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FICSI
Food Industry Capacity and Skill Initiative

Practical Guide

Sector
Food Processing

Sub-Sector
Fruits and Vegetables

Occupation
Processing

Reference ID: **FIC/Q0106, NSQF Level 4**

Fruit Pulp Processing Technician

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Disclaimer

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

Shri Narendra Modi
Prime Minister of India

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About this book

This book is designed to provide skill training and/or upgrade the knowledge and basic skills to take up the job of a 'Fruit Pulp Processing Technician' in the 'Food Processing' sector. All the activities carried out by a specialist are covered in this course. Upon successful completion of this course the candidate will be eligible to work as a Fruit Pulp Processing Technician.

This Practical Guide is designed to enable training on practical content for the specific Qualification Pack (QP). Each National Occupational Standards (NOS) is covered across Unit/s.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS.

- Prepare and maintain work area and process machineries for producing pulp
- Prepare for production of fruit pulp
- Produce pulp from various fruits
- Document and maintain records related to fruit pulp processing
- Follow and maintain food safety and hygiene in the work environment

Symbols Used

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1. Introduction

Unit 1.1 - Organisational Standards and Norms 7 hrs

Key Learning Outcomes

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

1. Execute the roles and responsibilities as per the organisation standard and norms
2. Demonstrate how to conduct yourself at the workplace
3. Demonstrate how to maintain personal hygiene and sanitation guidelines

UNIT 1.1: Organisational Standards and Norms

Unit Objectives

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

1. Execute the roles and responsibilities as per the organisation standard and norms
2. Demonstrate how to conduct yourself at the workplace
3. Demonstrate how to maintain personal hygiene and sanitation guidelines

1.1.1 Materials required for the practical

- Protective gloves
- Head caps
- Aprons
- Safety goggles
- Safety boots
- Mouth masks
- Sanitiser
- Safety manual

1.1.2 Practical

Pre-requisite knowledge:

- Work flow chart and personal attributes.

Method:

1. Understand/ assign the roles and responsibilities to be followed as per the work flow chart given below.

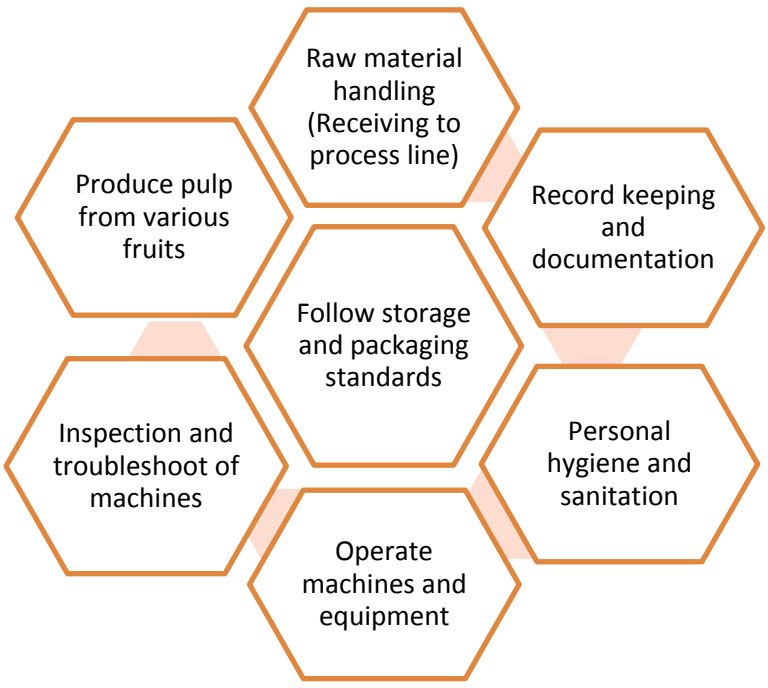

Fig . 1.1.1. Roles and responsibilities of Fruit Pulp Processing Technician

2. When at workplace you must wear the personal protective equipment following the way it is depicted in the picture given below.

Fig. 1.1.2. Personal Protective Equipment (PPE)

3. At workplace follow the safety instructions completely without any lapses.

Fig. 1.1.3. Safety symbols at workplace

Precautions:

- Make sure you are wearing safety gears.
- Do not waste the cleaning agent, sanitiser and water.
- Do not engage in smoking, spitting, chewing, sneezing or coughing over any food and eating in food preparation and food service areas.
- Report any illness or disease to the management and do not resume work unless treated and certified as fit to work.

Observation:

Sr no	Roles and responsibilities of fruits and vegetables canning technician	Has the function being carried out as per specifications?
1		
2		
3		
4		
5		
6		

Conclusion:
Based on the observations, write your conclusions here:

Sr no	
1	
2	
3	
4	
5	
6	

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2. Prepare and Maintain Work Area and Process Machineries for Production of Fruit Pulp

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Key Learning Outcomes

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

1. Demonstrate the appropriate method for cleaning and maintaining the work area
2. Exhibit that the work area is safe and hygienic for food processing
3. Check if the machines and tools required for production are in working condition
4. Clean process machineries using recommended cleaning agents and sanitisers

UNIT 2.1: Prepare and Maintain Work Area

Unit Objectives

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

1. Demonstrate the appropriate method for cleaning and maintaining the work area
2. Exhibit that the work area is safe and hygienic for food processing

2.1.1 Materials required for the practical

- Cleaning agents (like detergents, hypochlorite, liquid chlorine, hydrogen peroxide, ozoneetc.)
- Sanitisers
- Disinfectants
- Floor area layout

2.1.2 Practical

Pre-requisite knowledge:

- Prepare and Maintain Work Area and Process Machineries.

Method:

- Mark food and non-food contact surfaces.

Fig. 2.1.1. Area Layout

1. Follow the cleaning and sanitisation SOP for work area cleaning.
2. Refer to the SOP and manufacturers' instructions for appropriate cleaning agents, sanitisers and cleaning procedure.
3. Take the tools, trolleys, crates, utensils etc. available at the processing unit to the designated areas for cleaning.
4. Rinse with potable water and cleaning agents to wash them perfectly.
5. Sterilise the tools and other equipment for next use with 500 ppm sodium hypochlorite or the recommended disinfectant as per the SOP.

6. Remove gross debris from surfaces of work area.
7. Apply detergent solution to loosen soil and bacterial film and hold them in solution or suspension.
8. Rinse with potable water to remove loosened soil and residues of detergent.
9. Disinfect with subsequent rinsing (where necessary) as per manufacturers' instruction.
10. Dry clean using appropriate methods like blow dry for removing and collecting the residue and debris. (For e.g.: loosened threads from dusters, crumbs and burnt products etc.)
11. Check pest control measures are in place and work area is pest free.
12. Check that water waste is going to an Effluent Treatment Plant (ETP).
13. Check that solid waste is properly going into the solid waste treatment plant or composting unit.
14. Place the sanitiser and disinfectant in the designated store area after using it.

