain the standards for grades of agricultural produce;
11. Demonstrate the process of sorting and grading agricultural produce;
12. Demonstrate the process of packaging the graded produce;
13. State the storage procedures for harvested produce, packaging materials, and packed produce;
14. Demonstrate the process of cleaning and maintenance of work area after production;
15. State the method of managing waste.

Unit 2.1: Overview of the Sorting and Grading

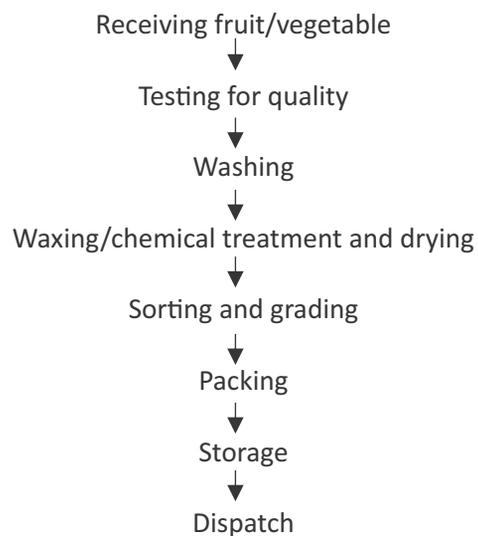
Unit Objectives

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

1. State the process of sorting and grading agricultural produce.
2. Explain the selection process in detail.

2.1.1 Overview of the Sorting and Grading Process

The following chart gives an overview of the selection process:



2.1.2 The Selection Process

Receive harvested fruits and vegetables

- Sort fruits and vegetables as per their shelf life

Check for quality of received produce

- Check if the fruits/vegetables are ripe/ unripe/overripe
- Check if the fruits/vegetables are damaged during transit
- Check if the fruits/vegetables have developed moulds or are rotten

Wash the fruits and vegetables

- Ensure fruits/vegetables are clean and dirt-free

Send the fruits/vegetables for waxing/chemical treatment

Dry the fruits/vegetables

Sort and grade fruits/vegetables

- As per size, length, colour, variety

Pack the fruits/vegetables

- In trays/cartons/gunny bags
- Ensure parameters are followed for fruits/vegetables that need to be exported

Store the fruits/vegetables

Send for dispatch/export



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[Overview of Fruits and Vegetables Processing](#)

Unit 2.2 – Equipment Used in the Sorting and Grading Process

Unit Objectives

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

- Identify the different equipment used in the selection process.

2.2.1 Equipment Used for Selection

The equipment used in the selection process are:

Name of the equipment	Use and operation
Fruit/vegetable washing machine	<ul style="list-style-type: none"> • Used for washing fruits and vegetables • Equipped with a water holding tank that facilitates continuous water flow
Roller conveyor	<ul style="list-style-type: none"> • Used for round fruits and vegetables like apples and potatoes
High pressure water nozzles	<ul style="list-style-type: none"> • Used to spray water on fruits/vegetables • Helps to clean dirt sticking to the surface of fruits/vegetables
Plastic crates	<ul style="list-style-type: none"> • Used to collect sorted raw materials for further processes
Grading line conveyor	<ul style="list-style-type: none"> • Used for grading fruits/vegetables as per size
Sorting line conveyor	<ul style="list-style-type: none"> • Used for manual sorting of fruits/vegetables
Electronic colour sorter	<ul style="list-style-type: none"> • Used for sorting fruits/vegetables as per colour
Hot-air dryer	<ul style="list-style-type: none"> • Used for drying fruits/vegetables
Packing machine	<ul style="list-style-type: none"> • Used for packing sorted fruits and vegetables
Brushing roller	<ul style="list-style-type: none"> • Used for wiping washed fruits and vegetables
	<ul style="list-style-type: none"> • Used for transferring produce to different lanes of sorting tables
Ring grader	<ul style="list-style-type: none"> • Used for sorting fruits/vegetables as per diameter



Fig. 2.2.1. Fruit/vegetable washing machine



Fig. 2.2.2. Roller conveyor



Fig.2.2.3. High pressure water



Fig. 2.2.4. Plastic crates



Fig. 2.2.5. Grading line conveyor



Fig. 2.2.6. Sorting line conveyor



Fig. 2.2.8. Hot-air dryer



Fig. 2.2.9. Packing machine



Fig. 2.2.10. Brushing roller



Fig. 2.2.11. Ring grader

2.2.2 Precautions and Safety Measures to Follow

- Avoid direct spillage of water on electrical components
- Clean the tools and equipment before and after each operation
- Ensure regular maintenance of tools and machinery
- Ensure the controls of all the machines are set to prescribed limits

Unit 2.3 – Types of Produce

Unit Objectives

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

- State different varieties of fruits and vegetables;

2.3.1 Types of Fruits and Vegetables

The following tables list the different varieties of fruits and vegetables:

Fruits	Variety
Orange	Kinno, Mandarin
Mango	Alphonso, Dusshehri, Malda (not for export), Kesar, Langda, Neelam, Safeda, Sinduri, Totapuri, Banganapalli
Apple	Red delicious, Royal delicious, Chaubattia anupam, Chaubattia princess, Amred, Lal ambri, Florina sunahri
Litchi	China, Shahi
Grapes	Thompson seedless grapes, Sonaka seedless grapes, Black seedless grapes, Bangalore blue, Gulabi, Beauty seedless, Sharad seedless, Anab-e-Shahi, Dilkhush, Pusa seedless
Pomegranate	Ganesh, Dholka, Bedana, Bhagwa, Araktha, Paper shell, Spanish ruby, Muscut red, Velladu, Mridula
Banana	Grand naine, Robusta, Dwarf cavendish, Nendran
Apricot	New castle, Early shipley, Shakarpara, Kaisha, Nugget, Royal, Suffaida, Charmagaz, Nari, Moorpark, Turkey, Ambroise, Chaubattia alankar, Chaubattia madhu, Chaubattia kesri, Bebeco, Halman, Rakchakarpa, Tokpopa, Margulam
Pineapple	Queen, Kew, Giant kew, Mauritius, Charlotte, Rothchild, Jaldhup, Desi
Watermelon	Augasta, Sugar king, Super dragon, Shehenshah

Vegetables	Variety
Tomatoes	Nunhems, Arka rakshak, Arka samrat, Roopali, Ramya, Swarna, Pusa, Supriya, Vaishali, Rasika, Rohini, Rajshri, etc.
Ladies' finger/okra	Kamini, Pusa makhmali, Parbhani kranti, Pusa sawani, Vaishali, Vagmi, Padmini
Bottle gourd	Alok, Bhim, Bhumi
Sweet corn	Sugar 75, Winter sweet, NK-6240
Cabbage	BC-64, BC-73, BC-79, Summer queen, Green globe, Quizzer
Cauliflower	Pawas, Suhasini, Snow heart, Kimaya, Barsati, Lucky, Snow ball
Brinjal/aubergine	Nichindapur Barrot, Pant rituraj, Mukatakeshi, Pusa ankur, Pusa kranti, Arka sheel, and Arka navneet
Green chillies	Guntur S4, Hindpur-S7, Jwala, Kashmir chilli, Sannam
Mushroom	Button, Oyster, Milky, Morel
Onion	Bhima red, Bhima raj, Bhima super, Bhima kiran, Bhima shakti, Bhima shubra, Bhima shweta, Bhima dark red, Pusa madhavi, Arka nikanan, Arka kalyan, etc. Godavari, Sweta, HG-1, HG-6, Pusa Sel-10, LCG-1, ARU-52, Agrifound
Garlic	White(G-41), Yamuna Safed (G-1), Yamuna Safed-2 (G-50), G-282 and Agrifound parvati
	Kufri jyoti, KCM (A-2708), Super jyoti, Kufri lauvkar, Kufri ashoka, Kufri
Potatoes	sindhura, Kufri jawahar, Kufri pukhraj, Kufri sutlej, Super pukhraj, Santana, etc.
Bitter gourd	Co 1, MDU 1, COBgoH 1 (Hybrid), Arka harit, Priya and Preethi
Sweet potato	Varsha, Sree nandini, Sree vardhini, Sree ratna, Sree bhadra, Sree arun, Sree varun, Pusa safed, Pusa sunehri, Cross-4, Rajendra shakarkand, Kalmegh
Ridge gourd	Rishi, Chickni, Luffa
Bitter gourd	Gori, Jawahar, Solok
Tinda	Jaya
Snake gourd	King cobra
Pumpkin	Amir
Baby corn	G-5406, G-5414
Cucumber	Delicious, Tasty
Radish	Ivory white
Bell pepper	Lario, Indra, Bomby, Orobelle, Picador

Unit 2.4 – Receiving and Washing the Produce

Unit Objectives

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

- State the chemicals used for washing fruits and vegetables;
- State the method of washing fruits and vegetables;
- Demonstrate the process of receiving and washing agricultural produce;

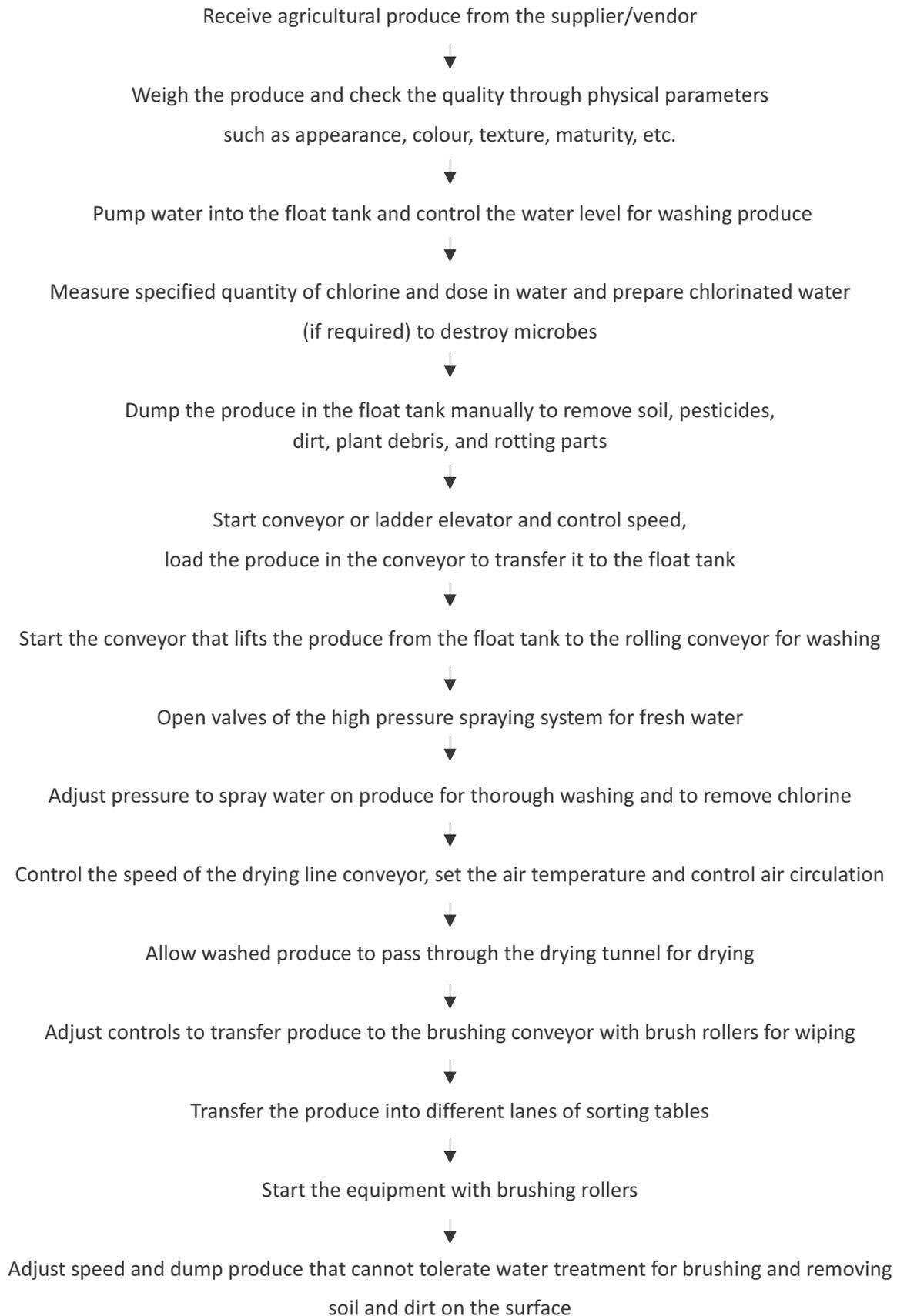
2.4.1 Chemicals Used for Washing

Before sorting and grading fruits/vegetables, they are washed properly with the help of chemicals. This helps to reduce the number of microorganisms present on their surface. For this process, most pack houses and food processing units use liquid chlorine and sulphur dioxide.

Sulphur dioxide is usually used by the method of fumigation. In a chamber, fumes of sulphur dioxide are introduced. This helps to avoid post-harvest spoilage.

Chlorine is used in concentrations ranging from 100 to 200 ppm. It is added to the water present in the fruit/vegetable washing tank. When fruits/vegetables undergo chemical washing process, they are transferred to the washing tank that contains plain water. This helps to remove any chemical residues from the surface of the fruit/vegetable.

2.4.2 Receiving and Washing the Produce



Unit 2.5 – Sorting and Grading the Produce

Unit Objectives

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

- Explain the standards for grades of agricultural produce;
- Demonstrate the process of sorting and grading agricultural produce;

2.5.1 Grading Standards

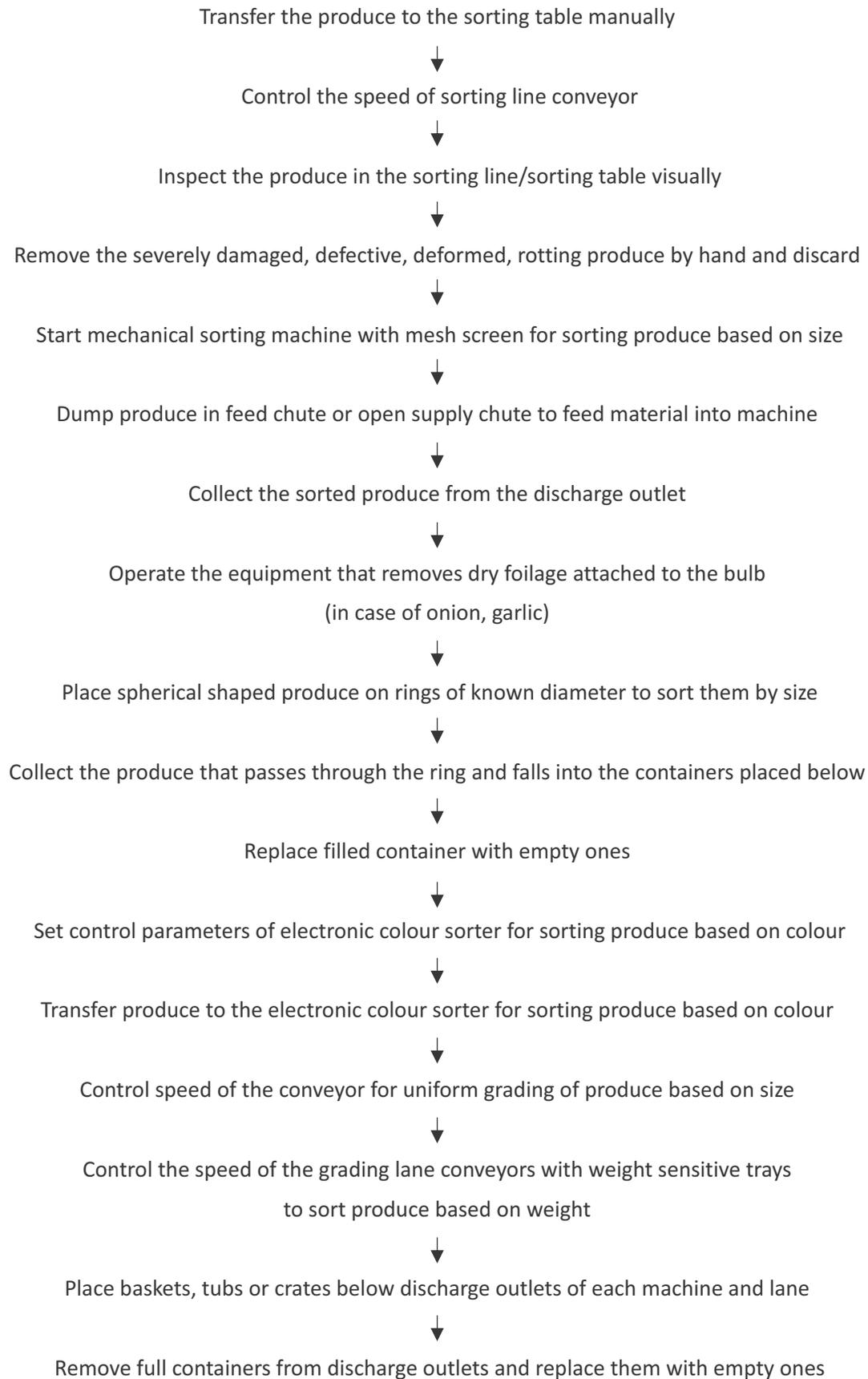
The Agricultural and Processed Food Products Export Development Authority (APEDA) has laid certain grades to classify fruits and vegetables. These grading standards have to be followed when sorting and grading. The following table explains the various grading standards proposed by the APEDA:

Grade Designation	Grade Requirements
Extra Class	<ul style="list-style-type: none"> • Must be of superior quality • Must possess all characteristics of the variety • Free of defects • May contain slight superficial defects. Such defects should not affect the appearance, quality, and presentation of the produce
Grade I	<ul style="list-style-type: none"> • Must be of good quality • Must possess all characteristics of the variety • May contain slight defects in shape or on the skin. However, such defects should not affect the appearance, quality, and presentation of the produce
Grade II	<ul style="list-style-type: none"> • Ones that do not qualify to be included in the higher grades, but satisfy the minimum requirements • May contain slight defects in shape or on the skin. However, such defects should not affect the appearance, quality and presentation of the produce



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2.5.2 Sorting and Grading the Produce



Unit 2.6 – Quality Analysis

Unit Objectives

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

- Explain the method of assessing the quality of produce based on physical parameters;
- Identify the different types of rejects;
- State the method of handling and disposing rejects as per defined procedures;

2.6.1 Quality Analysis Based on Physical Parameters

A Technician is expected to check the quality of harvested produce based on physical parameters. The following FSSAI guidelines have to be followed during the inspection:

- Check for visible deterioration of raw material and odour, if any
- Reject produce that is unfit for human consumption
- Examine for physical hazards and foreign body contamination
- Reject and remove too ripe, too small, severely damaged, bruised, mouldy, deformed or rotten fruits and vegetables

2.6.2 Types of Rejects

As soon as the harvested produce reaches the pack house, it is sorted by physical examination to remove rejects. Rejects refer to agricultural produce (fruits/vegetables) that cannot be used for sale or processing. This is a crucial process followed before the actual sorting and grading. Removing rejects at the very beginning helps to ensure that fruits/vegetables that are being processed have the required marketable value. It also means that selected fruits/vegetables are fit enough for processing.

The following table explains how fruits and vegetables are rejected:

Particulars	Details
Level of maturity	Produce that is immature or over mature
Level of ripeness	Produce that is under ripe or over ripe
Source of harvest	Produce coming from unclean, badly maintained fields
Level of scarring	Produce that is scarred during transportation
Variety	Produce belonging to a different variety than the other fruits/vegetables in the lot
Defects	Produce that is sun-scorched, deformed, damaged, rotten or moulded or too small

2.6.3 Handling and Disposal of Rejects

Fruits and vegetables that are rejected for being of a smaller size are usually removed mechanically. This is done with the help of mesh-screens and pre-sizing belts. Other rejected fruits and vegetables are removed manually.

Rejected fruits and vegetables are given to animals as feed. Apart from that, rejects are used for preparing organic compost.

Unit 2.7 – Packing, Packaging and Storage of Products

Unit Objectives

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

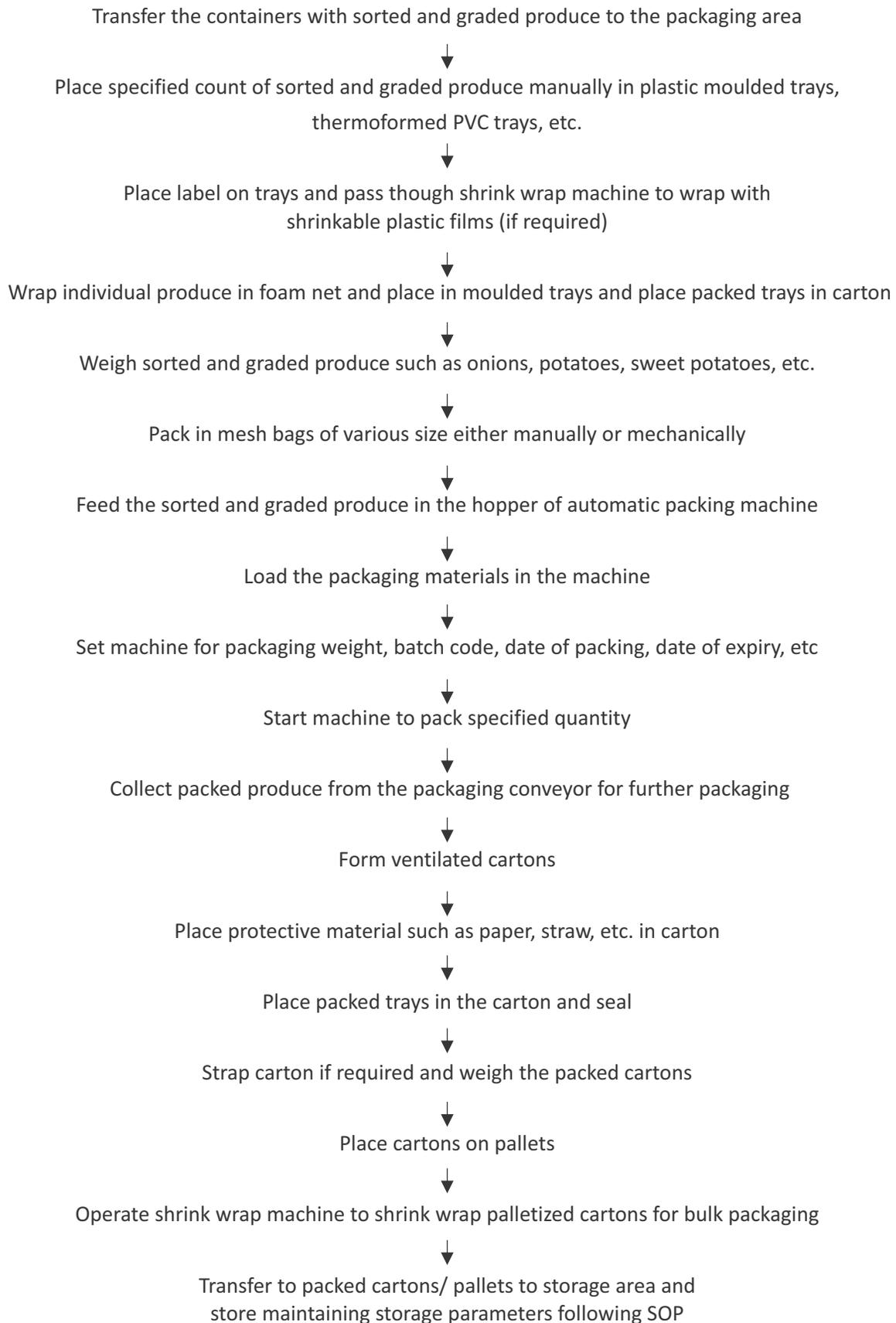
- Demonstrate the process of packaging the graded produce;
- State the storage procedures for harvested produce, packaging materials, and packed produce;

2.7.1 Packaging Fruits and Vegetables

The packaging materials for the fruits and vegetables are classified as under:

Particulars	Bulk Packaging	Consumer Packaging	Transport Packaging
Use	Used to pack fruits and vegetables for bulk sale	Used to pack fruits and vegetables for consumer use	Used to package consumer packs
Materials	<ul style="list-style-type: none"> • Corrugated fibre board box • Box with moulded pulp trays • Box with slotted partition • Jute/leno/net bags • Pallets • Containers 	<ul style="list-style-type: none"> • Plastic pouch • Plastic punnet with lid • Moulded expanded polystyrene tray stretch wrapped • Hessian bag • Raschel bag • Leno/net bags 	<ul style="list-style-type: none"> • Flexible plastic pouch • Plastic punnet with lid • Moulded expanded polystyrene tray stretch wrapped • Jute/raschel bag • Extruded plastic tubular net bag • Netlon bag • Pulp tray stretch wrapped • Pallets

2.7.2 Packaging the Graded Produce



2.7.3 Handling and Disposal of Rejects

Fruits and vegetables that are rejected for being of a smaller size are usually removed mechanically. This is done with the help of mesh-screens and pre-sizing belts. Other rejected fruits and vegetables are removed manually.

Rejected fruits and vegetables are given to animals as feed. Apart from that, rejects are used for preparing organic compost.

Harvested Produce	Packaging Materials	Harvested Produce
Used to pack fruits and vegetables for bulk sale	Used to pack fruits and vegetables for consumer use	Used to pack fruits and vegetables for bulk sale
<ul style="list-style-type: none"> • Fresh fruits/vegetables collected in collection centres in the field where primary sorting and pre-cooling is done • Then transferred to the central processing unit/ pack house where they are stored in a cool room • Root vegetables like onion and garlic are stored in dry conditions 	<ul style="list-style-type: none"> • Packaging materials like plastic, nylon net, net bags, gunny bags, cartons, and crates are stored in ordinary warehouse conditions • Warehouse is kept dry at all times 	<ul style="list-style-type: none"> • Fresh fruits/vegetables collected in collection centres in the field where primary sorting and pre-cooling is done • Then transferred to the central processing unit/ pack house where they are stored in a cool room • Root vegetables like onion and garlic are stored in dry conditions

During storage, fruits and vegetables are exposed to fumigation chambers at regular intervals (e.g. 7-10 days). In this chamber, sulphur fumes are introduced in concentrations of 0.25 %. This is done to eliminate insects and microorganisms that may affect the quality of produce.



Scan this QR Code or click on below link to access video of [Different Types of Packaging](#)

Unit 2.8 – Post Production Cleaning and Maintenance

Unit Objectives

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

- Demonstrate the process of cleaning and maintenance of work area after production;
- State the method of managing waste.

2.8.1 Post Production Cleaning Method

This explains the method of cleaning the work area after production

Clean machineries with recommended sanitisers →	Clean equipment and tools with recommended sanitisers ↓	e.g. knives, pans, buckets, trolleys
Clean the work area as per norms ↓	Attend to minor repairs and maintenance work ←	e.g. oiling and greasing machines
Ensure work area is free from pests →	Maintain equipment daily/ weekly as per supplier's instruction manual ↓	
Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel		

2.8.2 Waste Management Method

During fruit and vegetable processing, around 10 %-35 % of process loss occurs while trimming, coring, and blanching vegetables and fruits. The waste material gathered during these processes like stems, leaves, and tips have to be properly managed/ disposed.

In the fruit and vegetable industry, these waste materials are re-used for making some other products, wherever possible. The remaining waste is used as cattle feed. For example, waste from potato, cabbage, turnip, beet, beans is used for making cattle feed. Mango peel is fermented to prepare vinegar.

Exercise

1. Fill in the blanks with the correct option
 - a. A technician must _____ severely damaged fruits and vegetables.
 - i. reject
 - ii. accept
 - iii. process
 - iv. wash
 - b. Ensure _____ are followed for fruits/vegetables that need to be exported.
 - c. Sulphur dioxide is used by the method of
 - i. spoilage
 - ii. execution
 - iii. fumigation
 - iv. production
 - d. Fruits and vegetables are washed in _____ water.
 - i. impure
 - ii. dirty
 - iii. sulphated
 - iv. chlorinated
 - e. Fruits and vegetables of a smaller size are removed with the help of mesh-screens and _____ while procuring raw material.
 - i. knives
 - ii. plastic crates
 - iii. spoons
 - iv. pre-sizing belts
 - f. Rejected produce is _____ for human consumption.
 - i. unfit
 - ii. best
 - iii. ideal
 - iv. fit
 - g. Corrugated fibre board box is material used for _____.
 - i. bulk packaging
 - ii. preservation
 - iii. transport packaging
 - iv. consumer packing
 - h. _____ is transferred to cold storage after it is washed and sorted.
 - i. Packed produce
 - ii. Processed food
 - iii. Junk food
 - iv. Harvested produce
 - i. Fruits and vegetables are sorted as per size, colour, length and _____.
 - i. region
 - ii. variety
 - iii. acidity
 - iv. cost

Procedure/Steps	Order the steps (as 1, 2, 3, 4, 5.)
a. Maintain equipment daily/weekly as per supplier's instruction manual	
b. Attend to minor repairs and maintenance work	
c. Clean equipment and tools with recommended sanitisers	
d. Clean machineries with recommended sanitisers	
e. Clean the work area as per norms	
f. Ensure work area is free from pests	
g. Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel	

Notes



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3. Canning fruits and vegetables Duration



- Unit 3.1- Overview of Canning Process
- Unit 3.2- Equipment used in Canning Process
- Unit 3.3- Production Process for Canning Fruits and Vegetables
- Unit 3.4- Packing and Storage
- Unit 3.5- Post Production Cleaning and Maintenance



Key Learning Outcomes

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

1. State the process of canning;
2. State the production process used for canning fruits and vegetables;
3. List the types of containers used for packing canned products;
4. State the method of storing cans;
5. Demonstrate the process of cleaning and maintenance of work area after production;
6. State the method of managing waste

UNIT 3.1: Overview of Canning Process

Unit Objectives

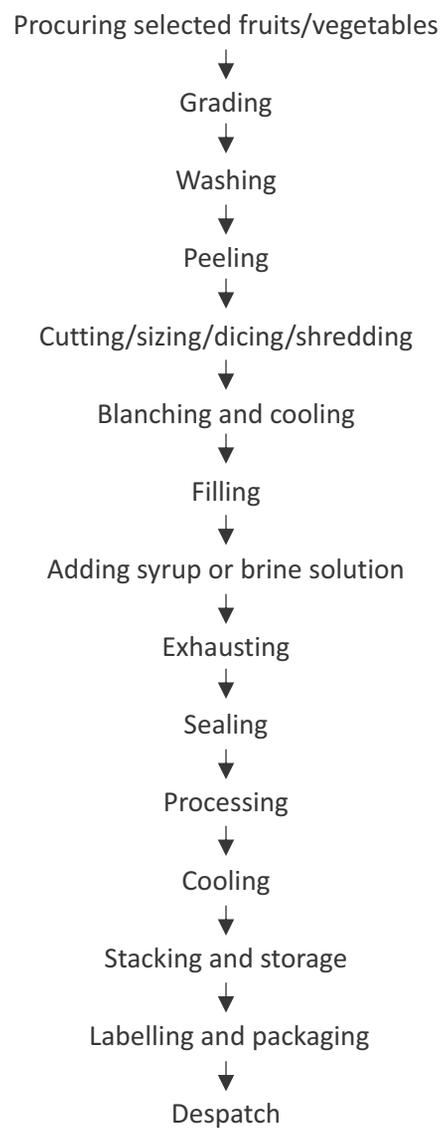
At the end of this unit, the participants will be able to:

1. State the process of canning;
2. Identify the raw materials required for production as per production schedule and formation;

3. 1.1 Process of Canning

Canning is the method of preserving fruits and vegetables to extend their shelf life. It is done by processing fruits and vegetables and sealing them in airtight containers.

The following process chart explains the process of canning:



Terminology Used in the Canning Process

- Brine: Salt solution used in the canning of vegetables
- Brine strength: Weight of salt in proportion to the weight of the solution
- Salt equilibrium: Strength of salt in the brine
- Sugar syrup: Sugar solution used in canning of fruits

3.1.2 Fruits and Vegetables that are Canned

Fruits and vegetables that are available seasonally and found only in certain parts of the world are mostly canned. Canning facilitates preservation as well as ensures marketability. Following is the list of fruits and vegetables that are canned.

Fruits	Vegetables
• Litchi	• Mushrooms
• Cherries	• Asparagus
• Pineapple	• Cucumber
• Peach	• Green peas
• Apricot	• Ladies' finger
• Pear	• Cauliflower
• Guava	• Beans
• Mango	• Carrot
• Banana	• Potato
• Grapes	• Pumpkin
• Papaya	• Spinach
• Plum	• Turnip



Scan this QR Code or click on below link to access video of [Fruits and Vegetables Canning Technician](#)

Unit 3.2 – Equipment used in Canning Process

Unit Objectives

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

- Identify the different equipment used in the canning process.

Name of the equipment	Use and operation
Fruit/vegetable washing machine	<ul style="list-style-type: none"> Used for washing fruits and vegetables Equipped with a water holding tank that facilitates continuous water flow
Roller conveyor	<ul style="list-style-type: none"> Carries fruits and vegetables for further processes
High pressure water nozzles	<ul style="list-style-type: none"> Used to spray water on fruits/vegetables Helps to clean dirt sticking to the surface of fruits/vegetables
Root vegetable peeler	<ul style="list-style-type: none"> Used to peel root vegetables Equipped with rotating soft and hard brushes which thoroughly clean and peel the vegetables
Peeling machine	<ul style="list-style-type: none"> Used for peeling fruits and vegetables like potatoes
Shredding/dicing/cubing/slicing machine	<ul style="list-style-type: none"> Used to cut, shred, slice, dice, and cube raw materials Equipped with a sizer and a cutter that helps to give raw material a uniform size and shape
Grading machine	<ul style="list-style-type: none"> Used to grade and sort fruits/vegetables
Plastic crates/stainless steel trays and utensils	<ul style="list-style-type: none"> Used to collect sorted raw materials for further processes
Steam-jacketed kettles	<ul style="list-style-type: none"> Used for heating/blanching fruits and vegetables Also used for syrup and brine preparation Equipped with pressure gauge, temperature gauge, steam inlet, and outlet valves that help control steam and release condensed water
Blending machine	<ul style="list-style-type: none"> Used to blend ingredients, chemicals and preservatives Equipped with a moving stirrer that moves slowly and mixes ingredients
Filling machine	<ul style="list-style-type: none"> Used to fill canned products Removes air from the bottle during the filling process
Inspection belt	<ul style="list-style-type: none"> Helps in manual inspection of fruits and vegetables
Lye peeling machine	<ul style="list-style-type: none"> Used for chemical peeling of fruits and vegetables
Coring machine	<ul style="list-style-type: none"> Used for removing the core of the fruit

Pulper	<ul style="list-style-type: none"> • Used for pulping fruits and vegetables • Used for refining the pulp
Syrup/brine tanks	<ul style="list-style-type: none"> • Used for preparation of syrup/brine
De-aeration machine	<ul style="list-style-type: none"> • Used for expelling air from pulp/juice
Brine/syrup filling machine	<ul style="list-style-type: none"> • Used for filling cans/bottles with brine/syrup
Can reforming unit	<ul style="list-style-type: none"> • Equipped with reformer, flanger, seamer, beader, and embossing unit
Can steriliser	<ul style="list-style-type: none"> • Used for sterilisation of empty cans before filling
Seamer	<ul style="list-style-type: none"> • Used for fixing lids on cans
Exhaust box	<ul style="list-style-type: none"> • Used for boiling the filled cans to expel gases
Retorts	<ul style="list-style-type: none"> • Used for processing and sterilisation of filled cans
Cooling tanks	<ul style="list-style-type: none"> • Used for cooling the processed cans
Refractometer	<ul style="list-style-type: none"> • Used for checking refractive index (TSS) of the pulp/juices/syrups, etc.
Salinometer	<ul style="list-style-type: none"> • Used for measuring salt strength in brine



Fig. 3.2.1. Fruit/vegetable washing machine



Fig. 3.2.2. Roller conveyor



Fig. 3.2.3. High pressure water nozzles



Fig. 3.2.4. Root vegetable peeler



Fig. 3.2.5. High pressure water nozzles



Fig. 3.2.6. Shredding/dicing/cubing/slicing



Fig. 3.2.7. Grading machine



Fig. 3.2.8. Steam-jacketed kettles



Fig. 3.2.9. Blending machine



Fig. 3.2.10. Filling machine



Fig. 3.1.11. Coring machine

3.2.2 Precautions and Safety Measures to Follow

- Avoid direct spillage of water on electrical components
- Clean the tools and equipment before and after each operation
- Ensure regular maintenance of tools and machinery
- Do not open machines with sharp knives during operation. It is safe to open a machine when it is unplugged from an electrical source
- Check machines like the steam-jacketed kettles regularly for efficiency of valves
- Ensure the build-up of pressure in machines is always under control
- Ensure the controls of all the machines are set to prescribed limits

UNIT 3.3: Production Process for Canning Fruits and Vegetables

Unit Objectives

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

- State the production process used for canning fruits and vegetables;

3.3.1 The Canning Process

Procure fruits (after fruit inspection)		
Perform a quality check		
Physical - for ripeness, maturity, texture	microbial - for moulds, yeast, bacteria	chemical - for acidity, TSS
Wash the fruits/vegetables		
Check the availability and quality of water	Add 100-150 ppm liquid chlorine to the water	
Grade fruits/vegetables		
As per ripeness	As per soundness	
Send for inspection		
Partially damaged fruits, fruit tips, stem, and leaves, if any, are removed		
Send for peeling		
Mechanical peeling	Chemical peeling (in lye solution)	
Send for coring (fruit core is removed mechanically/manually)		
Blanch the fruits/vegetables (in steam/boiling water)		
Fill cans		
55 % of the weight of can (for vegetables)	50 % of the weight of can (for fruits)	
Add the syrup		
Hot brine (for vegetables)	Sugar solution (for fruits)	
Undertake the process of exhausting		
Pass filled cans through exhaust box	Steam in the heated can will expel the dissolved air	
Seal the cans		
Seal the cans with a seamer immediately after exhausting		
Undertake the retorting process Boil/heat cans at about 115°C for required time		
Cool the cans		
Cool the cans under running water		
Stack the cans		
Send the cans to the storeroom for stacking		

UNIT 3.4: Packing and Storage

Unit Objectives

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

- List the types of containers used for packing canned products;
- State the method of storing cans.

3.4.1 Packing Canned Products

The canning industry used two types of containers to pack canned products. They are:

Tin Containers	Glass Containers
Easy to handle and light-weight	Require extra care during handling
Able to withstand processing	Do not contaminate contents
Cost-effective	Expensive but re-usable
E.g. Cans containing jams	E.g. Cans containing baby food

Besides these containers, plastic containers and heat-sealable pouches are also used at times for packing canned products.

Storing Cans

Packed cans are stored in strong wooden cases. Corrugated cardboard cartons are used as well. These are stored in a cool and dry place. Even small traces of moisture can affect the quality of canned product. Hence, special attention has to be paid to the storage of cans.



Scan this QR Code or click on below link to access video of [Food Packaging & Storage](#)

UNIT 3.5: Post-Production Cleaning and Maintenance

Unit Objectives

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

- Demonstrate the process of cleaning and maintenance of work area after production;
- State the method of managing waste.

3.5.1 Post Production Cleaning Method

This explains the method of cleaning the work area after production

Clean machineries with recommended sanitisers →	Clean equipment and tools with recommended sanitisers ↓	e.g. knives, pans, buckets, trolleys
Clean the work area as per norms ↓	Attend to minor repairs and maintenance work β	e.g. oiling and greasing machines
Ensure work area is free from pests →	Maintain equipment daily/ weekly as per supplier's instruction manual ↓	
Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel		

3.5.2 Waste Management Method

During fruit and vegetable processing, around 10 %-35 % of process loss occurs while trimming, coring, and blanching vegetables and fruits. The waste material gathered during these processes like stems, leaves, and tips have to be properly managed/ disposed.

In the canning industry, these waste materials are re-used for making some other products, wherever possible. The remaining waste is used as cattle feed. For example, wastes from potato, cabbage, turnip, beet, beans is used for making cattle feed. Mango peel is fermented to prepare vinegar.

Exercise

1. Arrange the steps for the production process of canning

Production sequence	Order the steps (as 1,2,3,4,5,6,7,8,9,10,11,12,13,14 and 15)
a. Labelling and packing	
b. Processing	
c. Sealing	
d. Blanching and cooling	
f. Washing	
f. Peeling	
g. Grading	
h. Stacking and storage	
i. Cutting, sizing and shredding	
j. Procuring selected fruits and vegetables	
k. Adding syrup or brine solution	
l. Cooling	
m. Despatch	
n. Filling	
o. Exhausting	

2. Fill in the blanks with the correct option

- a. Packed cans are stored in _____.
- i. balloons ii. rubber tyres iii. nylon sheets iv. wooden cases
- b. _____ are easy to handle and light weight.
- i. Tin containers ii. Glass containers iii. Pouches iv. Plastic containers
- c. Small traces of moisture can affect the _____ of the canned product.
- i. quantity ii. quality iii. number iv. quality and quantity
- d. _____ are expensive, require extra care during handling and are re-usable.
- i. Tin containers ii. Glass containers iii. Plastic containers iv. Pouches
- e. Approximately _____ of process loss occurs while trimming, coring and blanching vegetables and fruits.
- i. 20% - 35% ii. 10% - 35% iii. 5% - 10% iv. 15% - 25%

Notes



A large rectangular area with a thin orange border, containing 25 horizontal lines for writing notes.

Notes



A large rectangular area with a thin orange border, containing 25 horizontal lines for writing notes.

4. Produce fruit pulp from various fruits



- Unit4.1- Overview of Pulping Process
- Unit4.2- Equipment Used for Fruit Pulping
- Unit4.3- Fruit Pulping Process
- Unit4.4- Ripening of Fruit
- Unit4.5- Fruit Pulping Procedure and Sterilisation
- Unit4.6- Quality Analysis of Fruit Pulp
- Unit4.7- Packing, Packaging and Storage of Products
- Unit4.7- Post Production Cleaning and Maintenance



Key Learning Outcomes

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

1. Define fruit pulping;
2. List the various fruits used for pulping;
3. Describe the pulping process;
4. Explain the process of pulping fruit;
5. Define ripening;
6. Explain fruit ripening process;
7. State the procedures used to create fruit pulp;
8. Describe sterilisation process for fruit processing industry;
9. State the methods of sterilising fruit pulp;
10. List the quality control parameters for checking fruit pulp;
11. State the basic categories of packing;
12. State the various types of packaging materials used for packing fruit pulp;
13. State the factors for selecting packaging materials;
14. State the storage procedures for finished goods;
15. Explain the rules for stock rotation of finished goods;
16. Explain aseptic packaging in fruit processing industry;
17. Define canning and its purpose;
18. State the process of canning;
19. Arrange for proper cleaning of production area, equipment, tools and equipment used;
20. Organise periodic maintenance of all production machineries;
21. Arrange for proper cleaning of production area, equipment, tools and equipment used;
22. Organise periodic maintenance of all production machineries

UNIT 4.1: Overview of Pulping Process

Unit Objectives

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

1. Define fruit pulping;
2. List the various fruits used for pulping;

4.1.1 Pulp and Pulping

Fruit Pulp and Pulping

A soft, moist mass of a fruit after removal of skin, seeds, pith, and fibrous particles is called a fruit pulp. The process to create pulp is called pulping. This is performed under a controlled environment where the temperature, pressure, heat, etc. are monitored. The resulting product is a shapeless mass and acidic in taste. It is further processed for make a range of products like:



Fig. 4.1.1. Jams



Fig. 4.1.2. Juices



Fig. 4.1.3. Nectars



Fig. 4.1.4. Syrups



Fig. 4.1.5. Cordials

4.1.2 Types of Products Made from Pulp

The table below provides the various products made fruit pulp:

Name of fruit and vegetable	Products made
Mango	<ul style="list-style-type: none"> • Beverage • Jam • Mango leather • Pulp powder
Guava	<ul style="list-style-type: none"> • Beverage • Jelly • Jam • Pulp powder
Papaya	<ul style="list-style-type: none"> • Beverage • Jelly • Jam • Pulp powder
Banana	<ul style="list-style-type: none"> • Beverage • Jam • Pulp powder • Baby food
Pineapple	<ul style="list-style-type: none"> • Beverage • Jelly • Jam • Pulp powder
Orange	<ul style="list-style-type: none"> • Beverage • Jelly • Jam • Pulp powder
Apple	<ul style="list-style-type: none"> • Beverage • Jelly • Jam • Juice powder • Baby food
Pear	<ul style="list-style-type: none"> • Beverage • Jelly • Jam
Strawberry	<ul style="list-style-type: none"> • Beverage • Jam • Jelly • Ice cream • Pulp powder
Tomato	<ul style="list-style-type: none"> • Tomato paste • Ketchup • Sauces
Carrot	<ul style="list-style-type: none"> • Beverage • Powder • Baby food
Brinjal	<ul style="list-style-type: none"> • Culinary food

4.1.3 Terminology Used in Process

- TSS (Total Soluble Solids): It is the extracted mass of fruit, which contains fibres and fruit sugar.
- Refractometer: It is a tool used for measuring TSS.
- pH indicator: A numeric scale to check acid levels in pulp/juice. It is between 2.5 to 4.



Scan this QR Code or click on
below link to access video of
[Fruit Pulp Processing Technician](#)

Unit 4.2 – Equipment Used for Fruit Pulping

4.2.1 Equipment used for Fruit Pulping Process

Name of the equipment	Use and operation
Ripening chamber with ethylene doser	Used for ripening fruit/vegetables by passing ethylene gas
Fruit washing machine	Used for fruit/vegetable washing
Sorting and grading machine	Used for fruit/vegetable segregation as per size and firmness
Conveyer belt	Used for visual inspection of mango tips and for sorting fruits and vegetables
Peeler	Used for removing fruit/vegetable skin
Deseeder/destoner	Used for removing fruit seeds and stones in mangoes
Core cutter	Used for cutting fruit core, especially in pineapple
Crusher/chopper/shredder	Used for crushing/chopping/shredding of fruit/vegetables
Blancher/hot break system	Used to heat the fruit/vegetable to facilitate pulping process
Pulper	Used to extract pulp and separate fruit fibre, skin, seed, and grits from pulp
Steam jacketed kettles with tanks	Used for cooking pulp
Decanter	Used to remove fibre, grits, black and brown specks, extraneous matters, dust and other impurities from pulp
De-aerator	Used to remove air and dissolved gases from the pulp
Evaporator/concentrator	Used to evaporate water from pulp
Steriliser	Used for sterilizing pulp by boiling it
Aseptic filler	Used for aseptic filling of processed pulp in aseptic bags
Can reforming unit	Used for forming cans
Empty can steriliser	Used for sterilising cans by heating it
Can filler	Used for filling cooked pulp in cans
Seamer	Used for can reforming
Continuous can filling pasteuriser	Used for pasteurising cans by heat process
Retorts	Used for sterilization of filled cans
Can cooling tanks	Used for cooling of sterilised cans
Batch coder	Used for coding can coding
Labelling machine	Used for labelling packaged packets
Strapping machine	Used for combining smaller packets for easy transportation



Fig. 4.2.1. Fruit washing machine



Fig. 4.2.2. Sorting and grading machine



Fig. 4.2.3. Conveyer belt



Fig. 4.2.4. Peeler



Fig. 4.2.5. Core cutter



Fig. 4.2.6. Crusher/chopper/shredder



Fig. 4.2.7. Blancher/hot break system



Fig. 4.2.8. Aseptic filler



Fig. 4.2.9. Decanter



Fig. 4.2.10. De-aerator



Fig. 4.2.11. Evaporator/concentrator



Fig. 4.2.12. Steriliser



Fig. 4.2.13. Retorts

4.2.2 Precautions and Safety Measures to Follow

- Avoid direct spillage of water on electrical components
- Clean the tools and equipment before and after each operation
- Ensure regular maintenance of tools and machinery
- Do not open machines with sharp knives during operation. It is safe to open a machine when it is unplugged from an electrical source
- Check machines like the steam-jacketed kettles regularly for efficiency of valves
- Ensure the build-up of pressure in machines is always under control
- Ensure the controls of all the machines are set to prescribed limits

Unit 4.3 Production Process of Fruit Pulp

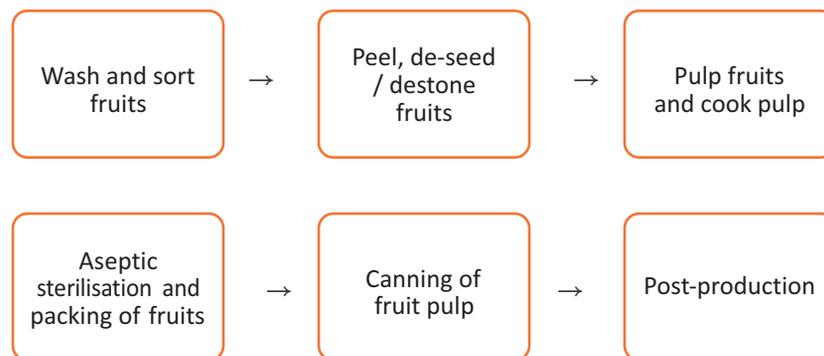
Unit Objectives

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

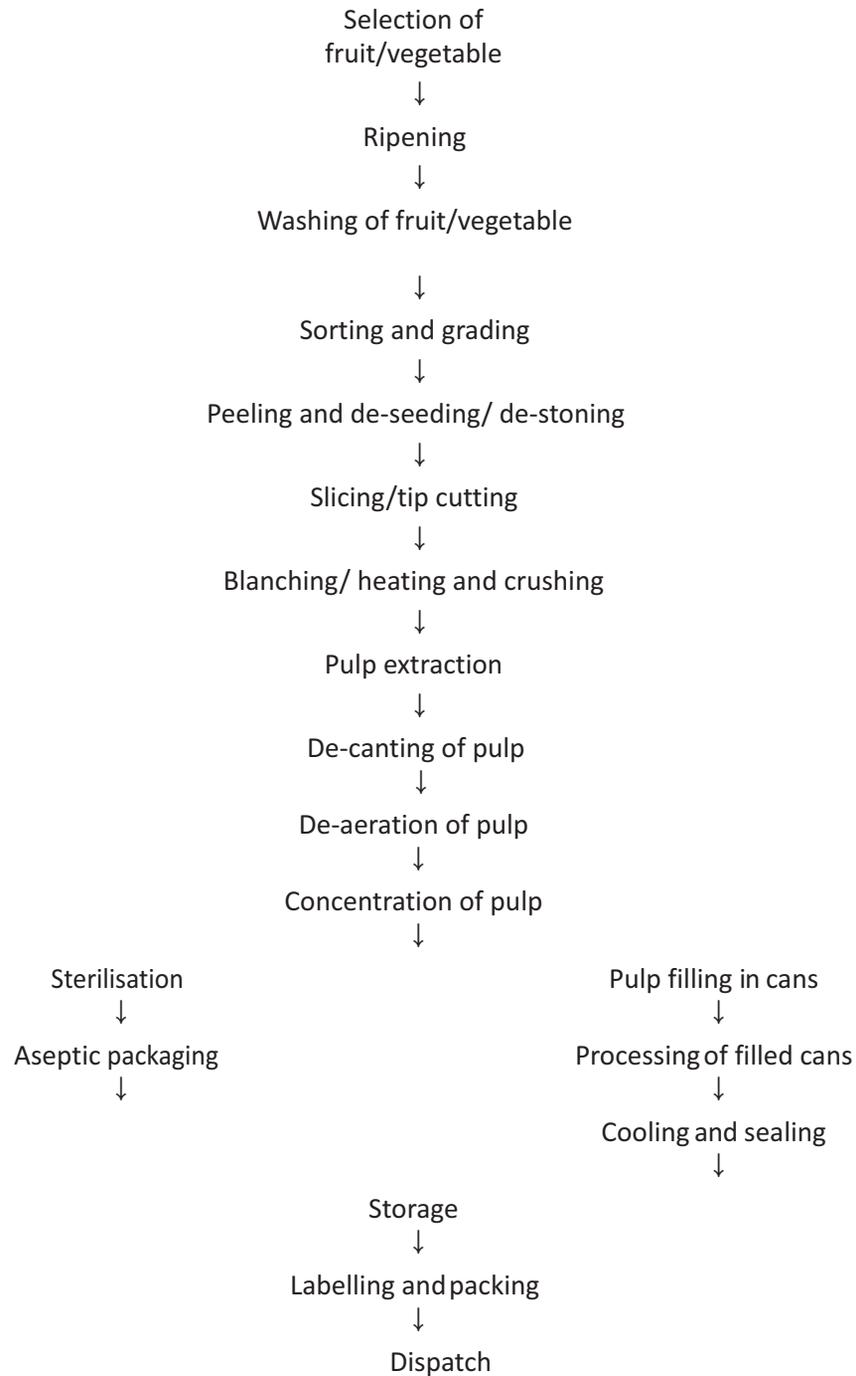
- Describe the pulping process;
- Explain the process of pulping fruit.