Area/ item	Frequency	Equipment and cleaning agents and sanitisers	Cleaning method	Person responsible
Structure				
Floors	End of each day or as frequently required	Brooms, damp mop, brush, detergent and sanitiser	1. 2. 3. 4.	
Walls, Windows and ceiling	Monthly or as required	Wiping cloth, brush and detergent	1. 2. 3. 4.	
Food contact surfaces				
Work tables and sinks	After use	Wiping cloth, detergent and sanitiser	1. 2. 3. 4.	

Fig . 2.1.2. Sample work area cleaning SOP

Fig. 2.1.3. Cleaning materials

Fig.2.1.4. Pressure cleaning

Precautions:

- Always wear protective gloves and goggles when recommended.
- Before using hypochlorite, and liquid chloride, ensure that pH and concentration level is maintained as per the SOP.
- Ensure that the area is well ventilated while using hydrogen peroxide.
- Always read the instructions on the label before use, even if it's a product you use regularly. You don't want to accidentally use the product in the wrong area or use it incorrectly.
- Always note the warning symbols and safety precaution symbols displayed in the work area and follow them.
- Never store chemicals near food, food storage areas or any tools or equipment that will touch food. Keep them under lock in a designated area only for cleaning tools and chemicals.
- Never leave chemicals on or near a food preparation area. That includes on top of counters, stoves, etc.
- Do not store chemicals above food prep areas, kitchen sinks or drain boards.
- Store chemicals in their originally labelled containers and make sure they are closed properly.
- Never use food storage containers to store, transport or mix chemicals.
- Always spray chemicals holding the spray nozzle away from you.
- Never mix two different chemicals together.

Observation:

Sr no	Name of food contact surfaces cleaned	Name of cleaning agents used	Name of sanitisers used	Amount of cleaning agent used
1				
2				
3				
4				
5				

Conclusion:

Sr no	Activities conducted to make work area clean and safe	(Yes/No)
1	Identification of food and non-food contact surfaces	
2		
3		
4		
5		

UNIT 2.2: Prepare and Maintain Process Machineries

Unit Objectives

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

1. Check if the machines and tools required for production are in working condition
2. Clean process machineries using recommended cleaning agents and sanitisers

2.2.1 Materials required for the practical

- Fruit washing machine
- Fruit sorting and grading machine
- Peeling machine
- De-seeding machine
- De-stoning machine
- Evaporator.
- Packaging machine
- Can steriliser
- SOP
- Safety manual

2.2.2 Practical

Pre-requisite knowledge:

- Prepare and Maintain Work Area and Process Machineries.

Method:

1. Prepare the list of machineries present in the processing unit.
2. Execute the cleaning of equipment and machineries as per the SOP.
3. Refer to the manufacturers' manual for recommended cleaning agents and sanitisers.
4. Execute CIP for the internal cleaning of the machines and equipment.
5. Carry out the COP for the parts like fittings, gaskets, valves, tank vents, grinders, pumps, knives and nozzles as per company SOP.
6. Carry out SIP process to sterilise, disinfect and sanitise the machineries.
7. If required apply high air pressure cleaning by removing the equipment parts and replacing them after cleaning.
8. Check for cleaning efficiency by swab test or rinse test.
9. Apply oil and grease to the required parts as part of routine maintenance.

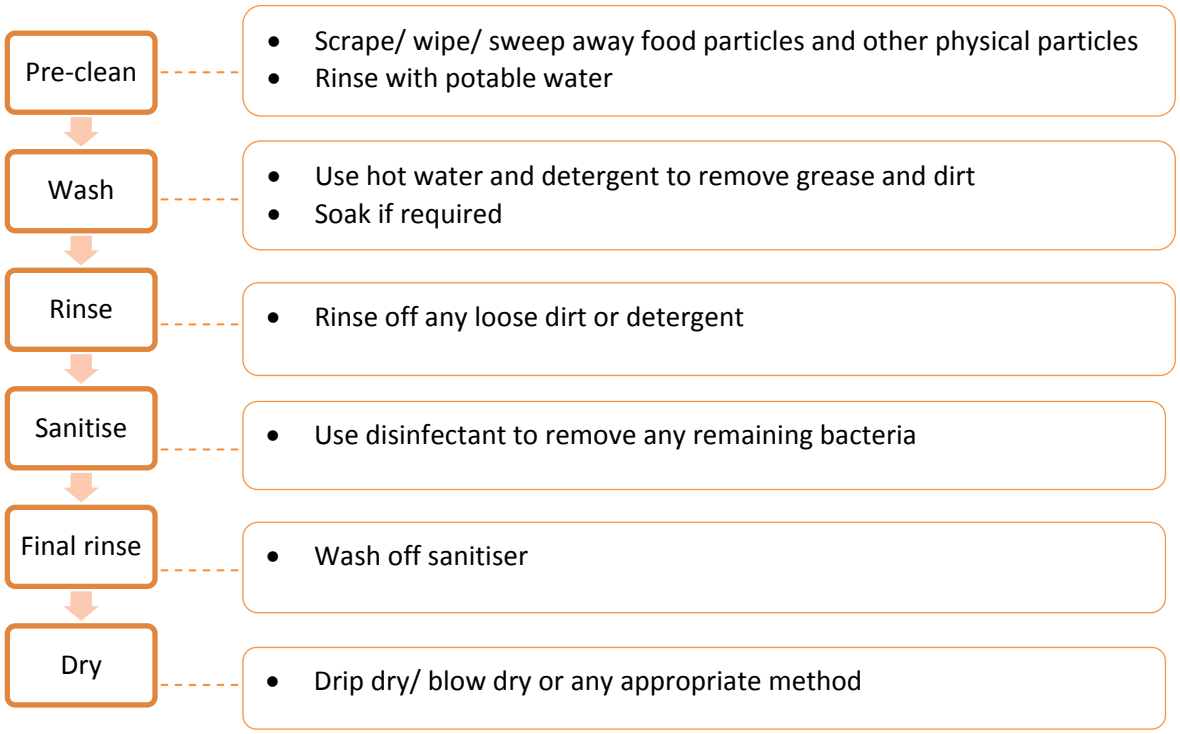

Fig 2.2.1. Steps in cleaning procedure

Precautions:

- Ensure machines are unplugged from the power source before cleaning.
- Make sure that after cleaning the machines and equipment are ready for use.
- Report any discrepancies in the equipment or machineries to the supervisor/ required authority.

Observation:

Sr no	Name of the activities	Time taken to conduct the process (hrs)
1		
2		
3		
4		
5		

Conclusion:

Sr no	Parts used for CIP	Parts used for COP	Parts used for SIP
1			
2			
3			
4			
5			

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3. Food Microbiology

FIC/N0121

Key Learning Outcomes

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

1. Test the given food sample for any contaminants and spoilage
2. Demonstrate the process of preserving the food.

UNIT 3.1: Causes of Food Spoilage

Unit Objectives

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

1. Test the given food sample for any contaminants and spoilage

3.1.1 Materials required for the practical

- Symptoms and causal chart of food spoilage
- Food samples (spoiled fruits/vegetables)

3.1.2 Practical

Pre-requisite knowledge:

- Food spoilage and prevention.

Method:

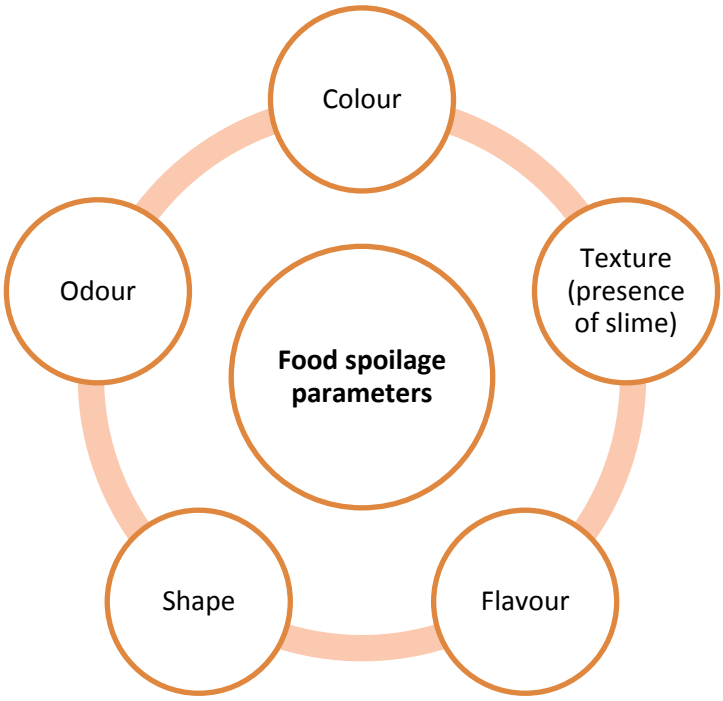

Fig. 3.1.1 Food spoilage parameters

Food contaminants

Sr. No.	Type of contaminants	Example
1	**Microbial**	Bacteria, moulds, yeasts, viruses, etc.
2	**Biological**	Hair, excreta, bone splinters, etc.
3	**Chemical**	Pesticide residues, detergents, etc.
4	**Physical**	Bolts from machinery, stones, glass, etc.

1. Check the odour of the food samples and observe the presence of any kind of foul odour (for eg. rotten eggs).
2. Check the texture of the fruit (sliminess over the fruit).
3. Check for any discolouration over the fruit/vegetable due to microbial growth.
4. Check the flavour by testing the pH of the fruits taken as sample. If the pH shows beyond the required limit then the fruit has become more souring.
5. Check the packaging of the sample for any swelling or popping or fizzing sound during opening. This is due to gas production by bacteria and yeasts.
6. Write your observations in the observation table.

Precautions:

- Do not taste the sample fruits provided for testing as it may cause sickness.
- Wear all safety gears required before doing the testing process.

Observation:

Sr. No	Samples	Spoilage parameters					
1		Odour	Colour	Texture	Flavour	Shape and Packaging	Food contaminants
2							
3							
4							
5							

Conclusion:

Write down the causal agents for the samples taken for the experiment.

Sr no	Causal Agents
1	
2	
3	
4	
5	

UNIT 3.2: Food Preservation

Unit Objectives

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

1. Demonstrate the process of preserving the food

3.2.1 Materials required for the practical

- Additives
- Preservatives
- Samples
- Room thermometer

3.2.2 Practical

Pre-requisite knowledge:

- Food spoilage and prevention.

Method:

- Food preservation helps in maintaining following properties of a food:

Fig.3.2.1 Properties of preserved food

- There are several methods to preserve the food like fresh storage, cold storage, freezing, drying/dehydration, concentration, chemical preservation, preservation with sugar, pasteurization, sterilization, filtration, irradiation, curing, fermentation and salting.

1. Follow the chemical method for preservation and note down the observations.

Sr no	Agent	Acceptable Daily intake (mg/Kg body weight)	Commonly used levels (%)
1	Lactic acid	No limit	No limit
2	Citric acid	No limit	No limit
3	Acetic acid	No limit	No limit
4	Sodium Diacetate	15	0.3-0.5
5	Sodium benzoate	5	0.03-0.2
6	Sodium propionate	10	0.1-0.3
7	Potassium sorbate	25	0.05-0.2
8	Methyl paraben	10	0.05-0.1
9	Sodium nitrite	0.2	0.01-0.02
10	Sulphur dioxide	0.7	0.005-0.2

Sr no	Preserving Agent	Preferable food items
1	Citric acid	fruit juices; jams; other sugar preserves
2	Acetic acid	vegetable pickles; other vegetable products
3	Sodium benzoate	vegetable pickles; preserves; jams; jellies; semi-processed products
4	Sodium propionate	fruits; vegetables
5	Potassium sorbate	fruits; vegetables; pickled products; jams, jellies
6	Methyl paraben	fruit products; pickles; preserves
7	Sulphur dioxide	fruit juices; dried / dehydrated fruits and vegetables; semi-processed products

2 Take the food sample given for preservation.
3 Weigh the total quantity of the sample and add sodium benzoate of 0.03 to 0.2 % of body weight of the food item taken.
4 Repeat the activity for other products with different chemical additives.

Precautions:

- Maintain the dosages of the additives as per the recommendation.
- Overdosing of additives will deteriorate the quality of final product.

Observation:

Sr no	Raw material/ sample	Quantity taken (kgs)	Additive	Quantity of additives
1				
2				
3				
4				
5				
6				

Conclusion:

Sr no	Raw material/ sample	Duration of preservation (how long this sample can be preserved?)
1		
2		
3		
4		
5		
6		

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4. Prepare for Production of Fruit Pulp

FIC/N0121

Key Learning Outcomes

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

1. Demonstrate how to plan the production process.
2. Demonstrate how to calculate the process time for effective utilization of machineries.
3. Explain how to plan batch size considering full capacity utilization of equipment.
4. Demonstrate the calculation of raw material required for getting desired quantity of finished product.

UNIT 4.1: Planning Production

Unit Objectives

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

1. Demonstrate how to plan the production process

4.1.1 Materials required for the practical

- Production process chart.

4.1.2 Practical

Pre-requisite knowledge:

- Production preparation.

Method:

- Every organisation has a standard operating procedure (SOP) for production process.