4.3.1 Overview of the Pulp Extracting Process

Pulp extracting process is as follows:



4.3.2 Production Process of Fruit Pulp



UNIT 4.4: Ripening of Fruit

Unit Objectives

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

- Define ripening;
- Explain fruit ripening process.

4.4.1 Fruit Ripening

Ripening is a process where fruit is transformed into a palatable state. It is a link in achieving optimal eating quality for many types of fruits. This process is speeded up using ripening agents.

Based on the ripening behaviour, fruits are classified as climacteric and non-climacteric fruits.

Climacteric Fruits	Non-climacteric Fruits
<ul style="list-style-type: none"> • Fruits which continue to ripen after harvesting • Cannot withstand travelling hence ripened near consumption area • Ethylene helps in ripening • Examples: Mango, banana, plum, papaya, guava, pear, etc. 	<ul style="list-style-type: none"> • Fruits which ripen only on plant • Withstand travelling and hence transported • Ethylene helps in removal of green colour of fruits • Examples: Orange, grapes, watermelon, litchi, strawberry, etc.

Ripening agents

The substance used to speed up the ripening process is called ripening agent. Commonly used ripening agent is ethylene gas. Under natural conditions, ethylene, a ripening hormone produced by the plant, plays a major role in the ripening process.

Methods of ripening

Given below are common methods for ripening of fruit:

- A simple method practiced in households is to keep un-ripened and ripened fruits together inside an airtight container.
- Another method is to place the fruits intended for ripening inside an airtight room and inducing charcoal smoke in the room.
- Another process is to dip the fruits in a solution that is 1 ml ethrel solution in 1 litre of water, and wiped dry. After that, each fruit spread out on a newspaper without touching each other and covered with a thin cotton cloth. The fruit ripens in two days.
- Spreading unripe fruits in layers over paddy husk or wheat straw for a week to ripen them is another alternative.
- Some ethylene releasing fruits such as papaya and banana are also kept in the same room with unripe fruit. Since ethrel is a plant hormone, it hastens the ripening process by releasing ethylene in the atmosphere. This practice is the safest method.
- Calcium carbide is also used for ripening, but it makes the fruit poisonous and such fruit should not be consumed.

UNIT 4.5: Fruit Pulping Procedure and Sterilisation

Unit Objectives

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

- State the procedures used to create fruit pulp;
- Describe sterilization process for fruit processing industry;
- State the methods of sterilizing fruit pulp.

4.5.1 Procedures Involved in Pulping

Decanting

It is a filtering/removal process. All the rotten fruit particles (black and brown skin and extraneous matter), larva, eggs, sand from the fruit extract, etc. is separated out. The extracted fruit pulp is raw, pure fruit pulp. It is done by centrifugation process. The raw extracted pulp is rotated at high speed to remove the layer of black specks and unwanted particles.

De-aeration

It is a process of expelling air from the product before sterilisation and filling.

In crushing, pressing, separation, and decanting, the raw fruit pulp extract is subjected to considerable aeration. The inclusion of oxygen can promote enzymatic browning, destroy nutrients, modify flavour, and otherwise damage quality. Hence, ensure caution and care to protect the material.

De-aeration methods

- Rapid heating and heated pulp transferred into a vacuum chamber: Rapid heating at high temperature removes some undesirable volatile aroma and air. The heated pulp is passed into vacuum chamber for storing/further processes
- Inert gas bubbling: In the extracted, raw, pre-cooked pulp, nitrogen or carbon dioxide gas is bubbled prior to storing it under an inert atmosphere. After the removal of air, pulp needs protection from the atmosphere in all subsequent processing steps. It is done in vacuum conditions with the aid of a pump

Concentration

It is a process to cook fruit pulp in order to remove water content from the product. The fruit pulp is boiled, and it becomes thick after water evaporates from it. The processed fruit pulp is called concentrate. It is done in an evaporator under controlled conditions of pulp flow, temperature, and boiling time. Low temperature evaporators operate at a maximum temperature of 50°C.

4.5.2 Sterilisation of Fruit Pulp

Sterilisation Process

It is a process to kill all harmful microorganisms present in the product. It is done to increase the product life.

Methods of sterilising fruit pulp

Given below are two methods used for sterilisation in fruit processing industry:

Retort	Tube-in-tube
<ul style="list-style-type: none"> • Batch process • Filled cans are put on rack and loaded into retort • Steam is trapped in retort • Sterilisation technique is done on the basis of cooking in a cooker • Cooling is done separately 	<ul style="list-style-type: none"> • Continuous process • Passed through series of tubes placed within a tube • Steam is passed through the outer tube • High Temperature Short Time (HTST) technique used for sterilisation • Cooling is done by the extension of tube at filling temperature

UNIT 4.6: Quality Analysis of Fruit Pulp

Unit Objectives

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

- List the quality control parameters for checking fruit pulp.

4.6.1 Quality Control

It is an optimum standard maintained continuously as per the company norms to produce quality product along with specific guidelines from the Government. If the quality standards are not maintained, it could lead to fatal consequences.

4.6.2 Quality Parameters of Fruit Pulp

Every step involved in the process requires monitoring inclusive of food safety and personal hygiene. In fruit pulp, quality check is done on basis of technical specification and organoleptic, which differ from fruit to fruit.

- pH: Each fruit has its own acidity level. The processing company maintains it as per their requirement.
- TSS: Each fruit product has its own Brix ratio. The processing company maintains it as per their requirement.
- Viscosity: It is measured by refractometer as per the need
- Taste/flavour, colour, and texture: It is checked by tasting the pulp

Given below is a chart of common fruit pulp requirements:

Fruit	pH (Acidity %)	TSS (Brix degrees)
Mango	0.6 % to 0.7 %	14°
Papaya	0.2 %	10° to 12°
Pear	0.3 %	10°
Peach/apricot	0.2 % to 0.3 %	10° to 12°
Pineapple	0.4 % to 0.6 %	10° to 12°
Litchi	0.3 % to 0.5 %	10° to 12°
Banana	0.2 % to 0.3 %	24°
Apple	0.15 % to 0.2 %	10° to 12°
Tomato	0.5 % to 0.6 %	4°

UNIT 4.7: Packing, Packaging and Storage of Products

Unit Objectives

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

- State the basic categories of packing;
- State the various types of packaging materials used for packing fruit pulp;
- State the factors for selecting packaging materials;
- State the storage procedures for finished goods;
- Explain the rules for stock rotation of finished goods;
- Explain aseptic packaging in fruit processing industry;
- Define canning and its purpose;
- State the process of canning;

4.7.1 Packing and Packaging

Packing of Finished Products

The finished product is filled in containers meant for packaging. Depending on the demand, the market and the size of the industry packing is categorised as follows:

Packing	
<p>Primary packing</p> <ul style="list-style-type: none"> • Comes in direct contact with food • E.g. Pouches, bottles, sachets, drums 	<p>Secondary packing</p> <ul style="list-style-type: none"> • Comes in contact with the primary packing material • E.g. Cartons (filled with bottles)
	
<p>Fig. 4.5.1. Primary packing</p>	<p>Fig. 4.5.2. Secondary packing</p>

When selecting the packaging material to pack the finished products, one must ensure that the packaging material is:

- Non-toxic and compatible with food
- Offers sanitary protection
- Protects the product from moisture, gas, and odour
- Protects the product from light, temperature, humidity, and rain
- Protects the product from insects, mites, bacteria, rodents, and birds
- Transparent and tamper-proof
- Offers ease of opening, pouring, resealing, and disposing
- Compatible with the size, shape, and appearance standards set by the organisation Low on cost

4.7.2 Storage of Finished Products

Methods of Storing Finished Products

The fruit industry follows the JIT (Just-In-Time) system. Here, finished product is dispatched to the distributor, retail industry or institution as soon as the product is ready.

The two most common, stock rotation systems like FIFO and FEFO are applied to finished product.

- FIFO (First-In-First-Out) is a stock rotation system that dispatches processed food depending on the order in which it is produced



Fig. 4.5.3. FIFO stock rotation

- FEFO (First-Expired-First-Out) is a stock rotation system wherein products that need to be consumed earlier are shipped first

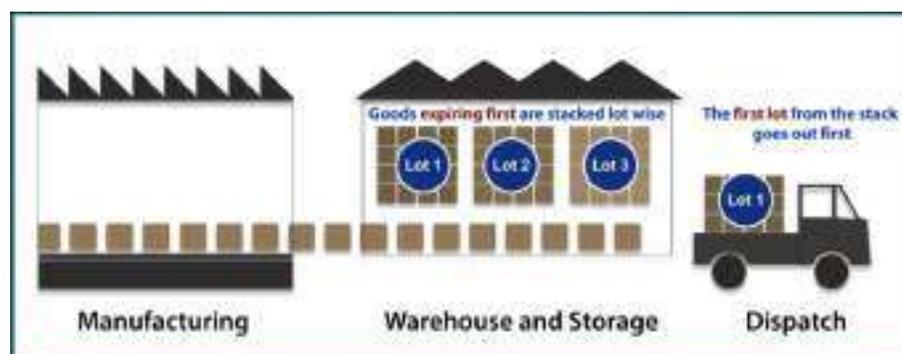


Fig. 4.5.4. FEFO stock rotation

4.7.3 Aseptic Packaging

Aseptic Packaging

Packaging ensures that processed food is sterile and protected from harmful microorganisms. Packaging done in a germ free environment is called aseptic packaging. It is the final steps in aseptic food processing. Food product is sterilised continuously ensuring that either food decay and/or food poisoning does not occur. Aseptic packaging ensures that the containers for the food are sterilised continuously and that the food is inserted into the container in a completely sterile environment.

The packaging material used is multi-layered paper, polyester, and metal liners are pre-sterilised products. Examples of aseptic packaging are milk tetra packs/cartons, juice pouches, boxes, etc.

The common methods of aseptic packing are:



Fig.4.5.5. Form-fill seal



Fig.4.5.6. Bag-in-box



Fig. 4.5.7. Bag-in-drum

4.7.4 Canning of Fruit pulp

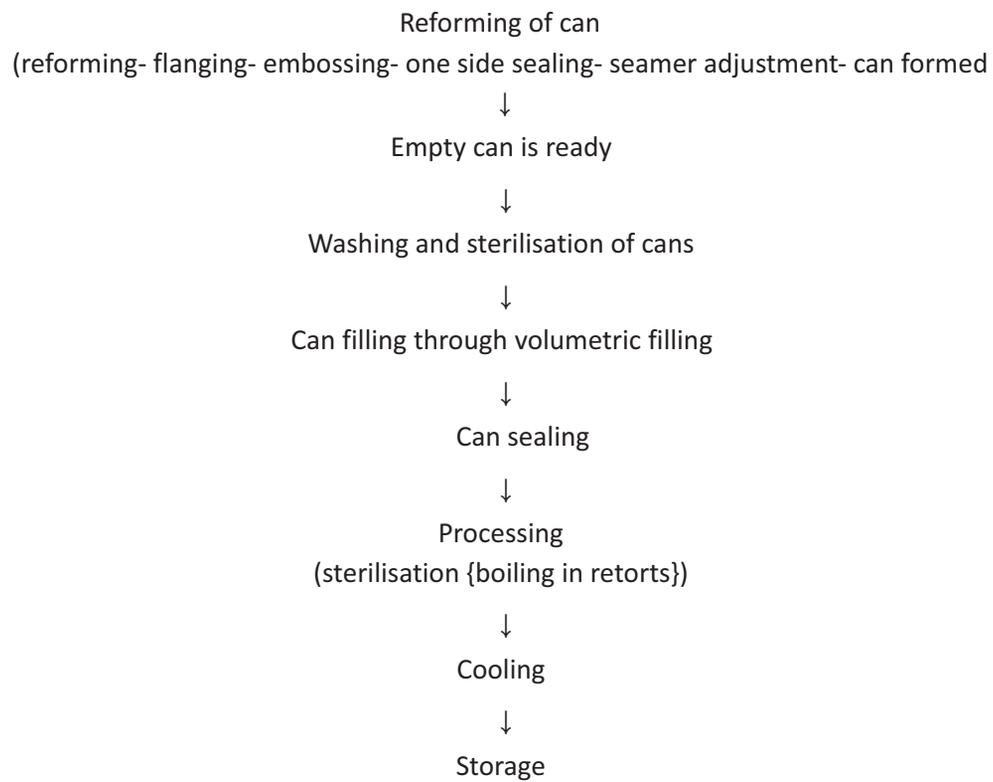
Canning

Canning is a food preservation technique. Processed food is filled into sterilised cans/bottles for preservation. This filled product along with cans/bottles undergoes pasteurisation/sterilisation using heat. The purpose of canning is:

- Canned foods are a way to store fruit/vegetables in an optimum way and to retain the oxygen.
- Canned foods are also used to supply foods to the defence and scarce areas where it may not be available.

Canning can be done in three ways given below:

1. Static canning followed by freezing under pressure
2. Sterilisation under high pressure
3. Sterilisation under hyper heating



UNIT 4.8: Post Production Cleaning and Maintenance

Unit Objectives

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

- Demonstrate the process of cleaning and maintenance of work area after production;
- State the kind of waste produced and its disposal.

4.8.1 Post Production Cleaning Method

This explains the method of cleaning the work area after production

Clean machineries with recommended sanitisers →	Clean equipment and tools with recommended sanitisers ↓	e.g. knives, pans, buckets, trolleys
Clean the work area as per norms ↓	Attend to minor repairs and maintenance work β	e.g. oiling and greasing machines
Ensure work area is free from pests →	Maintain equipment daily/ weekly as per supplier's instruction manual ↓	
Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel		

Exercise

1. Select the correct answer.
 - a. Ripening is a process in the transformation of fruit into a _____ state.
 - i. smelly
 - ii. rotten
 - iii. palatable
 - iv. oily
 - b. A unit used to describe the total soluble solids content in a fruit pulp/juice is _____ ratio.
 - i. TSS
 - ii. Brix to acid
 - iii. soluble solid
 - iv. soluble liquid
 - c. Two methods of sterilising fruit pulp are _____ and _____.
 - i. boiling and retort
 - ii. retort and tube-in-tube
 - iii. tube-in-tube and boiling
 - iv. boiling and cooling
 - d. The functions of a package are to _____ the quality and freshness of food, to add appeal to the food to attract consumers, and to facilitate its storage and distribution.
 - i. preserve
 - ii. enhance
 - iii. maintain
 - iv. observe
 - e. Packaging undertaken in a germ-free environment is called _____ packaging.
 - i. homogenized
 - ii. germ-free
 - iii. sterilised
 - iv. aseptic
 - f. De-canting is a _____ process in which all rotten fruit particles are removed.
 - i. filtering
 - ii. aeration
 - iii. sterilisation
 - iv. aseptic
2. Arrange the following in the correct sequence
 - a. Canning process
 - i. Storage
 - ii. Can sealing
 - iii. Sterilisation of cans
 - iv. Cooling
 - v. Empty can is ready
 - vi. Reforming of can
 - vii. Washing
 - viii. Volumetric filling
 - b. Fruit pulping process
 - i. Fruit selection
 - ii. Blanching
 - iii. Sterilisation
 - iv. Tip cutting
 - v. Aseptic packaging
 - vi. Washing
 - vii. De-aeration
 - viii. Decanting
 - ix. Concentration
 - x. Storage
 - xi. Pulp extraction
 - xii. Ripening

Notes



A large rectangular area with a thin orange border, containing 25 horizontal lines for writing notes.

Notes



A large rectangular area with a thin orange border, containing 25 horizontal lines for writing notes.

5. Produce Squash and Juice



- Unit 5.1- Introduction to Squash and Juice
- Unit 5.2-Equipment Used
- Unit 5.3-Squash and Juice Production
- Unit 5.4-Juice Extraction Procedure
- Unit 5.5-Pasteurisation and Sterilisation of Squash and Juice
- Unit 5.6-Quality Analysis of Squash and Juice
- Unit 5.6-Packing, Packaging and Storage of Products
- Unit 5.8-Post Production Cleaning and Maintenance



Key Learning Outcomes

At the end of the module, the participants will be able to:

1. Describe the squash and juice processing process;
2. Explain the processing of juice and squash;
3. Describe enzyme activity in fruit processing.
4. State the procedures used to create the fruit juice and squash;
5. Describe pasteurisation process for fruit processing industry;
6. Describe sterilisation process for fruit processing industry;
7. State the methods of sterilising fruit juice;
8. State the quality control of a product;
9. List the quality parameters of fruit pulp;
10. State the basic categories of packing;
11. State the various types of packaging materials used for packing fruit pulp;
12. State the factors for selecting packaging materials;
13. State the storage procedures for finished goods;
14. Explain the rules for stock rotation of finished goods;
15. Explain aseptic packaging in fruit processing industry;
16. Demonstrate the process of cleaning and maintenance of work area after production;
17. State the kind of waste produced and its disposal.

Unit 5.1 Documentation and record-keeping for raw material, and finished product

Unit Objectives

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

1. List the various sub-sectors of beverage industry;
2. List the various fruit drinks;
3. Define fruit juice and its types;
4. Define squash;
5. List the various fruits used for making squash and juice.

5.1.1 Beverage Industry

It is an industry that produces drinks and is a rapidly growing industry. The leading beverage companies in India are exporting various products around the world. The industry is fragmented and its sub- sectors are:

Beverage Type	Product
Soft drinks	Fruit drinks, carbonated drinks, Ready To Serve (RTS) drinks, mineral water, energy drinks
Alcoholic beverages/fermented drinks	Beer, wine, barley water, hard drinks, country liquor
Dairy drinks	Various milk drinks like chocolate milk, cocoa milk, etc.
Tea and coffee drinks (daily beverage)	Herbal teas, lemon tea, cold coffee, coffee flavoured liquors

Fruit Drinks

A beverage made from fruit is a fruit drink. Fruit drinks are of following types:

- Juice
- Concentrates and pulps
- Ready To Serve (RTS)
- Nectars
- Squashes
- Cordials
- Syrups
- Crush

Juices

It is an unfermented beverage made from crushing/squeezing fruit. The resultant liquid is juice. It is of two types:

Natural Juice	Sweetened Juice
<ul style="list-style-type: none"> • Pure in form; extracted from ripe fruits • Contains natural sugars • Example: Apple juice, orange juice, etc. 	<ul style="list-style-type: none"> • 85 % is pure juice mixed with soluble solids • Sugar added to sweeten it as per processing requirement • Example: Strawberry squash and lemon squash

Squashes

It is an unfermented beverage made from combining juice/pulp and total soluble solids of fruits in proportions.

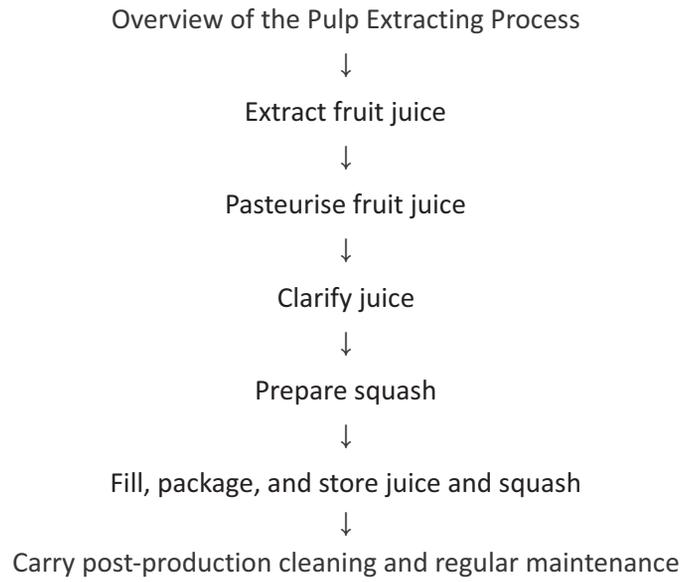
5.1.2 Types of Products Made from Various Fruits

The table below provides the various products made from fruit juice:

Name of Fruit	Juice Type	Name of Fruit	Juice Type
Mango	<ul style="list-style-type: none"> • Juice • Blended juice • Ready to serve • Squash • Nectar 	Apple	<ul style="list-style-type: none"> • Pure juice • Blended juice • Juice concentrate
Guava	<ul style="list-style-type: none"> • Blended juice • Ready to serve • Nectar • Squash 	Grape	<ul style="list-style-type: none"> • Juice • Blended juice • Syrup • Juice concentrate
Papaya	<ul style="list-style-type: none"> • Ready to serve • Nectar • Squash 	Strawberry	<ul style="list-style-type: none"> • Crush • Squash • Jelly • Ice-cream • Pulp powder
Pomegranate	<ul style="list-style-type: none"> • Juice • Blended juice • Syrup • Cordial • Nectar 	Lemon/lime	<ul style="list-style-type: none"> • Pure juice • Blended juice • Citrus juice • Ready to serve • Nectar • Squash • Cordial • Syrup
Pineapple	<ul style="list-style-type: none"> • Juice • Squash • Cordial • Juice concentrate 	Jamun	<ul style="list-style-type: none"> • Syrup • Squash • Nectar • Ready to serve
Orange	<ul style="list-style-type: none"> • Juice • Blended juice • Squash • Syrup • Juice concentrate 		

5.1.3 Overview of the Preparation Process

Juice extraction and squash preparation process is as follows:



Unit 5.2 – Equipment Used

5.2.1 Equipment used for Squash and Juice Process

Name of Equipment	Usage
Ripening chamber with ethylene doser	Used for ripening fruit/vegetables by passing ethylene gas
Fruit washing machine	Used for fruit washing
Sorting and grading machine	Used for fruit segregation as per size and firmness
Conveyor belt	Used for mango tip cutting and visual inspection for sorting
Peeler	Used for removing fruit skin
De-seeder/de-stoner	Used for removing fruit seeds and stones in mangoes
Core cutter	Used for cutting fruit core especially in pineapple
Crusher/chopper/shredder	Used for crushing/chopping/shredding of fruit
Blancher/hot break system	Used to heat the fruit/vegetable to facilitate pulping process
Juice extractor/hydraulic press/continuous press/filter press	Used to extract juice and separate fruit fibre, skin, seed, and grits from juice
Steam jacketed kettles/blending tanks	Used for cooking juice by blending all ingredients like sugar, ascorbic acid, colour, flavourings, etc.
Decanter	Used to remove fibre, grits, black and brown specks, extraneous matter, dust, and other impurities from juice
Enzyme treatment tank/collection tank	Used to hold juice when enzyme is added for enzyme activity
Evaporator/concentrator	Used for evaporating water from juice
Pasteuriser	Used for pasteurising juice by passing steam through it
Clarifier/ultra-filtration unit	Used to clarify juice. A clarifier is used to remove solid particulates or suspended solids from liquid for clarification and/or thickening
Aseptic filler	Used for aseptic filling of processed pulp in aseptic bags
Holding tank/reservoir tank	Used for storing fruit juice
Bottle filling machines	Filling of juices/squashes into bottles
Crown crimping machine	Metal lid capping machine
pilfer proof sealing machine	Plastic lid sealing machine
Bottle washing machine	Used for bottle washing. They are of two types: brush washer and chemical washer
Batch coder	Used for coding
Tetra packaging machine	Packing machine for tetra packages
Labelling machine	Used for labelling packaged packets
Strapping machine	Used for combining smaller packets for easy transportation



Fig. 5.2.1. Ripening chamber with ethylene doser



Fig. 5.2.2. Fruit washing machine



Fig. 3.1.3. Sorting and grading machine



Fig. 5.2.4. Conveyor belt



Fig. 5.2.5. Peeler



Fig. 5.2.6. De-seeder/de-stoner



Fig. 5.2.7. Evaporator/concentrator



Fig. 5.2.8. Pasteuriser



Fig. 5.2.9. Clarifier/ultra-filtration unit



Fig. 5.2.10. Aseptic filler



Fig. 5.2.11. Holding tank/reservoir tank



Fig. 5.2.12. Bottle filling machines

Precautions and safety measures to follow while handling equipment

- Avoid direct spillage of water on electrical components
- Clean the tools and equipment before and after each operation
- Ensure regular maintenance of tools and machinery
- Do not open machines with sharp knives during operation. It is safe to open a machine when it is unplugged from an electrical source
- Check machines like the steam-jacketed kettles regularly for efficiency of valves
- Ensure the build-up of pressure in machines is always under control
- Ensure the controls of all the machines are set to prescribed limits

UNIT 5.3: Squash and Juice Production Process

Unit Objectives

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

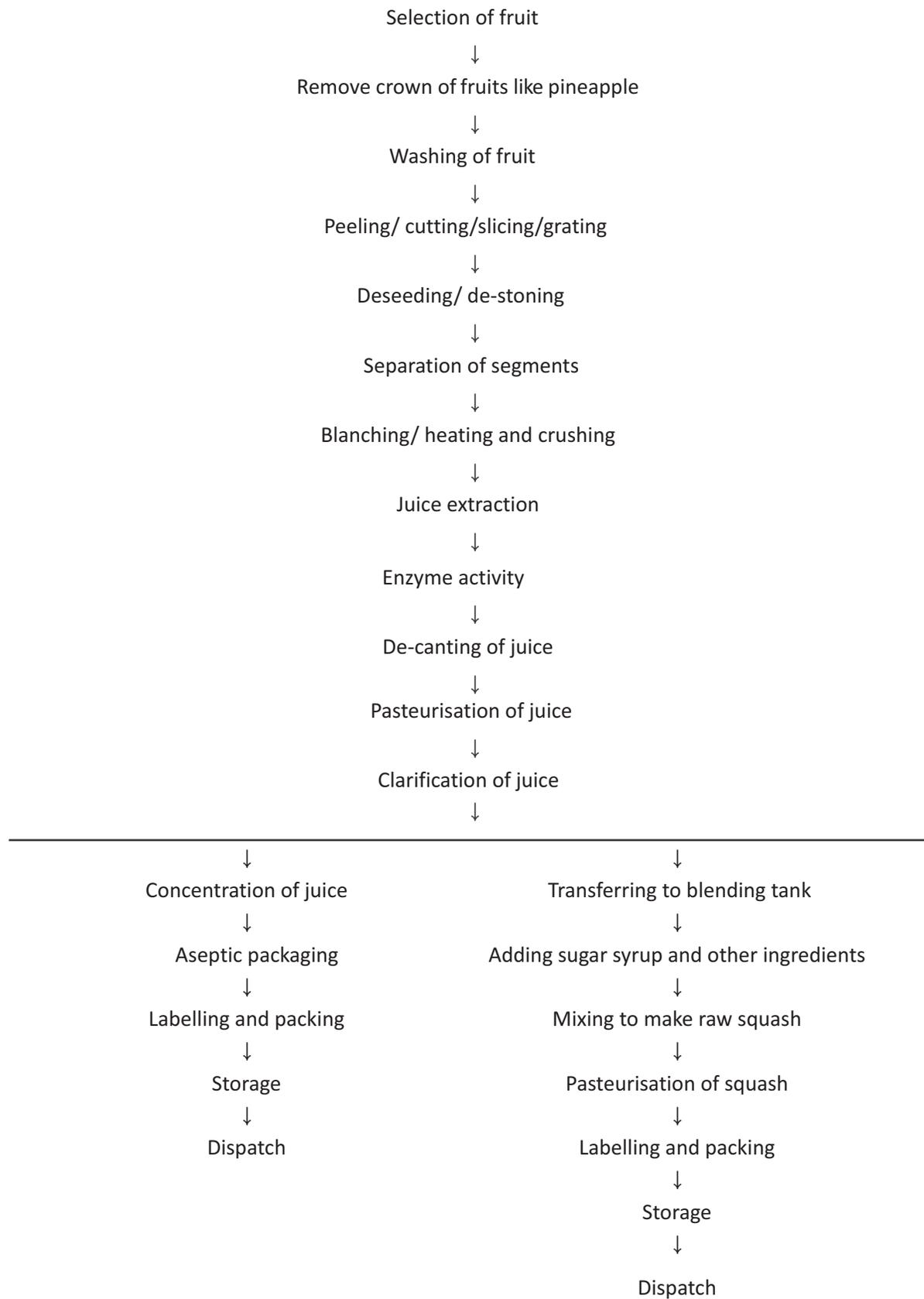
- Describe the squash and juice processing process;
- Explain the processing of juice and squash;
- Describe enzyme activity in fruit processing.

5.3.1 Terminology Used in Process

- TSS (Total Soluble Solids): It is the extracted mass of fruit, which contains fibres and fruit sugar.
- Refractometer: It is a tool used for measuring TSS.
- pH indicator: A numeric scale to check acid levels in pulp/juice. It should be between 2.5 and 4

5.3.2 Processing of Juice and Squash

The following chart gives a detailed overview of the juice and squash production process:



5.3.3 Enzyme Activity

Enzyme: Enzymes are a type of proteins that regulate chemical reactions within food products. Enzymes enhance in transformation of food flavour, colouring, and shelf life. Hence, it is necessary to know the types of enzymes naturally occurring in a particular fruit.

Enzyme activity: The chemical substance called substrate on which enzymes act and the conditions governing its activity are important. The enzymes are to used breakdown cells walls and release the liquids and sugars, which make up the fruit.

Enzymes used: Pectinases, amylases and celluloses are commonly used enzymes that break down different structures of the fruit cells and affect the extraction process in different ways.

UNIT 5.4: Juice Extraction Procedure

Unit Objectives

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

- State the procedures used to create the fruit juice and squash.

5.4.1 Procedures Involved in Juice Extraction

Decanting

It is a filtering/removal process. All the rotten fruit particles (black and brown skin and extraneous matter), larva, eggs, sand from the fruit extract, etc. is separated out. The extracted fruit pulp is raw, pure fruit pulp. It is done by centrifugation process. The raw extracted pulp is rotated at high speed to remove the layer of black specks and unwanted particles.

Concentration

It is a process to cook fruit pulp in order to remove water content from the product. Fruit pulp is boiled, and it becomes thick after water evaporates from it. This processed fruit pulp is called concentrate. It is done in an evaporator under controlled conditions of pulp flow, temperature, and boiling time. Low temperature evaporators operate at a maximum temperature of 50°C.

Clarification

It is a process of ultrafiltration in which quantities of tartar cream is used. Certain specks that are not removed during decanting are removed. The process is carried out in two ways:

Freezing	Heating
<ul style="list-style-type: none"> • Precipitation of juice • Bottle of juice is refrigerated to complete precipitation • Tartar crystals settle down leaving clear liquid on top • Example: Apple juice 	<ul style="list-style-type: none"> • Rapid heating to about 180°C followed by sudden cooling • It is done in flash heaters to avoid oxidation • After rapid heating and cooling, the liquid is passed through a filtering material • Example: Pomegranate juice

UNIT 5.5: Pasteurisation and Sterilisation of Squash and Juice

Unit Objectives

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

- Describe pasteurisation process for fruit processing industry;
- Describe sterilisation process for fruit processing industry;
- State the methods of sterilising fruit juice.

5.5.1 Pasteurisation

It is a process in which foods are heated at specific temperature and for specific time to kill (or deactivate) some number of potentially harmful bacteria. Pasteurisation is a preservation method used in food industry for milk and juices.

Methods of Pasteurisation

Optimum temperature and time used for pasteurisation of juices and squashes is 185°C. It is done in two ways:

- High Temperature Short Time (HTST): Juice is heated at high temperatures for short time
- Low temperature Long Time (LTLT): Juice is heated at low temperature for a long time Given below are three methods of pasteurisation:

1. In-The-Bottle/Holding

- Filtered juice filled in expandable bottles with proper heads, sealed airtight, and pasteurised
- LTLT way of pasteurisation is used

2. Overflow

- Juice is heated 50°C above pasteurisation temperature
- This heated liquid is filled in hot sterilised bottles up to brim and sealed
- Sealed bottles pasteurised at 50°C lower temperature filling
- On cooling, the bottles contract leaving no air space in between
- HTST way of pasteurisation is used

3. Flash

- The juice is heated 10°C above pasteurisation temperature for a minute
- The liquid filled in air tight container and sealed in steam cover for sterilised sealing
- It is cooled at room temperature
- HTST way of pasteurisation is used

5.5.2 Sterilisation of Fruit Juice and Squash

Sterilisation Process

It is a process to kill all harmful microorganisms present in the product. It is done to increase the product life.

Methods of Sterilising

Given below are two methods for sterilisation in fruit industry:

Retort	Tube-in-tube
<ul style="list-style-type: none">• Batch process• Filled cans are put on a rack and loaded into a retort• Steam is trapped in the retort• Sterilisation technique is done on basis of cooking in a cooker• Cooling is done separately	<ul style="list-style-type: none">• Continuous process• Passed through a series of tubes placed within a tube• Steam is passed through the outer tube• High Temperature Short Time (HTST) technique used for sterilisation• Cooling is done by extension of tube at filling temperature

UNIT 5.6: Quality Analysis of Squash and Juice

Unit Objectives

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

- State the quality control of a product;
- List the quality parameters of fruit pulp

5.6.1 Quality Control

It is an optimum standard maintained continuously as per the company standard norms to produce quality product along with specific guidelines from the Government. If the quality standards are not maintained, then it could lead to fatal consequences.

5.6.2 Quality Parameters

1. Fruit juice

Every step involved in the process requires monitoring inclusive of food safety and personal hygiene. In fruit juice, quality check is done on the basis of technical specification and organoleptic, which differ from fruit to fruit. The most important parameter to control is pH level as the juice is natural and without any additives.

- a. pH: Each fruit has its own acidity level. The processing company maintains it as per their requirement.
- b. TSS: Each fruit product has its own brix ratio. The processing company maintains it as per their requirement.
- c. Consistency: It is measured by refractometer as per the need
- d. Taste/flavour, colour, and texture: It is checked by tasting the juice

2. Squash

- a. It is made from fruit juice and fruit pulp with additives, sugar, acid and preservatives
- b. pH: Each fruit has its own acidity level. The processing company maintains it as per their requirement
- c. TSS: Each fruit product has its own Brix ratio, the optimum level is maximum 45
- d. Consistency: It is measured by refractometer as per the need
- e. Taste/flavour, colour, and texture: It is checked by tasting the juice

Given below is a chart of common fruit juice and squash and squash requirements

Fruit	pH (Acidity %)	TSS (Brix degrees)
Mango	0.6% to 0.7%	14°
Papaya	0.2%	10° to 12°
Pear	0.3%	10°
Peach/apricot	0.2% to 0.3%	10° to 12°
Pineapple	0.4% to .6%	10° to 12°
Litchi	0.3% to 0.5%	10° to 12°
Banana	0.2% to 0.3%	24°
Apple	0.15% to 0.2%	10° to 12°
Tomato	0.5% to 0.6%	4°

UNIT 5.7: Packing, Packaging and Storage of Products

Unit Objectives

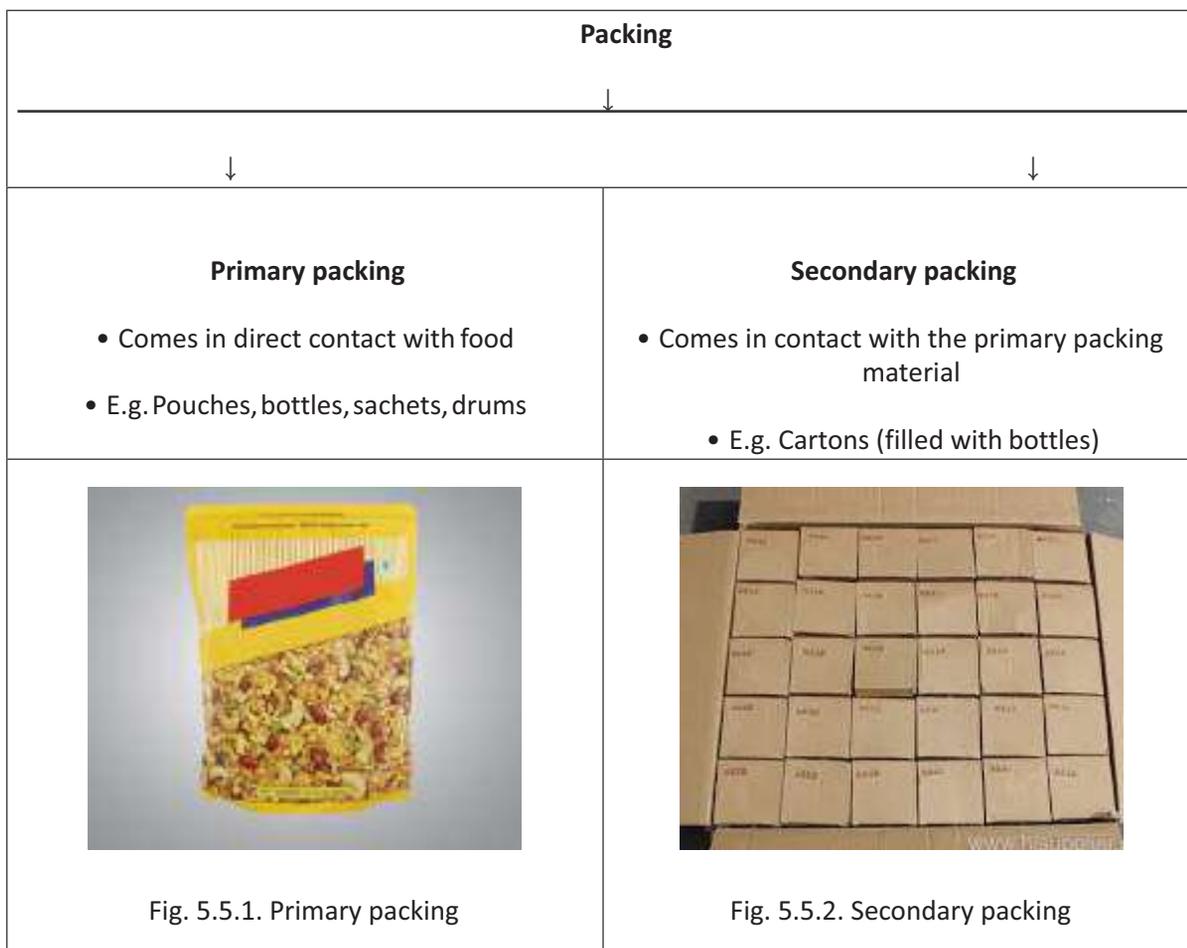
At the end of this unit, the participants will be able to:

- State the basic categories of packing;
- State the various types of packaging materials used for packing fruit pulp;
- State the factors for selecting packaging materials;
- State the storage procedures for finished goods;
- Explain the rules for stock rotation of finished goods;
- Explain aseptic packaging in fruit processing industry;

5.7.1 Packing and Packaging

Packing of Finished Products

The finished product is filled in containers meant for packaging. Depending on the demand, the market and the size of the industry, packing is categorised as follows:



When selecting the packaging material to pack the finished products, one must ensure that the packaging material is:

- Non-toxic and compatible with food
- Offers sanitary protection
- Protects the product from moisture, gas, and odour
- Protects the product from light, temperature, humidity, and rain
- Protects the product from insects, mites, bacteria, rodents, and birds
- Transparent and tamper-proof
- Offers ease of opening, pouring, resealing, and disposing
- Compatible with the size, shape, and appearance standards set by the organisation
- Low on cost

5.7.2 Storage of Finished Products

Methods of Storing Finished Products

The fruit industry follows the JIT (Just-In-Time) system. Here, finished product is dispatched to the distributor, retail industry or institution as soon as the product is ready.

The two most common, stock rotation systems like FIFO and FEFO are applied to finished product.

- FIFO (First-In-First-Out) is a stock rotation system that dispatches processed food depending on the order in which it is produced



Fig. 5.5.3. FIFO stock rotation

- FEFO (First-Expired-First-Out) is a stock rotation system wherein products that need to be consumed earlier are shipped first



Fig. 5.5.4. FEFO stock rotation

5.7.3 Aseptic Packaging

Aseptic Packaging

Packaging ensures that processed food is sterile and protected from harmful microorganisms. Packaging done in a germ free environment is called aseptic packaging. It is the final steps in aseptic food processing. Food product is sterilised continuously ensuring that either food decay and/or food poisoning does not occur. Aseptic packaging ensures that the containers for the food are sterilised continuously and that the food is inserted into the container in a completely sterile environment.

The packaging material used is multi-layered paper, polyester, and metal liners are pre-sterilised products. Examples of aseptic packaging are milk tetra packs/cartons, juice pouches, boxes, etc.

The common methods of aseptic packing are:



Fig. 5.5.5. Form-fill seal



Fig. 5.5.6. Bag-in-box

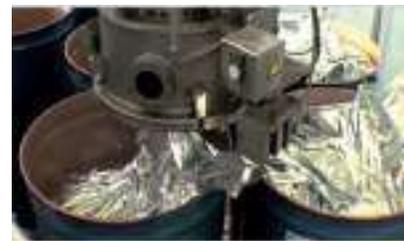


Fig. 5.5.7. Bag-in-drum

UNIT 5.8: Post Production Cleaning and Maintenance

Unit Objectives

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

- Demonstrate the process of cleaning and maintenance of work area after production;
- State the kind of waste produced and its disposal.

5.8.1 Post Production Cleaning Method

This explains the method of cleaning the work area after production

Clean machineries with recommended sanitisers →	Clean equipment and tools with recommended sanitisers ↓	e.g. knives, pans, buckets, trolleys
Clean the work area as per norms ↓	Attend to minor repairs and maintenance work β	e.g. oiling and greasing machines
Ensure work area is free from pests →	Maintain equipment daily/weekly as per supplier's instruction manual ↓	
Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel		

5.8.2 Waste Management

It is a method of treating/handling the unwanted materials that are a threat to the environment. Ensuring that the waste generated is disposed properly, one of the important features of Good Manufacturing Practices (GMP) is waste management.

A lot of waste is generated in fruit and vegetable processing industry. A valuable by-product can be made from waste to solve the problem of waste disposal. Given below is the table in which as per fruit, the name of waste and its by-products are listed:

Fruit	Name of waste	By-products
Apple	Pomace, Cores	Pectin, Cider, Vinegar, Chutneys, etc.
Apricot, peach	Kernel	Kernel oil can be used in pharmaceutical, Oil cake as cattle feed
Citrus fruits	Rags, Peels, Seeds	Peel can be used for oil, pectin, marmalades, and extraction candy manufacturing. Sludge can be used for citric acid manufacturing. Seed can be used for oil extraction
Grapes	Stem and Pomace	Pomace can be used for making jelly, chutney, cream of tartar, and cattle feed.
Guava	Cores, Seeds, Peels	Guava cheese and cattle feed
Mango	Peel and Stone	Mango stones after removal of coat is dried, powdered, and are used as edible starch. Peel can be fermented to prepare vinegar
Pear	Skin and Seed	Cattle feed
Pineapple	Skin, Rind, Crown	From crown, edible wax can be extracted. Rind can be used for pineapple candy and skin may be crushed for juice extraction
Tomatoes	Seeds	Can be used for extraction of oil
Other fruits		Banana skin may be used for paper pulp. Green papaya latex can be used for papain extraction
Vegetable waste	Skin leaves	Can be used for cattle feed

Exercise

1. Fill in the blanks with the correct option
 - a. _____ refers to the process of cooking fruit pulp in order to remove the water content from the product.
 - i. Decanting
 - ii. Aeration
 - iii. Pulping
 - iv. Concentration
 - b. Two methods of sterilising in fruit processing industry are _____ and _____.
 - i. boiling and retort
 - ii. retort and tube-in-tube
 - iii. tube-in-tube and boiling
 - iv. boiling and concentration
 - c. The functions of a package are to _____ the quality and freshness of food, to add appeal to the food to attract consumers, and to facilitate its storage and distribution.
 - i. preserve
 - ii. enhance
 - iii. maintain
 - iv. restore
 - d. Packaging undertaken in a germ-free environment is called _____ packaging.
 - i. homogenised
 - ii. germ-free
 - iii. sterilised
 - iv. aseptic
 - e. De-canting is a _____ process in which all rotten fruit particles are removed.
 - i. filtering
 - ii. aeration
 - iii. sterilisation
 - iv. aseptic
 - f. Clarification refers to the process of _____ from the extracted juice.
 - i. adding water
 - ii. adding syrup
 - iii. removing specks
 - iv. removing salt
 - g. Full form for HTST is _____.
 - i. High Terminal Short Time
 - ii. High Temperature Short Temperature
 - iii. High Tempo Short Time
 - iv. High Temperature Small Time
 - h. Enzymes are _____ that regulate chemical reactions within food products.
 - i. filtering
 - ii. aeration
 - iii. proteins
 - iv. aseptic
 - i. Pasteurisation is a _____ method used in food industry for milk and juices.
 - i. filtering
 - ii. preservation
 - iii. heating
 - iv. aseptic
 - j. _____ is made from fruit juice and fruit pulp with additives, sugar, acid and preservatives.
 - i. Squash
 - ii. Cordial
 - iii. Juice
 - iv. Soft drink
2. Arrange the following in the correct sequence

Production sequence	Order the steps (as 1, 2, 3, 4, 5, 6, 7 and 8)
a. Fruit selection	
b. Blanching	
c. Washing	
d. Aseptic packaging	
e. Clarification	
f. Decanting	
g. Concentration	
h. Pasteurisation	

Notes



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6. Execution of Drying/Dehydration Process



- Unit 6.1- Drying/ Dehydrating Fruits and Vegetables
- Unit 6.2- Equipment used in the Drying/ Dehydration Process
- Unit 6.3- Drying/ Dehydration Process
- Unit 6.4- Sun-Drying, Hot Air Drying and Freeze Drying Fruits and Vegetables
- Unit 6.5- Inspection of Dried Fruits and Vegetables
- Unit 6.6- Packing and Storage
- Unit 6.7- Post Production Cleaning and Maintenance



Key Learning Outcomes

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

1. State the production process used for drying/ dehydrating fruits and vegetables;
2. Demonstrate the process of sun-drying fruits and vegetables;
3. Demonstrate the process of hot air drying fruits and vegetables;
4. Demonstrate the process of freeze drying fruits and vegetables;
5. Demonstrate the process of inspecting dried fruits and vegetables;
6. Explain the method of packing dried fruits and vegetables;
7. Explain the process of storing packaged fruits and vegetables;
8. Demonstrate the process of packaging and storing dried fruits and vegetables;
9. State the method of managing waste;
10. Demonstrate the process of cleaning the work area and machineries after production.

Unit 6.1 – Drying/ Dehydrating Fruits and Vegetables

Unit Objectives

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

1. State the various drying/ dehydration methods;
2. List the various fruits and vegetables that are dried/ dehydrated.

6.1.1 Drying/Dehydration Methods

Drying/ dehydration is a method of removing/reducing the water content or moisture level from fruits and vegetables to preserve them. There are three methods of drying/ dehydration fruits and vegetables. They are:

Sun-drying

This is one of the oldest method of drying fruits and vegetables. Properly washed, peeled, and prepared fruits and vegetables are kept under the sun in a clean drying yard. They are treated with sulphur fumes in order to avoid spoilage by microorganisms



Fig. 6.1.1. Sun-drying



Fig. 6.1.2. Mechanical drying

Mechanical drying

This is a method of drying/ dehydration fruits and vegetables by using mechanical equipment. Industrial units follow this method for bulk production. Fruits and vegetables are dried/ dehydrated by heat or forced air circulation.

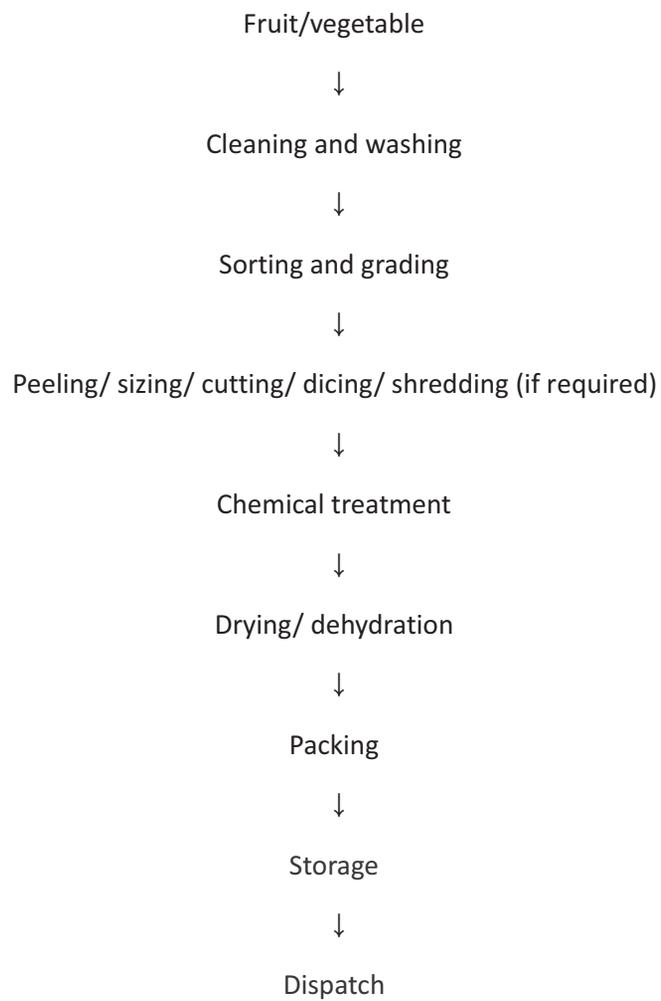
Freeze drying

This is a drying/ dehydration method done by freezing fruits and vegetables. After this, the surrounding pressure is reduced to facilitate the sublimation of frozen water. Sublimation is the process to convert a solid material into a gaseous substance.