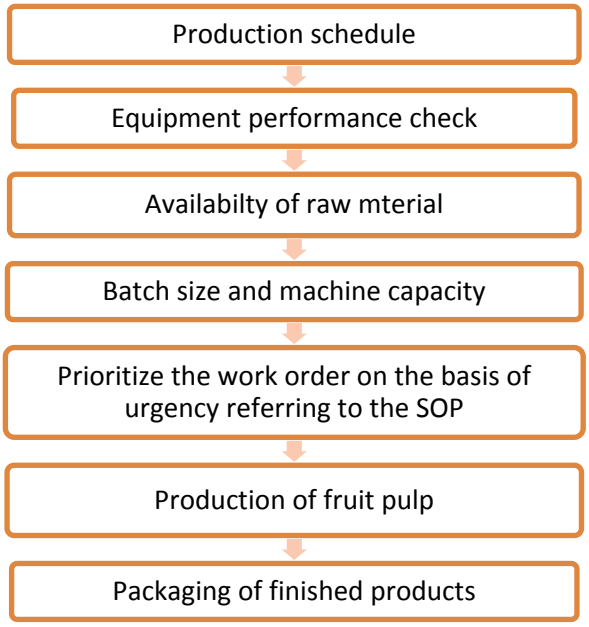

Fig . 4.1.1. Production flow chart

1. Check the production schedule of the day and note it down in your notepad.
2. Check that the required machineries are performing well and ready for production.
3. Prioritise the lot which has to be delivered urgently as per the SOP and stock rotation system (FIFO and FEFO) as applicable.
4. Identify the products to be made as per the schedule and plan the production of snacks and savoury making as per the defined specifications.
5. Identify the packaging material as per the SOP for the finished products.
6. Calculate and arrange for appropriate packaging as specified in the schedule for the finished products.

Precautions:

- Follow the production schedule and the time for each process parameter as specified.
- Follow the FIFO and FEFO stock rotation system as specified in the SOP/production schedule.

Sr no	Planning steps	Equipment to be used	Time to finish the activity (hrs)	Packaging material for the finished product
1				
2				
3				
4				
5				
6				

Conclusion:

Sr no	Batch details	Batch size	Production time	Quantity of finished products (packaged lots)
1				
2				
3				
4				
5				
6				

UNIT 4.2: Plan Equipment Utilization for Production

Unit Objectives

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

1. Demonstrate how to calculate the process time for effective utilization of machineries.
2. Explain how to plan batch size considering full capacity utilization of equipment.

4.2.1 Materials required for the practical

- Work flow diagram/chart
- SOP
- Food safety manual

4.2.2 Practical

Pre-requisite knowledge:

- Production preparation.

Method:

1. Identify the type of production line:
   - Automated production line
   - Semi-automated production line
   - Manual production line
2. Based on the type of production line plan the processing activities to calculate efficiency of equipment and manpower utilisation.

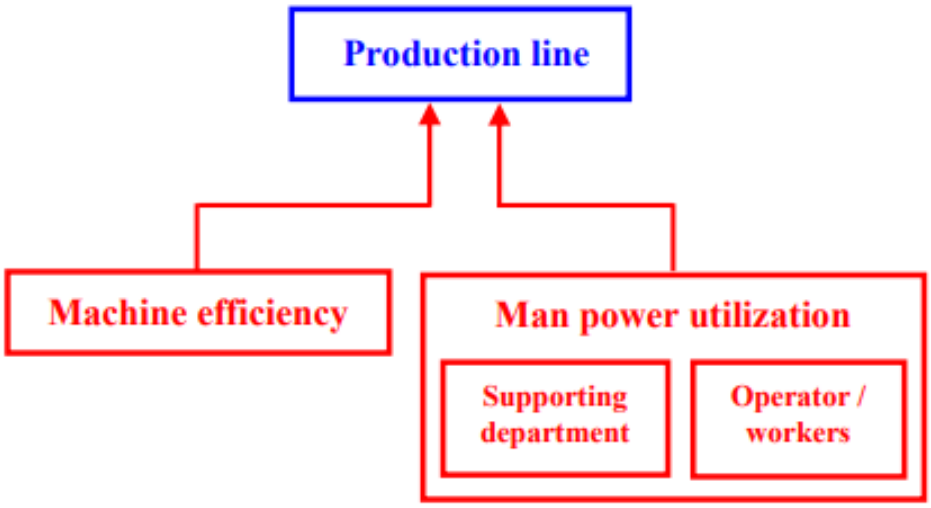

Fig . 4.2.1 Factors of production line

3. Calculate the machine efficiency using following formula given:
   - Actual Operation Time: Run time for a machine or system to produce an output from the moment it has started for operation.
   - Planned Operation Time: Actual run time of the machine removing all the stops during the operation (for eg: breakdowns, change over, etc.)
   - Machine Ideal Cycle Time: The minimum cycle time that your process can be expected to achieve in optimal circumstances.
   - Overall Equipment Efficiency: Takes into account all losses, resulting in a measure of truly manufacturing time. It gives a picture of how effective the manufacturing process is running.

Formula to calculate machine efficiency		Machine efficiency
Availability (A) =	$\frac{\text{Actual Operation Time}}{\text{Planned Operation Time}}$	
Performance (P) =	$\frac{\text{(Machine Ideal Cycle Time) X (Total Pieces Produced)}}{\text{(Planned Operation Time)}}$	
Quality (Q) =	$\frac{\text{Good Pieces Produced}}{\text{Total Pieces Produced}}$	
Overall Equipment Efficiency (OEE) =	**A X P X Q**	

4. Calculate manpower utilisation for manual and semi-automatic production line in terms of operators/workers by using following formula:

Type of production line	Formula to calculate	Manpower utilization (M)
Manual	$\frac{\text{Actual Production Output}}{\text{Target Production Output}}$	
Semi-automatic	$\frac{\text{(Machine Ideal Cycle Time) X (Total Pieces Produced)}}{\text{(Actual Operation Time) – (Machine Ideal Cycle Time) X (Total Pieces Produced)}}$	
	M =	

5. Check that whether preventive maintenance is in place or not.
6. Record all the details in the observation sheet.

Precautions:

- Use the raw materials which meet the quality parameters.
- Check the machineries are working properly and ready for use.
- Check if the work area cleaning and process machinery cleaning is done as per the SOP and ready for production.
- Wear the personal protective equipment during processing activities.

Observation:

Sr no	Overall Equipment Efficiency (OEE)	Manpower utilisation (manual) (M)	Manpower utilisation (semi-automatic) (M)
1			
2			
3			
4			
5			
6			

Conclusion:

Write your conclusions here.

Sr no	Observations
1	
2	
3	
4	
5	
6	

UNIT 4.3: Organise and Check Equipments and Raw Materials

Unit Objectives

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

1. Demonstrate the calculation of raw material required for getting desired quantity of finished product.

4.3.1 Materials required for the practical

- Work flow diagram/chart
- SOP
- Food safety manual
- Raw fruits
- Refractometer
- Weighing machine

4.3.2 Practical

Pre-requisite knowledge:

- Production preparation

Method:

1. Identify the required raw materials for the type of end product as per the SOP.
2. Calculate the yield of the end product.

- To calculate the yield of a particular fruit product, it is important to know Brix and pH levels of final product.
- The calculation is done as follows:

$$\text{Yield} = \frac{\text{TSS of all raw materials}}{\text{Percentage of TSS in final products}} \text{ X } 100$$

- Given below is an example to show how to calculate the yield for a mango beverage.
- Mango pulp TSS inclusive of sugar = Fruit: Sugar = 70:30.
- Required Brix of mango beverage = 40
- 10 kg of fruit at 10 % TSS = 1.000 kg
- 10 kg of sugar = 10.000 kg
- 80 g of acid = 0.080 kg
- Total =1.000 + 10.000 + 0.080 = 11.08 kg

$$\text{Yield} = \frac{11.08 \times 100}{40} = 27.7 \text{ kg}$$

Sr.No.	Fruit	pH (acidity %)	TSS (Brix degree)
1	Mango	0.6% to 0.7%	14°
2	Papaya	0.2%	10° to 12°
3	Pear	0.3%	10
4	Peach/apricot	0.2% to 0.3%	10° to 12°
5	Pineapple	0.4% to .6%	10° to 12°
6	Litchi	0.3% to 0.5%	10° to 12
7	Banana	0.2% to 0.3%	24°
8	Apple	0.15% to 0.2%	10° to 12°
9	Tomato	0.5% to 0.6%	4°

Note your calculations for yield and cost here

3. Identify the equipment and machines as per the SOP.
4. Calculate the number of times you will require to operate the machine for the given batch size and machine capacity.

- Based on the batch size and the machine availability select the processing machines for optimum utilisation.

Formula for calculation:

- Consider the machine capacity is = x kg
- The batch size = y kg
- No. of times the machine needs to be operated for optimum utilization = z
- Then z=x/y

For eg: if x=200 kg, y=50 kg then:

z=200/50

z = 4

Capacity of the machine = x	Batch size = y	No. of times the machine to be operated for the given capacity = z

Precautions:

- Use the raw materials which meet the quality parameters.
- Check the machineries are working properly.
- Wear the personal protective equipment during processing activities.

Observation:

Sr no	Production size	Batch size	Machine or equipment to be used	No. of times the machine/equipment to be used	Duration of the process
1					
2					
3					
4					
5					
6					

Conclusion:

Sr no	Final product	Is it as per schedule (Y/N)
1		
2		
3		
4		
5		
6		

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5. Produce Fruit Pulp from Various Fruits

FIC/N0122

Key Learning Outcomes

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

1. Execute the process of receiving and ripening of fruits.
2. Execute the process of washing and sorting of fruits.
3. Execute the process of peeling/de-seeding/de-stoning of fruits.
4. Execute the process of precooking and pulping of fruits.
5. Execute the process of aseptic sterilization and packing of fruit pulp.

UNIT 5.1: Receive and Ripen Fruits

Unit Objectives

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

1. Execute the process of receiving and ripening of fruits

5.1.1 Materials required for the practical

- Raw fruits
- pH meter
- Refractrometer
- Ethrel solution

5.1.2 Practical

Pre-requisite knowledge:

- Pulping process.

Method:

Nature of ripening	
Climacteric Fruits	**Non-climacteric Fruits**
Continue to ripen after harvesting	Ripens on the plant itself
Cannot withstand travelling hence ripened near consumption area	Can withstand travelling and hence transported
Ethylene helps in ripening	Ethylene helps in removal of green colour of fruits
Examples: Mango, banana, plum, papaya, guava, pear, etc.	**Examples:** Orange, grapes, watermelon, litchi, strawberry, etc.

1. Select the fruits as per their availability based on the season.

Fig. 5.1.1. Raw fruit - Mango

2. Check their minimum total solid content (TSS) with the help of refractometer as per the specifications given below:

Sr no	Fruits	TSS
1	Apple	10
2	Apricot	5 -12
3	Blueberries	5 10
4	Cherry	10
5	Grape	14 - 16
6	Grapefruit	14 -17
7	Kiwifruit	5
8	Mango	8
9	Mandarin	14
10	Melon	8
11	Orange	8
12	Papaya	10 -12
13	Peach	10
14	Pear	8
15	Persimmon	11
16	Pineapple	5
17	Plum	10
18	Pomegranate	13

3. Check the ripening state of the fruits selected for processing.
4. If the fruit is ripened, then send it for washing and sorting.
   - If the fruit is not ripened, then place the fruits in the ripening chamber maintained at a constant temperature of 18 to 21^{0}C for most of the fruits (refer to the SOP).
   - In case of mangoes a temperature of 29 to 31^{0}C to be maintained for ripening.
   - Optimum storage and ripening temperatures for a few fruits are given below:

Sr no	Fruits	Ethylene Concentration (ppm)	Ethylene exposure time (hr.)	Ripening temperature °C	Storage Temperature °C
1	Avocado	10 - 100	12 - 48	15 - 18	4.4 -13
2	Banana	100 - 150	24	15 - 18	13 - 14
3	Honey dew melon	100 - 150	18 - 24	20 - 25	7 - 10
4	Kiwifruit	10 - 100	12 - 24	0 - 20	0 - 0.5
5	Mango	100 - 150	12 - 24	20 - 22	13 - 14
6	Orange de-greening	1- 10	24 - 72	20- 22	5- 9

5. Write down the TSS percentage of the selected fruits with the ripening agent used (if any).

Precautions:

- Use only the fruits which meet the quality parameters for processing.

Observation:

Sr no	Selected Fruits	TSS %	Quantity selected for processing after quality check
1			
2			
3			
4			
5			
6			

Conclusion:

Write your conclusions here.

Sr no	Conclusion
1	
2	
3	
4	
5	
6	

UNIT 5.2: Wash and Sort Fruits

Unit Objectives

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

1. Execute the process of washing and sorting of fruits

5.2.1 Materials required for the practical

- Fruit washing machine
- Fruit sorting and grading machine
- Crates
- Weighing machine
- Ripened fruits

5.2.2 Practical

Pre-requisite knowledge:

- Pulping process.