Fig. 6.1.3. Freeze drying

6.1.1.1 Overview of the Drying/ Dehydration Process



6.1.2 Drying/ Dehydrating Fruits and Vegetables

The following table lists the fruits and vegetables that are dried/ dehydrated

Fruits	Vegetables
Banana	Cauliflower
Date	Cabbage
Fig	Chillies (red)
Grape	Green peas
Mango	Onion
Papaya	Garlic
Apple	Spinach, fenugreek and other green, leafy vegetables
Apricot	Tomato
Pear	Turnip
Peach	Beans
Amla	Bitter gourd
Pineapple	Brinjal/ aubergiene
Coconut	Carrot



Scan this QR Code or click on
below link to access video of
[Fruits and Vegetables Drying Dehydration Technician](#)

Unit 6.2 – Equipment used in the Drying/ Dehydration Process

Unit Objectives

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

- Identify the different equipment used in the drying/ dehydration process

6.2.1 Drying/ Dehydration Equipment

The equipment used for drying/ dehydration are:

Name of Equipment	Usage
Fruit/ vegetable washing machine	<ul style="list-style-type: none"> • Used for washing fruits and vegetables • Equipped with a water holding tank that facilitates continuous water flow
Roller conveyor	<ul style="list-style-type: none"> • Carries fruits and vegetables for further processes
High pressure water nozzles	<ul style="list-style-type: none"> • Used to spray water on fruits/vegetables • Helps to clean dirt sticking to the surface of fruits/ vegetables
Root vegetable peeler	<ul style="list-style-type: none"> • Used to peel root vegetables • Equipped with rotating soft and hard brushes which thoroughly clean and peel the vegetables
Shredding/dicing/cubing/ slicing machine	<ul style="list-style-type: none"> • Used to cut, shred, slice, dice, and cube raw materials • Equipped with a sizer and a cutter that helps give raw material a uniform size and shape • Used to slice and chop vegetables • Equipped with a chopping blade that produces finger-sized cuts
Grading machine	<ul style="list-style-type: none"> • Used to grade and sort fruits/vegetables as per size
Plastic crates	<ul style="list-style-type: none"> • Used to collect sorted raw materials for further processes
Steam-jacketed kettles	<ul style="list-style-type: none"> • Used for heating and blanching fruits and vegetables • Equipped with pressure gauge, temperature gauge, steam inlet, and outlet valves which help control steam and release condensed water
Chemical treatment tanks/ cooling tanks	<ul style="list-style-type: none"> • Used for cooling blanched fruits, vegetables, and other products • Used for treating fruits and vegetables with sulphur, citric acid, salt solution, ascorbic acid, etc.
Solar dryers	<ul style="list-style-type: none"> • Used for sun-drying fruits, vegetables, and other products
Mechanical dryers	<ul style="list-style-type: none"> • Used for mechanical drying of fruits, vegetables, and other products by heat or forced air circulation
Freeze dryer	<ul style="list-style-type: none"> • Used for freeze drying of fruits, vegetables, and other products
Spray dryer	<ul style="list-style-type: none"> • Used for liquid fruit and vegetable juices and other products
Powder filling machine	<ul style="list-style-type: none"> • Used to fill spray-dried products
Packing machine	<ul style="list-style-type: none"> • Used to fill, pack, and seal dried fruits and vegetables in pouches, bags, and tins

Shrink wrapping	<ul style="list-style-type: none"> • Used for wrapping the packs
Carton packing/strapping machine	<ul style="list-style-type: none"> • Used to pack final products in cartons
Electronic colour sorter	<ul style="list-style-type: none"> • Used for sorting final product according to colour • Also used for removing foreign matter
Metal detector	<ul style="list-style-type: none"> • Used for detecting and removing metal contaminants
Abrasive peeler	<ul style="list-style-type: none"> • Used for peeling the outer skin of fruits and vegetables
Hopper	<ul style="list-style-type: none"> • Used for transferring finished product into the packaging machine



Fig. 6.2.1. Fruit/vegetable washing machine



Fig. 6.2.2. Roller conveyor



Fig. 6.2.3. High pressure water nozzles



Fig. 6.2.4. Root vegetable peeler



Fig. 6.2.5. Shredding/dicing/cubing/slicing machine



Fig. 6.2.6. Grading machine



Fig. 6.2.7. Plastic crates



Fig. 6.2.8. Steam-jacketed kettles



Fig. 6.2.9. Chemical treatment tanks/
cooling tanks



Fig. 6.2.10. Solar dryers



Fig 6.2.11. Mechanical dryers



Fig. 6.2.12. Freeze dryer



Fig. 6.2.13. Spray dryer



Fig. 6.2.14. Powder filling machine



Fig. 6.2.15. Packing machine



Fig. 6.2.16. Shrink wrapping



Fig. 6.2.17. Carton packing/strapping machine



Fig. 6.2.18. Electronic colour sorter



Fig. 6.2.19. Metal detector



Fig. 6.2.20. Abrasive peeler



Fig. 6.2.21. Hopper

6.2.2 Precautions and safety measures to follow while handling equipment

- Avoid direct spillage of water on electrical components
- Clean the tools and equipment before and after each operation
- Ensure regular maintenance of tools and machinery
- Do not open machines with sharp knives during operation. It is safe to open a machine when it is unplugged from an electrical source
- Check machines like the steam-jacketed kettles regularly for efficiency of valves
- Ensure the build-up of pressure in machines is always under control
- Ensure the controls of all the machines are set to prescribed limits

UNIT 6.3: Drying/ Dehydration Process

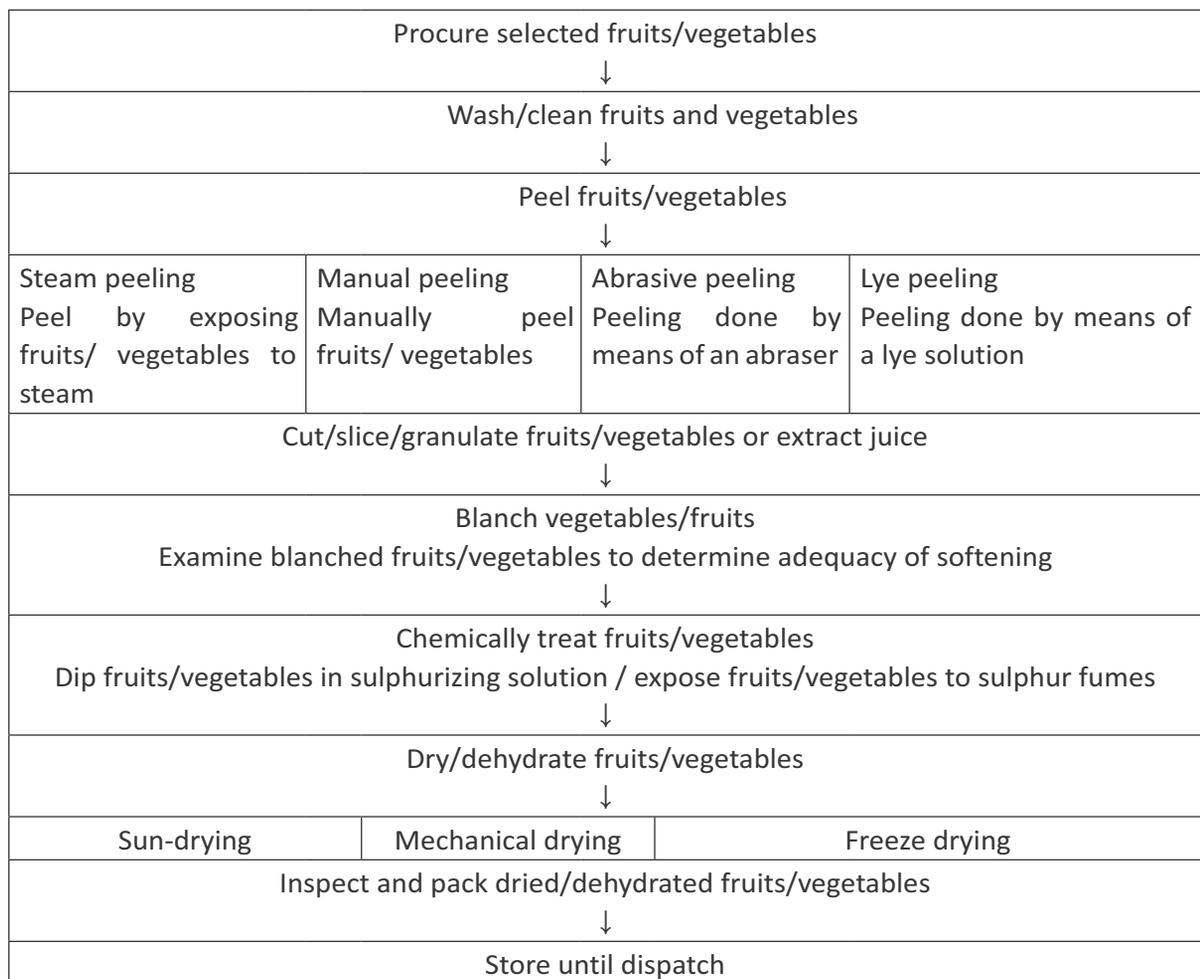
Unit Objectives

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

- State the production process used for drying/dehydrating fruits and vegetables.

6.3.1 The Drying/ Dehydration Process

Drying/ dehydration are a method of removing/reducing the water content or moisture level from fruits and vegetables to preserve them.



UNIT 6.4: Sun-Drying, Hot Air Drying and Freeze Drying Fruits and Vegetables

Unit Objectives

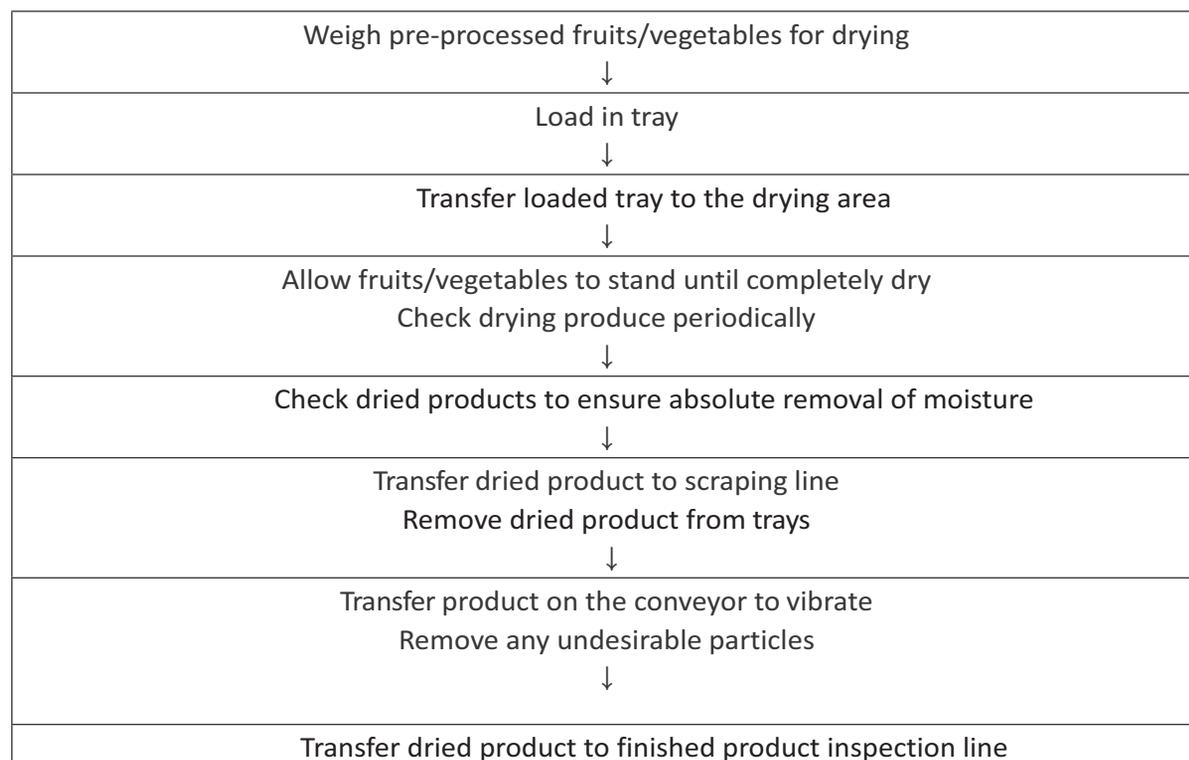
At the end of this unit, the participants will be able to:

- Demonstrate the process of sun-drying fruits and vegetables;
- Demonstrate the process of hot air drying fruits and vegetables;
- Demonstrate the process of freeze drying fruits and vegetables.

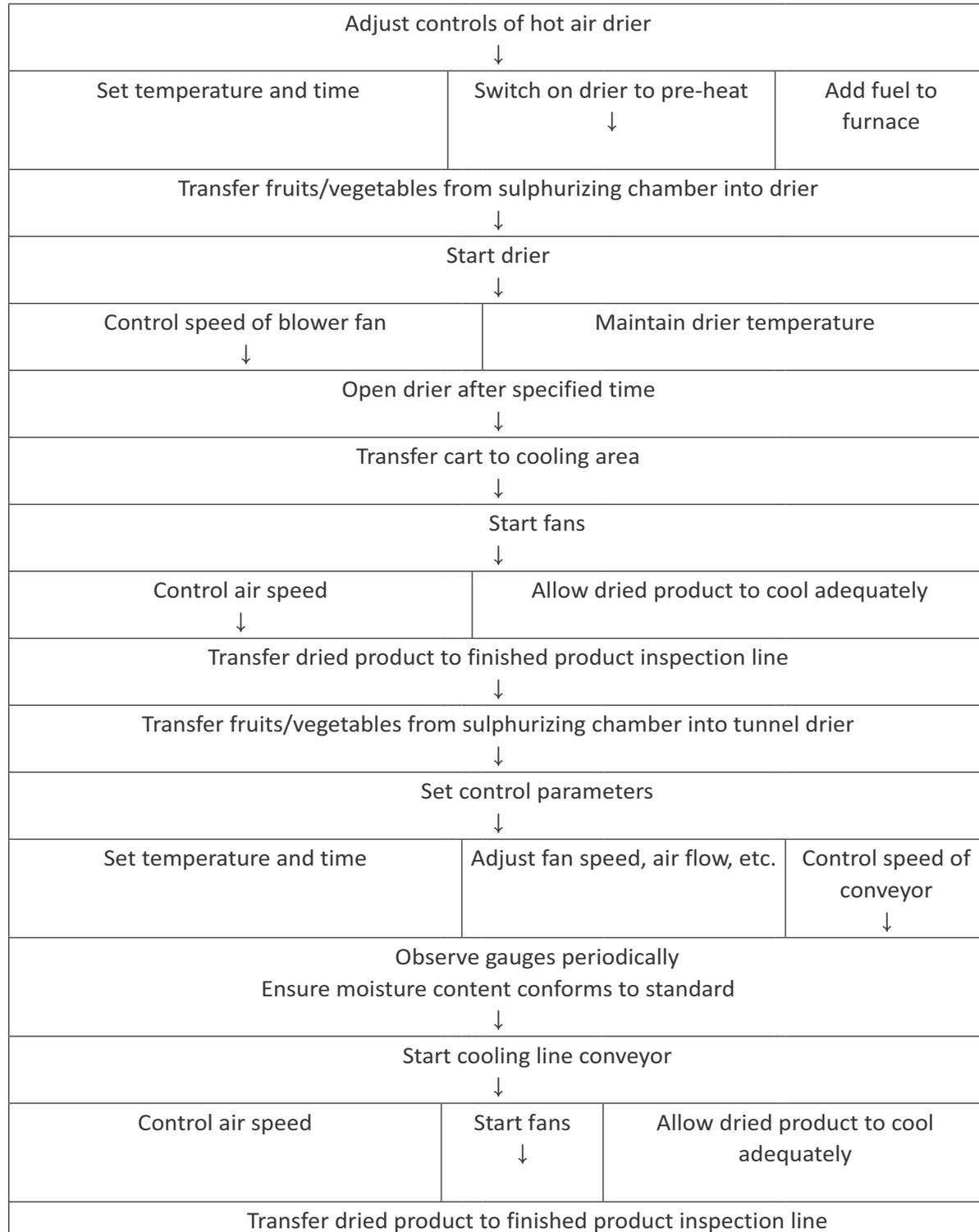
6.4.1 Sun-Drying Fruits and Vegetables

Fruits and vegetables that are rejected for being of a smaller size are usually removed mechanically. This is done with the help of mesh-screens and pre-sizing belts. Other rejected fruits and vegetables are removed manually.

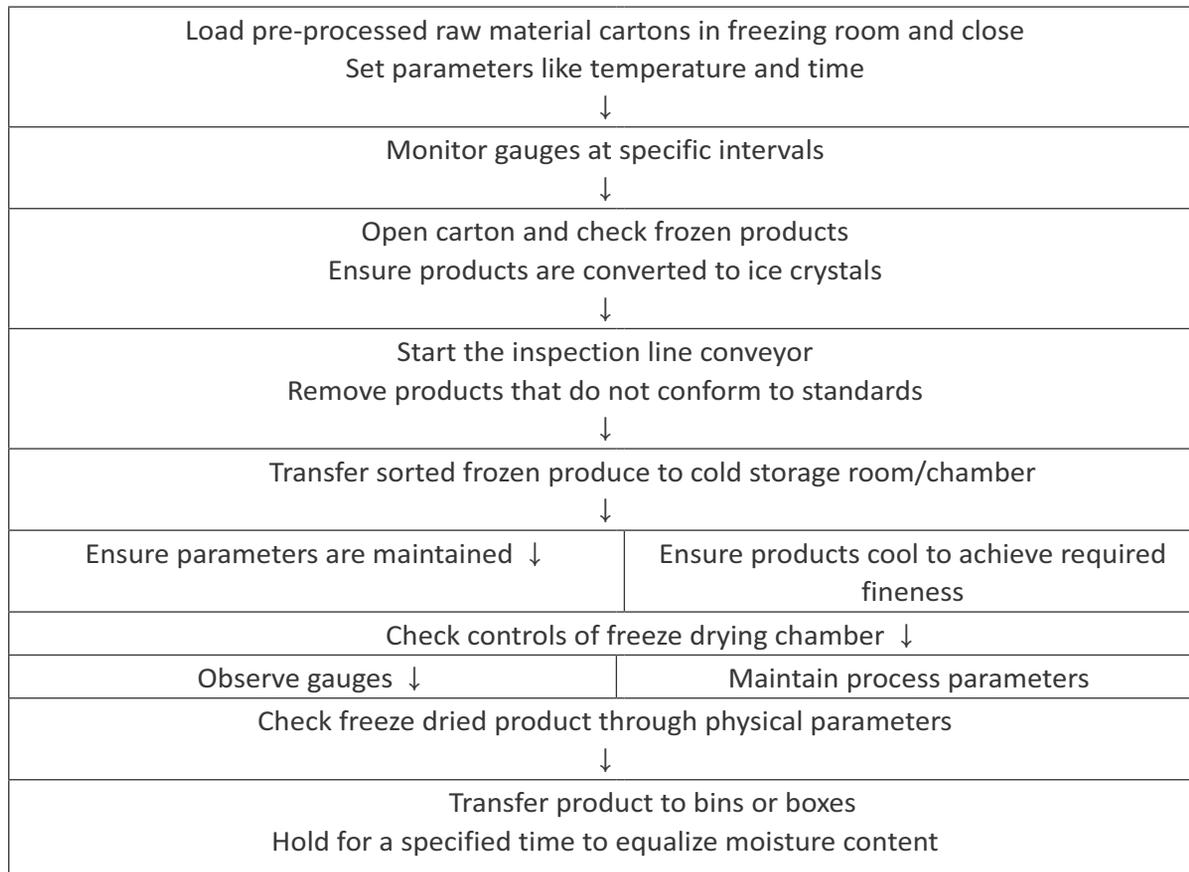
Rejected fruits and vegetables are given to animals as feed. Apart from that, rejects are used for preparing organic compost.



6.4.2 Hot Air Drying Fruits and Vegetables (Batch Process)



6.4.3 Freezing Fruits and Vegetables



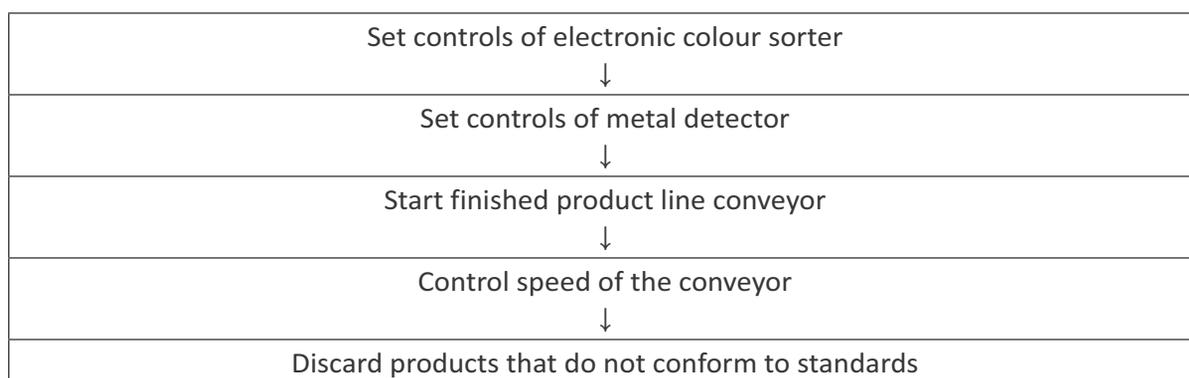
UNIT 6.5: Inspection of Dried Fruits and Vegetables

Unit Objectives

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

- Demonstrate the process of inspecting dried fruits and vegetables.

6.5.1 Inspecting of Dried Fruits and Vegetables



UNIT 6.6: Packing and Storage

Unit Objectives

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

- Explain the method of packing dried fruits and vegetables;
- Explain the process of storing packaged fruits and vegetables;
- Demonstrate the process of packaging and storing dried fruits and vegetables.

6.6.1 Packaging Dried Fruits and Vegetables

After cooling dried fruits/vegetables, they are packed in clean, moisture/vapour-resistant containers. Usually dried products are packed in glass containers, freezers or metal cans. Other storage containers with tight-fitting lids may also be used. Fruits that have been given the sulphur treatment should not come in contact with metal. Special care must be taken when handling such fruits.



Fig. 6.4.1. Packaging dried fruits and vegetables

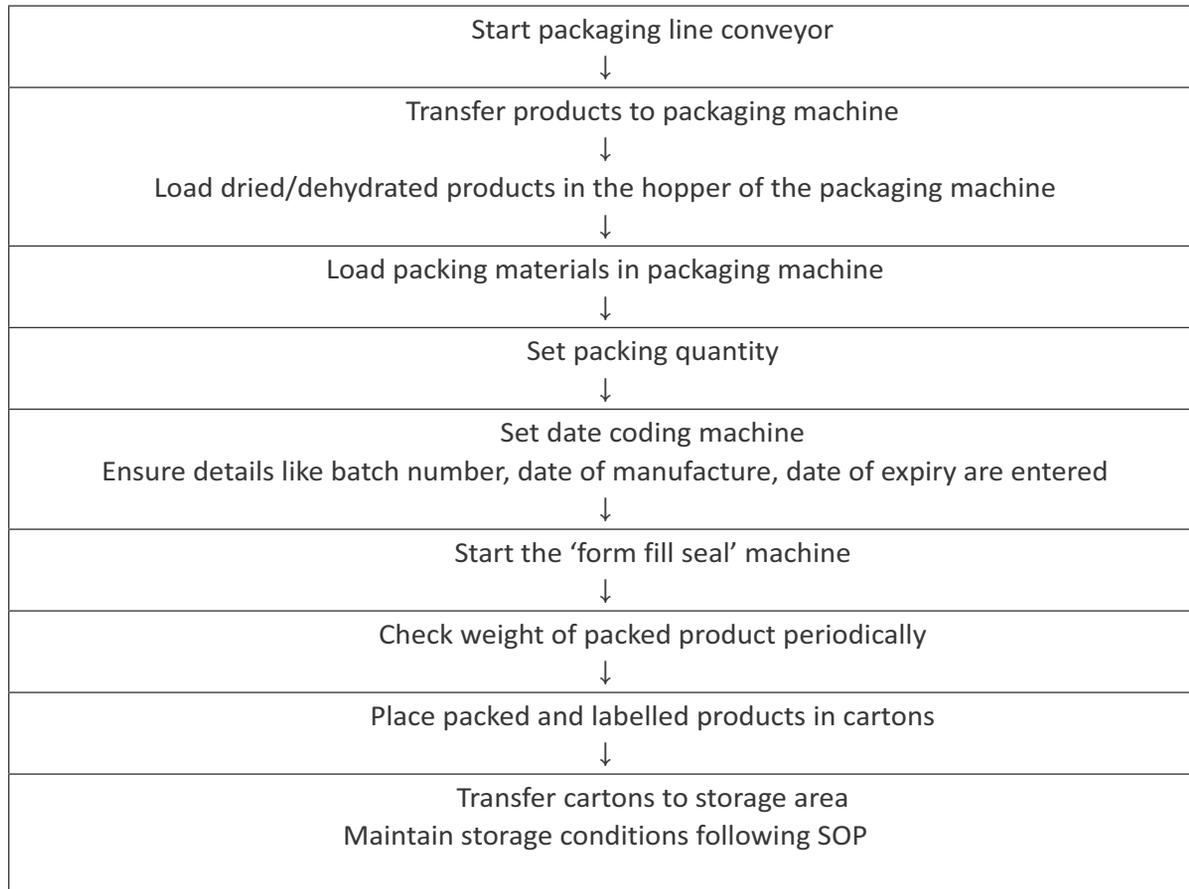
6.6.2 Storage of Dried Fruits and Vegetables

Dried fruits and vegetables must be stored in a cool, dry, and dark place. Most dried/dehydrated fruits can be stored for a year at about 15°C or at about 26°C for 6 months. Vegetables can be stored for approximately 6 months as they have a lower shelf life.



Fig. 6.4.2. Storage of dried fruits and vegetables

6.6.3 Packaging and Storage of Dried Fruits and Vegetables



UNIT 6.7: Post Production Cleaning and Maintenance

Unit Objectives

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

- State the method of managing waste;
- Demonstrate the process of cleaning the work area and machineries after production.

6.7.1 Waste Management Method

During fruit and vegetable processing, around 10 %-35 % of process loss occurs while trimming, coring, and blanching vegetables and fruits. The waste material gathered during these processes like stems, leaves, and tips have to be properly managed/ disposed.

In the fruit and vegetable industry, these waste materials are re-used for making some other products, wherever possible. The remaining waste is used as cattle feed. For example, waste from potato, cabbage, turnip, beet, beans is used for making cattle feed. Mango peel is fermented to prepare vinegar.

6.7.2 Post Production Cleaning Method

This explains the method of cleaning the work area after production

Clean machineries with recommended sanitisers →	Clean equipment and tools with recommended sanitisers ↓	e.g. knives, pans, buckets, trolleys
Clean the work area as per norms ↓	Attend to minor repairs and maintenance work ←	e.g. oiling and greasing machines
Ensure work area is free from pests →	Maintain equipment daily/ weekly as per supplier's instruction manual ↓	
Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel		

Exercise

1. Fill in the blanks with the correct option
 - a. _____ is the oldest method of drying fruits and vegetables.
 - i. Hot-air drying
 - ii. Sun-drying
 - iii. Mechanical drying
 - iv. Freeze drying
 - b. In the _____ drying method, sublimation of frozen water takes place.
 - i. hot-air
 - ii. freeze
 - iii. mechanical
 - iv. sun
 - c. While following the freeze-drying process, a drying/ dehydration technician must _____ moisture content.
 - i. minimize
 - ii. equalize
 - iii. maximize
 - iv. prioritize
 - d. During _____ peeling, raw materials are exposed to steam.
 - i. lye
 - ii. abrasive
 - iii. manual
 - iv. manual
2. Arrange the following in the correct sequence
 - a. Peeling
 - b. Storage
 - c. Drying/ dehydration
 - d. Procuring fruits and vegetables
 - e. Cutting
 - f. Chemical treatment
 - g. Sorting and grading
 - h. Packing
 - i. Cleaning and washing
 - j. Dispatch

7. Execution of pickle making process



- Unit 7.1- Pickle – Making and Processing
- Unit 7.2- Pickle – Making Process
- Unit 7.3- Equipment Used in Pickle- Making Process
- Unit 7.4- Curing of Raw Materials for Pickle – Making
- Unit 7.5- Different Methods of Preparing Pickles
- Unit 7.6- Packing and Packaging
- Unit 7.7- Storage of Finished Products
- Unit 7.8- Waste Management
- Unit 7.9- Post-Production Cleaning and Maintenance



Key Learning Outcomes

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

1. Illustrate the process for curing raw material and storing cured raw material
2. Illustrate the different methods of preparation of pickle
3. Illustrate the basic categories of packing
4. Illustrate the various types of packaging materials used for pickles
5. Illustrate the factors for selecting packaging materials
6. Illustrate the storage procedures for finished goods
7. Explain the rules for stock rotation of finished goods
8. Arrange for proper cleaning of production area, equipment, tools and equipment used
9. Organize periodic maintenance of all production machinery



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[Pickle and Paste Making Technician](#)

Unit 7.1: Pickle – Making and Processing

Unit Objectives

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

1. Define pickling and the method of pickling

7.1.1 What is Pickling?

Pickling is a food preservation method used to produce pickles. This process extends the life of a particular food. Food is immersed in salt solution and/or vinegar in order to pickle it. The preservative quality of salt combined with acid prevents spoilage. This combination also produces lactic acid. This is performed under a controlled environment where the temperature, storage condition, moisture in the air, etc. are monitored. The resulting product has a salty and sour taste that people enjoy as 'Pickle'.

7.1.2 What is Pickle?

Pickles are foods made from fruits or vegetables. They are flavoured with spices and preserved in salt solutions or vinegar to prevent spoilage. Traditionally, pickles were made at home.

However, in the recent years, there has been an increase in the demand for purchasing pickles from reputed brands. Hence, pickle-making companies are entering the market to fulfil the domestic and international demand for pickles.

Latest technology and better quality ingredients are used to produce pickles so that they last longer. Pickles made with good quantity edible oils have a shelf life of more than a year.

However, there are other varieties of pickles that are made from local produce, which have a relatively lower shelf life.

7.1.3 Types of Pickles

Table 7.1.1 lists the different types of pickles and the places in India where they are most popular

Type of pickle	Example	Popular in
Chutney	Gongura, tomato	South India
Dry	Lemon, mango	UP, Bihar
Stuffed	Chillies	North India
Oil	Mango, mixed	Throughout India
Fermented	Cucumber, onion	Outside India
Non-vegetarian	Chicken, mutton, pork	HP, Uttarakhand, Punjab

Table 7.1.1 Types of Pickles

Unit 7.2 Pickle – Making Process

Unit Objectives

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

- Illustrate the different types of pickle-making processes

7.2.1: Ways to Process Pickles

Pickles are processed in two ways: Curing and Fermentation.

1. Curing:

Fruits and vegetables are washed, cleaned, and cut. After this, they are kept in 12% salt solution, also called as brine. The cured fruit or vegetable is stored in barrels. When required, the cured fruits and vegetables are mixed with spices and ingredients. Then, the mixture is covered with oil to make oil pickles.

2. Fermentation:

Cured fruits and vegetables are mixed with vinegar or acetic acid and are kept for fermentation. In this process, the fermentative bacteria produce acids necessary for the preservation process.

These bacteria also generate flavour compounds. This helps to enhance the taste of fermented pickles

7.2.2: Terminology Used in Pickle-Making Process

1. Brine: It is the salt solution used in the curing process.
2. Brine strength: It is the weight of salt in proportion to the weight of the solution.
3. Salinometer: It is the tool for measuring the percentage of salt in the brine.

Salt equilibrium: It is the strength of salt in the brine. For pickling process, it has to be maintained between 12 to 14% of the volume of the final produce. At this strength, the pickle can be preserved for a long time

7.2.3: Overview of the Pickle-Making Process

Fig 7.2.1 gives an overview of the pickle-making process. It shows how raw material is processed to make pickles.

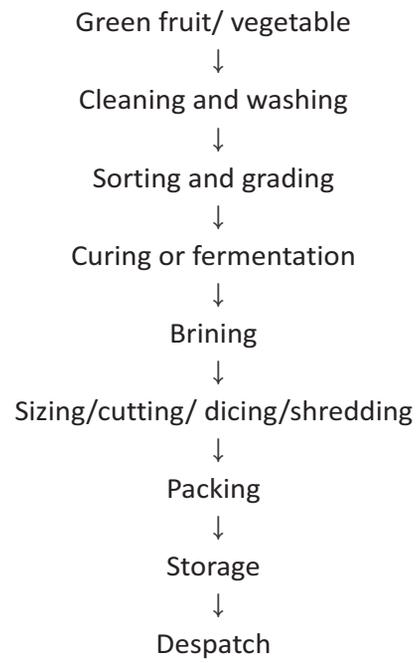


Fig 7.2.1 Pickle Making Process



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below link to access video of
[Pickle Making Process](#)

Unit 7.3 Equipment Used in Pickle-Making Process

Unit Objectives

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

- Identify the different equipment used in pickle-making process

7.3.1: Pickle-Making Equipment

Name of the equipment	Use and operation
Fruit/vegetable washing machine	<ul style="list-style-type: none"> • Used for washing fruits and vegetables • Equipped with a water holding tank that facilitates continuous water flow
Roller conveyor	<ul style="list-style-type: none"> • Carries fruits and vegetables for further processes
High pressure water nozzles	<ul style="list-style-type: none"> • Used to spray water on fruits/vegetables • Helps to clean dirt sticking to the surface of fruits/vegetables
Root vegetable peeler	<ul style="list-style-type: none"> • Used to peel root vegetables • Equipped with rotating soft and hard brushes which thoroughly clean and peel the vegetables
Shredding/dicing/cubing/ slicing machine	<ul style="list-style-type: none"> • Used to cut, shred, slice, dice, and cube raw materials • Equipped with a sizer and a cutter that helps to give raw material a uniform size and shape
Multifunction vegetable slice/ chopper	<ul style="list-style-type: none"> • Used to slice and chop vegetables • Equipped with a chopping blade that produces finger-sized cuts
Grading machine Plastic crates	<ul style="list-style-type: none"> • Used to grade and sort fruits/vegetables as per size • Used to collect sorted raw materials for further processes
Steam-jacketed kettles	<ul style="list-style-type: none"> • Used for heating and blanching fruits and vegetables • Equipped with pressure gauge, temperature gauge, steam inlet, and outlet valves which help control steam and release condensed water
Blending machine	<ul style="list-style-type: none"> • Used to blend cured raw material, oil, spice mixture, and salt • Equipped with a moving shaft that moves slowly and mixes ingredients
Pickle filling machine for bottles	<ul style="list-style-type: none"> • Used to fill processed pickles into bottles • Removes air from the bottle during the filling process
Pickle filling machine for pouches Lug cap sealers	<ul style="list-style-type: none"> • Used to fill, pack, and seal pickles in pouches • Used to cap and seal bottles

Table 7.3.1 The Equipment used in Pickle –Making Unit

7.3.2: Precautions and safety measures to follow while handling pickle-making equipment

- Avoid direct spillage of water on electrical components.
- Clean the tools and equipment before and after each operation.
- Ensure regular maintenance of tools and machinery.
- Do not open machines with sharp knives during operation. It is safe to open a machine when it is unplugged from an electrical source.
- Check machines like the steam-jacketed kettles regularly for efficiency of valves.
- Ensure the build-up of pressure for such machines is always under control.
- Ensure all controls of all the machines are set to prescribed limits.



Scan this QR Code or click on below link to access video of [Machinery in Pickle and Paste Industry](#)

UNIT 7.4 – Curing of Raw Materials for Pickle –Making

Unit Objectives

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

- Illustrate the process for curing raw material and storing cured raw material

7.4.1: The Process of Curing

Curing is the process in which cleaned and cut vegetables and fruits are immersed in brine. Cured raw material is stored in barrels for some time. After the vegetable/fruit is properly cured it is sent for further processing.

The following chart gives a detailed overview of the process of curing:

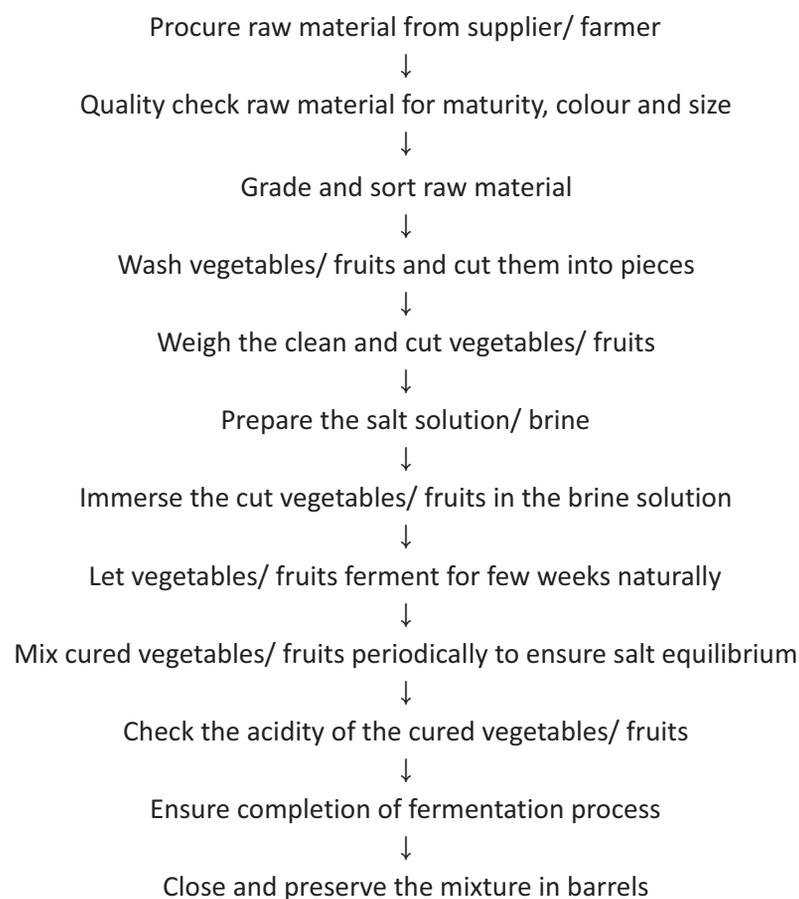


Fig 7.4.1: Curing Process



Scan this QR Code or click on below link to access video of [Curing of Fruits & Vegetables for Pickle Making](#)

Unit 7.5 – Different Methods of Preparing Pickles

Unit Objectives

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

- Illustrate the different methods of preparation of pickle

7.5.1 Preparation of Pickle in Oil

The following chart explains the process of preparing pickle in oil

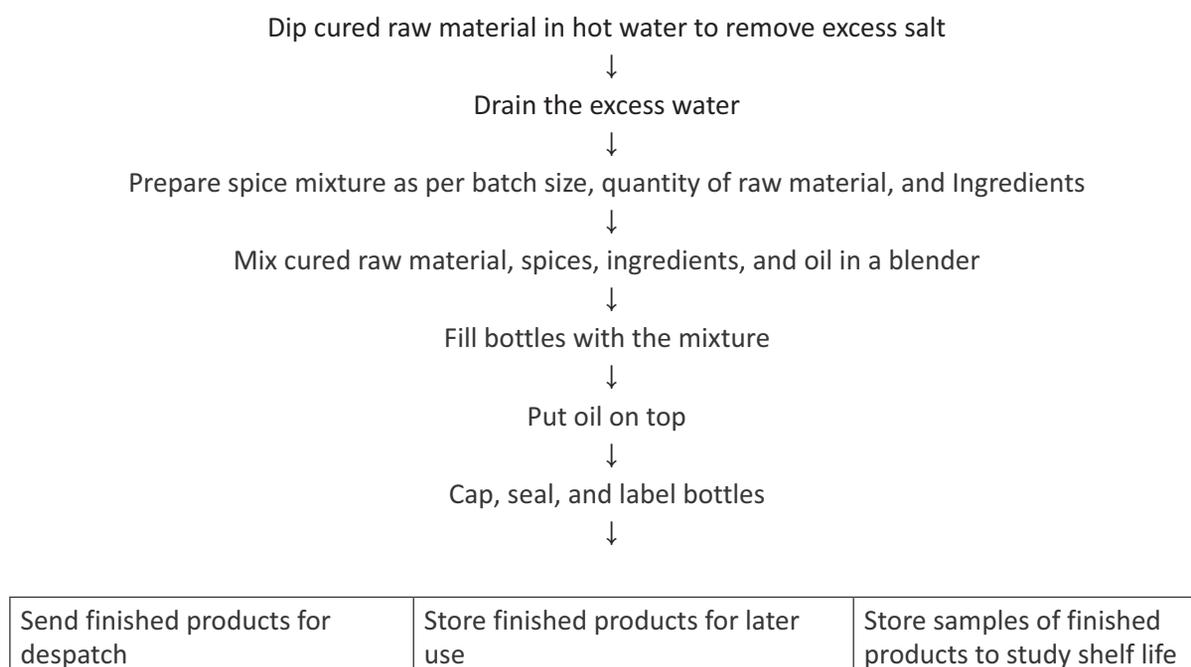


Fig 7.5.1: Preparation of Pickle in Oil

7.5.2 Preparation of Pickle in Brine

This chart explains the process of preparing pickle in brine solution

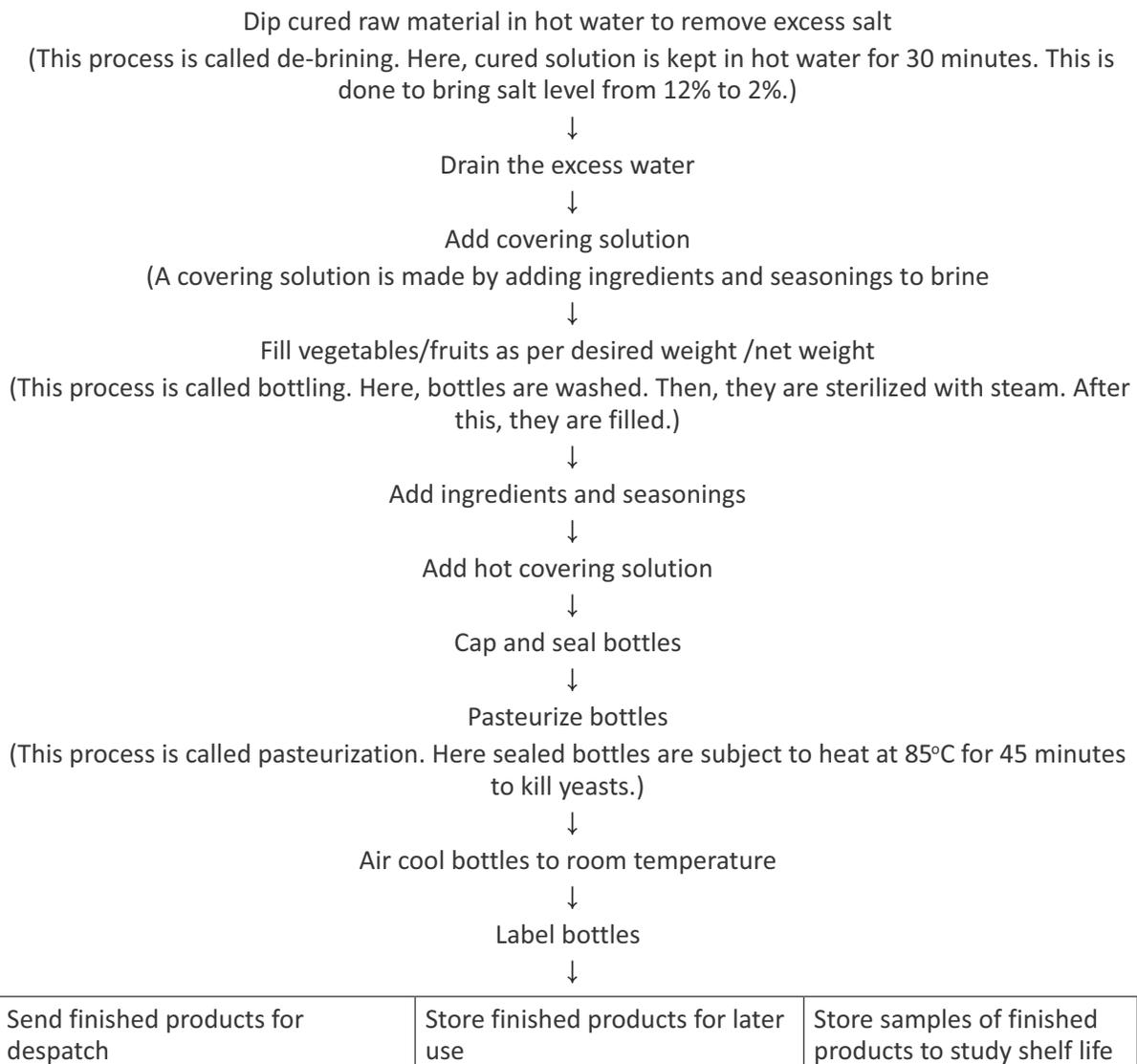


Fig 7.5.2 : Preparation of Pickle in Brine

7.5.3 Preparation of Pickle in Vinegar

This chart explains the process of preparing pickle in vinegar solution

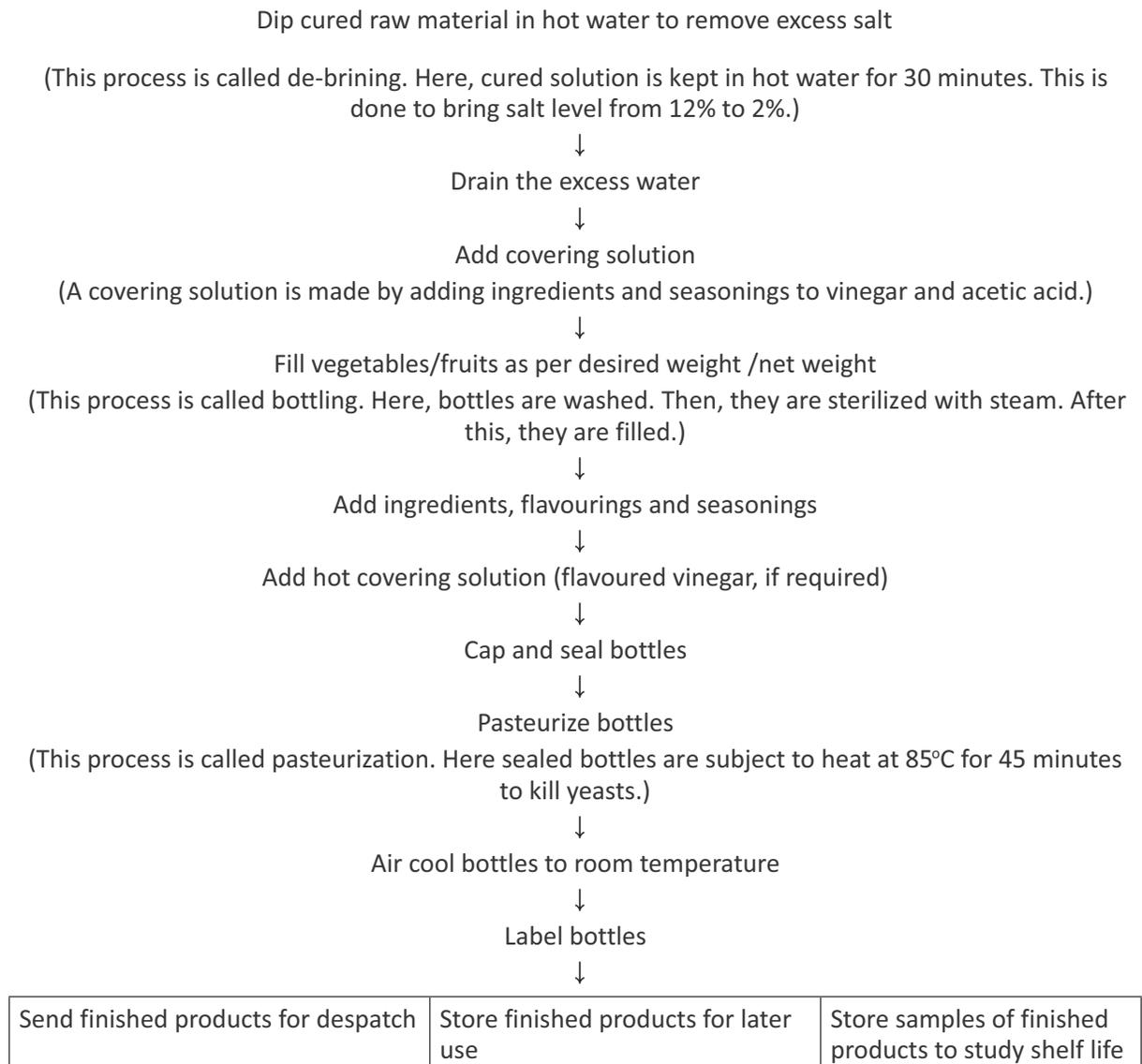


Fig 7.5.3 Preparation of Pickle in Vinegar

Unit 7.6 – Packing and Packaging

Unit Objectives

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

- State the basic categories of packing;
- State the various types of packaging materials used for packing fruit pulp;
- State the factors for selecting packaging materials;

7.6.1 Packing of Finished Products

The finished product is filled in containers meant for packaging. Depending on the demand, the market and the size of the industry, packing is categorised as follows:

Packing	
↓	↓
Primary packing <ul style="list-style-type: none"> • Comes in direct contact with food • E.g. Pouches, bottles, sachets, drums 	Secondary packing <ul style="list-style-type: none"> • Comes in contact with the primary packing material • E.g. Cartons (filled with bottles)

When selecting the packaging material to pack the finished products, one must ensure that the packaging material is:

- Non-toxic and compatible with food
- Offers sanitary protection
- Protects the product from moisture, gas, and odour
- Protects the product from light, temperature, humidity, and rain
- Protects the product from insects, mites, bacteria, rodents, and birds
- Transparent and tamper-proof
- Offers ease of opening, pouring, resealing, and disposing
- Compatible with the size, shape, and appearance standards set by the organisation
- Low on cost



Scan this QR Code or click on below link to access video of [Pickle Packaging and Storage](#)

Unit 7.7 – Storage of Finished Products

Unit Objectives

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

- Illustrate the storage procedures for finished goods
- Explain the rules for stock rotation of finished goods

7.7.1 Methods of Storing Finished Products

The fruit industry follows the JIT (Just-In-Time) system. Here, finished product is dispatched to the distributor, retail industry or institution as soon as the product is ready. A carton of processed pulp can be stored for a long time in the store house.

The two most common, stock rotation systems like FIFO and FEFO are applied to finished product.

- FIFO (First-In-First-Out) is a stock rotation system that dispatches processed food depending on the order in which it is produced

Manufacturing → Warehouse and Storage → Dispatch (First lot from the stock goes out first)

Fig. 7.7.1 FIFO stock rotation

- FEFO (First-Expired-First-Out) is a stock rotation system wherein products that need to be consumed earlier are shipped first

Manufacturing → Warehouse and Storage → Dispatch
(First expire lot goes out first)

Fig. 7.7.2. FEFO stock rotation

Unit 7.8.Waste Management

Unit Objectives

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

- State the kind of waste produced and its disposal.