Method:

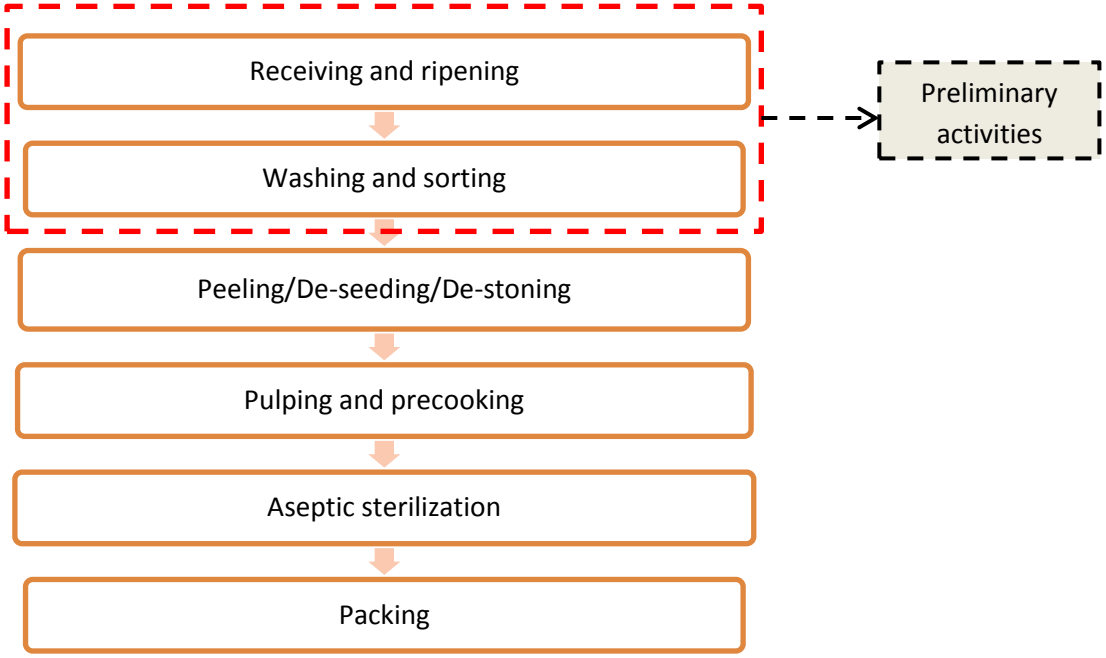

Fig . 5.2.1. Fruit Pulping Process

1. Send the selected ripened fruits to the fruit washing machine for cleaning the dirt and inert material from the fruits.

Fig. 5.2.2. Fruit Washing Machine

Equipped with a water holding tank that facilitates continuous water flow, used for washing fruits and vegetables

2. Collect the washed fruits from the other end of the machine.
3. Repeat the washing process again if required. .
4. Send the fruits to grading and sorting table/machine to manually check the uniformity and ripening of the fruits.

Fig. 5.2.3. Fruit Grading Machine

Used for fruit/vegetable segregation as per size and firmness

5. Remove the fruits that are not ripened from the chosen lot.
6. Write your findings in the observation table.

Precautions:

- Avoid wastage of water during washing the fruits.
- Remove rotten fruits during sorting and grading process.

Observation:

Sr no	Selected batch of fruits	Total weight before washing and sorting (Kg)	Total weight after sorting (Kg)
1			
2			
3			
4			
5			
6			

Conclusion:

Sr no	Selected batch of fruits	Washing Time	Grading/Sorting Time	Final quantity for further processing
1				
2				
3				
4				
5				
6				

UNIT 5.3: Peel/De seed/ De-stone fruits

Unit Objectives

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

1. Execute the process of peeling/de-seeding/de-stoning of fruits

5.3.1 Materials required for the practical

- Washed and sorted fruits
- Peeling machine
- De-seeding machine
- De-stoning machine

5.3.2 Practical

Pre-requisite knowledge:

- Pulping process.

Method:

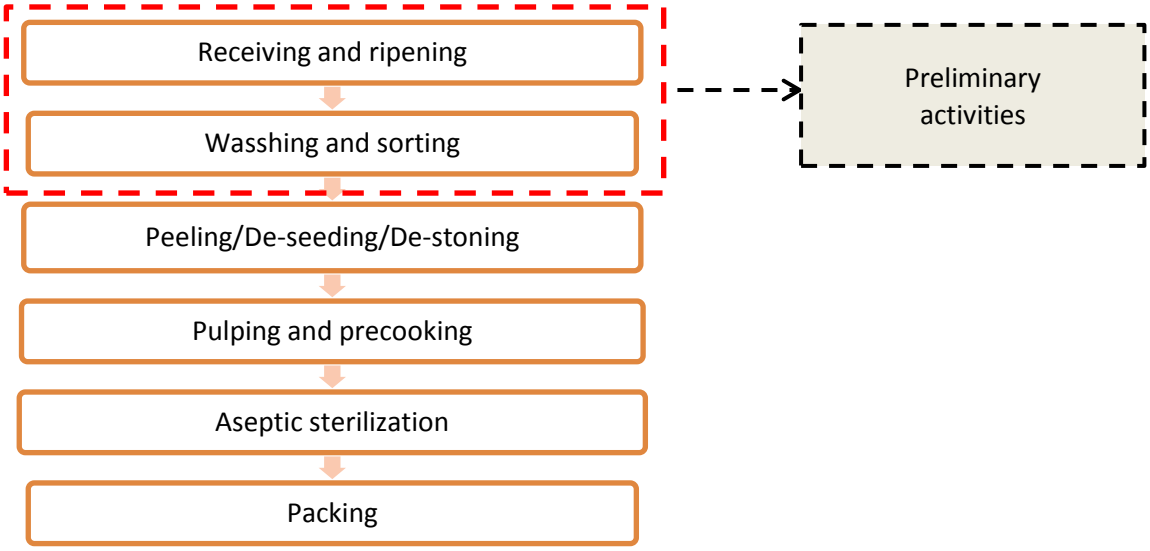

Fig 5.3.1. Fruit Pulping Process

1. As per the fruit selected, send the fruits for peeling – seeding –de-stoning process.

		
Fig. 5.3.2. Peeling machine Used for removing fruit/vegetable skin	*Fig. 5.3.3. De-seeding machine* Used for removing fruit seeds and stones in fruits/vegetables	*Fig. 5.3.4. De-stoner* Used for removing fruit seeds and stones in fruits/vegetables

2. Check the batch for successful peeling or de-seceding or de-stoning .
3. Note the quantity of peels, seeds and stones accumulated for every batch in the observation table.

Precautions:

- Ensure that the peels, seeds or stones are getting accumulated in the defined place during the process.

Observation:

Sr no	Weight of the fruits taken	Peel-off Quantity (Kg)	Peeling Time	Seed Quantity (Kg)	Deseeding Time	Stone Quantity (Kg)	Destoning Time
1							
2							
3							
4							
5							
6							

Conclusion:

Sr no	Weight of fruits taken before peel-off/de-seed/ de-stone	Time taken for the process	Final quantity after the process
1			
2			
3			
4			
5			
6			

UNIT 5.4: Pulp Fruit and Pre-cook Pulp

Unit Objectives

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

1. Execute the process of precooking and pulping of fruits

5.4.1 Materials required for the practical

- Evaporator

5.4.2 Practical

Pre-requisite knowledge:

- Pulping process.

Method:

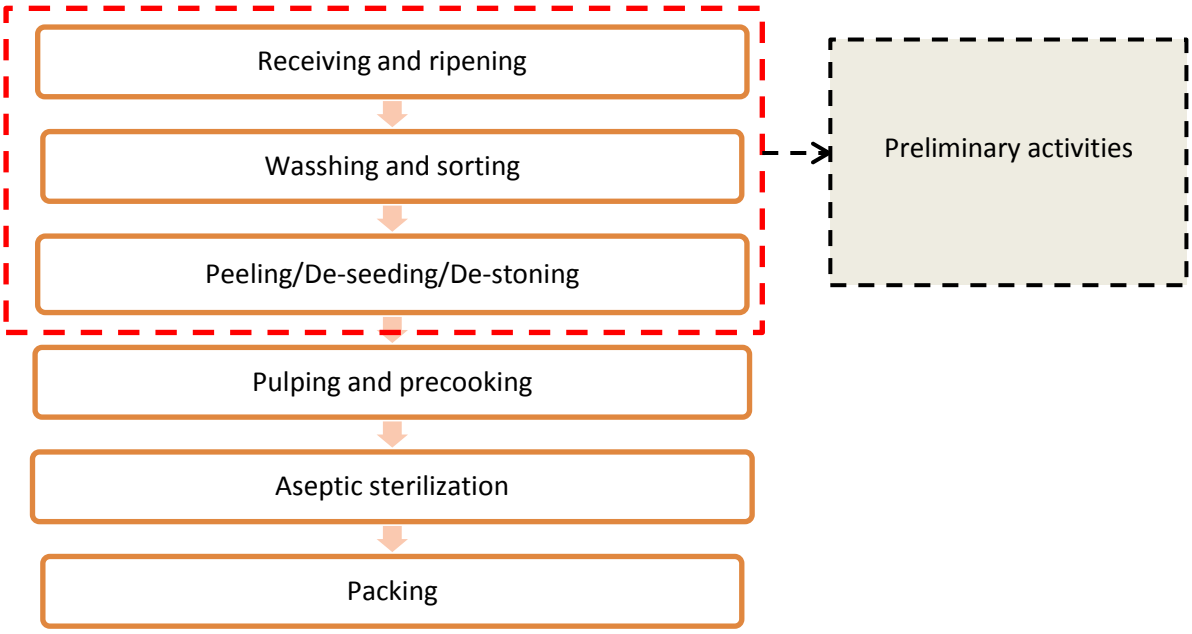

Fig.5.4.1. Fruit Pulping Process

1. Send the peeled/de-seeded/de-stoned fruits to the decanter to remove unwanted material by using centrifugation process.
2. After decanting, deaerate the resulted pulp by rapid heating at a high temperature of 120^{0}C to 125^{0}C to remove undesirable volatile aroma and air.
3. Start the concentration of deaerated pulp in the evaporator with a pulp flow at a maximum temperature of 50°C.
4. Note down your observations in the table.

Precautions:

- Do not concentrate the fruit pulp beyond the specified limits.

Observation:

Sr no	Details of the fruits in the pulp	Quantity on decanting	Quantity on deaeration	Concentration temperature	Time taken for concentration
1					
2					
3					
4					
5					
6					

Conclusion:

Sr no	Process	Result
1		
2		
3		
4		
5		
6		

UNIT 5.5: Carry out Aseptic Sterilization and Packing of Fruit Pulp

Unit Objectives

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

1. Execute the process of aseptic sterilization and packing of fruit pulp

5.5.1 Materials required for the practical

- Precooked pulp
- Aseptic processing machine
- Packaging materials

5.5.2 Practical

Pre-requisite knowledge:

- Pulping process.

Method:

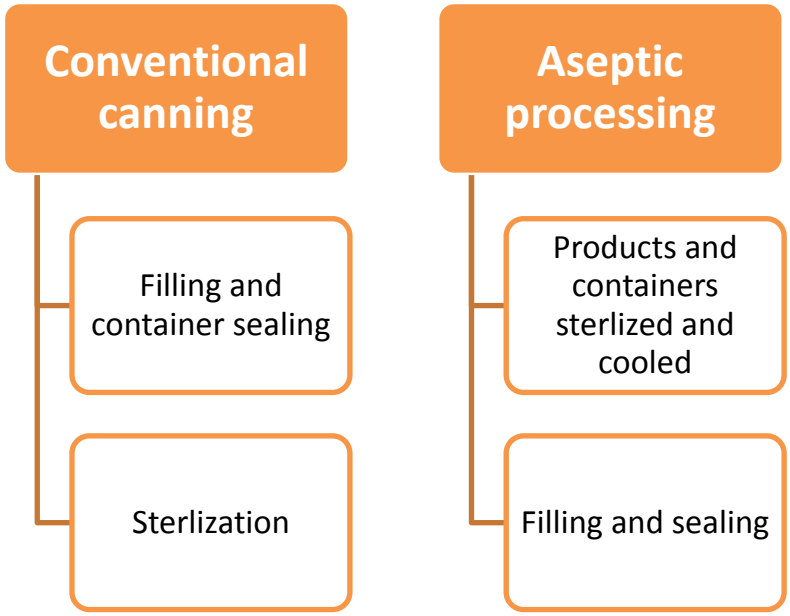

Fig.5.5.1 Sequence of operations

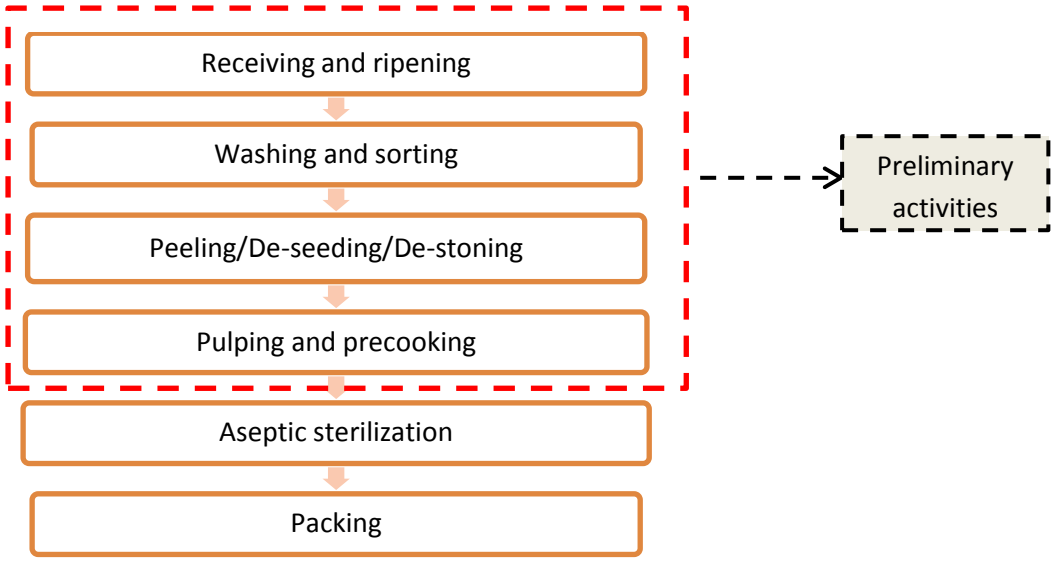

Fig. 5.5.2. Fruit pulping process

1. Conduct the pre-sterilisation operation of precooked pulp by heating, holding and cooling process in sequence.
2. Perform heating and cooling in pre-sterilisation as rapidly as possible for most of the food products in consideration of quality retention.
3. Do the heating directly by using steam, microwave, or electrical current as in ohmic heating, or indirectly by using a plate, tubular, or scraped-surface heat exchanger.