7.8.1 Waste Management

It is a method of treating/handling the unwanted materials that are a threat to the environment. Ensuring that the waste generated is disposed properly, one of the important features of Good Manufacturing Practices (GMP) is waste management.

A lot of waste is generated in fruit and vegetable processing industry. A valuable by-product can be made from waste to solve the problem of waste disposal. Given below is the table in which as per fruit, the name of waste and it's by-products are listed:

Fruit	Name of waste	By-products
Apple	Pomace, Cores	Pectin, Cider, Vinegar, Chutneys, etc.
Apricot, peach	Kernel	Kernel oil can be used in pharmaceutical, Oil cake as cattle feed
Citrus fruits	Rags, Peels, Seeds	Peel can be used for oil, pectin, marmalades, and extraction candy manufacturing. Sludge can be used for citric acid manufacturing. Seed can be used for oil extraction
Grapes	Stem and Pomace	Pomace can be used for making jelly, chutney, cream of tartar, and cattle feed.
Guava	Cores, Seeds, Peels	Guava cheese and cattle feed
Mango	Peel and Stone	Mango stones after removal of coat is dried, powdered, and are used as edible starch. Peel can be fermented to prepare vinegar
Pear	Skin and Seed	Cattle feed
Pineapple	Skin, Rind, Crown	From crown, edible wax can be extracted. Rind can be used for pineapple candy and skin may be crushed for juice extraction
Tomatoes	Seeds	Can be used for extraction of oil
Other fruits		Banana skin may be used for paper pulp. Green papaya latex can be used for papain extraction
Vegetable waste	Skin leaves	Can be used for cattle feed

Other unutilised portion of waste is dried and used as fuel for boiler and composed as agriculture compost. The wastewater generated is sent to effluent treatment plant for proper treatment.

Unit 7.9 Post-Production Cleaning and Maintenance

Unit Objectives

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

- Demonstrate the process of cleaning and maintenance of work area after production;

7.9.1 Post Production Cleaning Method

This explains the method of cleaning the work area after production

Clean machineries with recommended sanitisers → Clean the work area as per norms ↓	Clean equipment and tools with recommended sanitisers ↓ Attend to minor repairs and maintenance work ←	e.g. knives, pans, buckets, trolleys e.g. oiling and greasing machines
Ensure work area is free from pests →	Maintain equipment daily/ weekly as per supplier's instruction manual ↓	
Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel		

8. Produce Jam, Jelly and Ketchup



- Unit 8.1- Overview of Jam, Jelly, and Ketchup
- Unit 8.2- Jam, Jelly, and Ketchup Processing Processes
- Unit 8.3- Equipment Used in Jam, Jelly, and Ketchup Processing
- Unit 8.4- Production Processes
- Unit 8.5- Enzyme Activity
- Unit 8.6- Procedures Involved in Juice/ Pulp Extraction
- Unit 8.7- Pasteurization of Fruit and Vegetable Juice/Pulp
- Unit 8.8- Sterilization of Fruit and Vegetable Juice/Pulp
- Unit 8.9- Quality Analysis
- Unit 8.10- Packing and Packaging
- Unit 8.11- Aseptic Packaging
- Unit 8.12- Storage of Finished Products
- Unit 8.13- Waste Management
- Unit 8.14- Post-Production Cleaning and Maintenance



Key Learning Outcomes

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

Unit 8.1 Overview of Jam, Jelly, and Ketchup

Unit Objectives

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

1. Define jam, jelly, and ketchup;
2. List the differences between jelly and jam.

8.1.1: Introduction of Jam, Jellies, and Ketchup

Jam, jellies, and ketchups have been made from fruits and vegetables in different forms. The method of production has been conventional in many homes. Since availability of fruits and vegetables is seasonal, the need to preserve them in various ways for consumption during off-season arose. Fruit and vegetable processing techniques have evolved over the years to make jam, jelly, and ketchup to the present day refined version.

Jam, jellies, pickles, and sauces are in demand in following three major sectors:

- Army and defence: one third production consumed and important sector
- Hotel, catering services and airlines: Institutional sector
- Civilians: It was limited earlier, but is now gaining momentum due to rapid urbanization, rise in standard of living, and need for convenient food products.

8.1.2: Jam and Jelly

Most kinds of fruit and some vegetables are used to make a wide variety of jam and jelly. Jelly and jam is used as bread spread and as a filling for some cakes and cookies.

Jam is boiled fruit pulp with sugar and preservatives and is thick. Fruit jam is available in mango, apple, mixed fruit, pineapple, orange, and combination of the above mentioned flavours.

Jelly is a clear, bright mixture made from fruit juice, sugar, and sometimes pectin. It is made by boiling, but is clear, sparkling, and transparent.

Jelly and jam have differences, which are:

Jelly	Jam
<ul style="list-style-type: none"> • It is made from clear juice of fruit • It is clear, sparkling, and transparent • It is uniformly mixed product • Examples : Jamun, apple, jack fruit, strawberry 	<ul style="list-style-type: none"> • It is made with suspended fruit particles in processed pulp • It is indistinct and translucent • It is a scantily mixed product • Examples: Peach, pear, cherry, mango, plum

8.1.3 Ketchups

Ketchups are popular varieties of sauces made from tomato puree. It is also an important type of preserve that is popularly consumed as table serve.

8.1.4 Basic Ingredients Formulation

Ingredients	Jam	Jelly	Ketchup
Fruit	As per choice	As per choice	Tomato
Sugar	30 to 50%	60-65%	30 to 50%
Pectin	0.5 to 0.8% depending upon fruit	1.0%	Nil
Spices and seasonings	Nil	Nil	Onions, allspice, cloves, cinnamon, garlic, etc.
Acid levels	3.2 to 3.7 levels	2.5- 3.0	Acetic acid 1%
Water content	32-34%	33-38%	32-34%



Scan this QR Code or click on below link to access video of [Jam Jelly and Ketchup Processing Technician](#)

Unit 8.2 Jam, Jelly, and Ketchup Processing Processes

Unit Objectives

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

- Describe the processing of Jam
- Describe the processing of Jelly
- Describe the processing of Ketchup

8.2 1: Terminology Used in Process

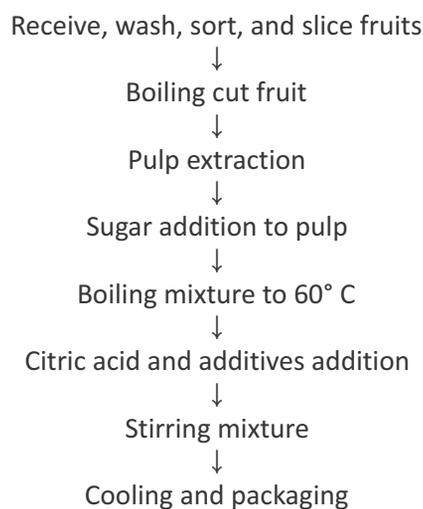
- TSS (Total Soluble Solids): It is the extracted mass of fruit, which contains fibres and fruit sugar.
- Refractometer: It is a tool used for measuring TSS.
- pH indicator: A numeric scale to check acid levels in pulp/ juice. It is between 2.5 to 4.

8.2.2: Jam

Jam is a product made by boiling fruit pulp with sufficient sugar to a reasonably thick consistency, firm enough to hold the fruit tissues in position, Apple, pear, sapota (chiku), apricot, loquat, peach, papaya, karonda, carrot, plum, strawberry, raspberry, mango, tomato, grapes and muskmelon are used for preparation of jams. It can be prepared from one kind of fruit or from two or more kinds. Commercial jams such as tutti-frutti can be prepared from pieces of fruit, fruit scraping and pulp adhering to cores of fruits which are available in plenty in canning factories. Jam contains 0.5-0.6 per cent acid and invert sugar should not be more than 40 per cent.

Fig.8.1.1 Jam

8.2.2.1 Overview of Processing Process



8.2.2.1 Overview of Processing Process

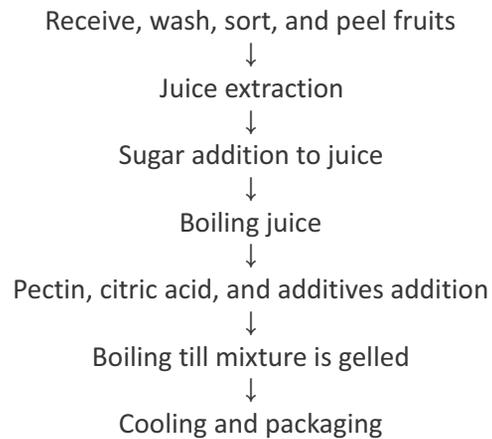
A jelly is a semi-solid product prepared by boiling a clear, strained solution of pectin containing fruit extract, free from pulp, after the addition of sugar and acid. A perfect jelly should be transparent, well-set, but not too stiff, and should have the original flavour of the fruit. It should be of attractive colour and keep its shape when removed from the mould. It should be firm enough to retain a sharp edge but tender enough to quiver when pressed. It should not be gummy, sticky or syrupy or have crystallized sugar. The product should be free from dullness, with little or no syneresis (weeping), and neither tough nor rubbery.

Fig.8.2.2 Jelly

8.2.3.1 According to their pectin and acid contents:

1. Rich in pectin and acid: Sour and crab apple, grape, sour guavas, lemon, oranges (sour), plum (sour), jamun.
2. Rich in pectin but low in acid: Apple (low acid varieties), unripe banana, sour cherry, fig (unripe), pear, ripe guava, peel of orange and grape fruit.
3. Low in pectin but rich in acid: Apricot (sour), sweet cherry, sour peach, pineapple and strawberry.
4. Low in pectin and acid: Ripe apricot, peach (ripe), pomegranate, rasp berry, strawberry and any other over-ripe fruit.

8.2.3.2 Jelly processing process is as follows:

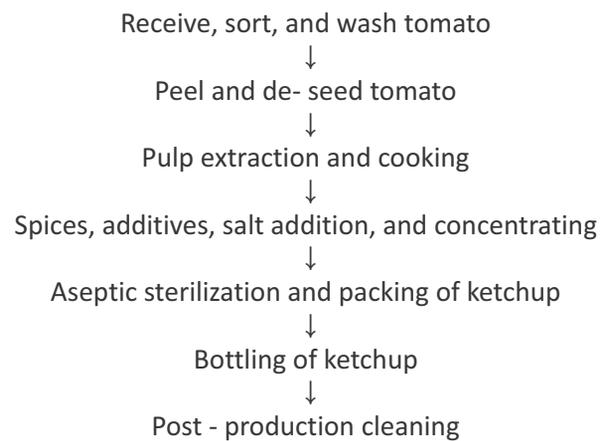


8.2.4: Ketchup

It is made from strained tomato juice or pulp and spices, salt, sugar and vinegar, with or without onion and garlic, and contains not less than 12 per cent tomato solids and 25 per cent total solids

Fig.8.2.3 Ketchup

8.2.4.1 Ketchup processing process is as follows:



Unit 8.3 Equipment Used in Jam, Jelly, and Ketchup Processing

Unit Objectives

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

- Identify the different equipment, tools, and machineries used for processing jam, jelly, and ketchup.

8.3.1: Pulp-Processing Equipment

The equipment used is:

Name of equipment	Usage
Ripening chamber with ethylene doser	Used for ripening fruit/vegetables by passing ethylene gas
Fruit washing machine	Used for fruit washing
Sorting and grading machine	Used for fruit segregation as per size and firmness
Conveyer belt	Used for visual inspection for sorting
Peeler	Used for removing fruit skin
De-seeder/ de-stoner	Used for removing fruit seeds and stones in mangoes
Core cutter	Used for cutting fruit core especially in pineapple
Crusher/ chopper/ shredder	Used for crushing/chopping/shredding of fruit
Blancher/ hot break system	Used to heat the fruit/vegetable to facilitate pulping process
Juice extractor/hydraulic press/ continuous press/ filter press	Used for the large-scale filtration of liquid under pressure. It is a device consisting of a series of cloth filters fixed to frames
Steam jacketed kettles/ blending tanks	Used for cooking juice by blending all ingredients like sugar, ascorbic acid, colour, flavourings, etc.
Decanter	Used to remove fibre, grits, black and brown specks, extraneous matters, dust, and other impurities are separated out from juice
Enzyme treatment tank/ collection tank	Used to hold juice when enzyme is added for enzyme activity
Evaporator/Concentrator	Used for evaporating water from juice
Pasteurizer	Used for pasteurizing juice by passing steam through it

Name of equipment	Usage
Clarifier/ Ultra-filtration unit	Used to remove solid particulates or suspended solids from liquid for clarification and/or thickening
Aseptic filler	Used for aseptic filling of processed pulp in aseptic bags
Holding tank/reservoir tank	Used for storing fruit juice
Bottle filling machines	Filling of juices/squashes into bottles
Crown crimping machine	Metal lid capping machine
PP sealing machine	Plastic lid sealing machine
Bottle washing machine	Used for bottle washing. They are of two types: brush washer and chemical washer
Batch coder	Used for coding
Packing machines	Packing machine for tetra packages
Labelling machine	Labelling machine used for labelling packaged packets Strapping machine used for combining smaller packets for easy transportation

8.3.2 Precautions and safety measures to follow while handling equipment

- Avoid direct spillage of water on electrical components
- Clean the tools and equipment before and after each operation
- Ensure regular maintenance of tools and machinery
- Do not open machines with sharp knives during operation. It is safe to open a machine when it is unplugged from an electrical source.
- Check machines like the steam-jacketed kettles regularly for efficiency of valves
- Ensure the build-up of pressure for machines is always under control
- Ensure the controls of all the machines are set to prescribed limits

8.4 Production Processes

Unit Objectives

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

- Explain the processing of jam ;
- Explain the processing of jelly;
- Explain the processing of ketchup.

8.4.1 Processing of Jam

Following are the steps for jam processing:

1. Selection of fruit
2. Washing of fruit
3. Peeling and washing
4. Deseeding/ mango tip cutting and destining/ core cutting
5. Separation of segments
6. Cutting/ slicing
7. Blanching/heating
8. Fruit pulp extraction by crushing
9. Decanting
10. De-aeration of pulp
11. Cooking
12. Mixing sugar
13. Boiling to 60°C
14. Addition of citric acid and additives (pectin if required)
15. Cooking and stirring till setting consistency
16. Cooling
17. Aseptic packaging
18. Labelling
19. Storage

8.4.2 Processing of Jelly

Following are the steps for jam processing:

1. Selection of fruit
2. Washing of fruit
3. Peeling and washing
4. Deseeding/ mango tip cutting and destining/ core cutting
5. Separation of segments
6. Cutting/slicing
7. Blanching/heating
8. Fruit juice extraction by crushing/squeezing
9. Decanting
10. Clarification of juice
11. Boiling juice
12. Mixing sugar syrup
13. Cooking the mixture
14. Addition of citric acid, pectin, and additives
15. Stirring and heating till setting consistency
16. Cooling
17. Aseptic packaging
18. Labelling
19. Storage

8.4.3 Processing of Ketchup

Following are the steps for ketchup processing:

1. Selection of tomato
2. Washing of tomato
3. Blanching/heating
4. Crushing/squeezing
5. Extraction of raw tomato puree/ pulp
6. Deseeding and separation of segments
7. Decanting
8. De-aeration
9. Cooking of tomato puree/ pulp
10. Addition of spices, seasonings, acetic acid and additives
11. Boiling of mixture
12. Addition of salt
13. Cooking till done
14. Cooling
15. Aseptic packaging
16. Labelling
17. Storage

Unit 8.5 Enzyme Activity

Unit Objectives

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

- Describe enzyme activity in fruit processing;
- Describe pectin's role

8.5.1 Enzyme

Enzymes are a type of proteins that regulate chemical reactions within food products. Enzymes enhance in transformation of food flavour, colouring, and shelf life. Hence, it is necessary to know the types of enzymes naturally occurring in a particular fruit.

8.5.2 Enzyme Activity

The chemical substance called substrate on which enzymes act and the conditions governing its activity are important. The enzymes used are breakdown cells walls and release the liquids and sugars, which make up the fruit.

8.5.3 Enzyme Used

Pectinases, amylases and celluloses are commonly used enzymes that break down different structures of the fruit cells and affect the extraction process in different ways.

Pectin is the commonly used substance for setting of jam and jelly. It is naturally present in fruits, which is extracted by dilution method. To the fruit minimum quantity of water is added and boiled and pectin is extracted.

Unit 8.6 Procedures Involved in Juice/ Pulp Extraction

Unit Objectives

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

- State the procedures used to extract the fruit and vegetable juice/pulp.

8.6.1 Decanting

It is a filtering/removal process. All the rotten fruit particles (black and brown skin and extraneous matter), larva, eggs, sand from the fruit extract, etc. is separated out. The extracted fruit pulp is raw, pure fruit pulp. It is done by centrifugation process. The raw extracted pulp is rotated at high speed to remove the layer of black specks and unwanted particles.

8.6.2 De-aeration

It is a process of expelling air from the product before sterilization and filling. In crushing, pressing, separation, and decanting, the raw fruit pulp extract is subjected to considerable aeration. The inclusion of oxygen can promote enzymatic browning, destroy nutrients, modify flavour, and otherwise damage quality. Hence, ensure caution and care to protect the material.

8.6.3 De-aeration methods

1. Rapid heating and heated pulp transferred into a vacuum chamber: Rapid heating at high temperature removes some undesirable volatile aroma and air. The heated pulp is passed into vacuum chamber for storing/further processes.
2. Inert gas bubbling: In the extracted, raw, pre-cooked pulp, nitrogen or carbon dioxide gas is bubbled prior to storing it under an inert atmosphere. After the removal of air, pulp needs protection from the atmosphere in all subsequent processing steps. It is done in vacuum conditions with the aid of a pump.

8.6.4 Concentration

It is a process to cook fruit pulp in order to remove water content from the product. The fruit pulp is boiled, and it becomes thick after water evaporates from it. The processed fruit pulp is called concentrate. It is done in an evaporator under controlled conditions of pulp flow, temperature, and boiling time. Low temperature evaporators operate at a maximum temperature of 50°C.

8.6.5 Clarification

It is a process of ultrafiltration in which quantities of tartar cream is used. Certain specks that are not removed during decanting are removed. The process is carried out in two ways:

Freezing	Heating
<ul style="list-style-type: none">• Precipitation of juice• The bottle of juice is refrigerated so as to• complete precipitation• The tartar crystals settle down leaving clear liquid on top• Example: Apple juice	<ul style="list-style-type: none">• Rapid heating to about 180°C followed by sudden cooling• It is one in flash heaters to avoid oxidation• After rapid heating and cooling the liquid is passed through a filtering material• Example: Pomegranate juice

Unit 8.7 Pasteurization of Fruit and Vegetable

Unit Objectives

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

- Describe pasteurization process for fruit processing industry

8.7.1 Pasteurization

It is a process in which foods heated at specific temperature and time to kill (or deactivate) some number of potentially harmful bacteria. Pasteurization is a preservation method used in food industry for milk and juices.

8.7.2 Methods of Pasteurization

Optimum temperature and time used for pasteurization of juices and squashes is 185°C. It is done in two ways:

- High Temperature Short Time (HTST): Juice is heated at high temperatures for short time
- Low temperature Long Time (LTLT): Juice is heated at low temperature for a longtime

Given below are three methods of pasteurization:

1. In-The-Bottle/Holding

- Filtered juice filled in expandable bottles with proper heads, sealed airtight, and pasteurized.
- LTLT way of pasteurization is used

2. Overflow

- Juice is heated above 50C pasteurization temperature
- This heated liquid is filled in hot sterilized bottles upto brim and after sealed
- Sealed bottles pasteurized at 50°C lower temperature filling
- On cooling the bottles contract leaving no air space in between
- HTST way of pasteurization is used

3. Flash

- The juice is heated 10°C above pasteurization temperature for a minute
- The liquid filled in air tight container and sealed in steam cover for sterilized sealing
- It is cooled at room temperature
- HTST way of pasteurization is used

Unit 8.8 Sterilization of Fruit and Vegetable Juice/Pulp

Unit Objectives

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

- Describe sterilization process for fruit processing industry;
- State the methods of sterilizing fruit juice.

8.8.1 Sterilization Process

It is a process to kill all harmful microorganisms present in the product. It is done to increase the product life.

Methods of sterilizing the fruit juice

Given below are two methods used for sterilization in fruit processing industry:

Retort	Tube-in tube
<ul style="list-style-type: none"> • Batch process • Filled cans are put on a rack and loaded into a retort • Steam is trapped in the retort • Sterilization technique is done on basis of cooking in a cooker • Cooling is done separately 	<ul style="list-style-type: none"> • Continuous process • Passed through a series of tubes placed within a tube • Steam is passed through the outer tube • Steam is passed through the outer tube • Cooling is done by extension of tube at filling temperature

Unit 8.9 Quality Analysis

Unit Objectives

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

- State the quality control of a product;
- List the quality parameters of fruit pulp, juice, jam, jelly, and ketchup;
- List the various faults in jellies;
- List the corrective measures for the faults in jellies.

8.9.1 Quality Control

It is an optimum standard maintained continuously as per the company standard norms to produce a quality product along with specific guidelines from the as per Government. If the quality standards are not maintained, then it could lead to fatal consequences and be harmful for health

8.9.2 Quality Parameters

Every step involved in the process requires monitoring inclusive of food safety and personal hygiene. In fruit juice & pulp, quality check is done on basis of technical specification and organoleptic, which differ from fruit to fruit. The most important parameter to control is pH level as the juice is natural and without any additives.

8.9.2.1 Fruit Juice and Pulp

1. pH: Each fruit has its own acidity level. The processing company maintains it as per their requirement.
2. TSS: Each fruit product has its own Brix ratio. The processing company maintains it as per their requirement.
3. Viscosity: It is measured by refractometer as per the need
4. Taste/flavour, colour, and texture: It is checked by tasting the pulp & juice

8.9.3 Jam & Jelly

In jam and jelly, quality check is done on basis of technical specification and organoleptic which differ from fruit to fruit.

1. Acidity: It is as per fruit taste. Optimum level maintained is between 3.2 to 3.7 pH
2. TSS: 65% for jelly 68% for jam
3. Viscosity: Jelly should beset
4. Taste/flavour: Additives as per Government approved standards
5. Colour: Additives added as per approved standards

8.9.4 Ketchup

of ingredients (sugar, acetic acid, spices, salt, etc.) It has thick consistency, but is pourable. It is made by boiling tomato juice with addition

1. Acidity: Acetic acid level has to be maintained to 1% minimum
2. TSS: 25 % minimum
3. Viscosity: As per company standard operating procedure
4. Taste/flavour, colour, and texture: It is checked by tasting

Given below is a chart of common fruit pulp requirements:

Fruit	Acidity %	TSS (Brix degrees)
Mango	0.6 % to 0.7 %	14°
Papaya	0.2 %	10° to 12°
Pear	0.3 %	10°
Peach/apricot	0.2 % to 0.3 %	10° to 12°
Pineapple	0.4 % to 0.6 %	10° to 12°
Litchi	0.3 % to 0.5 %	10° to 12°
Banana	0.2 % to 0.3 %	24°
Apple	0.15 % to 0.2 %	10° to 12°
Tomato	0.5 % to 0.6 %	4°

8.9.5 Faults & Remedies

Faults	Reasons	Remedies
Failure of setting jellies	<ul style="list-style-type: none"> • Jack of acid or pectin or both • Short cooking time • Addition of too much sugar • Cooking below end point • Slow cooking for a long time 	<ul style="list-style-type: none"> • Proper pectin extraction • Addition of clarified juice rich in pectin • Cooking has to be done up to endpoint not below or beyond it • Pectin's binding property is destroyed in presence of acid if heated for long time. Hence avoid over heating
Cloggy or foggy jellies	<ul style="list-style-type: none"> • Cloudy jelly if unclarified juice used • Use of immature fruits due to insoluble starch of raw fruit juice • Over-cooking makes jellies gummy • Over-cooling makes jellies vicious and lumpy • Faulty pouring traps air inside if done from height • Non-removal of scum • Premature gelation 	<ul style="list-style-type: none"> • Clarified juice to be used • Use ripened fruits • Coking till end point • Cooling at room temperature • Pouring jellies to be poured from pout of size an inch above the top of container • Heating solution to boiling point • Working at low sugar concentrations • Low wetting pectin
Crystal formation	<ul style="list-style-type: none"> • Excess sugar • Over concentrated • Cream of tartar 	<ul style="list-style-type: none"> • Boiling Jelly properly • Cooling and settling of juice
Weeping of Syneresis	<ul style="list-style-type: none"> • Excess of acid • Low concentration of sugar solids • Insufficient pectin • Premature gelation 	<ul style="list-style-type: none"> • Addition of clarified juice rich in pectin • Addition of sugar syrup

Unit 8.10 Packing and Packaging

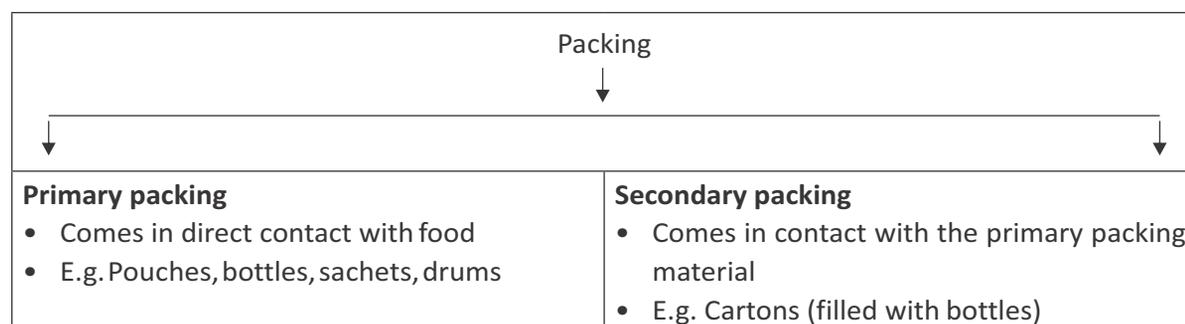
Unit Objectives

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

- State the basic categories of packing;
- State the various types of packaging materials used for packing fruit pulp;
- State the factors for selecting packaging materials;

8.10.1 Packing of Finished Products

The finished product is filled in containers meant for packaging. Depending on the demand, the market and the size of the industry, packing is categorised as follows:



When selecting the packaging material to pack the finished products, one must ensure that the packaging material is:

- Non-toxic and compatible with food
- Offers sanitary protection
- Protects the product from moisture, gas, and odour
- Protects the product from light, temperature, humidity, and rain
- Protects the product from insects, mites, bacteria, rodents, and birds
- Transparent and tamper-proof
- Offers ease of opening, pouring, resealing, and disposing
- Compatible with the size, shape, and appearance standards set by the organisation
- Low on cost

Unit 8.11 Aseptic Packaging

Unit Objectives

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

- Explain aseptic packaging in fruit processing Industry

8.11.1 Aseptic Packaging

Packaging ensures that processed food is sterile and protected from harmful microorganisms. Packaging done in a germ free environment is called aseptic packaging. It is the final steps in aseptic food processing. Food product is sterilised continuously ensuring that either food decay and/or food poisoning does not occur. Aseptic packaging ensures that the containers for the food are sterilised continuously and that the food is inserted into the container in a completely sterile environment.

The packaging material used is multi-layered paper, polyester, and metal liners are pre-sterilised products. Examples of aseptic packaging are milk tetra packs/cartons, juice pouches, boxes, etc.

The common methods of aseptic packing are:

- Form-fill seal
- Bag-in- box
- Bag-in-drum
- Bottling method aseptically
- FIFO (First-In-First-Out) is a stock rotation system that dispatches processed food depending on the order in which it is produced

Manufacturing → Warehouse and Storage → Dispatch
(First lot from the stock goes out first)

Fig. 8.12. FIFO stock rotation

- FEFO (First-Expired-First-Out) is a stock rotation system wherein products that need to be consumed earlier are shipped first

Manufacturing → Warehouse and Storage → Dispatch
(First expire lot goes out first)

Fig. 8.12. FIFO stock rotation

Unit 8.13 Waste Management

Unit Objectives

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

- State the kind of waste produced and its disposal.

8.13.1 Waste Management

It is a method of treating/handling the unwanted materials that are a threat to the environment. Ensuring that the waste generated is disposed properly, one of the important features of Good Manufacturing Practices (GMP) is waste management.

A lot of waste is generated in fruit and vegetable processing industry. A valuable by-product can be made from waste to solve the problem of waste disposal. Given below is the table in which as per fruit, the name of waste and its by-products are listed:

Fruit	Name of waste	By-products
Apple	Pomace, Cores	Pectin, Cider, Vinegar, Chutneys, etc.
Apricot, peach	Kernel	Kernel oil can be used in pharmaceutical, Oil cake as cattle feed
Citrus fruits	Rags, Peels, Seeds	Peel can be used for oil, pectin, marmalades, and extraction candy manufacturing. Sludge can be used for citric acid manufacturing. Seed can be used for oil extraction
Grapes	Stem and Pomace	Pomace can be used for making jelly, chutney, cream of tartar, and cattle feed.
Guava	Cores, Seeds, Peels	Guava cheese and cattle feed
Mango	Peel and Stone	Mango stones after removal of coat is dried, powdered, and are used as edible starch. Peel can be fermented to prepare vinegar
Pear	Skin and Seed	Cattle feed
Pineapple	Skin, Rind, Crown	From crown, edible wax can be extracted. Rind can be used for pineapple candy and skin may be crushed for juice extraction
Tomatoes	Seeds	Can be used for extraction of oil
Other fruits		Banana skin may be used for paper pulp. Green papaya latex can be used for papain extraction
Vegetable waste	Skin leaves	Can be used for cattle feed

Other unutilised portion of waste is dried and used as fuel for boiler and composed as agriculture compost. The wastewater generated is sent to effluent treatment plant for proper treatment.

Unit 8.14 Post-Production Cleaning and Maintenance

Unit Objectives

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

- Demonstrate the process of cleaning and maintenance of work area after production;

8.14.1 Post Production Cleaning Method

This explains the method of cleaning the work area after production

Clean machineries with recommended sanitisers →	Clean equipment and tools with recommended sanitisers ↓	e.g. knives, pans, buckets, trolleys
Clean the work area as per norms ↓	Attend to minor repairs and maintenance work ←	e.g. oiling and greasing machines
Ensure work area is free from pests →	Maintain equipment daily/ weekly as per supplier's instruction manual ↓	
Ensure periodic maintenance by AMC (Annual Maintenance Contract) personnel		

Exercise

- Q1. What is the correct sequence of steps that needs to be followed to clean the floor after completion of whole process?
1. Sweep thoroughly cleaning under and behind the equipment
 2. Mop the floor with a floor cleaner solution
 3. Sanitize the floor with a sanitizer solution
 4. Rinse the floor with hot water
- a. 1->2-->3->4 b. 1->2-->4->3 c. 1-->4->3-->2 d. 1->3-->4->2
- Q.2 Arrange the steps for Jam processing in order:
- a. Washing of fruit
 - b. Addition of citric acid and additives (pectin if required)
 - c. Cooking and stirring till setting consistency
 - d. Blanching/heating
 - e. Deseeding/mango tip cutting and destining/core cutting
 - f. Cutting/slicing
 - g. Selection of fruit
 - h. Fruit pulp extraction by crushing
 - i. Decanting
 - j. De-aeration of pulp
 - k. Separation of segments
 - l. Mixing sugar
 - m. Boiling to 600C
 - n. Cooling
 - o. Cooking
 - p. Aseptic packaging
 - q. Peeling and washing
- Q3. Which of the following enzymes are NOT used for breaking up of different structures of fruit cell wall?
- a. Cellulase b. Pectinase c. Lipase d. Amylase
- Q4. Enlist various methods of extracting fruit juice.
- Q5. What are different ways of sterilizing fruit juice?
- Q6. What different defects can occur during the processing of ketchup?
- Q7. What amongst the following quality parameters are NOT important for fruit juices?
- a. pH b. Consistency c. Brix Index d. Fat Index
- Q8. Tomatoes have a acidity between 0.5to 0.6. True or False
- Q9. The main reason/s for cloggy and foggy jellies are:
- a. Premature gelation b. Over cooking c. Over cooling d. All of the above
- Q10. What are the advantages of packaging?
- a. Protects the product from moisture, gas, and odour
 - b. Protects the product from light, temperature, humidity, and rain
 - c. Protects the product from insects, mites, bacteria
 - d. All of the above

Notes



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Notes



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9. Produce Baked Products



- Unit 9.1- Introduction to Bakery Industry
- Unit 9.2- Overview of the Baking Process
- Unit 9.3- Raw materials and ingredients
- Unit 9.4- Equipment and tools used in Bakery
- Unit 9.5- Types of Oven and Fuels Used in the Baking Industry
- Unit 9.6- Production Processes
- Unit 9.7- Process for mixing and preparing dough
- Unit 9.8- Proofing
- Unit 9.9- Process of Baking
- Unit 9.10- Quality Check of Baked Products
- Unit 9.11- Cooling of Baked Products
- Unit 9.12- Packaging of Baked Products
- Unit 9.13- Storage of Materials
- Unit 9.14- Post-Production Cleaning and Maintenance

Key Learning Outcomes

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

1. list the various products of the bread and bakery sub-sector;
2. list the various types of industries within the bakery sub-sector.
3. explain the baking process.
4. identify the baking ingredients required for production as per schedule and formation;
5. organise quality baking ingredients as per production process and company standards.
6. identify the different equipment used in the baking process
7. state type of ovens used in baking industry
8. identify the various fuels used in the baking industry.
9. state the various production processes followed in the baking industry.
10. state the different mixing methods used for baking.
11. describe the method of dough forming
12. demonstrate the dough-making process used in the baking industry.
13. state the process of proofing.
14. demonstrate the process of proofing in the baking industry
15. demonstrate the process of baking products in an oven.
16. identify if the final product meets the quality parameters.
17. state the process of cooling baked products.
18. state the process of packaging baked products.
19. state the method of storing baking ingredients;
20. state the method of storing finished products.
21. demonstrate the process of cleaning the work area and machineries after production.

Unit 9.1 Introduction to Bakery Industry

Unit Objectives

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

1. list the various products of the bread and bakery sub-sector;
2. list the various types of industries within the bakery sub-sector.

Introduction to the Bread and Bakery Industry

A bakery is an establishment that prepares baked goods. Baked goods are produced using two methods viz. fermentation and non-fermentation. Depending upon the process of production, baked products are classified as:

Fermented Products	Non-fermented Products
Breads and buns	Cookies
Cakes	Biscuits
Croissants	Crackers

Depending upon the size of the organization, the volume of production, and the turnover, the bread and bakery sub-sector is divided into:

- Small industries (includes tiny, home, and cottage industries);
- Medium industries
- Large industries



Scan this QR Code or click on below link to access video of [Introduction to the Bread & Bakery Industry](#)

Unit 9.2 Overview of the Baking Process

Unit Objectives

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

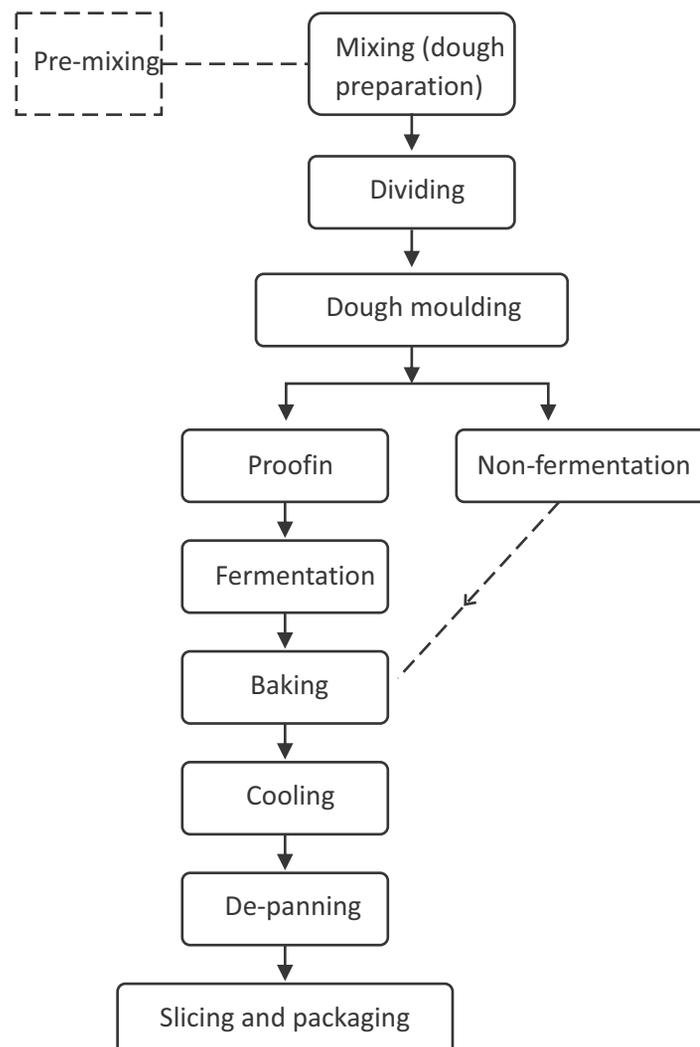
- explain the baking process.

Overview of the Process of Baking

Baking is the method of cooking food with the help of dry heat transfer that is controlled in an oven, hot ashes or hot stones. A combination of three forms of heat is used for the baking process. These three forms are:

Radiation	Hot Air Circulation	Conduction
<ul style="list-style-type: none"> • Heat is radiated from walls of the oven 	<ul style="list-style-type: none"> • Hot air is blown in circles inside the oven 	<ul style="list-style-type: none"> • Heat is conducted through baking pan or tray

Following is a process chart giving an overview of the entire process of baking:



Unit 9.3 Raw materials and ingredients

Unit Objectives

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

- identify the baking ingredients required for production as per production schedule and formation;
- organise quality baking ingredients as per production process and company standards.

Ingredients Used in the Baking Industry

The main ingredient used for baking is flour. The most commonly used flour is wheat flour. Flours are graded into strong and soft by the type of milling. Strong flours are flours with hard high protein varieties. Soft flours are flours with low protein varieties.

Ingredients used in the baking industry are divided into groups as per their roles. The following table explains this classification

Role	Types of baking ingredients	Function
Structure builder Materials that form the base and act as the binder in a product	Flour	<ul style="list-style-type: none"> • Hold other ingredients for uniform dough mixing to make dough • Produce gases during fermentation and retain them during baking
	Egg	<ul style="list-style-type: none"> • Whipped egg forms foam which acts as a leavening agent • Provides colour and flavour
	Milk powder	<ul style="list-style-type: none"> • Provides enrichment • Provides wholesome flavour, colour, and taste
Tenderiser Materials that give softness/fluffiness/crunchiness to the product	Sugar	<ul style="list-style-type: none"> • Imparts sweet taste • Softens gluten • Gives colour • Imparts texture
	Salt	<ul style="list-style-type: none"> • Strengthens and tightens the dough • Compacts the gluten protein to hold carbon dioxide • Gives taste to product
	Shortening (fats like butter, margarine, vegetable oil)	<ul style="list-style-type: none"> • Imparts shortening effect to the dough • Makes the dough more extensible • Improves the taste
	Baking chemicals like baking powder	<ul style="list-style-type: none"> • Aerates products to make them porous and crisp

Role	Types of baking ingredients	Function
Moisteners Material that gives slight wetness to the product	Water	<ul style="list-style-type: none"> Helps to mix the ingredients to make uniform dough Helps in gluten development during mixing Helps in airing of product
	Antioxidants	<ul style="list-style-type: none"> Helps to check rancidity of products, keeping them fresh
	Liquid part of milk	<ul style="list-style-type: none"> Helps in the development of gluten
	Egg	<ul style="list-style-type: none"> Provides nutritive value
Flavouring agents Materials that enhance the taste	Flavour and colour (synthetic or natural) Chocolate and cocoa products	<ul style="list-style-type: none"> Imparts and improves specific flavour and colour to the products Provides a characteristic aroma and taste
	Fruits and nuts	<ul style="list-style-type: none"> Adds a specific taste to the products
	Other cereal flours and starches	<ul style="list-style-type: none"> Dilutes the effect of strong flours Imparts specific taste and flavour to the product
Emulsifiers/ additives Materials which help in mixing flavouring agents and fats	GMS (Glycerol Monosterate) lecithin, SSL (Sodium Stearoyllactylate) are commonly used	<ul style="list-style-type: none"> Helps in uniform dispersion of fats and fat soluble colours and flavours in water.

Quality Parameters

While selecting ingredients for the baking process, certain quality parameters have to be met. They are:

Baking ingredient	Bread	Biscuits/cookies	Cake
Flour (clean, characteristic taste and smell, free from insects, fungus infection, rodent contamination and dirt, dusted bran particle, and other foreign matter)	High protein, strong flour, good water absorption (60-65 %), high starch, bit granulated (medium)	Soft flour, water absorption of 55 %, fine flour; certain biscuits require strong flour	Soft flour, low water absorption of 50 %, fine flour
Sugar (according to different particle size used are: granular sugar (6-30 mesh), castor sugar (30-80 mesh), pulverized sugar (80- 120 mesh), and icing sugar (120 mesh and above))	Powdered sugar if required, sugar acts as the substitute for honey or molasses	Fine powdered sugar or glucose, malt extract fructose, honey	Fine powdered sugar/ sugar syrup which is de-odorized by passing through activated charcoal and is clear in colour is used
Milk/milk products	Dry milk, which has very less fat content but high water absorption	Milk powder in water	Toned milk
Fat	Oil with low viscosity	Hydrogenated vegetable oil (dalda)	Butter
Yeast	Dry yeast as it mixes faster when added through water	Certain biscuits/ cookies require yeast, to some extent	Not applicable
Egg	Not applicable	Fresh eggs used (if required)	Fresh eggs used

Unit 9.4 Equipment and tools used in Bakery

Unit Objectives

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

- identify the different equipment used in the baking process.

Equipment Used in the Process of Baking

The tools and equipment used in the process of baking are:

Name of the equipment	Use and operation
Sifter	<ul style="list-style-type: none"> • It is used to separate coarse grains and fine particles of flour using flat sieves. • The main parts of a sifting machine are the drive mechanism and the set of sieves. • The flour is separated from the grains by horizontal or inclined sieve and sifted into three to six groups as per particle sizes.
Mixers	<ul style="list-style-type: none"> • It is used to mix cake batter and make whipped cream, dough, icing, and fillings. • There are two types of bakery mixers: planetary and spiral. • A planetary mixer's mixing arm is set in a planetary motion without motion of the bowl and is used for all products. • In spiral mixer, the bowl of the mixer rotates and the hook spins at the same time while spinning and kneading the dough in spiral manner. • It is used to knead and mix dough for bread, bagels, and pizza crusts.
Divider/rounder	<ul style="list-style-type: none"> • It is used to divide dough into equal proportions. This motor-driven machine is usually used for bread dough.
Dough sheeter	<ul style="list-style-type: none"> • It is used to roll out dough into a (consistent) sheet with the desired thickness. • Dough is compressed between two or more rotating rollers to produce a consistent sheet. • This equipment is used especially for pastries and biscuits.
Dough moulder	<ul style="list-style-type: none"> • It is used to give uniform shape to the dough at high speed. • It is highly efficient in terms of fuel and energy consumption. • It is used to get the desired shape of biscuit, cookie or cake.
Proof box/proofers	<ul style="list-style-type: none"> • It is a sealed space that provides the right environment and encourages fermentation of dough by yeast. • This is done by providing warm temperature and controlled humidity.

Name of the equipment	Use and operation
Laminator	<ul style="list-style-type: none"> • It is used to make sheets leaner, giving bite and texture to biscuits. • Depending on the orientation, laminators are classified as vertical and horizontal.
Gauge roll stand	<ul style="list-style-type: none"> • It is used to make dough thin and roll them.
Baking oven	<ul style="list-style-type: none"> • It is used to bake or roast food in an enclosed compartment or receptacle.
Depositors	<ul style="list-style-type: none"> • It is used to deposit accurate portions of batter.
Rotary cutter	<ul style="list-style-type: none"> • It is a pair of rollers with various shapes used for cutting the dough as per the desired shape of the biscuit.
Sprayers/coaters	<ul style="list-style-type: none"> • It is used for coating or spraying ingredients on baked products to give them a glazed look.
Dusters	<ul style="list-style-type: none"> • They are used for dusting sugar and/or salt on biscuits.
Cooling conveyor	<ul style="list-style-type: none"> • It is used for cooling baked products.
Packaging machinery	<ul style="list-style-type: none"> • It is used for packaging finished products.

Precautions and safety measures to follow while handling baking equipment:

- Avoid direct spillage of water on electrical components.
- Clean the tools and equipment before and after each operation.
- Ensure regular maintenance of machinery
- Do not open machines with sharp knives during operation. It is safe to open a machine when it is unplugged from an electrical source.
- Regularly check machines like ovens for efficiency of valves.
- Ensure the build-up of heat for such machines is always under control.
- Ensure all controls of all the machines are set to prescribed limits



Scan this QR Code or click on below link to access video of [Tools and Equipments used in the Baking Process](#)

Unit 9.5 Types of Oven and Fuels Used in the Baking Industry

Unit Objectives

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

- state type of ovens used in baking industry
- identify the various fuels used in the baking industry.

Types of Ovens

Ovens are the most important equipment required in the baking process. Different types of baking products require different baking processes. Hence, different types of ovens are used. The following table gives details about the ovens used in the baking industry.

Cabinet type	Mechanical	Masonry	
<ul style="list-style-type: none"> • Rack ovens and deck convection ovens 	<ul style="list-style-type: none"> • Reel oven and continuous tunnel convection 	<ul style="list-style-type: none"> • Wood fire ovens • Optimum temperature of 450°C is maintained 	
<ul style="list-style-type: none"> • Large sheet pans can be wheeled for baking in various heights 	<ul style="list-style-type: none"> • The product moves on a conveyor belt inside the oven. • Useful for uniform baking of biscuit 	<ul style="list-style-type: none"> • Black ovens: • Heated by burning wood in chamber • The product is cooked in the same chamber 	<ul style="list-style-type: none"> • White ovens: • Heated by heat transfer • The product is baked in a different chamber

Fuel Types

Fuel, being the largest contributor to the operating cost, careful selection of the right fuel is very important. Things to remember while choosing fuel are:

- An economically sound fuel
- Consistent flow/availability of fuel
- Waste produced i.e. type and quantity of ash that is formed
- Energy value of the fuel used
- Neighbourhood/bakery location for any smoke emission disturbances

Following is a list of fuels used in the baking industry:

Name of fuel	Use and properties
Gas fuel (LPG, CNG, biogas)	<ul style="list-style-type: none"> • Large scale commercial use • Burns clean without any contamination of products • Instant regulated heat
Electricity	<ul style="list-style-type: none"> • It is expensive • It is used mostly in large scale and medium scale industries
Solid fuel (Wood, charcoal, and coal)	<p>Wood:</p> <ul style="list-style-type: none"> • Cheap fuel • Used for small scale bakery • Causes smoke and contamination <p>Coal:</p> <ul style="list-style-type: none"> • It is dense and compact • Produces less ash • Used for small scale bakery <p>Charcoal :</p> <ul style="list-style-type: none"> • Produces less smoke and is dense • Used for small-scale bakery
Liquid fuels (furnace oil or diesel)	<ul style="list-style-type: none"> • Used in medium or large industries as backup • It is expensive • Highly combustible in nature and has strong odour
Solar energy	<ul style="list-style-type: none"> • Used in large baking industries • Cost effective • Environment friendly • No storage space required for fuel

Unit 9.6 Production Processes

Unit Objectives

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

- state the various production processes followed in the baking industry.

Purpose of Baking

Baking is a crucial step to get the desired product. In baking the dough undergoes physical and chemical changes. The purpose of baking can be stated as follows :

1. Physical changes: crust formation, oven spring formations takes place
2. Chemical changes: the blended effect of all the baking ingredients to give a quality product.

Control Points for Baking

While baking following points have to be noted, as if each is not maintained then the product quality is tampered.

- Optimum temperature: 2080 to 2100F;
- Time: 25-30 minutes

Production Processes Used in the Baking Industry

In the baking industry, there are two ways to process baked products. They are: Continuous and Batch process. The following table explains these processes in detail.

Continuous	Batch
<ul style="list-style-type: none"> • A mechanical process which runs non-stop till the process is complete • An automatic machine is used • No manual labour involved • Proofing is done in a flow as a part of process • It saves labour cost • Machine controls are set only once at the start of the entire process • Biscuits, cookies, etc. are baked using this process 	<ul style="list-style-type: none"> • A process which is done step wise • Semi-automatic machines used • Manual labour is involved • Proofing is done in groups of intervals • For each batch, machine setting is required • Bread, cake, etc. is baked using this process

Unit 9.7 Process for mixing and preparing dough in the Baking Industry

Unit Objectives

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

- state the different mixing methods used for baking.
- describe the method of dough forming
- demonstrate the dough-making process used in the baking industry.

Purpose of Mixing

The baking process for any baked good begins with mixing the dough. This stage determines the development of the dough and its temperature. If any of these variables are not met, it will have an effect on the quality of the final product. Hence, mixing is considered as the most important component of the baking process. The purpose of mixing can be stated as follows:

- to ensure uniform distribution of ingredients
- to ensure minimum loss of the leavening agent
- to hydrate dry ingredients
- to ensure perfect blending of ingredients
- to ensure prevention or development of gluten (depending upon the final product)

Control Points for Mixing

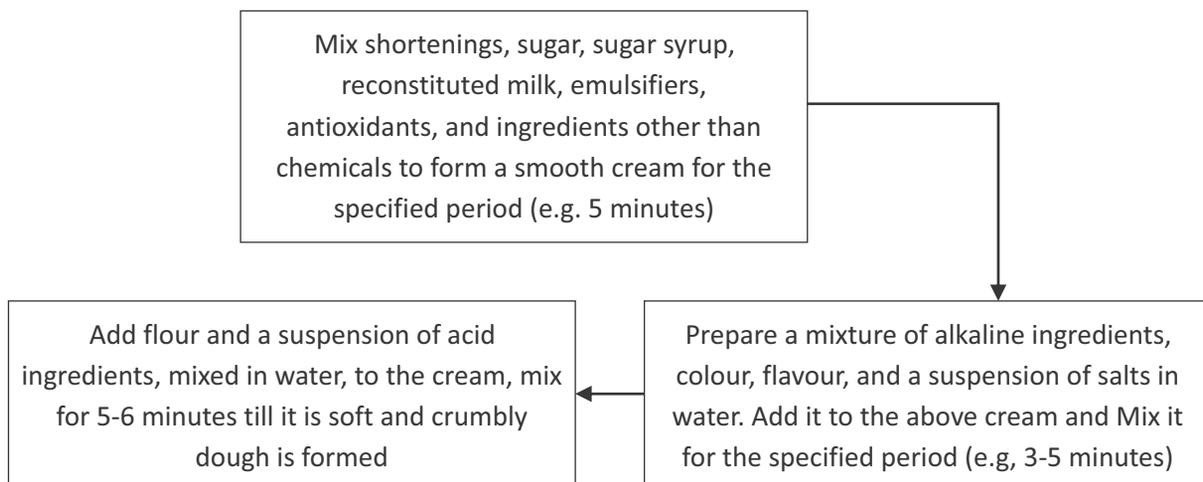
Mixing, being the most important stage of the baking process, having proper control over each of the components of the mixing process is extremely important. The following table explains the control points for mixing that one must pay attention to. Also mentioned in the table are the possible effects that may show up, if these control points are overlooked.

Control Point	Effect
1. Scaling	If the quantity of any of the ingredients is miscalculated, it will lead to faulty bread.
2. Mixing	If the dough is under mixed or over mixed, it will affect the handling properties of the dough.
3. Temperature	If the ideal temperature is not maintained, it will affect the rate of fermentation. This will, then, affect volume of the bread and the colour of the crust.
4. Time	If the mixing time is not maintained as per defined norms, it will affect the texture and the grain of the bread crumbs.
5. RPM of machine	If the RPM is not maintained, it will affect the dough quality and consequently, the quality of the final product.

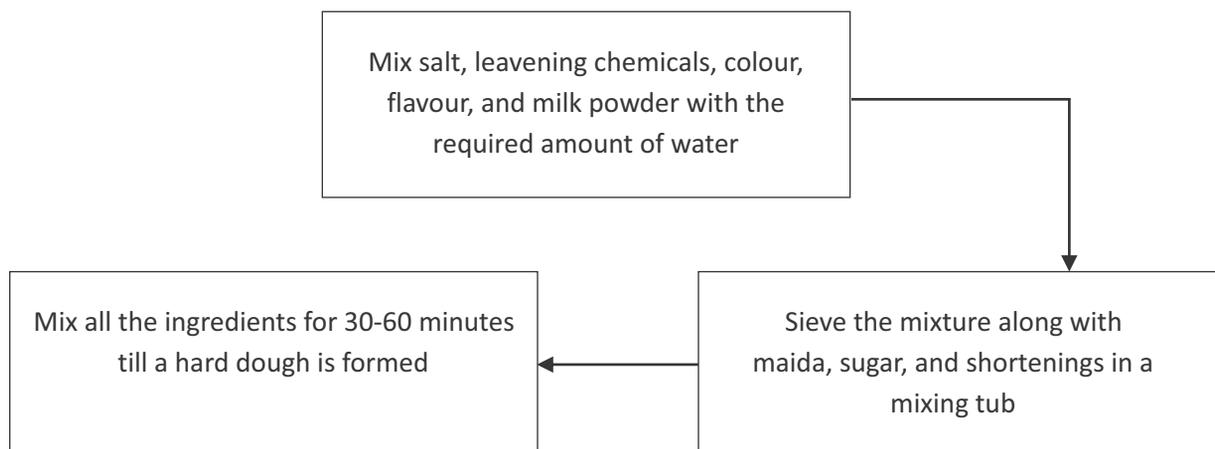
Mixing Techniques

Mixing is an important part of the baking process. Mixing provides uniformity to the dough, thereby enhancing the taste of the end product. Hence, the process by which ingredients are mixed and dough is formed determines the quality of the end product. The different techniques used in the baking industry are listed below:

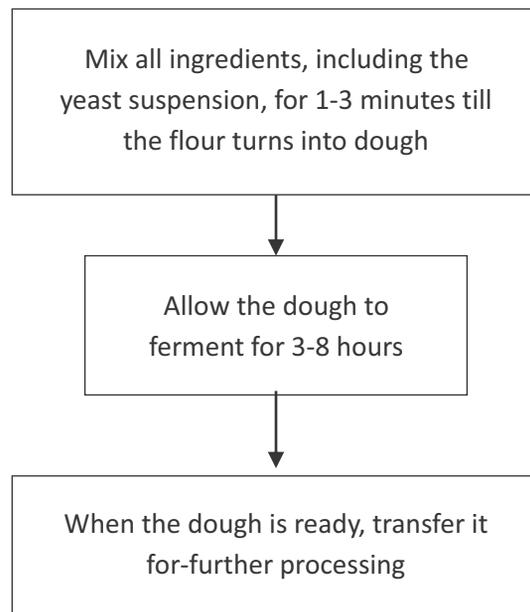
1. **Creaming method:** This method is used to prepare soft dough which is used to make sweet biscuits. The method is described below:



2. **All-in-one mixing method:** This method is used to prepare hard dough which is used to make crackers and semi-sweet biscuits. The process for the same is as follows:

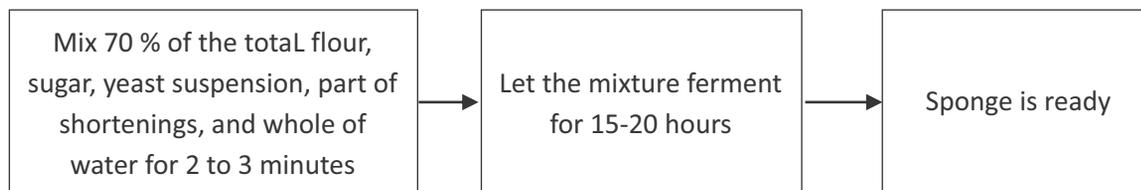


- 3. All-in-one mixing and fermentation method:** This method is used to prepare fermented dough which is used to make bread. The method for the same is as follows:

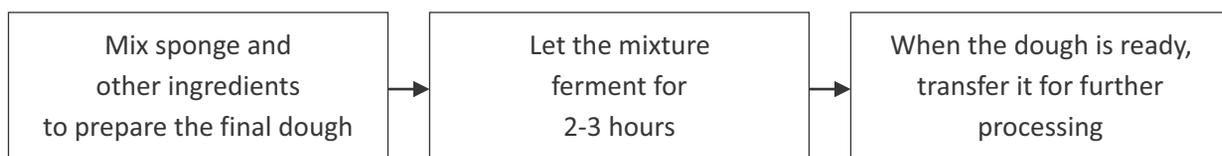


This method can also be divided into two stages by preparing the sponge and dough separately.

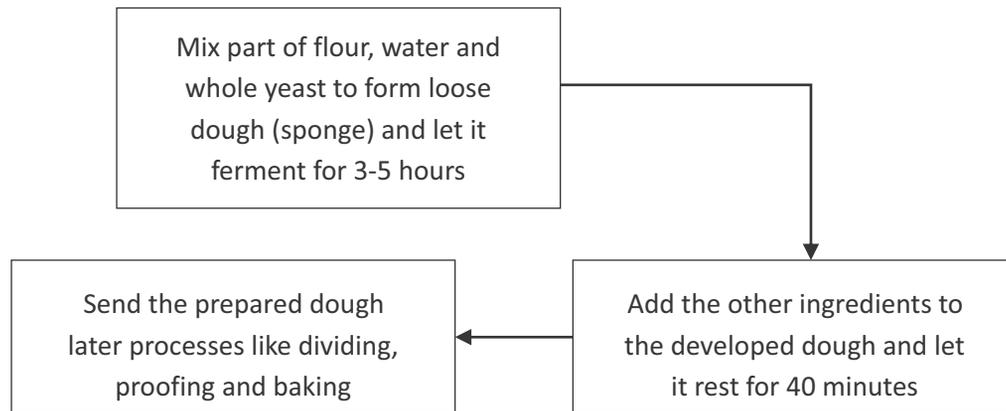
Stage 1:



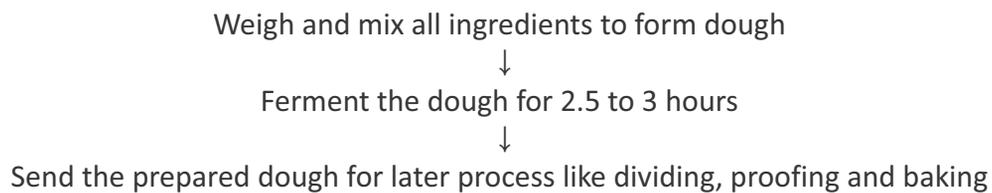
Stage 2:



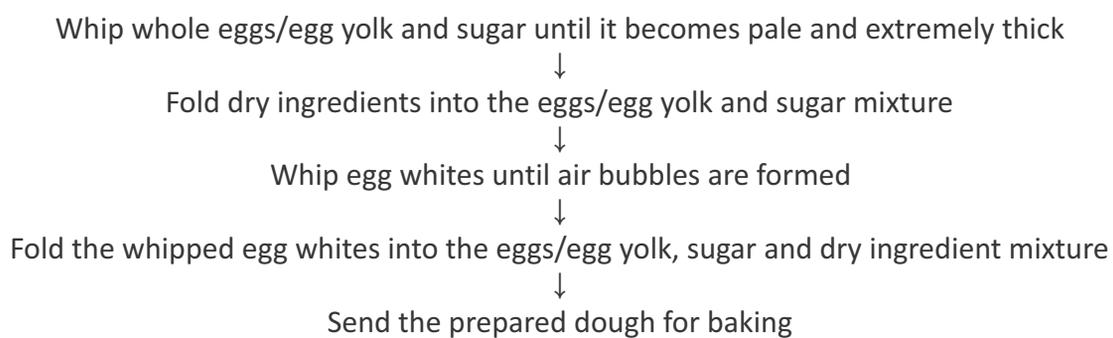
- 4. Sponge and dough method:** This method is used to prepare bread, especially traditional French breads. This method is described below:



- 5. Straight dough method:** This is the traditional method to make dough for breads. In this method, all ingredients are added together or sequentially and mixed in one kneading/mixing session. This method is described below:



- 6. Foaming method:** This method is used to make dough for cakes, especially sponge cakes. The following chart explains this method.



Quality Parameters for Prepared Dough

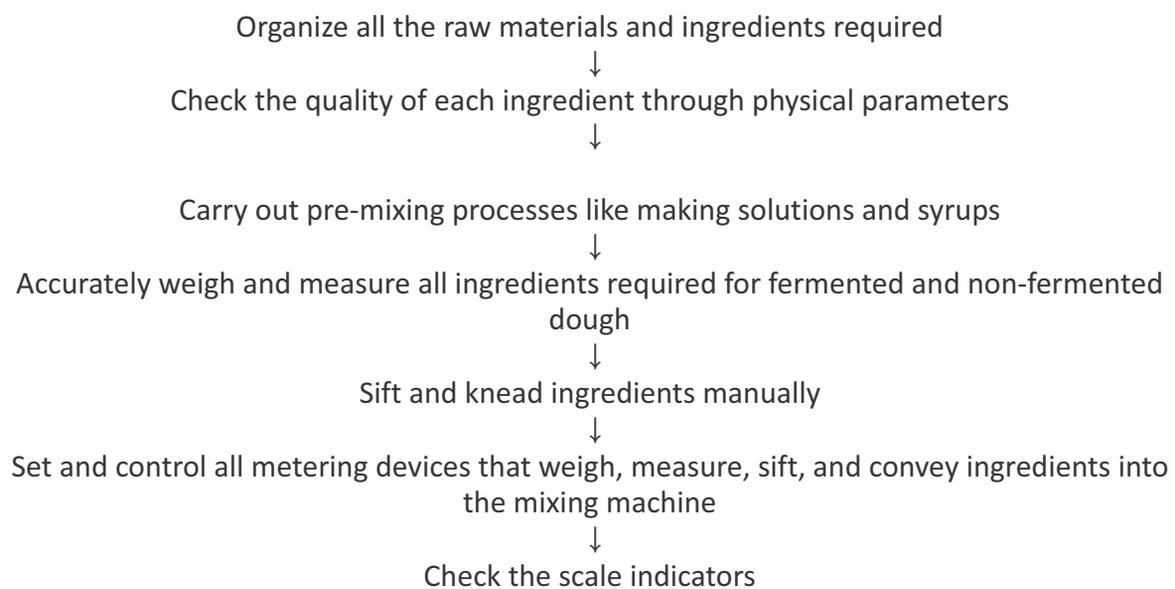
Certain quality parameters have to be considered while preparing the dough. These are:

Parameters	How To Ensure
Dough Consistency	Manually check the dough; stretch it from time to time. The dough must not fall into pieces. It should not be elastic as well.
Mixing Time	Mix the dough for at least 15-20 minutes. Mixing also depends on the speed of the mixer, quality of flour, and the temperature required for the dough.
Temperature	The temperature maintained during mixing can have a direct impact on the dough. If proper temperature is not maintained, the dough may be under-mixed or over-mixed. In most cases, the temperature has to be maintained between 80°F - 82 °F (26 °C to 27 °C).
Fermentation/Standing Time	The fermentation time, also called as standing time, required to prepare dough depends upon the end product. Usually, it takes about 75 minutes for dough to ferment properly.

Execution of the dough - mixing Process

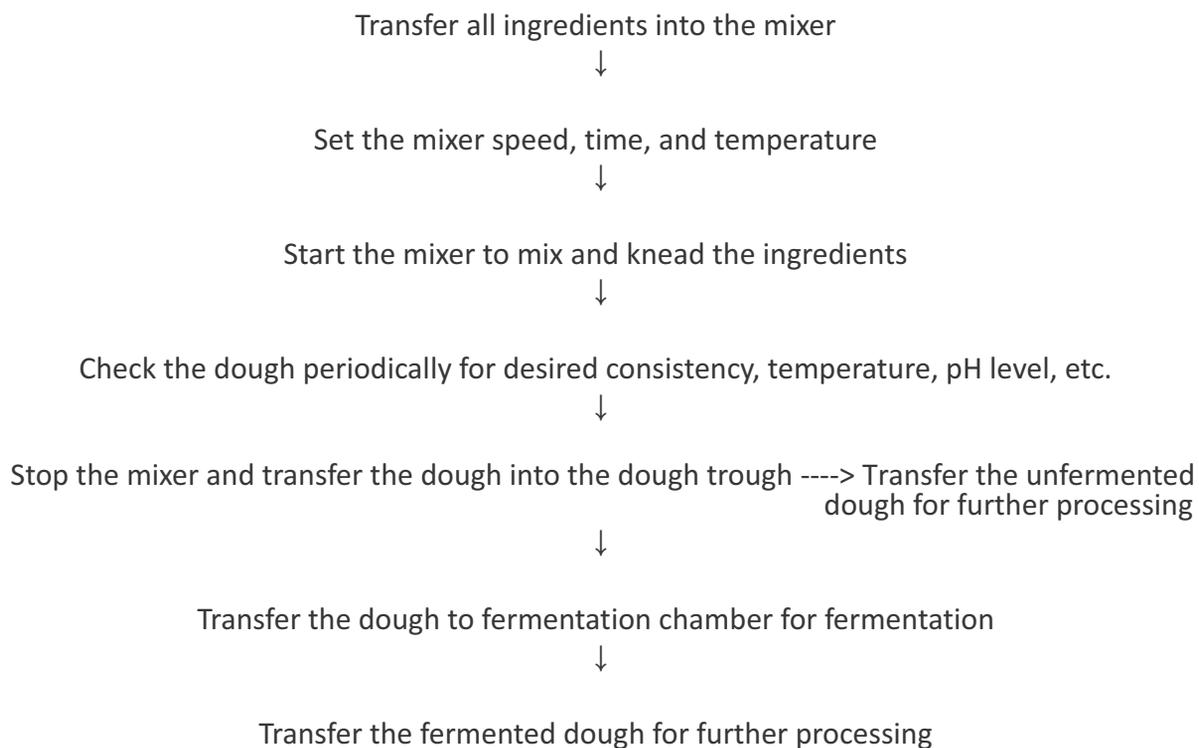
Organizing Baking ingredients

The actual dough-making process begins by organizing baking ingredients and ingredients. This also includes carrying out pre-mixing processes like making syrups. The following chart explains the pre-processing method:



Mixing and Kneading Ingredients

Once all the ingredients have been organized and all the controls have been set, you can execute the actual kneading process. The following chart explains this process.



Dough Forming

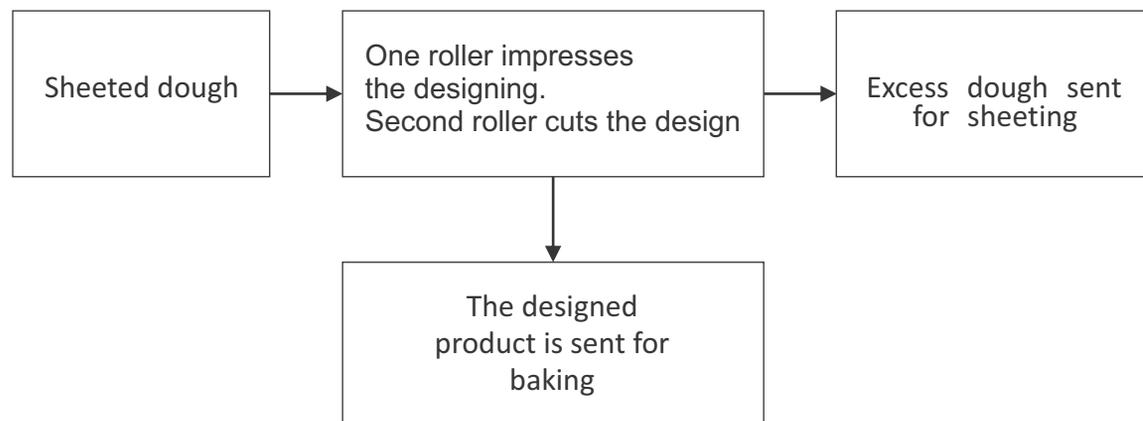
The moulding of dough in various forms is known as dough forming. Dough forming is done after mixing the ingredients as per the finished product. This is done in three methods:

1. **Lamination:** Lamination is the process of alternating layers of dough and butter to make the biscuit crisper. There are three types of laminators: Horizontal, vertical and stacked horizontal. The purpose of laminating can be stated as follows:
 - It is a method of repairing a poor dough sheet with pre-sheeter rolls.
 - The dough is folded at 90o angles to make it uniform in two directions.
 - Rolling and folding of the dough enhances the gluten, which makes the dough suitable for baking a desirable structure
 - A layer of fat is inserted between layers of dough to give it a characteristic, flaky structure.

Lamination process is done in two different styles: folding and cut-and-lay

Folding	Cut-and-lay
<ul style="list-style-type: none"> • A thin sheet is laid backward and forward on a conveyor. • The sheets are laid in a zigzag pattern with alternate “triangles” of the upper and lower surfaces of the original sheet 	<ul style="list-style-type: none"> • A sheet is cut into square pieces and it matches the width of gauge roll to move forward continuously. • The cut pieces are laid on top of one another in succession behind the previous one.

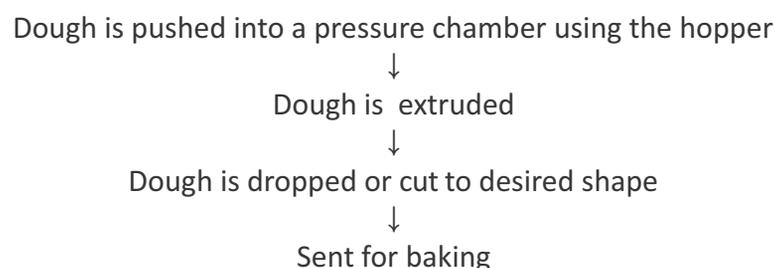
2. **Rotary Moulding:** In this method, soft dough is moulded. Uniform fermented/ unfermented dough is sheeted through a set of roller which is further moulded by rotary moulding method. The chart given below explains the rotary moulding processes of biscuits:



3. **Extrusion:** Extruder – dough formers are used when the dough is soft and evenly pourable. Products made from this method are irregularly shaped. The dough extrusion machine consists of a hopper. The hopper compresses the dough and pushes or drops it depending on the shape to be formed. The final product shape depends on the two mechanism used for cutting or pressing. They are:

Wire cut	Rout press
<ul style="list-style-type: none"> • It is used for semi-liquid/ vicious dough • The dough contains coarse particles in this process • Dough is dropped as chunks 	<ul style="list-style-type: none"> • It is used for thinner liquidly dough • The dough is fine • Dough is poured as a ribbon.

The chart below explains the process of extrusion method:



Unit 9.8 Proofing

Unit Objectives

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

- state the process of proofing.
- demonstrate the process of proofing in the baking industry.

What is Proofing

Proofing is the method of final dough rise using a leavening agent. Proofing is a part of the larger fermentation process.

Purpose of Proofing

Proofing is a crucial step that helps in achieving the desired volume as per the required product. The quantity of dough rises by 3-4 times during proofing. It is a period of continuous fermentation during resting of dough. The purpose of proofing can be stated as :

1. To relax the dough from the stress received during previous operations.
2. To facilitate production of gas in order to give desired volume to the dough.
3. To mellow gluten to extensible character for oven rise.

Control Points for Proofing

While proofing following points have to be noted, as if each is not maintained then the product quality is tampered.

- Optimum temperature: 950—980F
- Humidity: 80-85%
- Time: 55-65 minutes

Two stages of dough rising are

Primary fermentation	Secondary fermentation
This is done right after the dough is mixed together and the size of the dough doubles.	This is final rising period, which takes place before dough is shaped for bread.

Leavening agent/leavening is a substance that causes the dough/batter to rise. Yeast or baking soda is used as a leavening agent.

Working of leavening agent:

- In the presence of moisture, heat, and acidity, the leavening agent reacts to produce carbon dioxide gas.
- This gas gets trapped as bubbles in the dough and helps to raise the dough making it lighter.
- When the risen dough/batter is baked, the bubbles set and the holes left by the gas bubbles remain.
- This gives the cake, bread, etc. the soft and spongy texture.

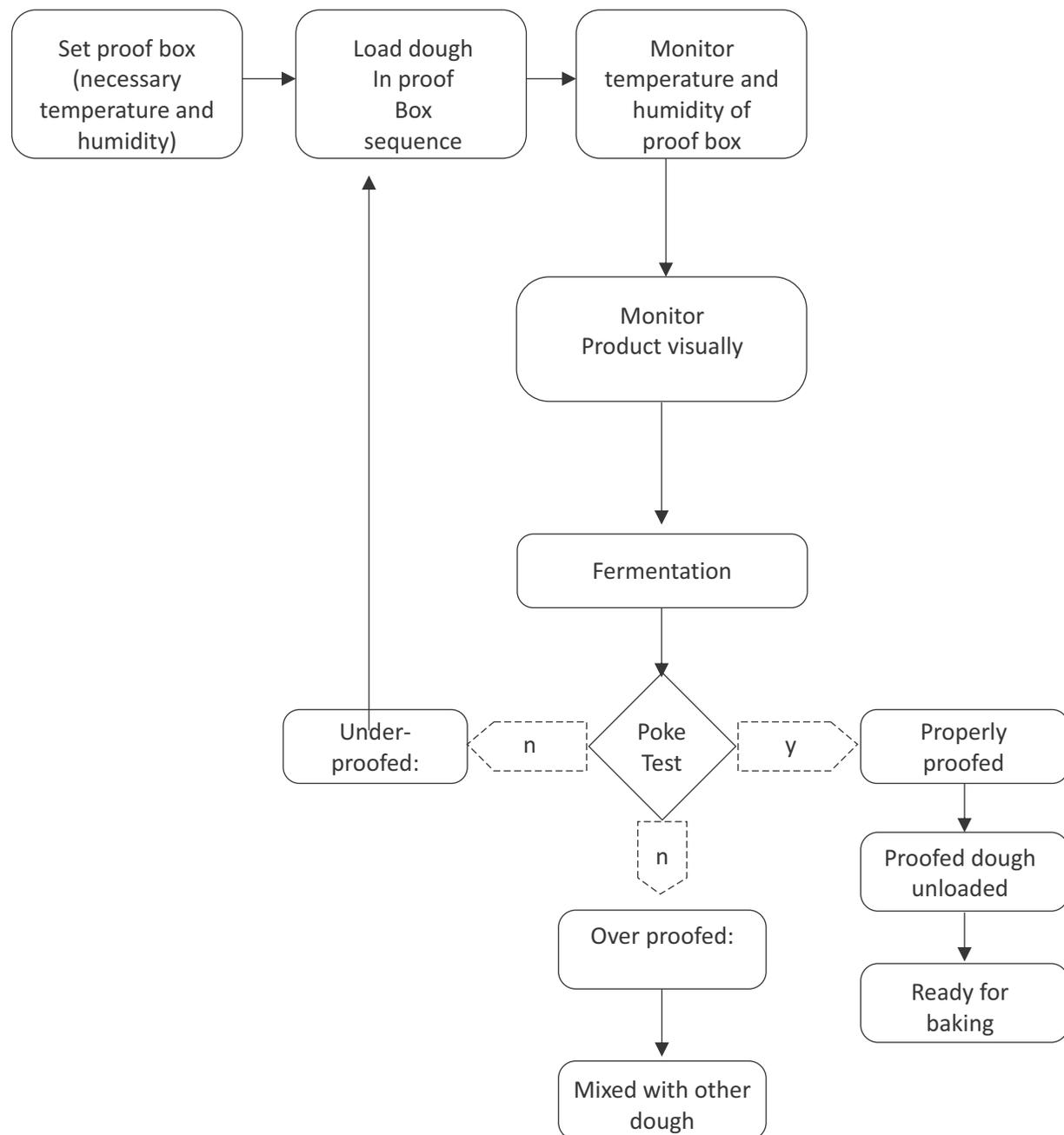
Test for proofing:

It is done with the help of poke method. In this method, a pointed stick is poked into the dough. When this is done, one of the following three conditions occurs:

Under proof	Over proof	Proofed
<ul style="list-style-type: none"> • The dough springs back after poking. • It is sent for proofing 	<ul style="list-style-type: none"> • A tunnel is seen • It is set aside for combining with other dough 	<ul style="list-style-type: none"> • The dough has risen as per desired level. • It is ready to bake

Execution of the Process of Proofing

The process of proofing is explained in the chart below:



Unit 9.9 Process of Baking

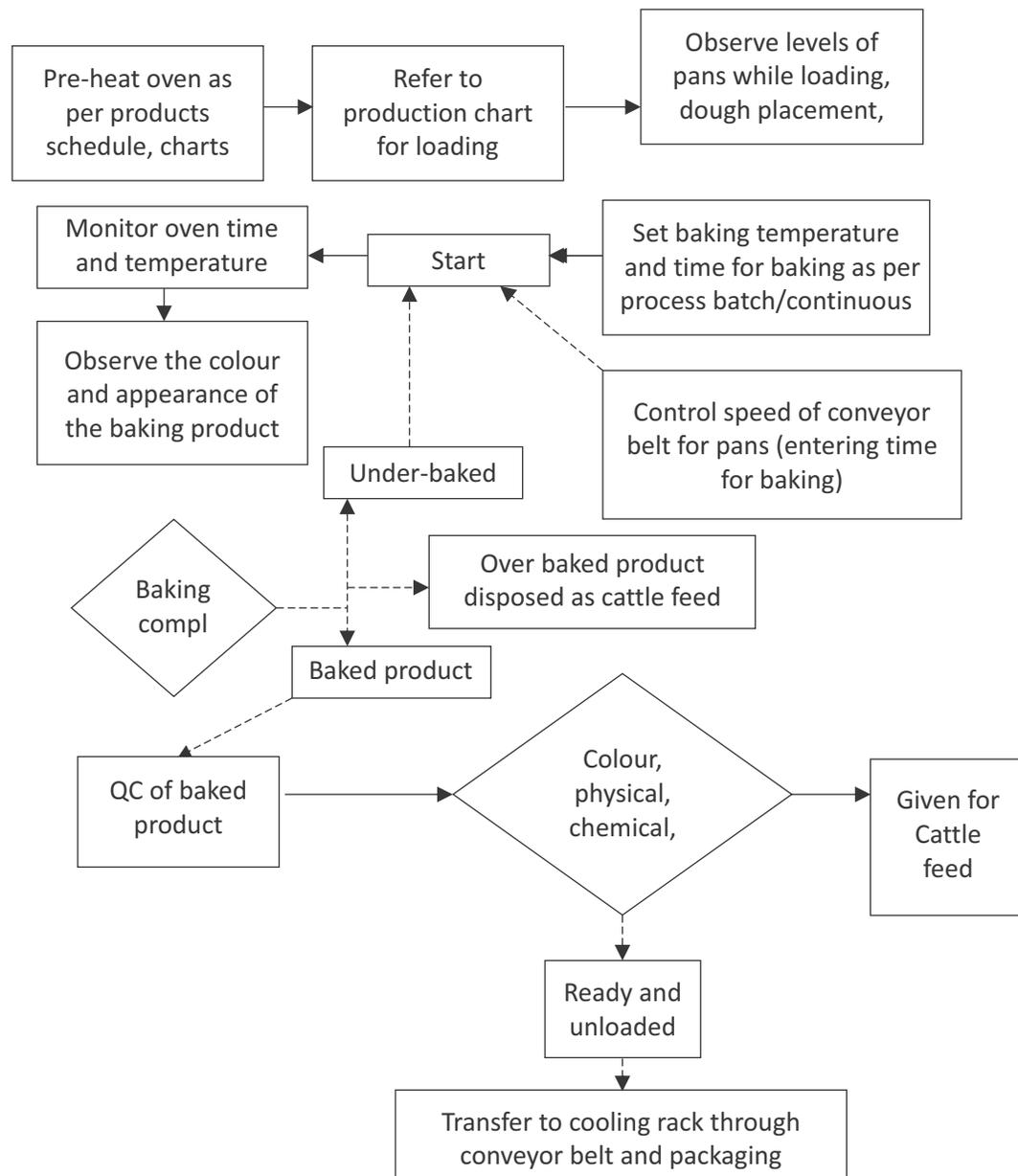
Unit Objectives

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

- demonstrate the process of baking products in an oven.
- Describe the process for baking breads, biscuits and cake

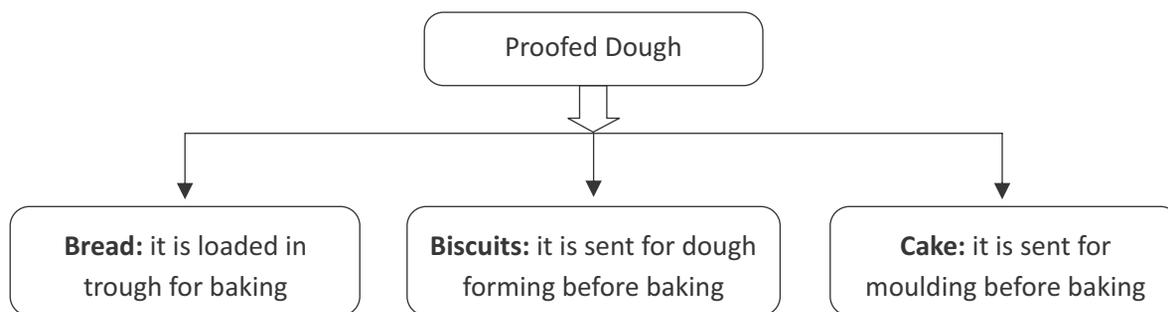
Oven Baking

The process of baking in an oven is explained in the chart below

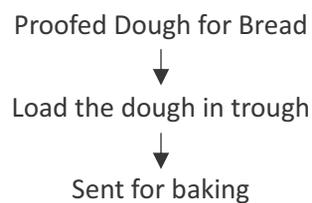


Process of Baking for baking breads, biscuits and cake

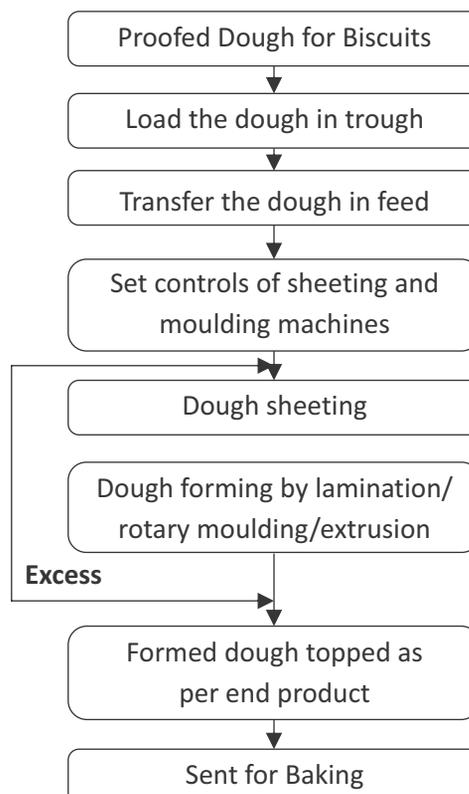
The chart below explains the process of bread, biscuits and cake baking after the proofing process. The proofed dough is sent for baking in the three ways as required.



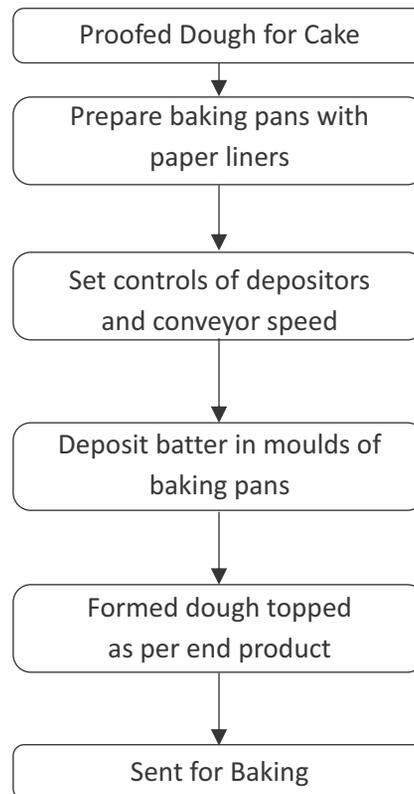
The bread baking process is given below:



The biscuit dough forming process is given below:



The cake moulding process is given below:



Unit 9.10 Quality Check of Baked Products

Unit Objectives

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

- identify if the final product meets the quality parameters.

Parameters to Check the Baked Product

Once the product is baked, there are several specifications to check if it is as per organizational parameters. The following table illustrates this:

Way of testing	What to observe	How to do
Sensory	Colour	Observation
Physical	Appearance, size and texture	Observation
Organoleptic	Taste, flavour, mouth feel, rancid	By eating it

Faults and Remedies

The following table describes the various faults that may be found in final products and their causes.

Faults	Causes
Lack of volume	<ul style="list-style-type: none"> • Use of weak flour • Too much salt • Lack of Shortening • Yeast dissolved in hot water • Too much / not enough dough for mixer • Under mixing/ over mixing • Young/old dough • Too long proof/ insufficient proof • Excessive steam pressure in oven • Oven too hot
Too much volume	<ul style="list-style-type: none"> • Not enough salt • Use of wrong type of flour • Dough slightly overaged • Too much dough for pans • Over proofing • Cool oven
Crust colour too pale	<ul style="list-style-type: none"> • Too lean formula • Flour lacking diastatic activity • Excessive mineral yeast food • Old dough • Insufficient humidity in proof box • Cool oven • Under baking

Faults	Causes
Crust colour too dark	<ul style="list-style-type: none"> • Too much sugar • High milk content • Old dough • Oven too hot • Over baking
Blisters under the crust	<ul style="list-style-type: none"> • Young dough • Excessive steam in proof box • Over proofed • Rough handling at oven
Crust too thick	<ul style="list-style-type: none"> • Insufficient shortening • Low sugar content • Old dough • Lack of moisture in proof box • Excess steam in proof box • Cool oven • Over baking
Shell tops	<ul style="list-style-type: none"> • Green or new flour • Stiff dough • Dough too young • Lack of moisture in proof box • Not enough pan proof • Excessive top heat
Lack of break and shred	<ul style="list-style-type: none"> • Weak flour • Excessive amount of mineral yeast • Young dough • Extremely old dough • Excessive proof
Grey crumb	<ul style="list-style-type: none"> • Use of too much malt • Old dough • Excessive proofing • Pans too large for amount of dough
Streaked crumb	<ul style="list-style-type: none"> • Improper incorporation of ingredients • Sponge or dough crusted over during fermentation • Sponge not broken up properly • Excessive trough grease • Scrap dough picked up during make up • Excessive use of divider oil • Excessive dusting flour • Dough crusted during intermediate proof • Too much machine punishment • Rough handling at oven

Faults	Causes
Coarse grain	<ul style="list-style-type: none"> • Weak flour • Improper mixing • Slack dough • Young dough • Old dough • Improper moulding • Excessive proof • Rough handling at oven • Cool oven
Poor Texture	<ul style="list-style-type: none"> • Weak flour • Lack of shortening • Improper mixing • Slack dough • Excessive trough grase • Young dough • Old dough • Excessive use of divider oil • Excessive dusting flour • Improper moulding • Cool oven
Poor flavour and taste	<ul style="list-style-type: none"> • Improper storage of ingredients • Poor quality ingredients • Off-flavoured ingredients • Improper amount of oil • Under fermented dough • Old dough • Unsanitary shop • Dirty pans • Under-baking • Over baking • Bread cooled under unsanitary conditions
Poor keeping qualities	<ul style="list-style-type: none"> • Too lean formula • Poor quality ingredients • Improper storage of ingredients • Old dough • Stiff dough • Over proofing • Cool oven • Bread cooled too long before wrapping

Faults	Causes
Holes in Bread	<ul style="list-style-type: none"> • Unbalanced formula • Flour too strong • Improper incorporation of ingredients • Under mixing • Over mixing • Excessive trough grease • Young dough • Old dough • Excessive use of divider oil • Excessive dusting flour • Too much machine punishment • Proof box too hot • Over proofing

In checking these faults, an analysis of the various causes will show

- inferior ingredients,
- unbalanced formula,
- improper mixing,
- incorrect fermentation time,
- poor control of temperature, time and humidity throughout the production process,
- poor makeup procedures,
- poor oven conditions
- improper handling in cooling,
- faults in wrapping and shipping

Unit 9.11 Cooling of Baked Products

Unit Objectives

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

- state the process of cooling baked products.

Cooling Baked Products

Baked products continue to lose moisture and starts setting as time passes. Hence, it is important to cool baked products in the right way. This ensures that baked products have a longer shelf life.

During the cooling process, the humidity of the cooling atmosphere must be controlled. There are two types of cooling systems that have to be followed. They are:

1. **Atmospheric multi-tier conveyer cooling:** The products from the oven band travel on a canvas web having single, double or three tiers. They are cooled slowly by the surrounding atmosphere.
2. **Forced draft-cooling conveyer cooling:** In this process, filtered air is blown against the direction of product coming out of the oven on the cooling conveyer. This ensures cooling of products faster than the atmospheric type.

Unit 9.12 Packaging of Baked Products

Unit Objectives

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

- state the process of packaging baked products.

Packaging Baked Products

The material used to contain, protect, and handle the delivery and preservation of finished goods from the manufacturer to the user is called packaging material. Materials used for packing baked products are selected if they:

- protect from foreign odour, contamination, heat, and moisture
- protect from mechanical damage
- help in easy handling of product
- are easy to carry
- increase or maintain product's shelf life
- follow legal compliance for values and ingredients for consumers

Packaging is basically categorized into:

Primary packaging	Secondary packaging
The packaging comes in direct contact with the product.	It is the packaging that is used for transportation/warehouse storage/handling
Wax coated or laminated, bopp film paper is used	Cardboard boxes, CBB made of craft papers, tins are used often
E.g. Bread and bun packaging is generally made of a base coated paraffin wax.	E.g. Plastic crates that contain breads and buns

Apart from these, there are some more materials that are used for packaging. They are:

Material	Products
Flexible material (laminates)	Family packs of biscuits
Cardboard boxes	Cakes
Display boxes	Cookies, cakes, biscuits
Sachets or vertical pouches	Cookies and cakes
Polybags	Breads

Method Used for Packaging of Finished Goods

For packaging of finished baked products, a method called Modified Atmosphere Packaging (MAP) is used. The gases used in the method are carbon dioxide and nitrogen that increase the shelf life of the products.

Thermoforming	Pre-formed container mechanism	Horizontal or vertical form-fill- seal
<ul style="list-style-type: none"> • The packing material is drawn from the reel into a heating station to soften. • It is sent to forming station where it is moulded into a shape of the container with aid of vacuum and air pressure. 	<ul style="list-style-type: none"> • An automatic tray sealer holds a tray/container held on conveyor chains throughout the length of the machine. • The product is loaded into a tray. • Then it is passed into a gas chamber together with the top lidding material where gas is flushed and the tray is sealed. 	<ul style="list-style-type: none"> • A fully automated system and machines form their own flexible or semi-rigid containers from a base film in the forming station. • Heat softens the film before it is moulded in desired shape and size with the aid of vacuum. • The formed containers are loaded with the product. • Covering is done in the vacuum and gas chamber • Heat-sealed and sent for cutting, tamping, and labeling

Unit 9.13 Storage of Materials

Unit Objectives

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

- state the method of storing baking ingredients;
- state the method of storing finished products.

Storage of Baking Ingredients

When storing baking ingredients, the baking industry follows some common methods. They are:

- Stock rotation methods like FIFO (First-In-First-Out) and FEFO (First-Expired-First-Out), especially for perishable ingredients, is used.
- Coolers are set at appropriate cooling temperatures (e.g. 41°F/5°C) for safety.

Leftovers from a process are stored appropriately.

- Potentially hazardous items are thawed in the refrigerator, never at room temperature.
- Newly received baking ingredients are stored in the manufacturers' original packaging.
- Eggs and egg washes are never stored above baked products to avoid cross-contamination.
- Baking ingredients are stored at least 6 inches (15 cm) above the floor.
- All the bins containing ingredients are covered in order to protect them from rodents and pests.
- All baking ingredients stored are properly labelled.

Storage of Finished Products

- When storing finished products, some common methods are followed. They are:
- Stock rotation methods like FIFO and FEFO is used to rotate finished products.
- Bakery items which may contain perishable ingredients like cream, cheese or eggs must be kept under refrigeration.
- Products that may have a longer shelf life can be stored at room temperature.
- All finished products are stored with labels of its ingredients and shelf life.

FIFO and FEFO methods of Storage:

FIFO	FEFO
<ul style="list-style-type: none"> • Abbreviation for First-In-First-Out • First received product leaves first from the store room/warehouse. 	<ul style="list-style-type: none"> • Abbreviation for First-Expired-First-Out • Product, which has shortest shelf life, will leave first, irrespective of the order • in which it comes in.

Unit 9.14 Post-Production Cleaning and Maintenance

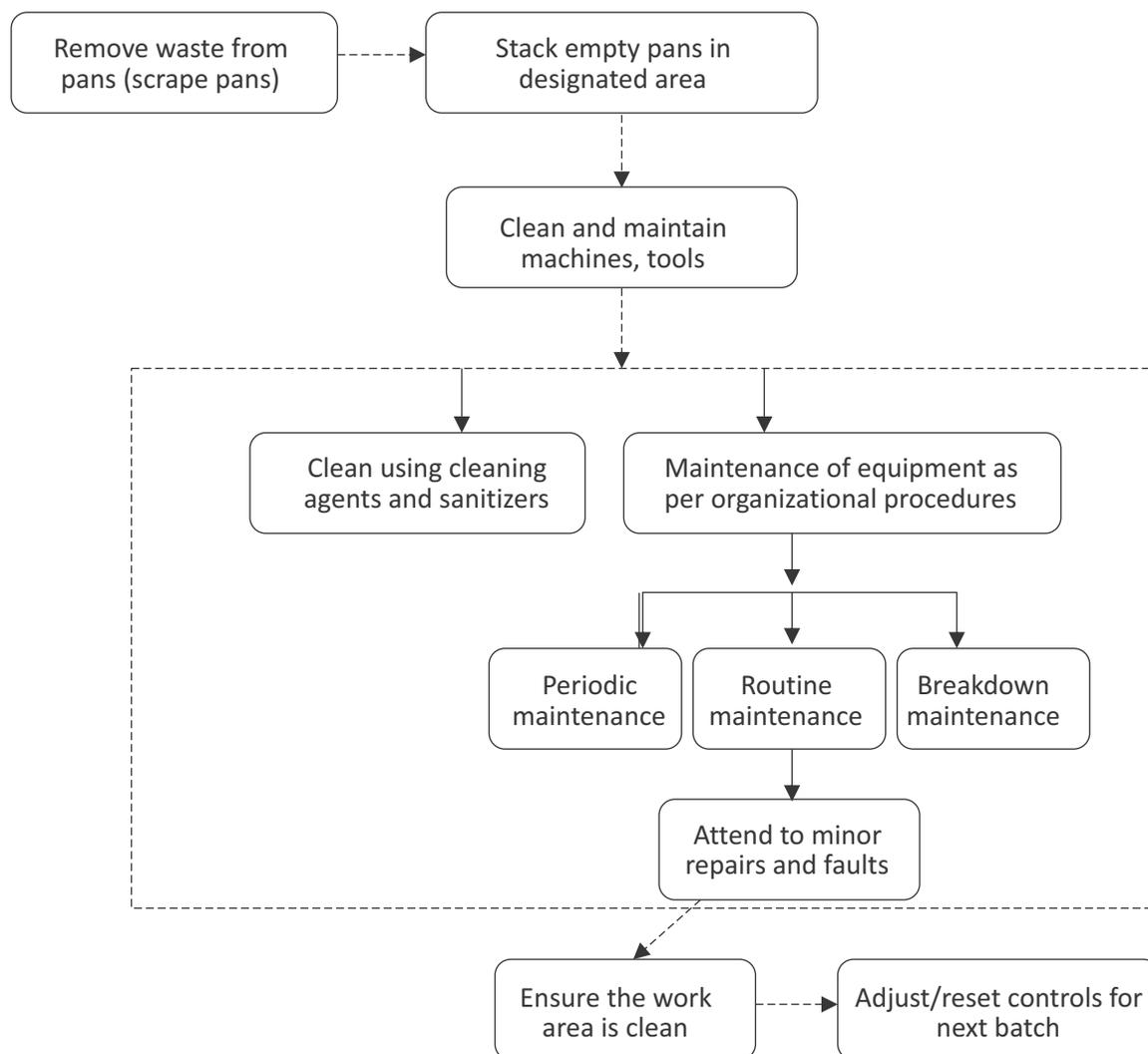
Unit Objectives

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

- demonstrate the process of cleaning the work area and machineries after production.

Method of Post-Production Cleaning

The chart below shows how to clean and maintain the work area and machineries after production. The cleaning and maintenance process has been detailed inside the dotted box.



The chart above shows how to clean and maintain the work area and machineries after production. The cleaning and maintenance process has been detailed inside the dotted box.

Types of Maintenance

After the production process is over, all food-handling equipment and tools are cleaned. Machineries are also checked for smooth and efficient functioning. The maintenance process of machineries can be classified as:

Routine maintenance	Periodic maintenance	Breakdown maintenance
It refers to checking and resolving any fault in the machinery after every batch production. It also includes regular maintenance and up-keep of the machine.	It refers to checking and resolving any fault in the machinery at scheduled intervals. These could be every day, week, month, and/or year.	It refers to checking and resolving any fault in the machinery, if they breakdown.

Notes



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10. Complete documentation and record keeping



Unit 10.1- Needs for documenting and maintaining records

Unit 10.2- Method of documenting and recording

Unit 10.3- Document daily records in the ERP system



Key Learning Outcomes

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

1. State the need for documenting and maintaining records of raw materials, processes and finished products
2. State the method of documenting and recording the details of raw material to final finished product
3. Document daily records in the ERP system effectively

Unit 10.1 Documentation and Record-Keeping for Raw Material, and Finished Product

Unit Objectives

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

1. Demonstrate the Process of maintaining documentation for Incoming Raw Materials and Finished Product

10.1.1 Need for Documentation

Every organization has to maintain records of raw material procurement, production processes, and sales. This is to ensure that the business runs effectively and is profitable. Listed below are some reasons why there is a need for documentation:

1. It gives detailed knowledge about running the business.
2. It helps to control product quality.
3. It helps to keep track of the money invested in the business.
4. It helps to identify the separate costs of raw material or product ingredients.
5. It helps to identify the production cost of a particular process.
6. It helps to make sure that all the quality assurance practices were followed during the production.
7. It helps to make sure that the production equipment is running smoothly/effectively.
8. It works as an evidence for legal procedures.
9. It helps to set an appropriate product price.
10. It helps to take corrective measures at the right time.

10.1.2 Keeping Records

Every food processing organization follows a more or less similar way of keeping records. Production records keep a log of the following:

- The quantity and type of raw materials received
- The quantity and type of ingredients used during processing
- The processing conditions in which production took place (e.g. the temperature set or the air pressure applied)
- The product quality produced

Product quality can be maintained only when:

- The same quantity and quality of ingredients and raw materials are mixed in every batch
- A standard formulation is used for every batch
- Standard process parameters are applied for every batch

Every batch of food is given a batch number. This number is recorded in:

- Stock control books (where raw material procurement is noted)
- Processing logbooks (where production process is noted)
- Product sales records (where sales and distribution is noted)

10.1.3 What is Batch Number?

A batch number is a coded description printed on the label which allows tracing the history of its production. It includes recognition of specific lot produced along with all related problems of control and manufacturing particulars that can be traced back. Batch no. is a unique code which includes characters of, shift, day, date of manufacturing

10.1.4 Example of stock (control) book

Name of Raw material	Raw Soybean	Batch No.	GF345T
Date and Time of Receiving	DD/MM/YYYY	Name of Supplier	XYX Company
Analysis Report			
Moisture			
Acid Insoluble ash			
Grade and size			
Colour			
Extraneous matter			

Unit 10.2 Method of documenting and recording

Unit Objectives

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

- Demonstrate the Process of Documenting Records.

10.2.1 Type of Record

Fruits and vegetables that are rejected for being of a smaller size are usually removed mechanically. This is done with the help of mesh-screens and pre-sizing belts. Other rejected fruits and vegetables are removed manually.

Rejected fruits and vegetables are given to animals as feed. Apart from that, rejects are used for preparing organic compost.

10.2.1 Type of Record:

A production plant has following Records:

1. Stock Register
2. Production Register
3. Dispatch Register
4. Records for GMP/GHP Activities

10.2.1.1 Stock Register: Maintain the details of all type of Raw material in stock register, like: Name of vendor/ Supplier, quantity, batch no., date of manufacturing, whether certificate of analysis came with raw material, expiry date, GR No, where it is to be placed, how many pallets used, and FIFO status.

10.2.1.2 Production Register: In this register, details of goods in process to be made for traceability purpose. In this register details like: How much quantity of material is in process, Monitoring of time & Temperature, other crucial parameters to be listed, as per standard operating procedure.

10.2.1.3 Dispatch Register: This register is maintained to identify the status of dispatch for Finished Good. The general information mentioned like: Date and time on which truck was loaded, FIFO status, Batch No., Vehicle No., Vehicle type, Name of driver quantity loaded and out time.

10.2.1.4 Records of GMP/ GHP Activities: These records are formulated by Food Safety team of the unit. These records may follow below indicated rules:

- Clearly written standard operating procedures will avoid errors resultant of inefficient spoken communication, also understandable documentation will allow better tracing of performed work.
- Documents like this have to be prepared, reviewed, and circulated with responsibility.
- Documents like this have to be signed, accepted, and date must be mentioned preferably with time.
- Documents should not have ambiguous contents. The title, nature, and purpose must be mentioned and laid out in an structured way.
- All the documents must be recent and up-to-dated
- If the document needs manual entry, in such case handwriting should be legible and must provide enough space in between words and sentences.
- Document or record must be signed, if any modification is made
- Storage of records should be at secure place and easily retrievable.
- Documents or records have to be duplicated, copied or generated electronically which are crucial to regulatory conformity or supports necessary business actions.
- In case any data is amended, it should be traceable

10.2.1.5 Classification of GMP/GHP records

The GMP/ GHP records can be categorized as:

- a) Quality Manual
- b) Standard Operating Procedure
- c) Test Method
- d) GMP Checklist
- e) Specification Sheet

A. Practical Exercise:

Objective: To make observation table for Raw material stock Register, Process Register and Dispatch Register

Materials Required for Practical:

- Raw Material Stock Register
- Process register
- Dispatch Register
- Weighing Machine
- Moisture Meter

Method:

1. Maintain the details of raw materials available at the production unit or plant in the stock register
2. Use the observation table and enter the details of the raw materials.
 - Enter the type of raw materials available at the plant.
 - Weigh the raw materials on weighing machine.
 - Enter the weight of each raw material in the stock register.

Precautions:

- Make sure that you make the correct entry after checking the raw materials physically.
- Ensure all records are up-to date as per SOP and are always ready for audits.

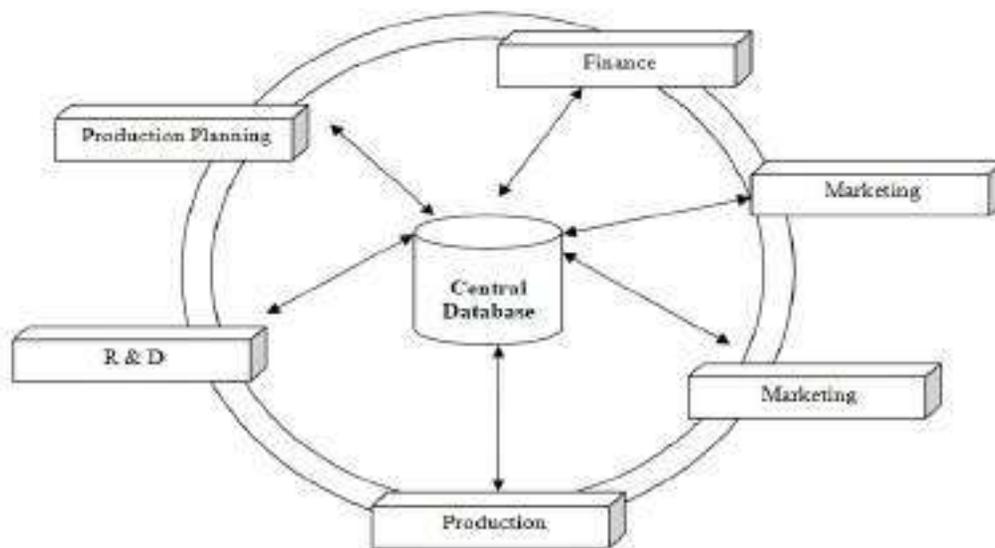
B. Exercise

1. Which one is True/False
 - a. Have you assessed hazards outside or not part of your existing HACCP flows for determining the preventive controls
 - b. Is record keeping is mandatory for quality monitoring and statutory compliance
 - c. HACCP is a science based system
 - d. GMP based policy/procedures, work instructions, test/validation etc. have been established for preventive controls at your food operations.
 - e. Is record keeping is mandatory part of Food safety management systems.
2. Answers the following questions
 - a. What is documentation?
 - b. What is record-keeping?
 - c. Why is it important to keep records of all documents under Food Safet Management System?
 - d. How do you maintain proper record keeping?

Unit 10.3 Using the ERP system

10.3.1. Enterprise Resource Planning or ERP is a effective planning method of organization resources by using computer. Success of any companies depends largely upon the reliable process of information gathering & acting accordingly.

ERP is primarily an enterprise wide system which encompasses corporate values, vision, operating style, objectives, attitudes beliefs and people who make the organization.



Modern Enterprise Resource Planning

10.3.2. Uses of ERP Effectively to record day to day activities



Information Integration through ERP System

There are many advantages of installing an ERP both tangible and intangible. The direct advantages include faster response time to customer queries, information integration for better decision- making, improved efficiency, etc. The indirect benefits include better customer satisfaction, improved customer goodwill, corporate image, and so on.

- ERP tools help in managing internal and external factor affecting the company, employee records and accounts.
- It increases productivity by reducing cost in the long term.
- It reduces effort & time of managing record as compared to the paper records.
- The merger of operational and financial information allows the company to analyse the business necessity and react in a more effective way.
- ERP makes the management of data easier and more productive by combining all the records in one whole.
- Apart from records, ERP also helps in handling of material & make sure that no material is lost or stolen. It would also mechanise the process of procuring and maintaining material after examining the stock.
- It helps in predict market trends & decide the course of action consequently.
- It helps the company to expand business using the internet.

Notes



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11. Food Safety, Hygiene and Sanitation



- Unit11.1-Importance of Food safety, Hygiene and sanitation
- Unit11.2-Applications of various industry standards to maintain hygienic workplace
- Unit11.3-Risk Analysis and Food Safety Management system
- Unit 11.4-HACCP Principles
- Unit 11.5-Apply Safety Practices



Key Learning Outcomes

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

1. State the importance of safety, hygiene and sanitation in the food industry
2. Follow the industry standards to maintain a safe and hygiene workplace
3. Follow HACCP principles to eliminate food safety hazards in the process and products
4. Follow safety practices in the work area

Unit 11.1 Importance of Food safety, Hygiene and Sanitation

Unit Objectives

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

1. State Food Safety and its importance
2. Know what is effective hand washing?
3. List hand washing steps do food employees need to follow
4. Know about Personal hygiene and sanitation

11.1.1 Food safety

11.1.1 Food safety- It is a scientific practice which involve supervision, preparation, and storage of food with the aim to avoid food borne illness. It comprises of different pattern that must be followed to stay away from rigorous health hazards.

11.1.1.1 Goal of food safety Main aim is to lessen the food borne illnesses by modifying or implementing food safety interrelated behaviours and system. Illnesses derived from food are trouble for communal health and it supplement to the health care cost. Some proportion of illness is the outcome of well-known food borne epidemic, which mostly take place when some cases of related illnesses occur due to consuming same food. The root cause of food borne epidemic should be find out including data analysis on the root cause or germs that is responsible for sickness and our usual behaviour which will add to food contamination. All this will contribute in identifying region of improvements in the nation's food safety system. The safety system will cover whole food chain, from cultivating the food, processing, packing, supplying, shipping, and storage to fork.

11.1.1.2 Why Is Food Safety Important?

Food borne outbreaks are communal health issues which are avoidable and improperly reported. They are surcharge on communal wellbeing and add to the expenditure of health care. They pose a key threat to definite groups of people. It can affect everyone but some groups are at higher risk.

Following are the objectives of Food Safety:

1. Food must be safe, hygienic and fit for human consumption.
2. Unbiased trade exercises must be ensured in food trade.
3. Food chain must be followed
4. Accounting the broad variety of Food safety standards
5. Laying a rigid groundwork to ensure food sanitation and hygiene along with every specific code of hygiene observe to all segments

11.1.1.3 Understanding Food Safety

Physical Determinants of Food Safety

Hazards are classified as physical, biological and chemical. These hazards can come into the food chain at any time ranging from field to fork. Mostly hazards could not be investigated in food at the time of purchasing or consuming. Also, food may result in rigorous reactions in individuals who are affected by it. In some countries like United States the cases of food allergies are of major issues in children below 18 and few adults.

Social and Behavioral Determinants of Food Safety

It is essential for every individual to recognize how their interaction and actions lead to safe food and how one can reduce the threat of food borne diseases. Human beings actions play major function in food safety and it ranges from processing on the field to activities in the kitchen. One can undergo a lot of challenges to keep their food safe.

11.1.1.4 The food industry is challenged by:

- Number of employees having more rates of turnover, communication threat , and also cultural differences in food preparation
- Training system and method of certifying workers are not same
- Insufficient leave policies for diseased or sick workers
- Tracing of food stuffs to their origin is difficult
- Modification or improvement in production practices
- Increase in imports

11.1.1.5 Consumers are challenged by:

- To determine when foods are prepared upto suitable temperature
 - Separation of high risk foods and low risk foods
 - Food must be stored at safe temperatures
 - Proper cleaning of hands and other contact surfaces
 - The benefit of food borne outbreak observation and customer complaint is that, they inform public health and regulatory agencies about the hazardous item in trade and must be recalled. The examination of food borne outbreak will help government agencies and food manufacturing industries on detecting problems, initiating controlling and improving practices. Preventing work and combined activities initiative by food manufacturing industry, regulatory and public health agencies, including consumers are necessary to decrease food borne outbreak in India.
- 11.1.2 What is effective hand washing?

11.1.2 What is effective hand washing?

The action of cleaning hands using soap and water, rubbing them energetically and then rinsing them using clear water followed by thorough drying. Following this practice one can get free from dust and microbes. Each hand washing step is significant and efficiently leads to soil exclusion and deduction of microbes which can result in illness.

11.1.2.1 Why is hand washing important?

It decreases the multiplication of disease causing microbes that transmit all the way through food. Hands of food handling employees may be infected with microbes such as Staphylococcus aureus or infected with micro-organisms sourcing from human fecal, example Norovirus, Shigella, hepatitis A virus, E. coli O157:H7, Salmonella Typhi, or infected from food sourced from raw animal example E. coli O157:H7 and Salmonella. Other harmful disease causing microbes can get on hands from different sources and then to food throughout cooking and service process.

A food handling employee with infected hands when exposed to food then it will contaminate the food and when consumer will eat the contaminated food, then it may result in illness

11.1.2.2 When should food employees wash their hands?

Washing of hands should be done right away after involving in behavior that can infect the hands

- Before going into food preparation area;
- Before wearing hygienic and single use gloves for handling food;
- Prior to starting food preparation;
- Prior to managing hygienic equipment and allocating utensils;
- Prior to altering jobs and switching in between uncooked foods and cooked RTE foods;
- Past to handling of dirty dishware, utensils and machines;
- Past to touching naked human body parts, for example, body parts excepting washed hands and uncovered portions of arms;
- Past to using toilet;
- Past to coughing, sneezing, blowing the nose, tobacco eating, or drinking
- Past to caring for or handling animals or marine animals example molluscan shellfish in exhibition tanks.



11.1.2.3 What hand washing steps do food employees need to follow?

- Wash under dirt free, lukewarm running water;
- Use soap and massage all surfaces of hands including fingers energetically with rubbing for minimum 10 to 15 seconds, paying attention to the region underneath the nails, in-between fingers, surfaces of hands and arms, and surrogate prosthetic gadgets;
- wash carefully with dirt free, lukewarm running water;
- carefully dry hands and uncovered surface of arms with one time use paper toweling, or hot air hand drying appliance, or use clean, new towel from a continuous towel system which supplies clean towel to user.
- stay away from recontamination of hands and arms with a unhygienic barrier example, during turning off hand sink faucets or moving the knob of a lavatory door.
- These steps must be followed to get rid of germs from hands and make sure that hands are as hygienic as possible.



11.1.2.4 How important is the temperature of water used for hand washing

Lukewarm water is generally more relaxing than normal water and encourages washing of hand for the suggested duration. The temperature of water used for washing of hand can also affect the solubility or emulsification of few soils. Lukewarm water is more effective as compared to cold water in cleaning fatty soils. Inadequate stream of lukewarm water will result in soap to lather and aid to remove soil rapidly from hands. 2005 FDA Food Code defines minimum temperature of water used for hand washing should be 38°C (100°F).

11.1.2.5 How important is properly drying your hands after hand washing

Drying of hand is an essential element of hand washing procedure because thorough hand drying will offer an extra decrease in microbes on the hands. 2005 FDA Food Code lists down three dissimilar efficient methods which include drying of hands using air dryer and with the help of one time use towel or a hygienic, new towel.

Can hand antiseptics (hand sanitizers) be used in place of adequate hand washing in food establishments?

No. Hand antiseptics should be used only in addition to proper hand washing.

11.1.2.6 What are some ways a food establishment can promote compliance with handwashing requirements?

Training of food handling employees on:

- What is the right time to wash hands;
- What are the steps of hand washing;
- Where they should wash hands.

11.1.2.6.1 Stress the importance of:

- Following correct cleaning/washing procedures;
- maintaining hands and uncovered surface of arms, which includes surrogate prosthetic gadget for cleaning hands and arms,
- maintaining clean and trimmed nails;
- hand washing must be done in selected hand washing sinks;
- Focusing on suitable utilizing of hand antiseptics.

11.1.2.6.2 Managers are responsible for:

- Making sure that food handling employees must wash their hands, as mandatory;
- Providing easy to get to, well maintained, selected hand washing sinks;
- Ensuring hand washing sinks must have dirt free, running lukewarm water, soap and paper towels, and other permitted way for drying;
- Redistributing signage that notifies food handling workers of hand washing prerequisite; and
- Checking food handling employees to make sure properly hand washing is done and first-class hand sanitation practice during job shift.

11.1.2.7 Tips for promoting effective hand washing practices in food establishments:

- Aware food handling employees about media reporting on neighboring and national food borne illness. The awareness program will reinforce the coverage of symptoms, ill health, and first-class hand washing measures.
- To generate opportunities to revise food handling employees every week related to the significance of hand sanitation.
- Emphasizing hand washing at the starting of the shift, coming out of the toilet, past to managing raw meat, and in between change of gloves. This will lead to good hand sanitation at forefront.
- Practicing "buddy" system so that food handling workers can support other worker.
- Using proper training and motivation programs for motivating food handling workers to obtain ownership and carry out good individual hygiene behavior.

11.1.2.8 The following elements can impact hand washing compliance among food employees:

- Create it top priority: management should force hand washing fulfillment as a compulsory practice, then workers will follow the necessity.
- Motivate: Providing inspiration to workers for hand washing, which is already proved to create an impact on improving hand washing fulfillment.
- Get rid of deterrents: easily located hand washing sinks have a great impact on hand washing compliance. Studies have establish that ease of use of hand washing sinks with soap and running water has a large impact on compliance; however, supplies and practices that result in itching and irritation to the skin could decrease hand washing compliance. For example, too much hand washing or using harsh soaps leads to skin irritation and reduces hand washing compliance.
- Offer positive strengthening: prize for compliance normally have a encouraging impact on improving hand washing compliance.

11.1.3 Personal hygiene and sanitation

Sanitation and hygiene are the most important aspects to take care of when working in the food processing industry.

Some important sanitation and hygiene practices that must be followed are:

- Sustain a high parameter of personal cleanliness viz. have a bath every day and wear clean clothes to work.
- Wear Personal Protective Equipment (PPE) such as aprons, mouth mask, head cover, face mask, hand gloves, gum boots, and beard cover mask at all times during work hours.
- Always keep your finger nails trimmed.
- Always keep your hair trimmed and wear hair net while working.
- Wash your hands and feet at the designated area or wash stations provided.
- Wash your hands with soap and water each time before you enter the production area.
- Abstain from smoking, spitting, chewing paan, sneezing or coughing over any food when in the production area.
- Do not handle food when suffering from a disease, illness, burns, injury or infection.
- Take proper and timely medical treatment when you are ill or if you have met with an accident.
- Visit a registered medical practitioner at regular intervals to keep a check on your health.
- Always button up your sleeves or roll them up above the elbows. Button up your cuffs and wear a protective cap
- Gloves should not be worn every time, if worn then an appropriate barrier cream must be applied to save the skin
- Cotton gloves should be worn with durable non-slip gripping surface whenever handling of oil or greases covered component or material is done
- Use high temperature resistant gloves to protect against burns
- Wear leather gloves to protect touching sharp edges whenever handling massive or weighty equipment
- Wearing rubber gloves whenever using cleaning fluids to guard hands from skin injury caused due to air blast during cleaning the element by using compressed air
- Wearing safety shoes or boots with resistant toe caps especially at work for lifting heavy components
- Take particular care of the floor when it is wet or there is an obstacle in your way
- Wear goggles when a chisel, a sharpening tool or a grinder is used and when cleaning with compressed air



Fig. Washing hands with soap and water



Fig. Do not smoke, spit and cough



Fig. Timely medical treatment

Note Below: For Sanitation refer Module 3 for details

Unit 11.2 Application of Various Industry Standards to maintain hygienic workplace

Unit Objectives

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

- Know Various Industry Standards to maintain a safe and hygiene workplace
- What is Schedule 4 Of FSSAI
- The Food Safety & Standards Act 2006
- Food Safety and Standards Regulations, 2011
- ISO (International Organization for Standardization)
- Know various ISO
- Occupational health safety
- Understand Hazard Analysis and Critical Control Point (HACCP)
- know what are GMP (Good Manufacturing Practices)

11.2.1 Schedule 4 of FSSAI (General Hygienic and Sanitary practices to be followed by Food Business operators)

The Food Safety and Standards Authority of India (FSSAI), has made Schedule 4 under Food Safety and Standards (Licensing and Registration of Food Businesses) Regulation, 2011. Under these regulations, it is mandatory that every Food Business Operator has to follow hygienic and sanitary practices in the premises where food is being manufactured. Schedule 4 is a set of basic - mandatory requirements to ensure food safety of product being made in any area. Food Business Operator shall constantly try to modify and improve hygienic conditions and sanitation practices at premises with a aim to attain Indian HACCP standards.

The Schedule 4 is divided into five parts, naming Part I to Part V. The title of parts is as follows:

Part I –General hygiene and sanitation practices to be carried out by Petty Food Business Operators who are applying for Registration

Part II –General requirements on various Hygiene and Sanitary Practices to be accomplished by all FBO applying for License

Part III- Specific Hygiene and Sanitary Practices to be carried out by FBO engaged in, processing, manufacture, storing and selling of milk as well as products related to Milk.

Part IV - Specific Hygiene and Sanitary Practices to be carried by FBO engaged in manufacture, processing, storing and selling of Meat and Meat Products

Part V - Specific Hygiene and Sanitary Practices to be carried out by FBO engaged in catering / food service establishments

The general sanitary and hygienic requirements are part of Good Manufacturing Practices (GMP) and Good Hygienic Practices (GHP). For food manufacturer/ processor/handler below indicated generic guidelines are provided which will give fair idea about the practices to be followed. The premises where food is made, or handled shall comply with the below indicated general requirements:

1. The food processing unit should be free from filthy surrounding and shall maintain overall hygienic environment. All units shall be set away from polluted areas.
2. There should be adequate space for the manufacturing of food and its storage in order to maintain overall hygienic conditions.
3. The premises need to be well lighted and ventilated with sufficient free space for movement.
4. The walls, floors and ceilings must be maintained in sound condition. They should be easy to clean and smooth without any flaking plaster or paint.
5. Disinfection should be done for the floors and walls as per condition/ requirement and the premises shall be kept free from pest and insects. Net and screen should be fitted in windows, doors and other openings, in order to make the premise insect free. Spraying shall not be done during the conduct of business, but in place fly flaps/ swats should be used in order to kill flies getting into the food premises. Potable water should be used in the manufacturing process and if necessary microbial and chemical testing should be done at regular intervals at any recognized laboratory.
6. Continuous potable/ fresh water supply shall be ensured in the premises. Sufficient storage arrangement for water should be done in case of irregular supply of water in food or for washing purpose.
7. Machinery and equipments when used shall be of design which will permit easy cleaning. Arrangements for cleaning of tables, containers and working parts of machines, etc. shall be provided.
8. None of the container or equipment, the use of which may cause contamination due to metal should be employed in the food preparation or packing or its storage.
9. All equipments shall be washed and kept clean, dried and stacked to ensure freedom from fungal infestation.
10. In order to ascertain correct inspection equipments shall be placed away from the walls.
11. Efficient drainage system with adequate provisions for disposal of refuse shall be there.
12. The workers shall use clean aprons, head wears and hand gloves while working in the preparation process.
13. Persons suffering from transmissible diseases shall not be allowed to work. Any cuts or wounds shall be covered all time and there should not be any direct contact with food and the person infected.
14. Finger nails should be trimmed, cleaned and washed with soap, or detergent and water by food handlers before beginning the work and every time after the toilet is used. Scratching of body parts and hairs should be strictly avoided.
15. Wearing of false nails or other items like loose jewelry should be avoided by the food handlers as they may fall into food.
16. There should be strict prohibition of eating, smoking, spitting, chewing and nose blowing within the premises while handling food.
17. All articles that are intended for sale shall be fit for utilization and have suitable cover to keep away from contamination.
18. The transportation vehicle used for the article of foods should be kept clean and maintained.
19. Required temperature should be maintained for Foods while in transport in packaged form or in containers.
Disinfectants /Insecticides should be kept away from food manufacturing or handling or storing areas.

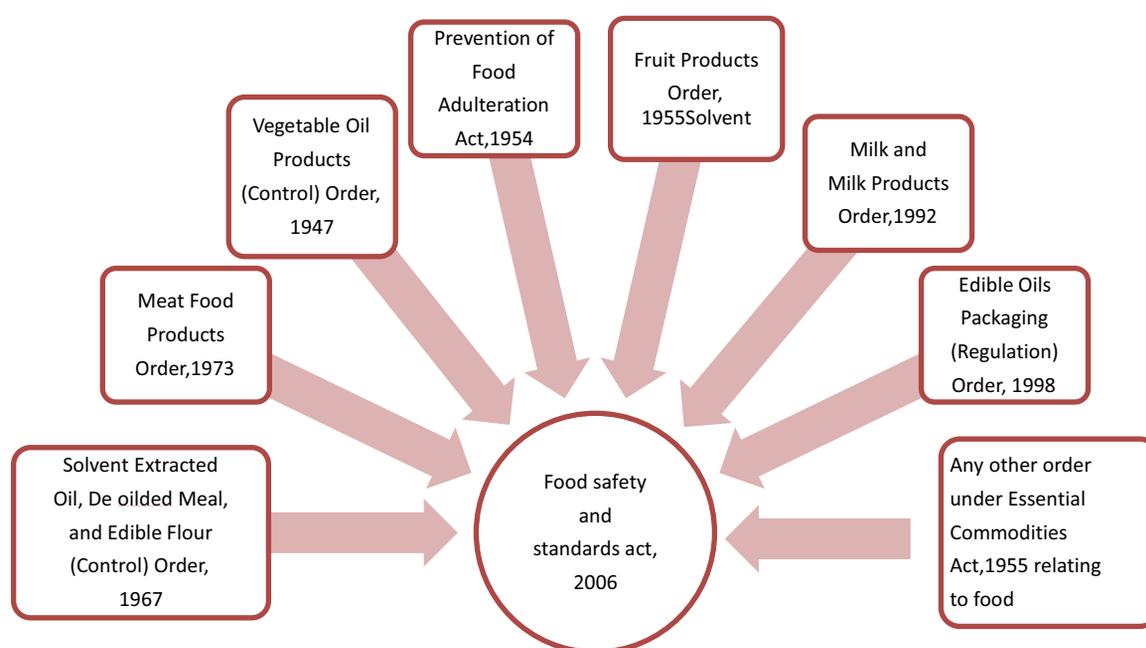
11.2.2 The Food Safety & Standards Act 2006

“The Food Safety & Standards Act 2006” is Act to unite the food related laws and to set up the Food Safety and Standards Authority of India for laying down science based standards for articles of food and to standardize their manufacture, storage distribution, sale and import, to ascertain accessibility of safe and wholesome food for human consumption and for matters related therewith or incidental thereto

“the objective of The Food Safety & Standards Act 2006 includes:

- To establish a single law concerning to food
- To provide the measures for scientific development of the food processing industry

How it integrates?



11.2.3 Food Safety and Standards Regulations, 2011

The Food Safety and Standards Regulations, 2011 has been notified in the Gazette of India dated 1st Aug, 2011. These Regulations come in force after 5 th Aug 2011. It is divided in to 6 parts. They are;

1. Food Safety and Standards (Licensing and Registration of Food businesses) Regulation, 2011
2. Food Safety and Standards (Packaging and Labelling) Regulation, 2011
3. Food Safety and Standards (Food product standards and Food Additives) Regulation, 2011
4. Food Safety and Standards (Prohibition and Restriction on sales) Regulation, 2011
5. Food Safety and Standards (contaminants, toxins and residues) Regulation, 2011
6. Food Safety and Standards (Laboratory and sampling analysis) Regulation, 2011

11.2.4. Occupational Health Safety

Health and safety of the workforce is vital feature of a company and for smooth and successful functioning, thereby ensuring an accident-free industrial environment.

11.2.5. ISO (International Organization for Standardization)

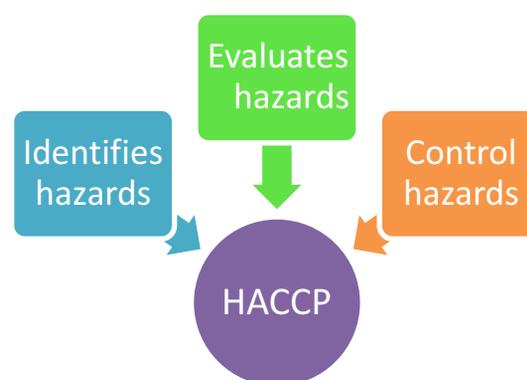
ISO stands for the “International Organization for Standardization”. ISO is a non-governmental organization which is a linkage between the public and private sector. The International Organization for Standardization (ISO) has led down various types of standards. It consists of standard institutes from different countries. Working together these Member countries have developed and approved various standards. Some major standards are;

- ISO 9000 covers quality management.
- ISO 14000 covers environmental management.

ISO 22000 specifies the requirements for a food safety management system. ISO 22000 puts together the principles of the Hazard Analysis and Critical Control Point (HACCP) system and application steps developed by the Codex Alimentarius Commission.

11.2.6. Hazard Analysis and Critical Control Point (HACCP)

Hazard Analysis Critical Control Point (HACCP) is an important step for identification of the critical points in the manufacturing line and to recommend critical limits in agreement with legislation and therefore the preventive and corrective measures.



Hazard: Hazard is an agent whether of physical, chemical or biological origin or the condition of food itself which makes the food unsuitable for consumption, which possess the potential to cause an adverse health effect.

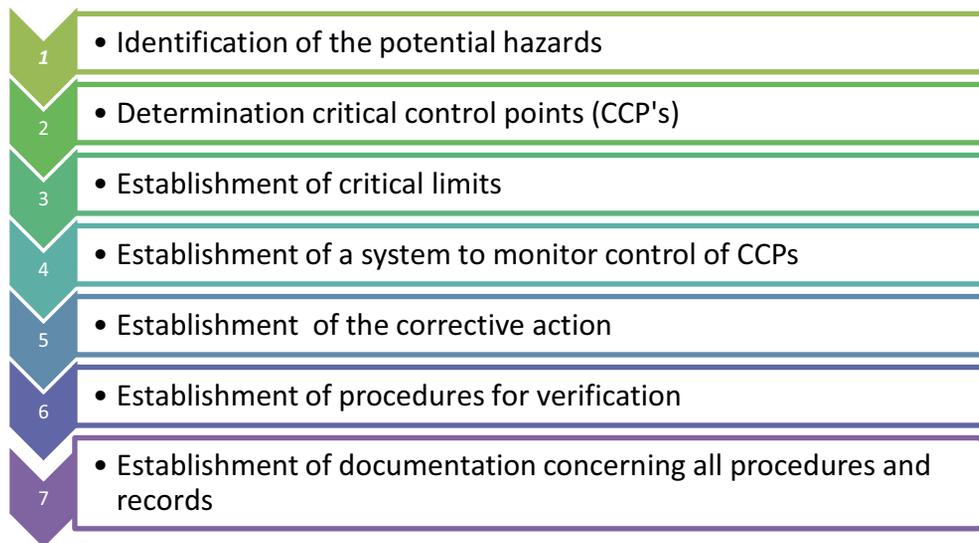
Contaminant: it is foreign matter of chemical or biological origin, or other substances added unintentionally to food which may compromise food safety or suitability.

Contamination: The occurrence or introduction of a contaminant in food or to the food surroundings.

Risk: It is a danger posed by hazard. It's the function of the probability of an adverse health outcome and the severity of that effect, substantial to a hazard (s) in food.

Food Safety: It is scientific discipline describing the handle, preparation and storage. It ensures that food is safe for consumption as per its intended use and it will not cause any harm to the consumer when it is prepared and eaten.

HACCP principles: During execution of HACCP, it is essential to set controls at every point of the manufacturing line which are important and are likely to cause safety problems (physical, chemical and microbiological). A HACCP plan is necessary to be in place before initiating the HACCP system. A HACCP plan consists of 7 major HACCP principles.



11.2.7. Good Manufacturing Practices (GMP)

It is a set of guidelines to ensure the manufacturing of good quality and safe processed foods. They may also be known as SOP's (Standard Operating Procedures) or PRP's (Pre requisite Programs). It is necessary to have a qualitative approach towards manufacturing to reduce chances of microbial contamination, spoilage, and errors.

Ten GMP Principles

1. Writing down the manufacturing procedure i.e. standard operating procedure.
2. Following the standard operating procedure
3. Documentation for traceability
4. Designing of facilities and equipments
5. Maintaining facilities and equipments
6. Validating work
7. Job competence
8. Cleanliness of the workplace and the surrounding
9. Component control
10. Auditing for compliance

The focus area of GMP is:



- Personal hygiene
- Process validation
- Maintenance of equipment
- Sanitisation of work place

Personal hygiene

- Follows strict hygiene and sanitation guidelines of the organization
- Undergo training on Good Hygienic Practices (GHP)
- Avoid working in food processing section when in not health condition
- Use facilities for toilets and wash stations provided in the processing unit



Fig. Good Behavioural Practices by food handlers

Sanitation of the work area

- The processing unit should be located in a clean, pollution-free area
- The entire processing unit is well ventilated and has adequate lighting
- The entire work area follows high standards of cleaning and sanitisation
- Keep utensils and equipment in the designated area which should be kept clean and pest-free at all times

Equipment maintenance

- The equipment used for processing of food to be protected against contamination from lubricants, metal fragments, fuel and contaminated water
- Adopt easy process for cleaning and maintenance of tools, equipment and material
- Carry out cleaning and sanitizing as per schedule -, viz., daily, weekly and monthly

Process validation

- All process of production like raw material procurement, execution, storage, packaging and logistics to follow strict organizational parameters
- Carry out quality checks at each step of production. This ensure food quality is maintained as per prescribe norms and standards

11.2.7.1 Stock Rotation

Follow stock rotation adopting FIFO/FEFO methods. This is to ensure a minimum chance of food spoilage. This helps to retain the taste of processed foods.

11.2.8. Visitor Management

- Generally, entry for the visitors should be restricted from going inside the food handling areas.
- Visitors shall wear protective clothing, footwear and personal protective equipments (PPE) while entering in food manufacturing, cooking, preparation and storage or handling areas .
- As mandate for food handlers visitors shall also adhere to the personal hygiene provisions.



Visitor policy shall be documented



Visitor shall be given visitor card with restricted entry



Visitor shall wear protective clothing & footwear and shall adhere to food safety provisions as mandate.

11.2.9. Guideline versions and enforcement

- Pharmaceutical Regulators, Pharmaceutical Industry and Food Industry follow the World Health Organization (WHO) version of GMP over one hundred countries worldwide, primarily in the developing world.



- The European Union's GMP (EU-GMP) possesses the similar requirements as led by WHO GMP, along with the Food and Drug Administration's version in the US.



Unit 11.3: Risk Analysis Framework and Food Safety Management System

Unit Objectives

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

- Explain Risk Analysis Framework
- State what is risk assessment
- State Various terms related to Risk Assessment
- Know the procedure of Risk Assessment
- Define Food Safety Management System
- How to prepare documents

11.3.1 Risk Analysis Framework

It is an uncomplicated part having risk assessment as a scientific component. It utilizes output of the assessment to be put in place of actions to manage hazards. Risk communication is the discussion among interested parties related to the output of Food Safety.

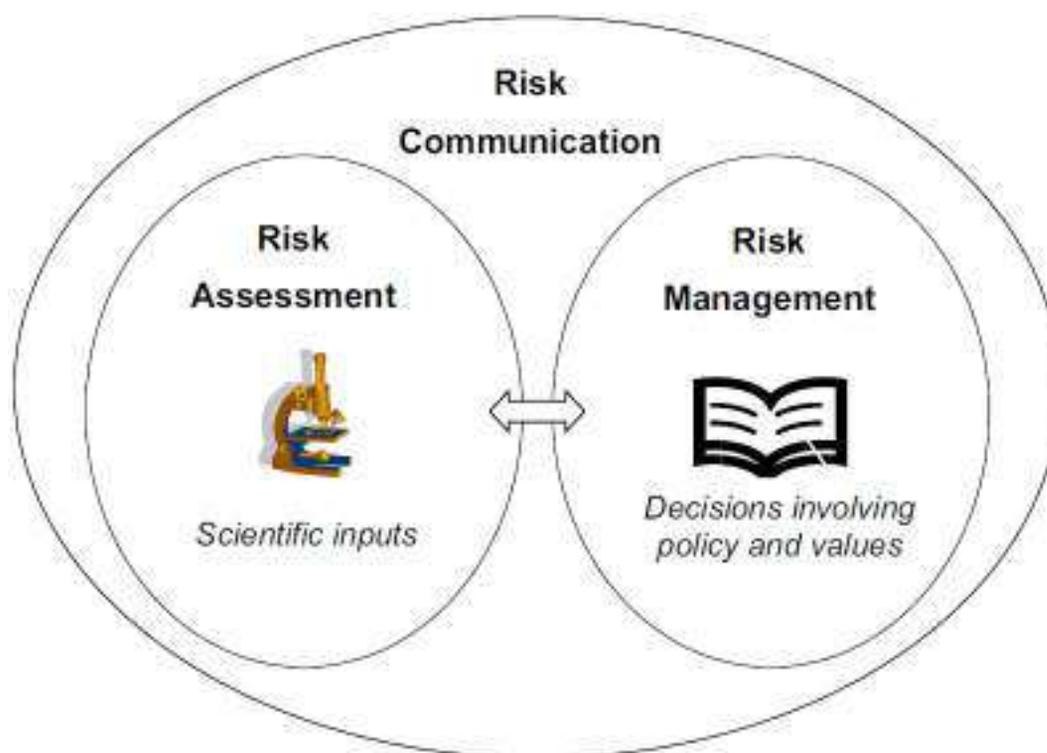


11.3.1.1 Risk Assessment is systematically based procedure comprises of following steps:

- Hazard identification
- Hazard characterization
- Exposure assessment and
- Risk characterization

11.3.1.7.2 Risk Management: It is the method different from risk assessment, method of weighing plan alternatives consulting among every concerned party, taking into consideration of risk assessment and many factors appropriate for the health security of customers and for promoting fair trade activities, if needed, selecting proper avoidance and managing options. The contribution of top management and food safety group to find the method throughout discussion for decreasing the Risk level, identified during risk assessment.

11.2.1.7.3 Risk Communication: Interacting people to exchange thoughts and opinions right through the risk analysis procedure relating to risk, risk-related reason and risk perception, among risk assessors, risk managers, customers, business, academic society and other concerned parties, together with the description of risk assessment to discover the base for risk management decisions.



11.3.1.2 Risk Assessment is the procedure for identifying hazard and calculating risk posed by hazard. It can be quantitative or qualitative. Exhaustive quantitative risk assessment is impossible. Major benefit of Risk Analysis is to take into story of different factors like quality, adequate risk, technical probability, cost added with developing extra efficient HACCP Plans. Risk assessment contributes to enhanced consideration of total food systems and changes. It is used to evaluate risk between foods and other hazards within same food.



11.3.1.2.1 There are 4 Steps of Risk Assessment

Hazard Identification

- It is the recognition of agents capable to cause unpleasant health effects
- It detect micro-organism, toxins etc of worry and determine if it is a hazard or not.

Hazard Characterization

- The evaluation of the character of unfavorable health effects related with hazard.
- It provides an estimation of character, severity and extent of effects. unfavorable health effect depend on following :
 - The agent
 - The consumer
 - The food
 - consumption pattern
 - Dose response: Quantity or magnitude of agent that causes unfavorable answer
 - variety of symptoms
 - Microbes (Infectious or toxicogenic)
 - Attributes of food (Food matrix or Fatty foods)

Exposure Assessment

- Evaluating levels of risky means in food at time of consumption.
- It can be real or anticipated human experience due to consumption.
- Science based techniques which directly affect production, processing, managing, allotting, preparing, packaging, hygiene conditions, etc.

Risk Characterization

- Assessment of character of unfavorable health effects related with danger which can be present in food
- Provide estimation of character, severity and extent of the unpleasant effects
- It will help to get together data and analysis both. Example of Risk characterization is risk of public health resulting from food borne Listeria monocytogenes amongst preferred categories of RTE foods

**11.3.2 Application of FSMS plan in Convenience Food Industry**

Food Safety Management System (FSMS) is the set of interrelated or interacting elements to create policy and objectives and to attain those objectives, used to direct and control an organization with regard to food safety.

11.3.2.1 Configuration of the FSMS Program

FSMS Program will cover following documents

- The FSMS Plan (samples are provided as guidance) and
- Flow chart of for the Process
- A self-inspection checklist, which is to be submitted as an annexure to the plan.

These documents will need to be submitted by the FBO (Food Business Operator) as part of application for new license or renewal of license. Also the FSSAI approved audit agency may scrutinize the FBOs on basis of this scope.

11.3.2.2 Process of preparing the documents

- Use guideline documents for preparation of the FSMS program. The guideline document is to be used only for reference purpose - to understand how to make the flow chart and FSMS plan.
- Schedule 4 checklists are given category-wise that should be used for self-checking purpose.
- The categories which are not covered can use general checklist.
- For compliance of Schedule 4 & FSMS Plan, the reference documents are attached with the program to facilitate the FBOs in development of individual FSMS Program.

11.3.2.3 Reference Documents

A Reference documents is provided to support the implementation of FSMS and give clarity to FBO about FSMS, It may be changed depends upon the type of food business.

These documents has covered following

- Implementing Schedule IV Requirements – Guidance.
- Conducting a Food Safety Assessment and Developing a FSMS Plan – Guidance.

11.3.2.4 Record

1. Food Safety Management Plan (FSMS) Plan Form
2. Self-Inspection checklist (Schedule IV)
3. Flow chart

11.3.2.5 Conclusion

The Food Safety Management System is a continual process and every FBO should aim for improvement and take higher Food Safety objectives for consumer safety.

Unit 11.4: Hazard Analysis and Critical Control Points

Unit Objectives

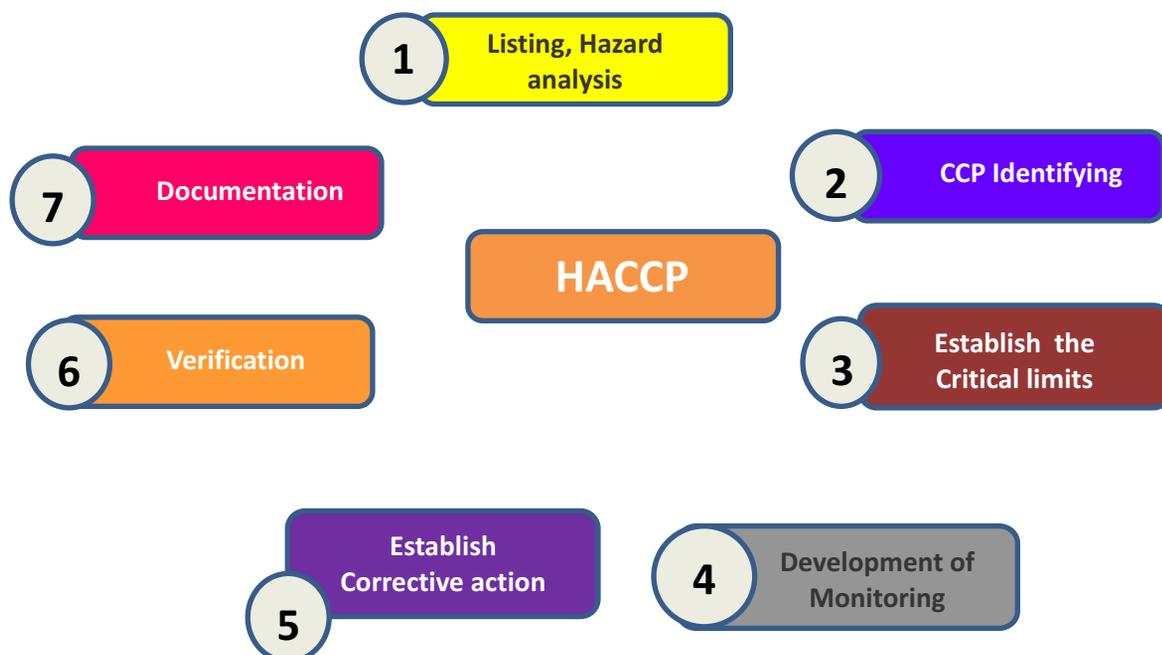
At the end of this unit, the participants will be able to:

- What are hazards?
- What are various types of hazards?
- What is HACCP?
- Twelve Steps of HACCP
- Seven principles of HACCP
- Various food hazards

11.4.1 HACCP Principles to Eliminate Hazard

HACCP stands for Hazard Analysis and Critical Control Points. It is globally accepted system for reduction of the risk of hazards in food products. HACCP is a process control system designed for the identification and prevention of hazards whether of microbial or of other origin in food manufacturing area. It consists of various steps to prevent occurrence of problems beforehand and if occurred then various ways to correct deviations as soon as problems are detected. Such preventive control system with documentation and verification are widely recognized by scientific authorities and international organizations as the most effective approach available for producing safe food.

11.4.2 Principles of HACCP



11.4.3 Twelve Steps of HACCP

- i. Assemble HACCP team
- ii. Description of food
- iii. Description of the intended consumer and how they are going to consume the food
- iv. Draw diagram for process flow, from receiving raw ingredients to the dispatch of the finished good.
- v. Verification of the process flow diagram
- vi. Conduct a hazard analysis
- vii. Determination of critical control points(CCP)
- viii. Setting up critical limits
- ix. Establishment of monitoring procedures
- x. Establishment of corrective actions
- xi. Verification and then validation
- xii. Establishment of good record keeping

Exercise

A. Check your progress:

- 1) What is the difference between HACCP and the traditional quality and safety evaluation procedures?
- 2) Why food safety is important?
- 3) Brief about HACCP
- 4) What are the PRPs of Food Processing Plant?
- 5) What is the hazard?
- 6) What are the various types of hazards?
- 7) What are biological hazards?
- 8) What are various types of ISO?
- 9) What are ten principles of GMP
- 10) What is the need for implementation of HACCP in food industry?
- 11) Who pioneered HACCP?
- 12) For whom HACCP is being pioneered?
- 13) List the points to be considered for describing the product for HACCP implementation.
- 14) How can we determine the critical limits of hazard?
- 15) If any hazard is present in raw material, then how you diagnose it?
- 16) What Is The Food Safety & Standards Act 2006?

B) Match the column:

- | | | |
|-------------------------------|---|---|
| a) HACCP risk of food hazards | : | 1) The last step at which you can prevent, eliminate, or reduce the |
| b) CCP | : | 2) For planned verification activities and Procedures |
| c) Record Keeping | : | 3) Hazard Analysis and Critical Control Points |

C) Multiple choice questions

- 1) HACCP is designed to _____ potential hazards.

a) Control	b) Prevent	c) Eliminate	d) Catch
------------	------------	--------------	----------
- 2) Mycotoxins are _____ type of hazard.

a) Physical	b) Chemical	c) Biological	d) None of these
-------------	-------------	---------------	------------------
- 3) Critical Limits must be _____.

a) Measurable	b) Determinable	c) Visual or easy to see	d) All of these
---------------	-----------------	--------------------------	-----------------
- 4) As per HACCP, which of the following is not a "Hazardous characteristic that presents an unacceptable consumer health risk."

a) Chemical	b) Genetic	c) Physical	d) Biological
-------------	------------	-------------	---------------
- 5) Checking the sieve condition during a unit operation may be an example of which HACCP Principles.

a) Verification	b) Hazard Analysis	c) Record keeping	d) Monitoring
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- 6) How many principles are there in GMP?

a) 10	b) 7	c) 8	d) 5
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Unit 11.5 Safety practices in the work place

Unit Objectives

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

- Understand occupational safety and health
- Identify source of Fire at workplace
- Understand occupational safety and health
- Explain mechanism of fire
- Choose the right type of fire extinguisher based on the source/type of fire
- Operate a fire extinguisher
- Identify safety signs correctly

11.5.1 Occupational Safety and Health Policy

Occupational safety and health policy of food industry is as follows:

- a. To provide a safe work environment for all employees working in processing plant premises.
- b. To provide the same safe and healthful environment for the company visitors.
- c. Safety policy shall be a cooperative effort between labour and management in order to prevent hazards, work related causes and minimize losses of property damage
- d. The safety policy should have the first of management level. The occupier shall prepare as often as may be appropriate, revise a written statement of his general policy in respect of Health & Safety of workers.
- e. Policy should contain:
 - f. Assigning work responsibility related to particular safety hazard to each level in the unit
 - g. Arrangement for involving the workers at different work of health and safety issues
 - h. Relevant techniques and method (such as safety audits and risk assessment) for periodical interval at least once in every two years on the status of employees health and safety
 - i. Arrangements for informing, educating and retraining own employees at different levels and the visitor

11.5.2 Safety systems for food industry

Food industry involves several hazards. To handle these hazardous environments following safety systems are very essential:

A. Firefighting systems:

- Fire hydrant
- Fire Extinguishers for different types of Fires- A, B, C or combination
- Fire Sand Buckets
- Sprinkler system

- B. Emergency alerting system
 - Smoke Detectors of optical and heat sensing type
 - Ammonia Detector
- C. Emergency Declaring systems
 - Emergency Siren
 - Manual Call Points
- D. Emergency Indicating systems –
 - Cold room bells
- E. Escape routes
- F. Assembly point
- G. Wind sack
- H. First Aid systems
 - Ambu bag
 - First Aid box

11.5.3 Safety symbols

There are some symbols that you must know and understand to ensure safety in case of an emergency or fire. They are:



KNOW YOUR SAFETY SIGNS

Get to know what the symbols mean, they are provided for your safety, There are 4 main categories, each has a different shape and colour.

	MEANING	SHAPE & COLOUR	SYMBOLS are put inside the safety shape. These are used in all EEC Countries		
PROHIBITION	You must not. Do not do. Stop.	 RED means STOP	 No admittance	 No smoking	 No dirty clothes
MANDATORY	You must do. Carry out the action given by the sign.	 BLUE means OBEY	 Keep clear	 Head protection must be worn	 Wear gloves
WARNING	Caution. Risk of danger. Hazard ahead.	 YELLOW means risk of DANGER	 Danger high voltage	 Danger mind your head	 Danger fork lifts in operation
SAFE CONDITION	The safe way. Where to go in an emergency	 GREEN means GO	 First aid station	 Emergency phone	 Emergency exit

<p>MULTI-PURPOSE SIGNS To be used when the hazard requires more than one of the 4 types to convey the safety message.</p>	 Acetylene  Wear masks  Warning  Protective garments must be worn
<p>SUPPLEMENTARY TEXT If the safety sign needs additional information it may be added in words.</p>	 Fire alarm call point  DANGER  Protective gloves must be worn  Electrical gloves
<p>FIRE EQUIPMENT SIGNS For indicating the location of fire fighting equipment and how they should be used.</p>	 Fire alarm call point  Fire hose reel  Fire extinguisher  Fire phone
<p>WORKS TRAFFIC SIGNS Are the same design as public road signs.</p>	      <p style="text-align: center;">DANGER IDENTIFICATION MARKING</p> 

At workplace follow the safety instructions completely without any lapse



11.5.4 Emergency Management

Emergency Measures

During an emergency, you must follow certain measures to tackle the situation in an organized manner. These measures are:

- Do not panic
- Respond to your senior immediately or escalate the matter to the concerned person
- Prepare against the emergency situation by keeping a fire bucket and a water source handy
- Evacuate the work area

After the emergency, you must:

- Report the situation to a senior or the concerned authority
- Undertake recovery measures

Fire Safety Measures

Just like emergency measures, some common fire safety measures must be followed in case of fire. They are:

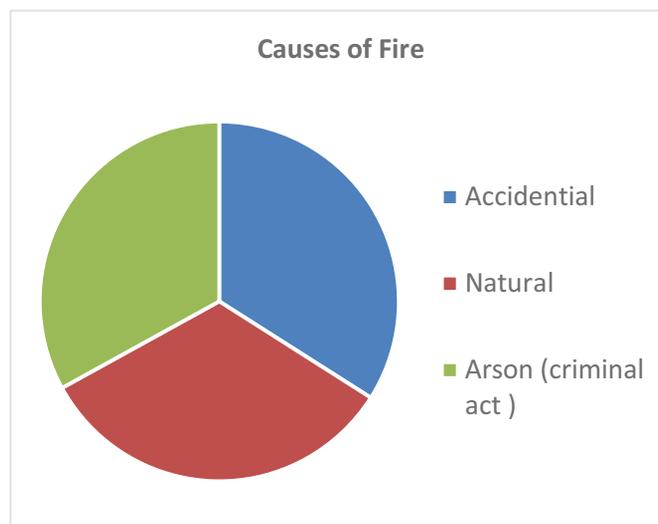
- Press the closest fire alarm button (if available)
- Call the fire brigade
- Assemble at the assembly point or designated area for safety
- Evacuate the building from the closest fire exit

11.5.5 Sources and causes of Fires

A technician works with a lot of heat-generating equipment. Due to a fault in the equipment or inflammable material close to the heat or fire source, an unwanted fire incident can take place and cause a lot of damage to lives, materials and equipment. Hence, all technician must know basic fire safety

Source of fire

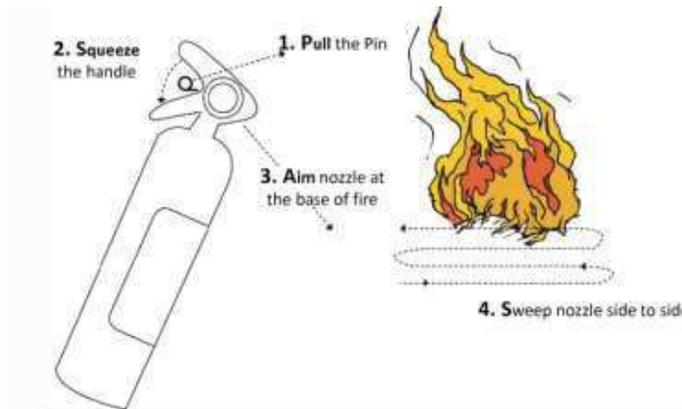
- Sparks (short circuit in machinery, etc.)
- Flames (open fires, oxy-acetylene, torch, heating boilers, etc.)
- Hot surfaces (machinery, overheating, friction, etc.)
- Radiant heat (electric fire, open fire, etc.)



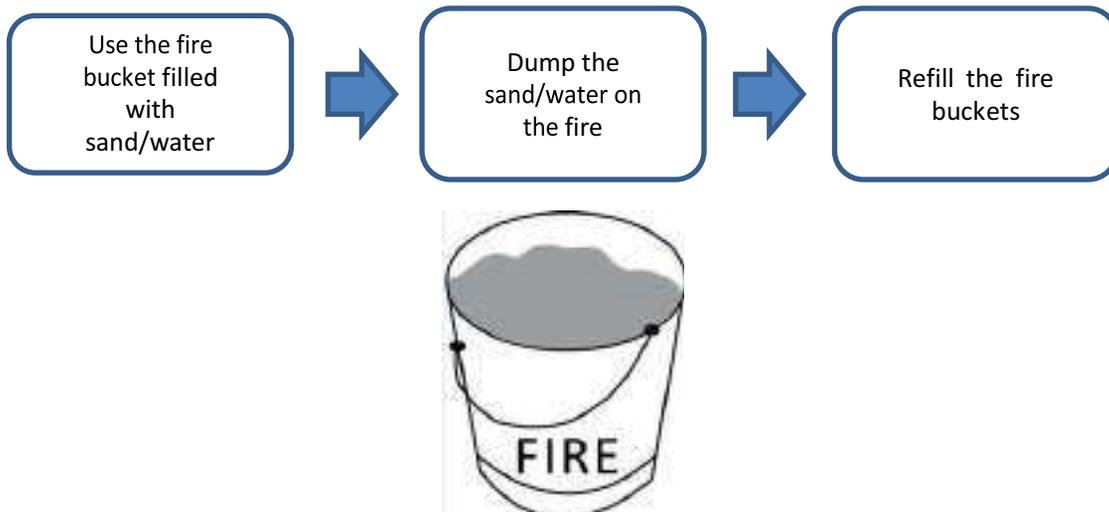
11.5.6 Types of Fire and Fire Extinguishers

	→			CO ₂	
A		✓	✓	✗	✓
B		✗	✓	✓	✓
C		✗	✗	✓	✓

11.5.7 Steps to Use the Fire Extinguisher



11.5.9 Step to use the Fire Buckets



12. Developing Entrepreneurial Skills



- Unit12.1- Concept of Entrepreneurship and Business Opportunities
- Unit12.2- Communication Skills
- Unit12.3- Banking and Managing Finance
- Unit12.4- Interpersonal Relationships
- Unit12.5- Managing Networks
- Unit12.6- Food Laws
- Unit12.7- Self-Assessment
- Unit12.8- Motivation
- Unit12.9- Business Plan



Key Learning Outcomes

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

1. Describe the concept of entrepreneurship;
2. State the benefits of entrepreneurship;
3. Explore opportunities in the field of business;
4. Identify the right opportunity in the food processing sector;
5. State the different types of communication;
6. Identify the barriers of communication;
7. State the importance of clear communication;
8. Differentiate between effective and ineffective communication;
9. State the functions of banking;
10. Apply the concept of accounting to make business decisions;
11. Apply the concept of cost management to make business decisions;
12. Describe the role of communication and behaviour in a business relationship;
13. State the importance of interpersonal skills to maintain good relationships at the workplace;
14. Explain the concept of networking;
15. Demonstrate the steps involved to create business networks;
16. State the benefits of networking in business;
17. State the need for food laws;
18. State the important food laws;
19. Conduct a self – assessment to identify strengths and weaknesses;
- 20.1 Practice goal setting and plan activities to achieve the same;
21. Identify ways to motivate yourself;
22. Differentiate between internal and external motivation to sustain a business;
23. Explain the purpose and importance of business plan;
24. Describe the components of a business plan;
25. Create a business plan;
26. State the features of a bankable project;
27. Identify the various types of risks and challenges in setting up a business;
28. Explore the possibilities of using technology effectively in the business setup;
29. State the process of setting up a business.

Unit 12.1 – Concept of Entrepreneurship and Business Opportunities

Unit Objectives

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

1. Describe the concept of entrepreneurship;
2. State the benefits of entrepreneurship;
3. Explore opportunities in the field of business;
4. Identify the right opportunity in the food processing sector;

12.1.1 Concept of Entrepreneurship

Entrepreneurship is doing something new. A person who starts a truck service in an area where there are no trucks, a man who develops salt pans where they do not exist, an inventor who invents a new product are all entrepreneurs. They are doing something new. Entrepreneurship is different from running a business. A man, who runs a textile factory inherited from his father, is a businessman. He is hardly an entrepreneur.

Usually, entrepreneurship has a profit motive behind it. When there is no profit motive, and it is done for the good of the community, it becomes Social Entrepreneurship. A man who starts a free school in an area where there is low literacy may not expect any returns or profit from the school. He is doing it with a motive of benefiting his village or community. He is a Social Entrepreneur.

Who is an Entrepreneur?

An entrepreneur is one who creates a new business in the face of risk and uncertainty for achieving profit and growth opportunities and assembles the necessary resources to capitalize on those opportunities.

Traits of an Entrepreneur

- Desire for responsibility
- Preference for moderate risk
- Confidence in their ability to succeed
- Desire for immediate feedback
- High level of energy
- Future orientation (serial entrepreneurs)
- Skill in organization
- Value of achievement over money
- High degree of commitment
- Willingness to accept risk, work hard and take action
- Flexibility

The Benefits of Entrepreneurship

The primary benefits entrepreneurs enjoy include the opportunity to:

- Create your own destiny
- Create a new product or service
- Make a difference to the society
- Generate impressive profits
- Do what you enjoy and have fun at it!

12.1.3 Exploring Opportunities

Opportunity is defined as an uncertainty that could have a positive effect on a business leading to benefits or rewards. An opportunity if not availed at an appropriate time may become a threat in the long run as it may be harnessed later by the competition. At a time, several opportunities may coexist in the market and a marketer may have to prioritize and identify the right opportunities that he can serve. Focusing on the right opportunities brings a strategic advantage into the business while inability to do so makes the business vulnerable to competitive forces.

Opportunities and threats refer to external factors that can affect the future of business over which it has no control. Opportunities are observed trends/possible trends in the environment, which are attractive to the firm. Threats are observed/possible trends in the environment that could be detrimental to the firm. Failure to identify opportunities and threats could lead to a position of stagnation.

Assessing opportunity means finding out how big a particular opportunity is. If a rural entrepreneur decides to start a bicycle repair shop, before making any investments, he should have a good idea as to how much money he can make from it. He should also be aware of the capital investments that he would have to make.

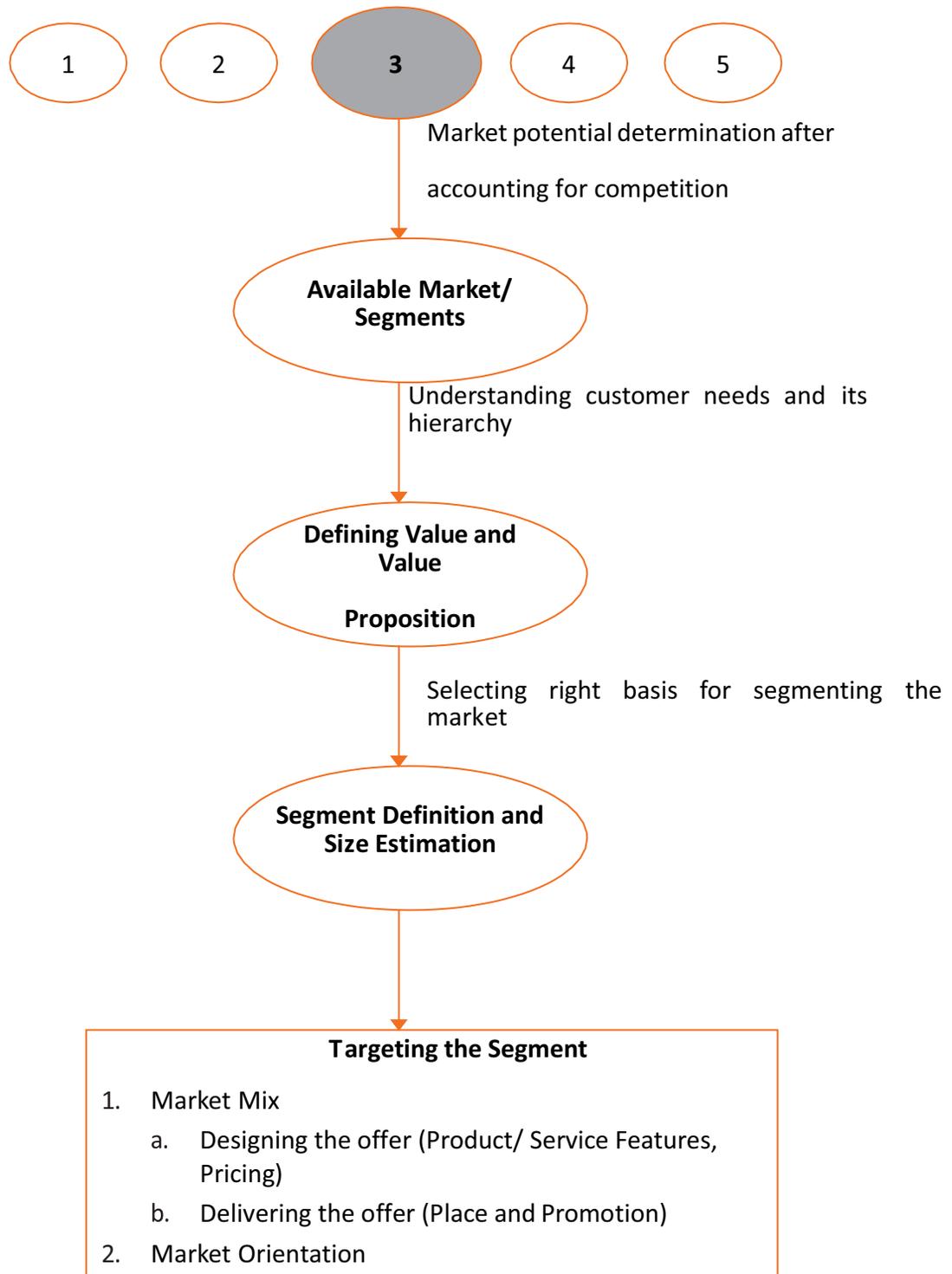
Assessing opportunity means finding out the demand for bicycle repair. In order to do that, he first has to estimate the number of bicycles, the frequency of them going in for repairs, the different types of repairs possible and the prices he can charge.

Opportunity Analysis in Steps

- The first and foremost step in opportunity analysis is to prioritize the available opportunities on the basis of their gross market potential.
- The business may select the most promising opportunity by estimating the available market upon excluding the already served market. The served market is usually captured by direct or indirect competition.
- The business then defines the value it can provide to the customers within the available market. On the basis of the value proposition it wants to offer, the business defines the market segment to be served.
- The size of the market segment needs to be estimated to understand the actual potential of the business proposition.

The next step is of targeting the identified market segment with appropriate marketing mix and market strategy. It involves decisions like product and service features, pricing, and promotion and distribution channel.

Identifying the Right Opportunity



Scan this QR Code or click on below link to access video of [Business Opportunities in Entrepreneurship](#)

Unit 12.2. Communication Skills

Unit Objectives

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

- State the different types of communication;
- Identify the barriers of communication;
- State the importance of clear communication;
- Differentiate between effective and ineffective communication

12.2.1 What is Communication?

Communication is being able to clearly state one's thoughts or message to another person. Communication is the process by which people exchange information and feelings through verbal and non-verbal messages. The act of communication requires skills such as speaking, listening, observing, questioning, processing, analyzing and evaluating.

Communication consists of two aspects, verbal and non-verbal.

Verbal communication includes all the spoken elements. Verbal communication is:

- the use of sounds and language to convey a message
- it helps us express our desires, ideas and concepts through words

Non-verbal communication includes body language, gestures, facial expressions, eye contact, etc., which also become a part of the communicating process; as well as the written and typed modes of communications.

Communication is successful only when both the sender and the receiver understand the same information as a result of the communication. If there is clarity in communication, that means the goal of communication will be achieved.

Do's and Don'ts of Communication

Do's	Don'ts
Smile	Avoid having an unkind expression
Keep your arms open - Shows positive body language	Do not keep hands on hip – Shows aggressive body language
Be friendly in tone of voice even while teasing your friends	Do not use challenging tone of voice
Welcome juniors	Do not show lack of courtesy in choice of words used
Speak slowly and clearly	Do not be nervous or speak fast
Be respectful in your choice of words	Do not use rude words
Be genuine	Do not use over-polite language; it seems affected

Unit 12.3 Banking and Managing Finance

Unit Objectives

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

- State the functions of banking;
- Apply the concept of accounting to make business decisions;
- Apply the concept of cost management to make business decisions;

12.3.1 Basics of Accounts

Accounting revolves around three key concepts – EQUITY, ASSETS and LIABILITIES.

- Equity is what the owner in a business has final claim to
- Assets are things of value. It could be cows, furniture, house, cash, bank deposit, etc
- Liabilities are what the owner owns to others

Assume that the owner owns furniture of Rs.2,000 and he has Rs.500 cash in his pocket. He also has a bank balance of Rs.1,200. Also assume that he owes a friend Rs.700 and Rs.200 to the grocer. In this scenario, his assets are furniture, cash and bank balance. His assets are worth Rs.3,700 and his total liabilities are Rs.900.

Assets	Amount (Rs.)
Furniture	2000.00
Cash	500.00
Bank Balance	1200.00
Total	3700.00

Liabilities	Amount (Rs.)
Payable to a friend	700.00
Payable to grocer	200.00
Total	3700.00

Of the total assets Rs.3,700, he has to pay Rs.900 to others. So how much of his assets does he have a claim to?

He has a claim to $3,700 - 900 = \text{Rs.}2,800$.

That is his equity. Equity means 'having a claim to'. It represents final ownership.

12.3.2 Fundamental Equation of Accounts

ASSETS = EQUITY + LIABILITIES

This is known as the fundamental equation of accounting.

12.3.3 Transactions

A transaction is an economic exchange. Buying and selling are transactions. Getting a loan, giving a loan, repaying a loan, paying salaries, paying electricity bills are all transactions.

A transaction often changes the values of assets, equity and liabilities. The accounting equation however remains unchanged.

12.3.4 Business Entity Concept

When we write books of account, we do not consider personal expenses. We treat the business separate from the person. In other words, we treat the business as a separate person for the accounting purposes. Personal expenditures are not mixed with business expenditures. Accountants call this as a business entity. Business entity concept means that the business is a separate entity (i.e. person) from the owner for accounting purposes. Usually, when someone starts a business, he opens a separate bank account for the business. He also keeps business cash separately from his personal cash.

12.3.5 Assets

Assets are things that have monetary value that can be measured and can be expressed in terms of money e.g. cash, investments, amounts receivable from others, inventory (ie stock of goods in hand), land, buildings, equipment, and vehicles.

12.3.6 Liabilities

Liabilities refer to the obligations of the owner. They are moneys the owner has to pay in future. They refer to the amounts owed to lenders, suppliers, amounts received in advance for a future sale or for a future service to be performed.

Examples of liabilities	Description
Loan from bank	Amount owed to lenders
Amount payable to suppliers of raw material who have given credit	Amounts owed to suppliers
Advance received from customers, outstanding expenses i.e. expenses incurred but not paid off	Salaries pending to employees

12.3.7 Income, Expenses and Profits

Income refers to all sales of goods or services. As an example, consider a business person who sells saris. If he buys a sari for Rs.300 and sells it for Rs.400, then the sale of Rs.400 is his income. Note the income refers to the sales and not to the moneys earned. In this example, Rs.300 is the expense and profit is Rs.100.

- Income increases Equity
- Expense decreases Equity

12.3.8 Sale and Purchase of Goods on Credit

A Sale is considered an income whether goods are sold on credit or for cash. When it is sold for cash, cash assets increases. When it is sold on credit, receivables, another asset increases. In both cases, it is considered an income.

Similarly, expenses are recognised whether cash is paid out or not. When cash is paid out, cash, asset decreases. When cash is not yet paid, payables, a liability increases. In both cases, it is considered as an expense.

12.3.9 Expenses v/s Expenditure

Just because it is an expense it does not mean that cash is paid out. Similarly, just because cash is paid out does not make it an expense. When a business purchases goods or services, it is expenditure. Expenditure necessarily involves a cash pay-out. But it may not be an expense.

12.3.10 Profits

$$\text{PROFIT} = \text{INCOME} - \text{EXPENSE}$$

Income increases equity and expenses decrease equity. The net increase in equity from business is the profit.

12.3.11 Financial Statements

Financial statements summarise the accounts of the business. They are the result of the collection, tabulation and summation of accounting data. The two main financial statements are:

- Balance Sheet
- Profit and Loss Statement

Balance Sheet

It is a statement showing financial condition (position) of a business at a point in time. It is the summary of all assets one side and 'liabilities and equity' on the other side. Both sides of the balance sheet should always match.

A TYPICAL BALANCE SHEET

As on Mar 31, YYYY

Liabilities and Capital	Amount (Rs.)	Assets	Amount (Rs.)
Capital	10000.00	Land & Buildings	5000.00
Retained Earnings	5575.00	Furniture	3000.00
Bank Loans	1500.00	Vehicles (Motor Car/ Scooter/ Cycle)	2000.00
Creditors	1000.00	Security Deposits Paid	1500.00
Advance Received from Customers	425.00	Bank Balance	2000.00
Outstanding Expenses		Receivables	3000.00
- Rent Due but not Paid	750.00		
- Salary Outstanding	250.00	Prepaid Expenses	
		- Prepaid Insurance	500.00
Income Received in Advance			
- Commission Received in Advance	500.00	Cash in Hand	3000.00
	20000.00		20000.00

12.3.12 7.3.12 Profit and Loss Statement

This statement shows the results of business for the period. It summarises the income and expense for the period. The result of the account is either the profit or loss for the period.

A TYPICAL PROFIT AND LOSS ACCOUNT

As on Mar 31, YYYY

Liabilities and Capital	Amount (Rs.)	Assets	Amount (Rs.)
Capital	10000.00	Land & Buildings	5000.00
Retained Earnings	5575.00	Furniture	3000.00
Bank Loans	1500.00	Vehicles (Motor Car/ Scooter/ Cycle)	2000.00
Creditors	1000.00	Security Deposits Paid	1500.00
Advance Received from Customers	425.00	Bank Balance	2000.00
Outstanding Expenses		Receivables	3000.00
- Rent Due but not Paid	750.00		
- Salary Outstanding	250.00	Prepaid Expenses	
		- Prepaid Insurance	500.00
Income Received in Advance			
- Commission Received in Advance	500.00	Cash in Hand	3000.00
	20000.00		20000.00

12.3.13 7.3.13 What is Cost?

In simple terms, cost is the amount spent in getting something. Let us consider an example of a maker of shirts.

Cost of materials and services to make a shirt:

- cloth Rs.150
- buttons and others Rs.5
- tailoring charges Rs.50

Then the cost of the shirt is Rs.205. The shirt could be sold for Rs.400. The cost still remains Rs.205. Rs.400 is called the 'Selling Price' or 'Price'. It has nothing to do with cost. Selling price is decided by the maker of the shirt. Cost is determined by the amount of money it takes to make the shirt.

Direct Costs and Indirect Costs

- Direct costs can be directly traced to a product or a department, and hence can be charged directly to the product. For example, direct material cost, direct labour costs, etc.
- Indirect costs are common cost across departments. They cannot be allocated to a product or department but is apportioned on a suitable basis among the departments.

Variable Cost and Fixed Cost

- Variable Cost is the cost that tends to vary proportionately with the level of activity within the relevant range and within a given period. For example, clothes required for manufacturing a shirt varies directly with the number of shirts that are manufactured and hence the cost of clothes is variable. The cost is constant per unit.
- Fixed Costs remain constant in total regardless of changes in volume up to a certain level of output. They are not affected by changes in the volume of production. For example, rent of the office, etc.

Sunk Cost and Relevant Cost

- Sunk Costs are those for which the expenditure has taken place in the past. This cost is not affected by current and future decisions.
- Relevant Costs are the costs that are appropriate and that affect the decision in hand.
- In any decision-making situation, such as make or buy, buy or lease, etc. only the relevant costs are taken into consideration while evaluating the various options.

Break-even Analysis

Break-even analysis is a technique where total variable and fixed costs are compared with sales revenue in order to determine the level of sales volume, sales value or production at which the business makes neither a profit nor a loss (the "break-even point"). It also helps us determine the sales quantity, which will enable us to make a certain amount of profit.

Summary

1. All costs can be classified under the two heads – Variable cost and Fixed Cost
2. Variable cost per unit is constant, no matter what the level of output is. Total variable cost varies proportionately with level of output.
3. Total fixed cost is constant for all levels of production. It does not vary with actual number of units produced.
4. Selling price per unit is constant.
5. Variable cost, fixed cost, selling price can be determined in advance.

Unit 12.4 Interpersonal Relations

Unit Objectives

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

- Describe the role of communication and behaviour in a business relationship;
- State the importance of interpersonal skills to maintain good relationships at the workplace

12.4.1 What are Interpersonal Skills?

The ability to develop fruitful relationships with others is called interpersonal skills. You would be working with other members in the team at your workplace. Therefore knowing how to develop healthy working relationships with people at the workplace will contribute significantly to your success. Most importantly, building a rapport with the customer, earning his trust, providing him excellent customer service depends largely on having excellent interpersonal skills.

How Can You Develop Good Interpersonal Skills ?

- Effective communication plays a key role in developing good interpersonal skills.
 - Non-verbal communication which result in achieving positive interpersonal skills are:
 - Smile and eye contact
 - Use of correct postures and gestures
 - Touch
 - Listening is an activity of paying attention to and trying to get meaning from something we hear.
 - It patiently conveys that “you care”
 - It enables you to understand other people’s viewpoints and empathise with their situation
 - Verbal communication which result in achieving positive interpersonal skills are:
 - Voice
 - Intensity
 - Sounds
 - Giving criticism in a positive manner

Unit 12.5 Managing Networks

Unit Objectives

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

- Explain the concept of networking;
- Demonstrate the steps involved to create business networks;
- State the benefits of networking in business;

12.5.1 What is a Network?

A Network is “An extended group of people with similar interests or concerns who interact and remain in an informal contact for mutual assistance or support” (The American Heritage Dictionary, 2000)

In India, social networks are present almost everywhere. To begin with, the multiple systems of belongingness are a basis for starting a relationship or a network. Many of us recall the question when we enter a new system, “Where are you from? What is your native place?”

Family, school, neighbourhood are some of the basis for relationships. In addition, we may be customers to some and suppliers to others.

Why Network?

In India, networks come alive in social events, or when there is a crisis. Flood, fire or earthquakes are prime examples when a large part of the society gets into action and contributes however they can. At a micro level many of us recall experiencing a sense of social warmth when we are affected by a major sickness or death of a family member and a large number of people turn up.

Networks can also be purposive i.e. focused on a specific purpose. However, many networks, apart from the main purpose, simultaneously provide opportunities for building strong relationships; provide access to information and mobilize available knowledge wisdom for learning. Some of the objectives/ purposes of a network include:

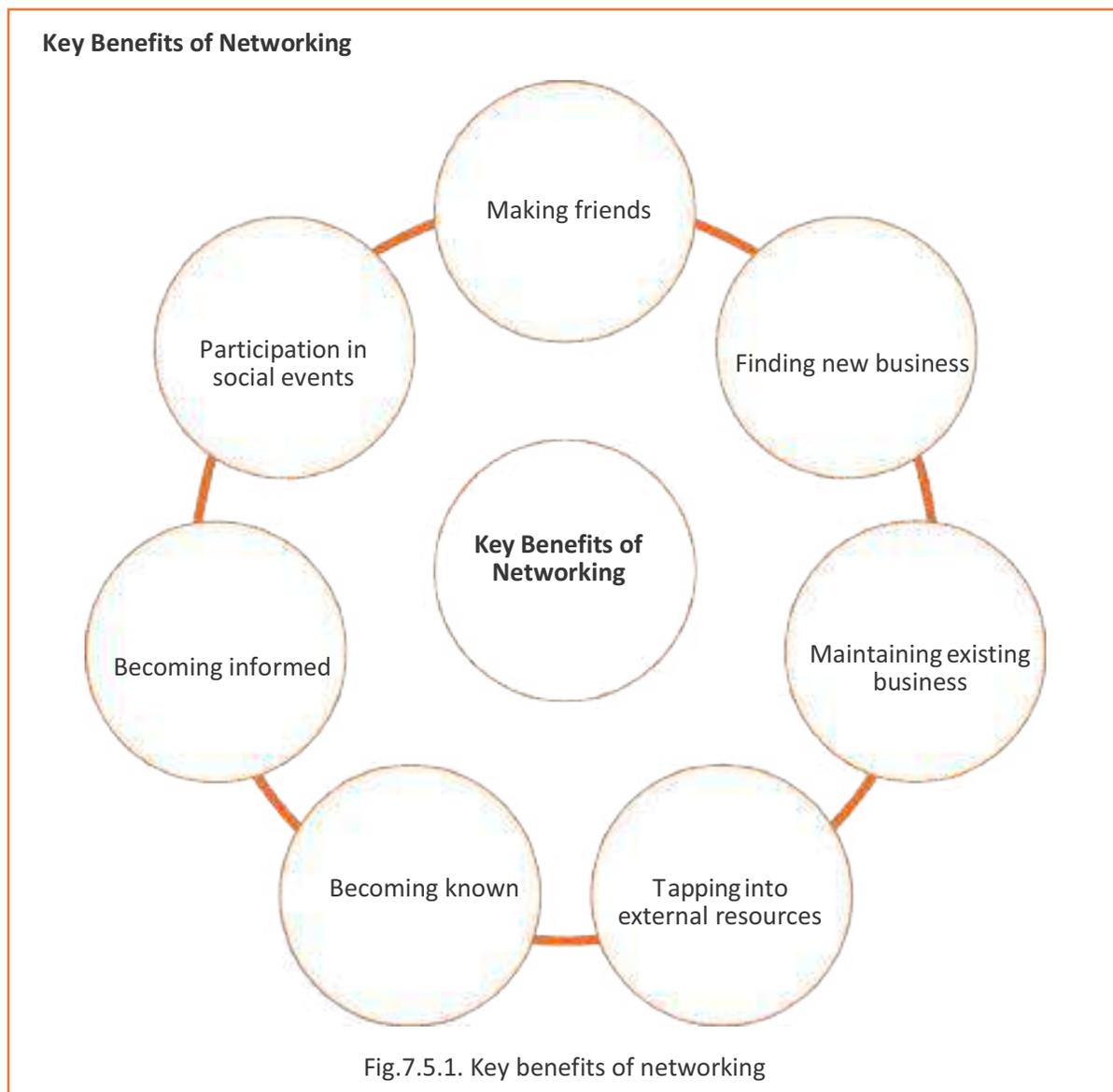
- Brokering (Mediating)
- Building a common perspective
- Implementing Large Scale Changes

Roles Played in the Network

As seen earlier, relationships have three elements: understanding, trust and tolerance. Those relationships having more of these elements are stronger (e.g. networking in the family). A group of co-travelers in the train have relationships that have less of these elements and thus the relationships are weaker.

Depending on the relationship as well as the situational context, individuals in the network perform various roles as follows:

- Advisor
- Merchant
- Expert
- Informer/Grapevine
- Inspiration



Unit 12.6 Food Laws

Unit Objectives

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

- State the need for food laws;
- State the important food laws;

12.6.1 Need for Food Laws

- To meet a country's sanitary requirements, food must comply with the local laws and regulations to gain market access.
- These laws ensure the safety and suitability of food for consumers.
- The Indian Parliament has recently passed the Food Safety and Standards Act, 2006 that overrides all other food related laws, such as:
 - Prevention of Food Adulteration Act, 1954
 - Fruit Products Order, 1955
 - Meat Food Products Order, 1973;
 - Vegetable Oil Products (Control) Order, 1947
 - Edible Oils Packaging (Regulation) Order 1988
 - Solvent Extracted Oil, De-Oiled Meal and Edible Flour (Control) Order, 1967,
 - Milk and Milk Products Order, 1992 etc are repealed after commencement of FSS Act, 2006

12.6.2 Food Safety and Standards Authority of India (FSSAI)

The Food Safety and Standards Authority of India (FSSAI) has been established under Food Safety and Standards Act, 2006 which consolidates various acts and orders that have hitherto handled food related issues in various Ministries and Departments.

FSSAI has been created for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import to ensure availability of safe and wholesome food for human consumption.

12.6.3 Functions Performed by FSSAI

Framing of Regulations to lay down the standards and guidelines in relation to articles of food and specifying appropriate system of enforcing various standards

12.6.4 Bureau of Indian Standards (BIS)

The Bureau of Indian Standards (BIS), the National Standards Body of India, resolves to be the leader in all matters concerning Standardization, Certification and Quality.

12.6.5 AGMARK

Standards are being harmonised with international standards keeping in view the WTO requirements. Certification of agricultural commodities is carried out for the benefit of producer/manufacturer and consumer.

Products available under AGMARK are as follows:

- Pulses
- Whole spices & ground spices
- Vegetable oils
- Wheat products
- Milk products.

Unit 12.7 Self-Assessment

Unit Objectives

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

- Conduct a self – assessment to identify strengths and weaknesses;
- Practice goal setting and plan activities to achieve the same;

Exercise

Activity 1: Identify your strengths and weakness.

Activity 2: Set your goals and create a plan to achieve the goals.

Unit 12.8 Motivation

Unit Objectives

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

- Identify ways to motivate yourself;
- Differentiate between internal and external motivation to sustain a business;

12.8.1 Motivation

Motivation is necessary to achieve anything. Motivation is what pushes people to act and it is an important ingredient for success in life. Most of us have goals, but the difference between those who actually go out and achieve their goals and those who don't is in people's level of motivation. While motivation can be artificially created by external factors such as facing negative consequences for not doing something, the most powerful motivation comes from within.

Types of Motivation

External	Internal
<ul style="list-style-type: none"> • driven by desire 	<ul style="list-style-type: none"> • true passion to fulfil a dream
<ul style="list-style-type: none"> • to gain reward or avoid negative consequences 	<ul style="list-style-type: none"> • less dependent on reward or negative consequences
<ul style="list-style-type: none"> • to achieve short-term goals 	<ul style="list-style-type: none"> • to achieve long-term goals



Fig. 12.8.1. Ways to get motivated

Valuing Self

1. List three things you really do well.
2. List three things you do fairly well.
3. List three things you would like to be able to do.
4. List three things you like about yourself in each of these categories: Appearance Personality Abilities. Which of these listed do you value the most and why?
5. If you could be an animal for a day, which animal would you choose to be and why?
6. Choose one of your friends. Write a description of the ways in which your friend is special to you. Show your friend what you have written. Ask your friend to write comments about what you have written.
7. Complete these sentences:
I feel angry when.....
I feel jealous when.....
I feel disappointed when.....
I am happiest when.....
I am proud of myself when.....

12.9 Business Plan

Unit Objectives

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

- Explain the purpose and importance of business plan;
- Describe the components of a business plan;
- Create a business plan;
- State the features of a bankable project;
- Identify the various types of risks and challenges in setting up a business;
- Explore the possibilities of using technology effectively in the business setup;
- State the process of setting up a business.

12.9.1 Business Plan

A business plan is a document that contains the objectives, scope and direction for your business. It aids in determining the feasibility of your business ideas and raise capital. It is a road map for your business operations.

The purpose of writing a business plan is to detail:

- what you seek to achieve
- how you intend to take to achieve it

	Raise Capital
The Importance of Business Plan ----->	Provide Road Map
	Prevent Omissions

There is no rigid formula existing for writing business plans. Every new business may be unique to the business situation or idea. Even so, there are some general guidelines to be followed while preparing a business plan.

A business plan is a detailed project report that becomes a base document for planning and implementing. It serves as collateral with future cash flow and profitability, to be acceptable to raise the necessary funds (bankable project).

After the preparation of a business plan, it is advisable to get expert advice of the concerned areas of operations and modify it accordingly.

12.9.2 Components of a Business Plan

The major sections of a business plan include the detail of the business idea, the formation of type of company/business, products or services, manufacturing and operations plan, marketing plan, the team, critical risks and assumptions, benefits to the community, exit strategy, financial plan (sources and uses of funds), possible contingencies that you should anticipate etc.

12.9.3 Understanding the Risks of Small Business

The decision to start your own business should be made with a full understanding of the risks involved. You should be able to anticipate problems and reduce the possibility of loss, and increase your chances of success.

The prospect of failure should serve as a warning to you. You need a vision, resources, and a plan to take advantage of the opportunity that exists.

	Failing to understand the commitment and hard work
Mistakes Leading to Business Failure ----->	Not hiring the right resources
	Inaccurate estimates of cash flow and capital requirements

Business risk can be classified into risk of damage to assets and risk of personal lives. Damage to assets like plant and machines can be avoided by way of insuring the assets, which also includes cash (loss due to theft etc.). Personal insurance for own life is covered by life insurance periodical premium payments.

12.9.4 Form of Business

The entrepreneurs may decide to set up the business on its own or may decide to start jointly with others. The various factors that one needs to consider while deciding on form of organisation are funds required, risk associated with the projects, length of the project, etc. In case of partnership, there is an added requirement on deciding the terms of the agreement, capital ratio, profit sharing, legal documentation, etc.

12.9.5 Sources of funds

The entrepreneur should calculate the total funds required under the following heads:

- Fixed Capital Requirement: the funds required to acquire fixed assets for the business. These can be owner's capital investment or long-term loans
- Working Capital Requirement: the minimum funds required to effectively cover the costs and expenses necessary to operate the business.

12.9.6 Cash Flow Statement

A cash flow statement shows how money enters and exits your business. It is a financial document that shows the amount of money a business has on hand at the beginning of a time period, receipts coming into the business, and money going out of the business during the same period.

12.9.7 Evaluation of Profitability

Profitability should not be measured in terms of absolute profit amount. Rather, profitability means the returns as a percentage of capital invested in the business.

12.9.8 Process of Setting up the Business

Write a Business Plan →	Get Business Assistance & Training →	Choose a Business Location →	Finance your Business ↓
Register for State & Local Taxes ↓	Get a PAN	Register a Business Name	Finance your Business
Obtain Business Licenses and Permits→	Understand Employer Responsibilities		

Exercise

You should ask these twenty questions to yourself before considering entrepreneurship. Read the clue given in brackets for possible answers.

(Source: 20 Questions Before Starting. (n.d.). Retrieved May 1, 2015, from <https://www.sba.gov/content/20-questions-before-starting-business>)

- 1. Why am I starting a business?**
(is it to make a lot of money, to fulfil a need in the market, to compete with the existing market, to introduce an innovation)
- 2. What kind of business do I want?**
(think about the type of activity you will be engaged in, where you will operate from - home-based, online, small office/ setup etc.)
- 3. Who is my ideal customer?**
(think about the demographic you wish to serve – age group, socio-economic class, their characteristics etc.)
- 4. What products or services will my business provide?**
(think about what will you offer as products/ services and in what form)
- 5. Am I prepared to spend the time and money needed to get my business started?**
(you will be working for longer hours every day and may be even weekends too. Also need to have enough savings or at least an assured sum to establish your business)
- 6. What differentiates my business idea, and the products or services I will provide, from others in the market?**
(this is to see if you are offering something new or better than what already exists in the market, what is it that makes your product stand out, something unique or valuable to offer that will sell)
- 7. Where will my business be located?**
(will you operate out of home, buy a place, or rent one, if your business requires you to be visible and easily reachable)
- 8. How many employees/ workers will I need?**
(you need to know exactly how many people you need to get the work done, and whether you have adequate funds to pay them, you may outsource some work)
- 9. What types of suppliers do I need?**
(suppliers are those who provide raw material for creating your product, or to resell your finished product)
- 10. How much money do I need to get started?**
(the money required to set up the business and begin work)
- 11. Will I need to get a loan?**
(how will you organise the funds to start the business, will you apply for a loan, approach funders, tap into your own resources)
- 12. How long will it take before my products or services are available?**
(the time you will need to be ready to launch your product or service, you need to set tentative deadlines)
- 13. How long do I have until I start making a profit?**
(you need to have some idea of how long it will be before you can break even and make a profit)

14. Who is my competition?

(you need to know who your competitors, you should also be certain of the strengths of your product or service)

15. How will I price my product compared to my competition?

(this will depend on your target audience and how you choose to place your product in the market)

16. How will I set up the legal structure of my business?

(sole proprietorship, partnership, franchisee, do you need any license or certification to start, have you collected the information regarding this, how long it takes to get the legalities done etc.)

17. What taxes do I need to pay?

(sales tax, service tax, professional tax - you need to be aware of which taxes apply to you)

18. What kind of insurance do I need?

(you may need to insure the premises or the machinery you have invested in)

19. How will I manage my business?

(this refers to the people and processes you will need to run your business effectively)

20. How will I advertise my business?

(will you use print, online channels, local cable TV operators, friends etc. for promoting your business)

Notes



A large rectangular area with a thin orange border, containing 25 horizontal lines for writing notes.

13. Working in a team and learning team ethics



unit13.1- Teamwork

unit13.2- Ethics and Discipline



FIC/N9025

Key Learning Outcomes

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

1. Demonstrate qualities of a good team player
2. Define 4Cs of working in a team
3. Explain the importance of ethical behaviour in your day-to-day work
4. State how to conduct yourself at a workplace.
5. Explain the importance of discipline in your life, and apply the same in the workplace

Unit 13.1 – Teamwork

Unit Objectives

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

1. Demonstrate qualities of a good team player
2. Explain 4Cs of working in a team

13.1.1 Introduction

To work effectively, one needs to develop qualities and habits over and above the skills and expertise to do the job, like:

- Teamwork
- Good communication skills
- Customer orientation
- Ethics and Integrity
- Discipline

These qualities are key to success, and more often people with these qualities rise higher in life than those who do not. Multi Skill Technicians at work are likely to meet different types of people. Hence, it is important that they know how to conduct themselves in all types of situations, and should be able to effectively communicate with a wide variety of audiences.

Good communication skills are needed to understand and deliver appropriate information and fulfil the requirement of the client. Poor communicators may end up confusing customers, conveying wrong messages to customers or fellow workers.

Good communication is an essential part of everyday life, both at personal and professional level. Multi Skill Technician requires making frequent interpersonal interactions with fellow workers and others. Such people are well appreciated by customers, and get more business. Ethics and Integrity are the most important qualities one can have. It is an inner guideline that tells the person how to react positively to the outside world.



Fig. 13.1.1 Team work in a bakery

The 4Cs of working in a team



Fig. 13.1.2 Working in teams

Common goal

Being aware that each member is working for the benefit of the whole group, even if their roles are different is the most important part of teamwork. Once one is aware of this, then he/she will realize that one cannot get own work done at the expense of others, and should neither allow own work to suffer, while helping others

How to ensure common goal?

- Each member of the team should clarify to himself/herself about the common goal that the whole team is trying to achieve. The reason as to why everyone has come together, e.g. to get the work done, etc.
- Each Individual team member should refer to the common goal whenever in doubt or conflict or when they have to take a decision.

Collaboration

Finding a win-win solution. Understanding even when in conflict, it is possible that both parties are standing for something that is important for the overall good. Hence, both should talk it out and explore options such that both parties are satisfied.

How to ensure collaboration?

- By realizing that no matter what is the job at hand, it cannot be done alone. One always needs co operation. Hence it is very important to develop positive relationships with whomever one is working with.
- One should try to understand the other person's point of view as well as explain his or her own perspective clearly and without being defensive. This can only happen if one believes that it will be possible to satisfy both.

- Consult with and assist others to maximize effectiveness and efficiency in carrying out tasks
- Whenever, there is conflict one should treat it like problem solving, and try to think creatively for a solution where both the parties can get the desired results. Remember, if one tries hard enough, no problem is without a solution.

Co-ordination

Co-ordination means consulting with and assisting others to maximize effectiveness and efficiency in carrying out tasks. It means ensuring that information and assistance is provided and received efficiently and effectively.

How to ensure coordination?

- When working in teams it helps to build rules and norms for smooth functioning and to share them with all.
- These rules and norms are documented in the form of Manuals, Standard Operating Procedures etc.
- All team members should familiarize themselves with these rules and norms as well as the reasons behind them and then follow them sincerely
- However, for smooth co-ordination, sometimes it may be required to take exceptions, or change the rule or make new rules; hence no-one should become too rigid or follow the rules blindly, but should use logic and consult with superiors when in doubt.

Communication

Communication is critical for working with others. It a good way to make the goal of the team clearer, to improve the understanding among all the members and to smooth up the cooperation in every day's work. It is also important in a work environment to communicate in a manner that is professional and polite. One should speak to each other with respect, using appropriate title and terms of respect.

- Address the guest as Sir/ Madam.
- Use, 'Dear Mr. <Surname>' in written communications
- Never distort names or use abusive language, even when talking to peers and juniors.
- Do not eat or chew while talking (vice versa), etc.

How to ensure communication?

- Give information to others clearly, at a pace and in a manner that helps them to understand.
- Accurately pass on information to authorized persons who require it and within agreed timescales.
- A regular meeting is good, for sharing opinions or putting comments on the malfunctions of the whole team.
- Personal attacks should be avoided. Business is business.

Some important aspects of teamwork:

- Display helpful behaviour by assisting others in performing tasks.
- Have consideration for others and discomfort caused to them due to poor time keeping and absenteeism by oneself.
- Possess good listening skills and pay attention to instruction, and what others are saying.
- Discuss problems and complaints with patience to avoid any conflicts.
- Keep personal and professional life separate.
- Cooperate with respect to changes on site, in schedules or work style.
- Recognise the strengths and weaknesses of others and assist wherever required.
- Don't overburden colleagues and teammates with your share of duties and responsibilities.
- Be honest with fellow team members.
- Assist in times of dangers and risks irrespective of any personal differences.
- Understand the job and expectations of other people.
- Teamwork involves compromise and co-operation.
- Do not hesitate to observe or question, if required.
- Behave professionally at work.

Unit 13.2 – Ethics and Discipline

Unit Objectives

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

- Explain the importance of ethical behaviour in your day to day work
- State how to conduct yourself at a workplace.
- Explain the importance of discipline in life and apply the same at workplace

13.2.1 Ethics

Ethics are those rules of conduct by which people regulate their conduct while dealing with other people in their everyday life.

One must be constantly mindful of one's obligations to serve the customer and company efficiently and effectively. The degree to which the community will cooperate is dependent upon respect and confidence one has for oneself.



Fig. 13.2.1. Providing correct and complete information and services

13.2.1.1 Workplace Ethics

Workplace ethics are a set of guidelines that are followed to ensure smooth and effective functioning of a workplace. Some important ones to remember are:

- Address seniors, assistants, and workers with respect
- Follow the processes laid out in the manufacturing unit
- Follow food safety norms at all times
- Do not compromise with the quality of the product at any given cost
- Perform your work with complete honesty
- Perform your roles and responsibility with integrity
- Be a team player

13.2.3 Unethical Behaviour

Causes of unethical behaviour:

- Financial instability.
- Poor character (not screened).
- Resistance to change (not embracing new training).
- Fatigue (taking shortcuts; path of least resistance).
- Conflicts of interest (Doing more than one job).

Consequences of unethical or unprofessional behaviour:

- Loss of business.
- Loss of reputation.
- Being snubbed by colleagues and superiors.
- Passed over for promotion.
- Termination.
- Civil and criminal liability.

A Professional's Pledge

- I will be honest and loyal.
- I will be responsible and accountable.
- I will take pride in everything I do.
- I will maintain a 'can do' attitude.
- I will never accept bribes and/ or gifts.
- I will strive for excellence in everything I do

13.2.4 Integrity

Integrity is one of the most important qualities one should pursue. It is an inner guideline that tells the person how to react positively to the outside world. People who have integrity are respectful, reliable, honest and principled.

When you are respectful?

- You like yourself and treat yourself well.
- You treat others as you treat yourself.
- You understand that it is important to follow laws and orders.
- You respect the property of others.

When you are reliable?

- You can be depended onto, and do your duties to the best of your ability.
- You can take control and stay calm in emergencies.

When you are honest?

- You tell the truth.
- You take responsibility for your actions, instead of blaming others.
- You can be trusted to keep information to yourself.
- You are sincere.

When you are principled?

- You believe in treating everyone fair.
- You speak out if you see someone being ill-treated.

Besides integrity, one should also be disciplined.

13.2.5 Discipline

Discipline is the key to success in any business. Discipline requires one to:

- Display appropriate professional public appearance for the workplace i.e.
 - ✓ As per company guidelines
 - ✓ Clean uniform
 - ✓ Polished shoes, tidy hair
 - ✓ Appropriate stance and posture and facial expressions, etc.
- Look professional, active and confident
- Display appropriate work habits i.e.
 - ✓ Make commitments that one aims to fulfil
 - ✓ Avoid gossip at workplace
 - ✓ Remain calm under stress
 - ✓ Arrive to work on time
 - ✓ Respect working hours by being 100% on the job when at work i.e. must not invite friends to work.
 - ✓ Stay off the phone unless it is for work or an emergency
- Ensure that one is able to manage self and time and does not make errors at work. Also, customers find such workers dependable and trustworthy, and give them more business.
- Be responsible for their work and the people around

One must remember to keep their personal and professional life separate. One should be disciplined enough to leave personal issues at home, and focus on work. Similarly, a bad day at work, should not be taken home



14. Employability & Entrepreneurship Skills



- Unit14.1- Personal Strengths & Value Systems
- Unit14.2- Digital Literacy: A Recap
- Unit14.3- Money Matters
- Unit14.4- Preparing for Employment & Self Employment
- Unit14.5- Understanding Entrepreneurship
- Unit14.6-Preparing to be an Entrepreneur



Key Learning Outcomes

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

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

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

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

Unit 14.1 Personal Strengths & Value Systems

Unit Objectives

At the end of this unit, the participants 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

Tips to Prevent Health Issues

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

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

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

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

6. Stand more than you sit.
7. Drink a glass of water first thing in the morning and have at least 8 glasses of water through the day.
8. Go to the doctor and dentist for regular checkups.
9. Exercise for 30 minutes at least 5 days a week.
10. Avoid consuming lots of aerated beverages.

What is Hygiene?

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

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

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

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

See how healthy and hygienic you are, by giving yourself 1 point for every ticked statement!

Then take a look at what your score means.

Your Score

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

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

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

Swachh Bharat Abhiyan

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

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

What are Habits?

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

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

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

Some bad habits that you should quit immediately are:

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

Tips

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

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

Non-Negotiable Employee Safety Habits

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

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

Tips

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

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

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

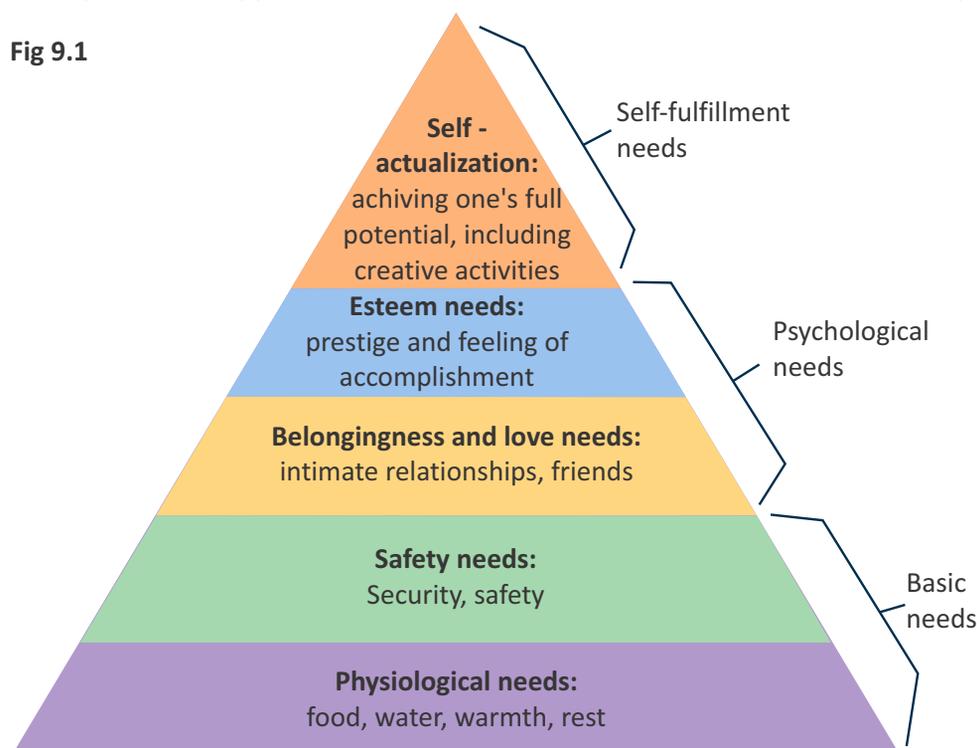
What is Motivation?

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

Maslow's Hierarchy of Needs

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

Fig 9.1



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

Rupa comes from a very poor family. She never has enough food, water, warmth or rest. According to Maslow, until Rupa is sure that she will get these basic needs, she will not even think about the next level of needs – her safety needs. But, once Rupa is confident that her basic needs will be met, she will move to the next level, and her behaviour will then be motivated by her need for security and safety. Once these new needs are met, Rupa will once again move to the next level, and be motivated by her need for relationships and friends. Once this need is satisfied, Rupa will then focus on the fourth level of needs – her esteem needs, after which she will move up to the fifth and last level of needs – the desire to achieve her full potential.

Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

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

What Motivates You?

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

I am motivated by:

Characteristics of Entrepreneurs with Achievement Motivation

Entrepreneurs with achievement motivation can be described as follows:

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

Think about it:

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

How to Cultivate a Positive Attitude

The good news is attitude is a choice. So it is possible to improve, control and change our attitude, if we decide we want to! The following tips help foster a positive mindset:

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

What is Attitude?

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

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

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

What Are Your Strengths and Weaknesses?

Another way to analyze yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses.

Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Strengths	Weaknesses

Tips

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

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.

Qualities of Honest People

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

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

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

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

Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves. Let's look at how being honest would lead to great benefits for entrepreneurs.

- Honesty and customers: When entrepreneurs are honest with their customers it leads to stronger relationships, which in turn results in business growth and a stronger customer network.

What are Work Ethics?

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

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

Elements of a Strong Work Ethic

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

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

How to Foster a Good Work Ethic

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

- **Honesty:** All work assigned to a person should be done with complete honesty, without any deceit or lies.
- **Good attitude:** All team members should be optimistic, energetic, and positive.
- **Reliability:** Employees should show up where they are supposed to be, when they are supposed to be there.
- **Good work habits:** Employees should always be well groomed, never use inappropriate language, conduct themselves professionally at all times, etc.
- **Initiative:** Doing the bare minimum is not enough. Every team member needs to be proactive and show initiative.
- **Trustworthiness:** Trust is non-negotiable. If an employee cannot be trusted, it's time to let that employee go.

- **Respect:** Employees need to respect the company, the law, their work, their colleagues and themselves.
- **Integrity:** Each and every team member should be completely ethical and must display above board behaviour at all times.
- **Efficiency:** Efficient employees help a company grow while inefficient employees result in a waste of time and resources.

Tips 

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

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

Tips

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

14.1.6 Time Management: What is Time Management?

Time management is the process organizing your time, and deciding how to allocate your time between different activities. Good time management is the difference between working smart (getting more done in less time) and working hard (working for more time to get more done). Effective time management leads to an efficient work output, even when you are faced with tight deadlines and high pressure situations. On the other hand, not managing your time effectively results in inefficient output and increases stress and anxiety.

Benefits of Time Management

Time management can lead to huge benefits like:

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

Not managing time effectively can result in undesirable consequences like:

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

Traits of Effective Time Managers

Some traits of effective time managers are:

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

Effective Time Management Techniques

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

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

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

Tips

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

14.1.7 Anger Management: What is Anger Management

Anger management is the process of:

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

Anger management does not mean suppressing anger.

Importance of Anger Management

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

Extreme anger can:

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

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

Anger Management Strategies

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

Strategy 1: Relaxation

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

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

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

Strategy 2: Cognitive Restructuring

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

Strategy 3: Problem Solving

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

Strategy 4: Better Communication

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

Strategy 5: Changing Your Environment

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

Tips for Anger Management

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

Tips 

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

14.1.8 Stress Management: What is Stress

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

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress

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

External causes of stress

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

Symptoms of Stress

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

Cognitive Symptoms	Emotional Symptoms
<ul style="list-style-type: none"> • Memory problems • Concentration issues • Lack of judgement • Pessimism • Anxiety • Constant worrying 	<ul style="list-style-type: none"> • Depression • Agitation • Irritability • Loneliness • Anxiety • Anger

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

Tips to Manage Stress

The following tips can help you manage your stress better:

- Note down the different ways in which you can handle the various sources of your stress.
- Remember that you cannot control everything, but you can control how you respond.
- Discuss your feelings, opinions and beliefs rather than reacting angrily, defensively or passively.
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed.
- Devote a part of your day towards exercise.
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large amounts of sugar.
- Plan your day so that you can manage your time better, with less stress.
- Say no to people and things when required.
- Schedule time to pursue your hobbies and interests.
- Ensure you get at least 7-8 hours of sleep.
- Reduce your caffeine intake.
- Increase the time spent with family and friends.

Tips

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

Unit 14.2 Digital Literacy: A Recap

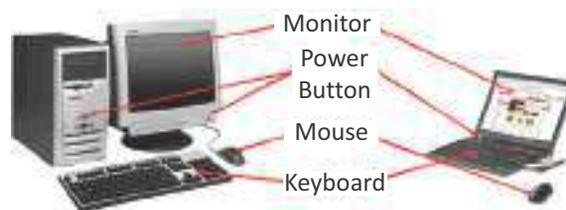
Unit Objectives

At the end of this unit, the participants 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 Computer and Internet basics: Basic Parts of a Computer

Fig 1.49



Basic Parts of a Keyboard

Fig 1.50



Basic Parts of a Computer

- **Central Processing Unit (CPU):** The brain of the computer. It interprets and carries out program instructions.
- **Hard Drive:** A device that stores large amounts of data.
- **Monitor:** The device that contains the computer screen where the information is visually displayed.
- **Desktop:** The first screen displayed after the operating system loads.
- **Background:** The image that fills the background of the desktop.

Basic Parts of a Computer

- **Mouse:** A hand-held device used to point to items on the monitor.
- **Speakers:** Devices that enable you to hear sound from the computer.
- **Printer:** A device that converts output from a computer into printed paper documents.
- **Icon:** A small picture or image that visually represents something on your computer.
- **Cursor:** An arrow which indicates where you are positioned on the screen.
- **Program Menu:** A list of programs on your computer that can be accessed from the Start menu.
- **Taskbar:** The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.
- **Recycle Bin:** A temporary storage for deleted files.

Basic Internet Terms

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

Basic Computer Keys

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

Tips

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

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:

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

Why Choose Microsoft Outlook

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

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

Tips

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

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

Some examples of e-commerce are:

- Online shopping
- Online auctions
- Online ticketing
- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- **Business to Business (B2B):** Both the transacting parties are businesses.
- **Business to Consumer (B2C):** Businesses sell electronically to end-consumers.
- **Consumer to Consumer (C2C):** Consumers come together to buy, sell or trade items to other consumers.
- **Consumer-to-Business (C2B):** Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A):** Online transactions conducted between companies and public administration.
- **Consumer-to-Administration (C2A):** Online transactions conducted between individuals and public administration.

Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers:

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers:

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.

Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.

Tips

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

Unit 14.3 Money Matters

Unit Objectives

At the end of this unit, the participants 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.

Tips

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

14.3.2 Types of Bank Accounts, Opening a Bank Account: Types of Bank Accounts

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

- Current Accounts
- Savings Accounts
- Recurring Deposit Accounts
- Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Savings Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details (name, address, phone number, date of birth, gender, occupation, address)
- Method of receiving your account statement (hard copy/email)
- Details of your initial deposit (cash/cheque)
- Manner of operating your account (online/mobile banking/traditional via cheque, slip books)

Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual needs to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

- Passport
- Driving License
- Voters' Identity Card
- PAN Card
- UIDAI (Aadhaar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!

Tips 

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

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 output changes.
Nature	Time related.	Volume related.
Incurred	Incurred irrespective of Units being produced.	Incurred only when Units are produced.
Unit cost	Inversely proportional to the number of Units produced.	Remains the same, per Unit.
Examples	Depreciation, rent, salary, insurance, tax etc.	Material consumed, wages, commission on sales, packing expenses, etc.

Tips

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

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 – Life Insurance and Non-Life or General Insurance.

Life Insurance

Life Insurance deals with all insurance covering human life.

Life Insurance Products

The main life insurance products are:

- **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.
- **Endowment Policy:** This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- **Unit-Linked Insurance Plan (ULIP):** Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.

- **Money Back Life Insurance:** While the policyholder is alive, periodic payments of the partial survival benefits are made during the policy tenure. On the death of the insured, the insurance company pays the full sum assured along with survival benefits.
- **Whole Life Insurance:** It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products

The main general insurance products are:

- **Motor Insurance:** This can be divided into Four Wheeler Insurance and Two Wheeler Insurance.
- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.
- **Travel Insurance:** This can be categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- **Home Insurance:** This protects the house and its contents from risk.
- **Marine Insurance:** This insurance covers goods, freight, cargo etc. against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes – Direct Taxes and Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable.

Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.
- **Capital Gains Tax:** This tax is payable whenever you receive a sizable amount of money. It is usually of two types – short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.
- **Securities Transaction Tax:** This tax is added to the price of a share. It is levied every time you buy or sell shares.
- **Perquisite Tax:** This tax is levied on perks that have been acquired by a company or used by an employee.
- **Corporate Tax:** Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

Indirect taxes are levied on goods or services.

Some examples of Indirect Taxes are:

- **Sales Tax:** Sales Tax is levied on the sale of a product.

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

Tips

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

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 information:

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

RTGS

RTGS stands for Real Time Gross Settlement. This is a real time 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
- Beneficiary's bank's IFSC code

IMPS

IMPS stands for Immediate Payment Service. This is a real-time, inter-bank, electronic funds transfer system used to transfer money instantly within banks across India. IMPS enables users to make instant electronic transfer payments using mobile phones through both, Mobile Banking and SMS. It can also be used through ATMs and online banking. IMPS is available 24 hours a day and 7 days a week. The system features a secure transfer gateway and immediately confirms orders that have been fulfilled.

To transfer money through IMPS, the you need to:

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

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

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

1. Link his mobile number with his respective account
2. Receive the MMID from the bank

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

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

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

Differences Between NEFT, RTGS & IMPS

Table 1.28

Criteria	NEFT	RTGS	IMPS
Settlement	Done in batches	Real-time	Real-time
Full form	National Electronic Fund Transfer	Real Time Gross Settlement	Immediate Payment Service
Timings on Monday – Friday	8:00 am – 6:30 pm	9:00 am – 4:30 pm	24x7
Timings on Saturday	8:00 am – 1:00 pm	9:00 am – 1:30 pm	24x7
Minimum amount of money transfer limit	₹1	₹2 lacs	₹1
Maximum amount of money transfer limit	₹10 lacs	₹10 lacs per day	₹2 lacs
Maximum charges as per RBI	Upto 10,000 – ₹2.5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15 above 2 – 5 lacs – ₹25 above 5 – 10 lacs – ₹25	above 2 – 5 lacs – ₹25 above 5 – 10 lacs – ₹50	Upto 10,000 – ₹5 above 10,000 – 1 lac – ₹5 above 1 – 2 lacs – ₹15

Tips

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

Unit 14.4 Preparing for Employment & Self Employment

Unit Objectives

At the end of this unit, the participants 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.**
 - Studying the company beforehand will help you be more prepared at the time of the interview. Your knowledge of the organization will help you answer questions at the time of the interview, and will leave you looking and feeling more confident. This is sure to make you stand out from other, not as well informed, candidates.
 - Look for background information on the company. Try and find an overview of the company and its industry profile.
 - Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.
 - Note down any questions that you have after your research has been completed.
2. **Think about whether your skills and qualifications match the job requirements.**
 - Carefully read through and analyze the job description.
 - Make a note of the knowledge, skills and abilities required to fulfill the job requirements.
 - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.
3. **Go through the most typical interview questions asked, and prepare your responses.**
 - Remember, in most interviews a mix of resume-based, behavioral and case study questions are asked.
 - Think about the kind of answers you would like to provide to typical questions asked in these three areas.
 - Practice these answers until you can express them confidently and clearly.

4. Plan your attire for the interview.

- It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
- Ensure that your clothes are clean and well-ironed. Pick neutral colours – nothing too bright or flashy.
- The shoes you wear should match your clothes, and should be clean and suitable for an interview.
- Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.

5. Ensure that you have packed everything that you may require during the interview.

- Carry a few copies of your resume. Use a good quality paper for your resume print outs.
- Always take along a notepad and a pen.
- Take along any information you may need to refer to, in order to fill out an application form.
- Carry a few samples of your work, if relevant.

6. Remember the importance of non-verbal communication.

- Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
- Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
- Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.

7. Make a list of questions to end the interview with.

- Most interviews will end with the interviewer(s) asking if you have any questions. This is your chance to show that you have done your research and are interested in learning more about the company.
- If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
- Some good questions to ask at this point are:
 - What do you consider the most important criteria for success in this job?
 - How will my performance be evaluated?
 - What are the opportunities for advancement?
 - What are the next steps in the hiring process?
- Remember, never ask for information that is easily available on the company website.

Tips 

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

14.4.2 Preparing an Effective Resume: How to Create an Effective Resume

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a résumé that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section

The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

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

Step 2: Add the Profile Summary Section

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

Example:

Profile Summary

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

Step 3: Include Your Educational Qualifications

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

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

Example:

Educational Qualifications

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

Step 4: List Your Technical Skills

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

Example:**Technical Skills**

- Flash
- Photoshop

Step 5: Insert Your Academic Project Experience

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

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

Example:**Academic Projects**

Project Title: Different Communication Skills

Organization: True Blue Solutions

Platform used: Articulate

Contribution: Content writing and graphic visualization

Description: Development of storyboards for corporate induction & training programs

Step 6: List Your Strengths

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

Example:**Strengths**

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

Step 7: List Your Extracurricular Activities

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

Example:**Extracurricular Activities**

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

Step 8: Write Your Personal Details

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

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

Example:**Personal Details**

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

Tips 

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

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.

Q1. Can you tell me a little about yourself?

Tips to answer:

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

Q2. How did you hear about the position?

Tips to answer:

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

Q3. What do you know about the company?

Tips to answer:

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

Q4. Why do you want this job?

Tips to answer:

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

Q5. Why should we hire you?

Tips to answer:

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

Q6. What are your greatest professional strengths?

Tips to answer:

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

Q7. What do you consider to be your weaknesses?

Tips to answer:

- The purpose of this question is to gauge your self-awareness and honesty.

Q8. What are your salary requirements?**Tips to answer:**

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

Q9. What do you like to do outside of work?**Tips to answer:**

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

Q10. If you were an animal, which one would you want to be?**Tips to answer:**

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

Q11: What do you think we could do better or differently?**Tips to answer:**

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

Q12: Do you have any questions for us?**Tips to answer:**

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

Tips 

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

14.4.4 Work Readiness – Terms & Terminologies:

Basic Workplace Terminology

Every employee should be well versed in the following terms:

- **Annual leave:** Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- **Breaks:** Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- **Compensatory Time (Comp Time):** Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's services to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.
- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- **Curriculum Vitae (CV)/Resume:** A summary of a candidate's achievements, educational background, work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer made by the employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- **Employment Gaps:** Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- **Follow-Up:** The act of contacting a potential employer after a candidate has submitted his or her resume.
- **Freelancer/Consultant/Independent Contractor:** A person who works for him or herself and pitches for temporary jobs and projects with different employers.
- **Holiday:** Paid time-off from work.
- **Hourly Rate:** The amount of salary or wages paid for 60 minutes of work.

- **Internship:** A job opportunity offered by an employer to a potential employee, called an intern, to work at the employer's company for a fixed, limited time period.
- **Interview:** A conversation between a potential employee and a representative of an employer, in order to determine if the potential employee should be hired.
- **Job Application:** A form which asks for a candidate's information like the candidate's name, address, contact details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.
- **Job Offer:** An offer of employment made by an employer to a potential employee.
- **Job Search Agent:** A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies.
- **Lay Off:** A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- **Leave:** Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- **Letter of Acceptance:** A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- **Letter of Agreement:** A letter that outlines the terms of employment.
- **Letter of Recommendation:** A letter written for the purpose of validating the work skills of a person.
- **Maternity Leave:** Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor:** A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- **Minimum wage:** The minimum wage amount paid on an hourly basis.
- **Notice:** An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.
- **Offer of Employment:** An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract:** A contract of employment that continues till the employer or employee terminates it.
- **Overqualified:** A person who is not suited for a particular job because he or she has too many years of work experience, or a level of education that is much higher than required for the job, or is currently or was previously too highly paid.
- **Part-Time Worker:** An employee who works for fewer hours than the standard number of hours normally worked.
- **Paternity Leave:** Leave granted to a man who has recently become a father.
- **Recruiters/Headhunters/Executive Search Firms:** Professionals who are paid by employers to search for people to fill particular positions.
- **Resigning/Resignations:** When an employee formally informs his or her employer that he or she is quitting his or her job.
- **Self-Employed:** A person who has his or her own business and does not work in the capacity of an employee.
- **Time Sheet:** A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

Unit 14.5 Understanding Entrepreneurship

Unit Objectives

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

- Discuss the concept of entrepreneurship
- Discuss the importance of entrepreneurship
- Describe the characteristics of an entrepreneur
- Describe the different types of enterprises
- List the qualities of an effective leader
- Discuss the benefits of effective leadership
- List the traits of an effective team
- Discuss the importance of listening effectively
- Discuss how to listen effectively
- Discuss the importance of speaking effectively
- Discuss how to speak effectively
- Discuss how to solve problems
- List important problem solving traits
- Discuss ways to assess problem solving skills
- Discuss the importance of negotiation
- Discuss how to negotiate
- Discuss how to identify new business opportunities
- Discuss how to identify business opportunities within your business
- Understand the meaning of entrepreneur
- Describe the different types of entrepreneurs
- List the characteristics of entrepreneurs
- Recall entrepreneur success stories
- Discuss the entrepreneurial process
- Describe the entrepreneurship ecosystem
- Discuss the government's role in the entrepreneurship ecosystem
- Discuss the current entrepreneurship ecosystem in India
- Understand the purpose of the Make in India campaign
- Discuss the relationship between entrepreneurship and risk appetite
- Discuss the relationship between entrepreneurship and resilience
- Describe the characteristics of a resilient entrepreneur
- Discuss how to deal with failure

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

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

Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

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

Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common.

They are all:

- Extremely passionate about their work
- Confident in themselves
- Disciplined and dedicated
- Motivated and driven
- Highly creative
- Visionaries
- Open-minded
- Decisive

Entrepreneurs also have a tendency to:

- Have a high risk tolerance
- Thoroughly plan everything
- Manage their money wisely
- Make their customers their priority
- Understand their offering and their market in detail
- Ask for advice from experts when required
- Know when to cut their losses

Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

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

Types of Enterprises

As an entrepreneur in India, you can own and run any of the following types of enterprises:

Sole Proprietorship

In a sole proprietorship, a single individual owns, manages and controls the enterprise. This type of business is the easiest to form with respect to legal formalities. The business and the owner have no separate legal existence. All profit belongs to the proprietor, as do all the losses - the liability of the entrepreneur is unlimited.

Partnership

A partnership firm is formed by two or more people. The owners of the enterprise are called partners. A partnership deed must be signed by all the partners. The firm and its partners have no separate legal existence. The profits are shared by the partners. With respect to losses, the liability of the partners is unlimited. A firm has a limited life span and must be dissolved when any one of the partners dies, retires, claims bankruptcy or goes insane.

Limited Liability Partnership (LLP)

In a Limited Liability Partnership or LLP, the partners of the firm enjoy perpetual existence as well as the advantage of limited liability. Each partner's liability is limited to their agreed contribution to the LLP. The partnership and its partners have a separate legal existence.

Tips

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

14.5.2 Leadership & Teamwork:

Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means not asking someone to do something that you wouldn't willingly want to do yourself. Leadership is about figuring out what to do in order to win as a team, and as a company.

Leaders believe in doing the right things. They also believe in helping others to do the right things. An effective leader is someone who:

- Creates an inspiring vision of the future.
- Motivates and inspires his team to pursue that vision.

Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

1. **Pragmatism:** This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.
2. **Humility:** This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.
3. **Flexibility:** It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.
4. **Authenticity:** This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.
5. **Reinvention:** This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.
6. **Awareness:** This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

- Gaining the loyalty and commitment of the team members
- Motivating the team to work towards achieving the company's goals and objectives
- Building morale and instilling confidence in the team members
- Fostering mutual understanding and team-spirit among team members
- Convincing team members about the need to change when a situation requires adaptability

Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

Importance of Teamwork in Entrepreneurial Success

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

1. **Unity of purpose:** All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.
2. **Great communication skills:** Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.
3. **The ability to collaborate:** Every member should feel entitled to provide regular feedback on new ideas.
4. **Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.
5. **Visionary members:** The team should have the ability to anticipate problems and act on these potential problem before they turn into real problems.
6. **Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.
7. **Excellent organizational skills:** The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to measure progress and ROI.

Tips

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

14.5.3 Communication Skills: Listening & Speaking: The Importance of Listening Effectively

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated.

It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

How to Listen Effectively

To listen effectively you should:

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

How to Listen Effectively

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable. Besides this, the words spoken out loud need to match the gestures, tone and body language used.

What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

How to Speak Effectively

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should be crystal clear at all times.
- Use a pleasant and natural tone when speaking. Your audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.
- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.
- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be careful not to speak too slowly because this can come across as stiff, unprepared or even condescending.
- Remember to pause at the right moments.

Tips

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

14.5.4 Problem Solving & Negotiation skills:

What is a Problem?

As per The Concise Oxford Dictionary (1995), a problem is, “A doubtful or difficult matter requiring a solution”

All problems contain two elements:

1. Goals
2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve the goals.

How to Solve Problems

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

Step 1: Identify the problem

Step 2: Study the problem in detail

Step 3: List all possible solutions

Step 4: Select the best solution

Step 5: Implement the chosen solution

Step 6: Check that the problem has really been solved

Important Traits for Problem Solving

Highly developed problem solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

- Being open minded
- Asking the right questions
- Being proactive
- Not panicking
- Having a positive attitude
- Focusing on the right problem

How to Assess for Problem Solving Skills

As an entrepreneur, it would be a good idea to assess the level of problem solving skills of potential candidates before hiring them. Some ways to assess this skill are through:

1. **Application forms:** Ask for proof of the candidate’s problem solving skills in the application form.
2. **Psychometric tests:** Give potential candidates logical reasoning and critical thinking tests and see how they fare.
3. **Interviews:** Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.
4. **Technical questions:** Give candidates examples of real life problems and evaluate their thought process.

What is Negotiation?

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a startup. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate

Take a look at some steps to help you negotiate:

Step 1: Pre-Negotiation Preparation	Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.
Step 2: Discuss the Problem	This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.
Step 3: Clarify the Objective	Ensure that both parties want to solve the same problem and reach the same goal.
Step 4: Aim for a Win-Win Outcome	Try your best to be open minded when negotiating. Compromise and offer alternate solutions to reach an outcome where both parties win.
Step 5: Clearly Define the Agreement	When an agreement has been reached, the details of the agreement should be crystal clear to both sides, with no scope for misunderstandings.
Step 6: Implement the Agreed Upon Solution	Agree on a course of action to set the solution in motion

Tips

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

14.5.5 Business Opportunities Identification: Entrepreneurs and Opportunities

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

Peter Drucker

The ability to identify business opportunities is an essential characteristic of an entrepreneur.

What is an Opportunity?

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances.

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

Common Questions Faced by Entrepreneurs

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

Some common questions that entrepreneurs constantly think about are:

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

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

When is an Idea an Opportunity?

An idea is an opportunity when:

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

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

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

Ways to Identify New Business Opportunities

1. Identify Market Inefficiencies

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

2. Remove Key Hassles

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

3. Create Something New

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

4. Pick a Growing Sector/Industry

Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.

5. Think About Product Differentiation

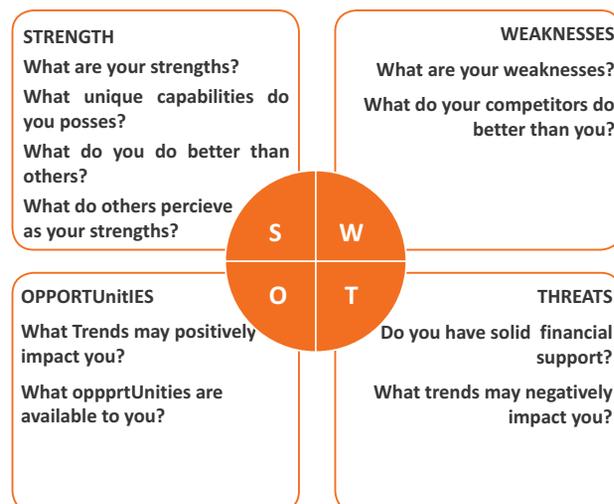
If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities Within Your Business

1. SWOT Analysis

An excellent way to identify opportunities inside your business is by creating a SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats. SWOT analysis framework:

Fig 1.51



Consider the following when looking for business opportunities:

By looking at yourself and your competitors using the SWOT framework, you can uncover opportunities that you can exploit, as well as manage and eliminate threats that could derail your success.

2. Establishing Your USP

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

Opportunity Analysis

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

To analyze an opportunity, you must:

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

Tips

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

14.5.6 Entrepreneurship Support Eco - System: What is an Entrepreneur?

An entrepreneur is a person who:

- Does not work for an employee
- Runs a small enterprise
- Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

1. **The Traditional Entrepreneur:** This type of entrepreneur usually has some kind of skill – they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.
2. **The Growth Potential Entrepreneur:** The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.
3. **The Project-Oriented Entrepreneur:** This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.
4. **The Lifestyle Entrepreneur:** This type of entrepreneur has usually worked as a teacher or a secretary. They are more interested in selling something that people will enjoy, rather than making lots of money.

Characteristics of an Entrepreneur

Successful entrepreneurs have the following characteristics:

- They are highly motivated
- They are creative and persuasive
- They are mentally prepared to handle each and every task
- They have excellent business skills – they know how to evaluate their cash flow, sales and revenue
- They are willing to take great risks
- They are very proactive – this means they are willing to do the work themselves, rather than wait for someone else to do it
- They have a vision – they are able to see the big picture
- They are flexible and open-minded
- They are good at making decisions

Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling “bhajias” to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

Dr. Karsanbhai Patel

Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-to-door and offered a money back guarantee with every pack that was sold. He charged Rs. 3 per kg when the cheapest detergent at that time was Rs.13 per kg. Dr. Patel eventually started Nirma which became a whole new segment in the Indian domestic detergent market.

The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

Stage 1: Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.

Stage 2: Germination or Recognition. In this stage a possible solution to the identified problem is thought of.

Stage 3: Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.

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

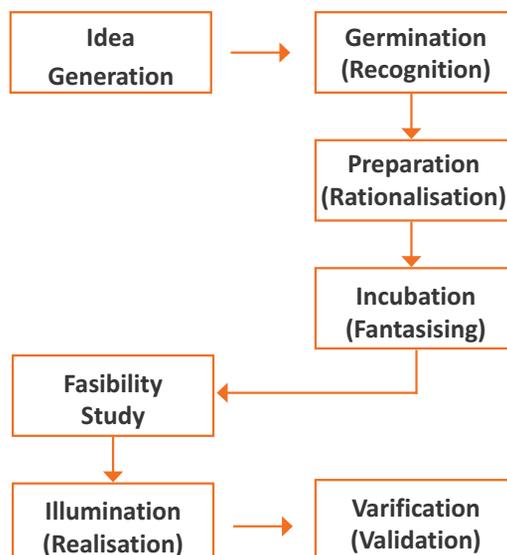
Stage 5: Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.

Stage 6: Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.

Stage 7: Verification or Validation. In this final stage, the idea is verified to see if it works and if it is useful.

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

Fig 1.52



What is an Entrepreneur?

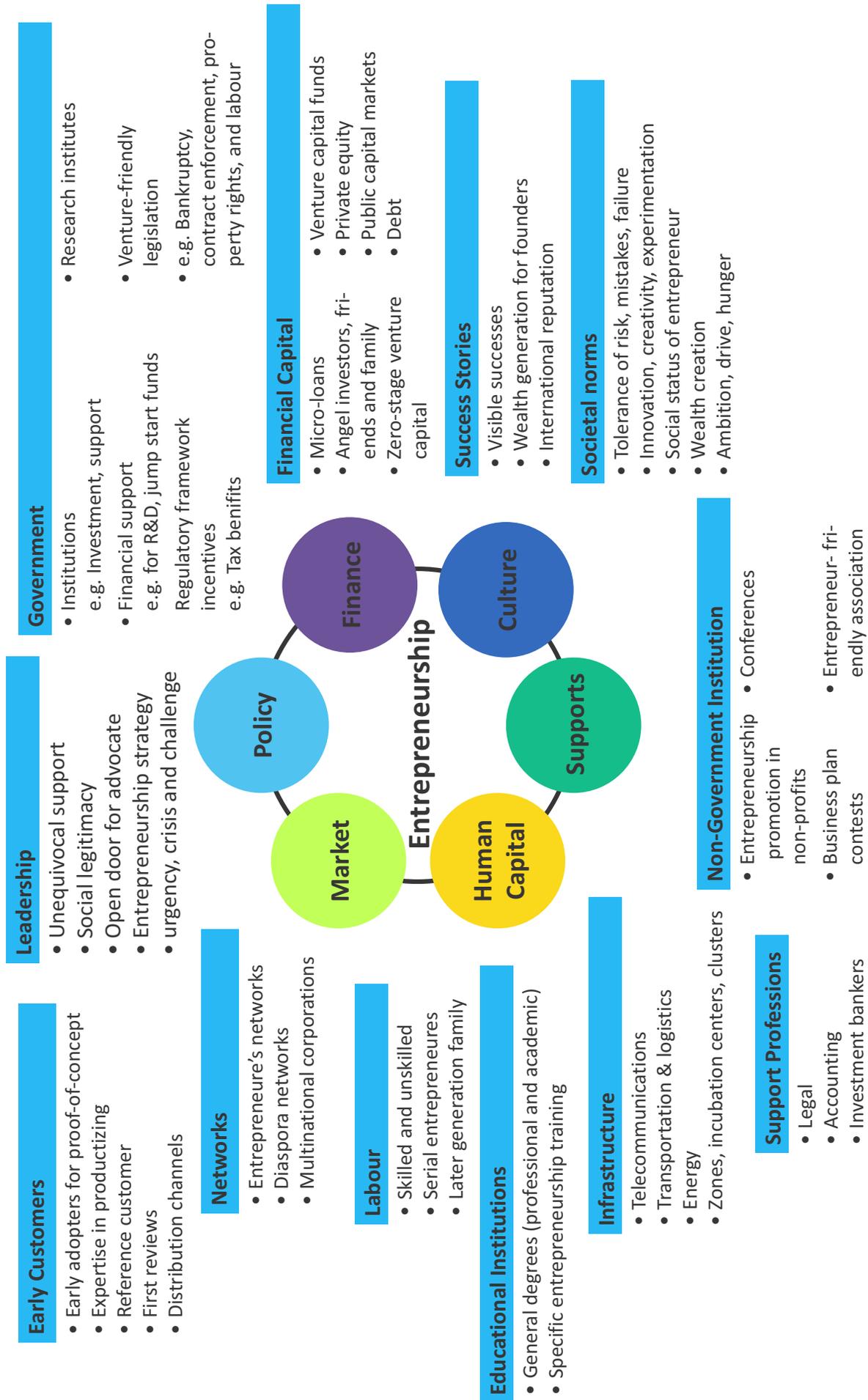
The entrepreneurship support ecosystem signifies the collective and complete nature of entrepreneurship. New companies emerge and flourish not only because of the courageous, visionary entrepreneurs who launch them, but they thrive as they are set in an environment or 'ecosystem' made of private and 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.

Fig 1.53



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

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

Government's Role in the Entrepreneurship Ecosystem

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

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

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

Snapshot of the Entrepreneurship Ecosystem in India

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

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

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

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

Make in India Campaign

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

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

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

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

Tips

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

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.

Risk Appetite Statement

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

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired tradeoff between risk and reward.
- Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience?

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

- By developing a professional network of coaches and mentors
- By accepting that change is a part of life
- By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

- A strong internal sense of control
- Strong social connections
- Skill to learn from setbacks
- Ability to look at the bigger picture
- Ability to diversify and expand
- Survivor attitude
- Cash-flow conscious habits
- Attention to detail

Tips

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

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!

Tips

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



Scan this QR Code or click on below link to access video of [Introduction to Entrepreneurship](#)

Unit 14.6 Preparing to be an Entrepreneur

Unit Objectives

At the end of this unit, the participants 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.

The 4 Ps of Marketing

The 4 Ps of marketing are Product, Price, Promotion and Place. Let's look at each of these 4 Ps in detail.

Product

A product can be:

- A tangible good
- An intangible service

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

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

Price

Once all the elements of Product have been established, the Price factor needs to be considered. The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some questions to ask yourself are:

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

Promotion

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

Some questions to ask yourself are:

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

Place

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

Some questions to ask yourself are:

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

Importance of an IDEA

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

Some ways to do this are by:

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

Tips

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

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.

14.6.3 CRM & Networking: What is CRM?

CRM stands for Customer Relationship Management. Originally the expression Customer Relationship Management meant managing one's relationship with customers. However, today it refers to IT systems and software designed to help companies manage their relationships.

The Need for CRM

The better a company can manage its relationships with its customers, the higher the chances of the company's success. For any entrepreneur, the ability to successfully retain existing customers and expand the enterprise is paramount. This is why IT systems that focus on addressing the problems of dealing with customers on a daily basis are becoming more and more in demand.

Customer needs change over time, and technology can make it easier to understand what customers really want. This insight helps companies to be more responsive to the needs of their customers. It enables them to modify their business operations when required, so that their customers are always served in the best manner possible. Simply put, CRM helps companies recognize the value of their clients and enables them to capitalize on improved customer relations.

Benefits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to:
 - Increased sales
 - Identification of customer needs
 - Cross-selling of products
- It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

14.6.4 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.

14.6.5 The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs.

Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that.

Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

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

Tips

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

14.6.6 Business Plan: Why Set Goals

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

Short-Term Goals

- These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

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

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

Long-Term Goals

These goals require time and planning.

They usually take a year or more to achieve.

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan

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

A business plan typically comprises of eight elements.

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, distributors and even the internet.
- **Communication strategy:** These can be written strategies (e-mail, text, chat), oral strategies (phone calls, video chats, face-to-face conversations), non-verbal strategies (body language, facial expressions, tone of voice) and visual strategies (signs, webpages, illustrations).

Your Sales section should include the following information:

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

Funding Request

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

The Funding Request section should include the following information:

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

Financial Planning

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

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

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

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

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

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

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

Risk Management

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

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

Tips

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

14.6.7 Procedure and Formalities for Bank Finance:

The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for startups. With numerous funding options available, entrepreneurs need to take a close look at which funding methodology works best for them. In India, banks are one of the largest funders of startups, offering funding to thousands of startups every year.

What Information Should Entrepreneurs Offer Banks for Funding?

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- Letter(s) of Introduction: This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- Your Profile: This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- Business Brochure: A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- Bank and Other References: If you have an account with another bank, providing those bank references is a good idea.
- Proof of Company Ownership or Registration: In some cases, you may need to provide the bank with proof of company ownership and registration. A list of assets and liabilities may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Cash-Flow Statement
- Business Plan
- Profit-and-Loss Account
- Projected Sales and Revenues
- Feasibility Study

Guarantees or Collaterals

Usually banks will refuse to grant you a loan without security. You can offer assets which the bank can seize and sell off if you do not repay the loan. Fixed assets like machinery, equipment, vehicles etc. are also considered to be security for loans.

The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

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

The Procedure

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

1. Submit your application form and all other required documents to the bank.
2. The bank will carefully assess your credit worthiness and assign ratings by analyzing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.
3. The bank will make a decision as to whether or not you should be given funding.

Tips

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

14.6.8 Enterprise Management - An Overview: How to Manage Your Enterprise

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required.

Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others – realize that you cannot handle everything yourself.

Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle. Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job.

Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you

put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well.

Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase their motivation.

Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well.

Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers. This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively.

Use all your skills and the skills of your employees to market your enterprise in an effective manner. You can also hire a marketing agency if you feel you need help in this area.

Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

Tips 

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

14.6.9. 20 Questions to Ask Yourself Before Considering Entrepreneurship

1. Why am I starting a business?
2. What problem am I solving?
3. Have others attempted to solve this problem before? Did they succeed or fail?
4. Do I have a mentor¹ or industry expert that I can call on?
5. Who is my ideal customer²?
6. Who are my competitors³?
7. What makes my business idea different from other business ideas?
8. What are the key features of my product or service?
9. Have I done a SWOT⁴ analysis?
10. What is the size of the market that will buy my product or service?
11. What would it take to build a minimum viable product⁵ to test the market?
12. How much money do I need to get started?
13. Will I need to get a loan?
14. How soon will my products or services be available?
15. When will I break even⁶ or make a profit?
16. How will those who invest in my idea make a profit?
17. How should I set up the legal structure⁷ of my business?
18. What taxes⁸ will I need to pay?
19. What kind of insurance⁹ will I need?
20. Have I reached out to potential customers for feedback?

Tips

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



Scan this QR Code or click on
below link to access video of
[Traits of an Entrepreneur](#)

Notes



A large rectangular area with a thin orange border, containing 25 horizontal lines for writing notes.



Skill India
कौशल भारत - कुशल भारत



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



N S D C
National
Skill Development
Corporation

Transforming the skill landscape



Food Industry Capacity and Skill Initiative

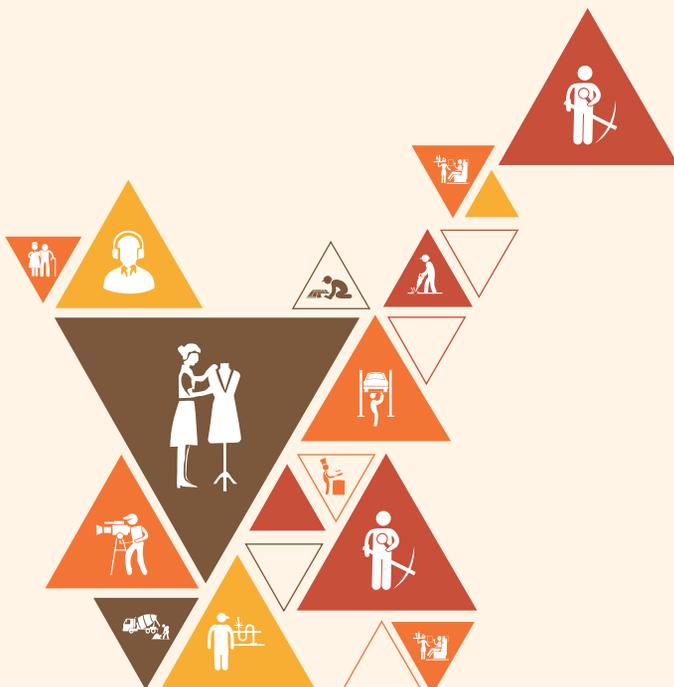
15. Prepare and Produce Spice Products

Unit 15.1 – Basic Calculations

Unit 15.2 – Classification of Spices

Unit 15.3 – Produce Spice Products

Unit 15.4 – Packaging and Storage



FIC/N8509

Key Learning Outcomes



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

1. Outline basic principles of mathematics
2. Calculate the quantity of raw material required for a finished product
3. Classify Indian spices
4. State the process for producing spices
5. State the types of packaging material and machines
6. State the procedures for storage of raw material, packaging material and finished goods
7. State the various food laws

UNIT 15.1: Basic Calculations

Unit Objectives

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

1. Outline basic principles of mathematics
2. Calculate the quantity of raw material required for a finished product

15.1.1 Measuring Units

Prefix	Symbol	Value	Meaning
kilo	k	1000	A thousand times bigger
deci	d	0.1	Ten times smaller
centi	c	0.01	A hundred times smaller
milli	m	0.001	A thousand times smaller

The following table has been created by combining the three basic units for length (meter), weight (gram) and volume (liter) with the prefixes listed above:

Unit (Symbol)	Quantity	Examples	Uses
milliliter (ml)	Smaller volumes	About the volume of a kidney bean	It is used for measuring most liquids. It is not used very often for non-liquids. For quantities larger than about 1000 ml, the liter is normally used.
liter (l)	Large volumes	Slightly more than 1 quart	It is used for measuring larger amounts of liquids or the volume of pots, mixing bowls, etc. Liters are not usually used for measuring dry ingredients. Note that one liter is the same as 1000 ml.
gram (g)	Smaller weights	About the weight of a kidney bean	It is used for measuring the majority of non-liquid ingredients, including flour, sugar, meats, cheeses, butter, etc. For quantities larger than 1000 g, the kilogram is usually used.
kilogram (kg)	Large weights	A bunch of grapes or a large loaf of bread	It is used for measuring larger quantities of non-liquid ingredients, including meats, fruits, and vegetables. Note that 1 kg is the same as 1000 g.
centimeter (cm)	Length	About the width of the nail on your little finger	Whenever a traditional recipe gives something in inches, the metric recipe will probably specify centimeters.
millimeter (mm)	Length	About the thickness of uncooked angel hair pasta	In the kitchen, millimeters are most likely to be used for measuring very small lengths. Note that 10 mm are the same as 1 cm.

15.1.2 Temperature

Temperature in the metric system is usually measured in degrees Celsius (°C). Here is a table with some common temperatures in °C.

Temperature	Description
0°C	Water freezes
21°C	Room temperature
37°C	Body temperature
100°C	Water boils
200°C	A hot oven

Calculating the cost of raw materials:

The amount of usable food after raw materials are prepared for processing is known as the 'yield' and is calculated as follows:

$$\text{Yield (\%)} = \frac{\text{weight of raw material actually used in the process} \times 100}{\text{weight of raw material that is bought}}$$

The true cost of raw materials depends on the yield and can be calculated as below:

$$\text{True raw material cost} = \frac{\text{Supplier cost} \times 100}{\% \text{ yield}}$$

For Example,

If we take 1 Kg of turmeric and dry it for processing it in the powder form and we get 500g of Turmeric powder then

$$\begin{aligned} \text{Yield (\%)} &= \frac{500 \times 100}{1000} \\ &= 50\% \end{aligned}$$

UNIT 15.2: Classification of Spices

Unit Objectives



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

1. Classify Indian spices

15.2.1 Classification of Spices

There are various classes of spices, let us understand each class in details:

Whole Spices

Aniseed	Ajwanseed	Asafoetida	Badian seed
Basil	Bay Leaf	Black Pepper	Cassia
Cambodge	Caraway	Cardamom(small)	Cardamom(large)
Celery	Chilli	Cinnamon	Cloves
Coriander	Cumin	Curry leaf	Dill Seed
Fennel	Fenugreek	Garlic	Ginger
Juniper	Kokam	Long Pepper	Mace
Mint	Mustard	Nutmeg	Poppy
Pomegranate	Rosemary	Saffron	Sage
Star anise	Sweet Flag	Tamrind	Tejpat
Thyme	Tumeric	Vanilla	

Organic

Organic Pepper	Organic Vanilla	Organic Ginger
Organic Ginger	Organic Turmeric	Organic Cardamom
Organic Herbal Spices	Organic Parsley	Organic Rosemary
Organic Thyme	Organic Sage	Organic Marjoram
Organic Black Pepper	Organic Mustard	

Spice Mixes

Curry Powder	Curry Paste	Curry Masala	Other Mixtures
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Spice Blends

Tamarind Concentrates	Blend Curry powders like Curry Masala , Chicken Masala , Meat Masala, Fish Curry, Sambar, Rasam, Instant Pickles.
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Freeze dried

Green Pepper

Spice Powders / Mixtures

Pepper Powder	Cardamom powder	Chilli Powder
Ginger Powder	Turmeric Powder	Coriander Powder
Cumin Powder	Celery Powder	Fennel Powder
Fenugreek Powder	Dill Powder	Mustard Powder
Poppy Powder	Tamarind Powder	Cinnamon Powder
Cassia Powder	Tejpat Powder	

Oleoresins

Pepper Oleoresins	Cardamom Oleoresins	Chilli Oleoresins
Capsicum Oleoresins	Paprika Oleoresins	Ginger Oleoresins
Turmeric Oleoresins	Coriander Oleoresins	Cumin Oleoresins
Celery Oleoresins	Fennel Oleoresins	Fenugreek Oleoresins
Dill Oleoresins	Mustard Oleoresins	Garcinia Extract
Garlic Oleoresins	Clove Oleoresins	Nutmeg Oleoresins
Mace Oleoresins	Cinnamon Oleoresins	Cassia Oleoresins
Tamarind Oleoresins	Galangal Oleoresins	Rose mary Oleoresins
Thyme Oleoresins	Curry leaf Oleoresins	Parsley Oleoresins
Curry Powder Oleoresins	Vanilla Oleoresins	Spice Oleoresins (NES)

Essential oils

Pepper oil	Cardamom oil	Asafoetida oil
Aniseed oil	Paprika oil	Ginger oil
Turmeric oil	Coriander seed oil	Cumin seed oil
Celery Oleoresins	Fennel seed oil	Ajwan seed oil
Dill seed oil	Mustard seed oil	Caraway seed oil
Garlic oil	Clove oil	Nutmeg oil
Mace oil	Cinnamon oil	Cassia oil
Kokam oil	Greater galanga oil	Rose mary oil
Thyme oil	Juniper oil	Parsley oil
Basil oil	Horse Radish oil	Star anise oil
Spice oils	Japanese mint oil	Peppermint oil
Spearmint oil	Horsemint oil	Bergomint oil
Other mint oil	Menthol crystal	

UNIT 15.3: Produce Spice Products

Unit Objectives

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

1. State the process for producing spices

15.3.1 Produce Spice Products

The Process flow to produce spice products consist of four steps:

S.no.	Steps	Process
1.	Finish Drying	Generally, dried spices are used which need to be further checked, whether humidity has influenced the quality. A finish drying may be needed if the material is not completely dried. Various types of dryers are used for processing spices, ranging from simple sun drying to gas or kerosene-fired dryers.
2.	Grinding and Mixing	Spices are ground and mixed using stone mill.
3.	Packing	Ground spices are packed into desired sizes using automatic packaging machines.
4.	Storage	Finished packets are cartoned and stored in warehouses.

For Example: (Process of Coriander)



Fig. 4.3.1. Process of Coriander

UNIT 15.4: Packaging and Storage

Unit Objectives



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

1. State the types of packaging material and machines
2. State the procedures for storage of raw material, packaging material and finished goods
3. State the various foods laws

15.4.1 What is Packaging?

Packaging is the science, art and technology of enclosing or protecting products for distribution, storage, sale and use. Packaging is the activity of designing and producing the container of the product.

The packaging requirements depend on:

1. The type of spice
2. Whether it is ground or intact
3. The humidity of storage.
 - Most intact spices can be stored adequately in sacks/boxes if the humidity of the air is not too high. Ground spices can also be stored without special packaging if humidity is low but over long periods there is a loss of flavour and risk of contamination and spillage.
 - It is therefore better to store spices in a barrier film such as polypropylene (essential in areas of high humidity) to provide an attractive package, retain spice quality and prevent contamination and losses.
 - If polypropylene is not available, cellulose film is adequate if it is heat sealable. Polythene is a poor substitute and should only be used for short term storage as it allows the flavour/aroma of the spices to escape.



Fig. 4.4.1. Packaging of spices

15.4.2 Storage of Spices

Spices are stored at a moisture level low enough so that the product can be held under normal storage conditions without development of mould.

Incoming materials and packaging materials are handled and stored in a manner that prevents damage and/or contamination (including cross-contamination with allergens).

- For example, the storage area for spices should be clean, dry, protected against pests and separate from the rest of the facility. It should not be used to store equipment, chemicals or personal items.
- Spices are stored off the floor, away from walls and in proper storage conditions to prevent mould and bacterial growth and facilitate pest control inspection. Open bags are stored in closed containers or otherwise protected from contamination.

Non-Food Chemicals Receiving and Storage

- Non-food chemicals are received and stored in a dry, well-ventilated area.
- Non-food chemicals are stored in designated areas ensuring that there is no possibility for cross-contamination of food or food contact surfaces.
- Where required for ongoing use in food handling areas (e.g. conveyor lubricants), these chemicals are stored separate from food and located in a manner that prevents contamination of food, food contact surfaces and packaging materials.
- Non-food chemicals are stored and mixed in clean, correctly labelled containers.
- Non-food chemicals are dispensed and handled only by authorised and properly trained personnel.

Finished Product Storage

- Spices are stored and handled under conditions that minimise damage, deterioration and prevent contamination including cross-contamination with raw materials and/or allergens.
- Stock rotation is controlled to prevent deterioration and spoilage (e.g. first-in, first-out).
- Returned defective or suspect product is clearly identified and isolated in a designated area for appropriate disposition.

15.4.3 Food Laws and Regulations

Food and Safety Standards for Packaging and Labelling Regulations state that:

1. "Best before" means the date which signifies the end of the period of Product.
2. "Date of manufacture" means the date on which the food becomes the product as described.
3. "Date of packaging" means the date on which the food is placed in the immediate container in which it will be ultimately sold.
4. "Lot number" or "code number" or "batch number" means the number either in numerals or alphabets or in combination thereof, by which the food can be traced in manufacturing and identified in distribution.
5. "Multipiece package" means a package containing two or more individually packaged or labelled pieces of the same commodity of identical quantity, intended for retail either in individual pieces or packages as a whole.
6. "Use – by date" or "Recommended last consumption date" or "Expiry date" means the date which signifies the end of the estimated period under any stated storage conditions, after which the food probably will not have the quality and safety attributes normally expected by the consumers and the food shall not be sold.

Labelling

General Requirements

Every prepackaged spice shall carry a label containing information as required here:

1. The particulars of declaration required under these Regulations to be specified on the label shall be in English or Hindi.
2. Label in packaged spices shall be applied in such a manner that they will not become separated from the container.
3. Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use.
4. Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it.

Exercise**1. Fill in the blanks with the correct option.**

- a. Packaging is science, art and technology of _____ products for distribution, storage, sale and use.
 - i. Protecting
 - ii. Processing
 - iii. Picking
 - iv. Dispersing
- b. _____ is a poor substitute and should be used for short term storage as it allows the flavour of the spices to escape.
 - i. Cellulose film
 - ii. Polythene
 - iii. Polypropylene
 - iv. None of the above
- c. Spices are _____ using stone mill.
 - i. Ground
 - ii. Mixed
 - iii. Ground and mixed
 - iv. None of the above
- d. _____ means the date which signifies the end of the period of product.
 - i. Date of packaging
 - ii. Best before
 - iii. Date of manufacture
 - iv. Batch number
- e. The true cost of raw materials depends on the _____.
 - i. Quality
 - ii. Quantity
 - iii. Yield
 - iv. None of the above

2. Match the following.

Column A	Column B
a. Whole Spices	i. Organic Parsley
b. Organic	ii. Chicken Masala
c. Spice Mixes	iii. Green Pepper
d. Spice Blends	iv. Curry Powder
e. Freeze dried	v. Cardamom Oleoresins
f. Oleoresins	vi. Nutmeg
g. Essential oils	vii. Turmeric oil



Scan this QR Code or click on
below link to access video of
[Spice Processing Technician](#)

Notes



A large rectangular area with a thin orange border, containing 25 horizontal lines for writing notes.

S.No	Unit Name	Topic Name	Page No	Link for QR Code	QR Code
1	Unit 1 - Prepare and Maintain Work Area and Process Machineries for production of final products	Orientation video of Multiskill Technician	24	https://youtu.be/J9yV1mtXixo	
2	Unit 2 - Sort and Grade Produce	Overview of Fruits and Vegetables Processing	30	https://youtu.be/hW10tq2fWfY	
3	Unit 2 - Sort and Grade Produce	Overview of Food Processing Industry	38	https://youtu.be/J-2EiMVNtpM	
4	Unit 2 - Sort and Grade Produce	Different Types of Packaging	44	https://youtu.be/iTNRv0IZacl	
5	Unit 3 - Canning fruits and vegetables	Fruits and Vegetables Canning Technician	52	https://youtu.be/2feH-pLw8f0	
6	Unit 3 - Canning fruits and vegetables	Food Packaging & Storage	58	https://youtu.be/Ta18d6JIO3o	
7	Unit 4 - Produce fruit pulp from various fruits	Fruit Pulp Processing Technician	67	https://youtu.be/1tvh6wTxnmY	
8	Unit 6 - Execution of Drying/Dehydration Process	Fruits and Vegetables Drying Dehydration Technician	113	https://youtu.be/pZ3P5TckftQ	
9	Unit 7 - Execution of pickle making process	Pickle and Paste Making Technician	130	https://youtu.be/i9HIFi-g2x4	
10	Unit 7 - Execution of pickle making process	Pickle Making Process	133	https://youtu.be/mQQE98UWfZQ	

S.No	Unit Name	Topic Name	Page No	Link for QR Code	QR Code
11	Unit 7 - Execution of pickle making process	Machinery in Pickle and Paste Industry	135	https://youtu.be/C-6kF52qtOA	
12	Unit 7 - Execution of pickle making process	Curing of Fruits & Vegetables for Pickle Making	136	https://youtu.be/wfAxT5S5x6M	
13	Unit 7 - Execution of pickle making process	Pickle Packaging and Storage	140	https://youtu.be/-Wrk4zAANpo	
14	Unit 8 - Produce Jam, Jelly and Ketchup	Jam Jelly and Ketchup Processing Technician	148	https://youtu.be/-rIhuZ_Kdo	
15	Unit 9 - Produce Baked Products	Introduction to the Bread & Bakery Industry	173	https://youtu.be/mcpVs3CVNlw	
16	Unit 9 - Produce Baked Products	Tools and Equipments used in the Baking Process	179	https://youtu.be/zNArOSLoTiY	
17	Unit 12 - Developing Entrepreneurial Skills	Business Opportunities in Entrepreneurship	255	https://youtu.be/s8poBVRm-n8	
18	Unit 14 - Employability & Entrepreneurship Skills	Introduction to Entrepreneurship	359	https://youtu.be/BzeoC3mSDgg	
19	Unit 14 - Employability & Entrepreneurship Skills	Traits of an Entrepreneur	377	https://youtu.be/3uEqWH9oWls	
20	Prepare and Produce Spice Products	Spice Processing Technician	391	https://youtu.be/5qe4gy2QFgc	



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