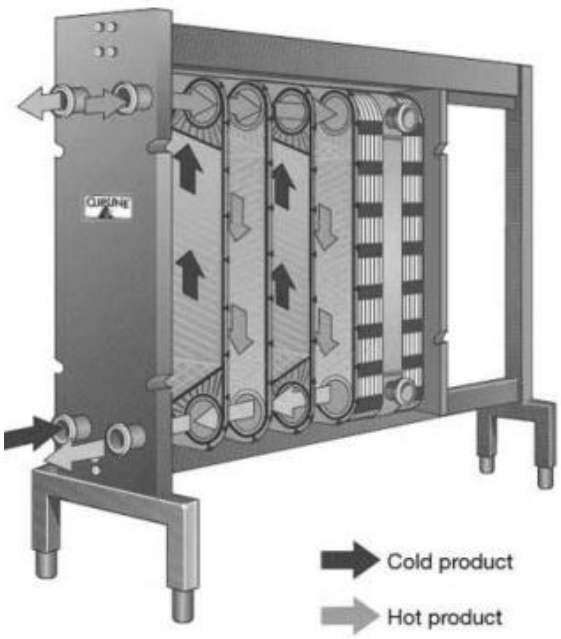

Fig. 5.5.3. A plate heat exchanger (courtesy of Tetra Pak Processing Components)

4. Select the packaging materials available for commercial aseptic products.
5. Conduct sterilisation of packaging materials or use preformed containers.

Fig. 5.5.4. Fruit pulp products in different aseptic containers

6. Ensure that finished products are getting into the chosen packaging material on the aseptic packaging line.
7. Mention the time taken for heating, holding and cooling by the selected fruit pulp in the observation table.

Types of Packaging	Primary Packaging	Secondary Packaging	Tertiary Packaging	Transit Packaging
Meaning	• Comes in direct contact with the food and holds the product and features labeling	• Creates ease of manual movement of products	• Used for long distance transportation and distribution	• Used to bundle the boxes or crates for ease of transportation and distribution overseas
Packaging Materials	• Glass bottle/jars • Wooden barrels/casks • Tin containers/cans • Chinaware jars • Aluminium foil • Polythene bags/ lining • Cellophane paper • Plastic bottles/ containers/crates • Sanitary cans • Lacquered cans • Thermocol • Thermoformed plastic bottle • Paper products (bags, boxes etc.)	• Cardboard box • Polythene • Paper bags • Small cartons boxes	• Large carton boxes	• Palletised crates • Large carton

Types of Packaging	Primary Packaging	Secondary Packaging	Tertiary Packaging	Transit Packaging
Products Packed	• Fruit juices, pulps, concentrates, jam, jellies, marmalades, squashes, crush, syrup • Canned fruits • Pickles • Harvested fruits and vegetables	• Nuts • Fruits • Vegetables	• All products	• All products

Precautions:

- Follow the heating – holding – cooling parameters as per specifications.

Observation:

Sr no	Fruit Pulp	Heating time	Holding time	Cooling time	Finished product
1					
2					
3					
4					
5					
6					

Conclusion:

Sr no	Finished Products	Type of packaging	Material for packaging
1			
2			
3			
4			
5			
6			

UNIT 5.6: Can Fruit Pulp

Unit Objectives

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

1. Execute the process of sterilisation, cooling and packing of canned fruits and vegetables

5.6.1 Materials required for the practical

- Precooked pulp
- Can steriliser
- Retorts
- Cooling tanks
- Refractometer
- Salinometer

5.6.2 Practical

Pre-requisite knowledge:

- Pulping process.

Method:

- The filling of products and container sealing operations are done prior to sterilisation in conventional canning.

1. Conduct the pre-sterilisation operation of prepared preserve in brine/sugar solution by heating, holding and cooling process in a sequence.
2. Heat directly by using steam, microwave, or electrical current as in ohmic heating, or indirectly by using a plate, tubular, or scraped-surface heat exchanger.
3. Seal, label and store the canned products.

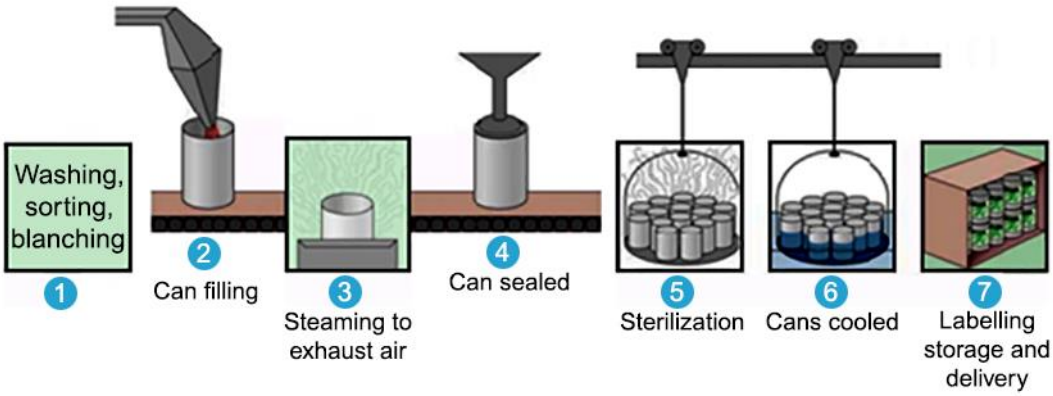

Fig.5.6.1. Canning process

Precautions:

- Perform heating and cooling in pre-sterilisation as rapidly as possible for retaining the quality of food.

Sr no	Canned products	Heating time	Holding time	Cooling Time
1				
2				
3				
4				
5				
6				

Conclusion:

Write your conclusions here.

Sr no	Finished Products
1	
2	
3	
4	
5	
6	

UNIT 5.7: Post Production Cleaning and Regular Maintenance of Equipment

Unit Objectives

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

1. Carry out the process of post-production cleaning and regular maintenance of equipment

5.7.1 Materials required for the practical

- Equipment and machines used in processing
- Cleaning agents (like detergents, hypochlorite, liquid chlorine, hydrogen peroxide, ozone etc.)
- Sanitisers
- Disinfectants
- Floor area layout
- Tool box

 *Fig. 5.7.1 Tool box*	It is a box to organize, carry, and keep the tools safe

5.7.2 Practical

Pre-requisite knowledge:

- Produce Fruit Pulp from Various Fruits

Method:

1. Follow the cleaning and sanitisation SOP for work area cleaning.
2. Refer to the SOP and manufacturers' instructions for appropriate cleaning agents, sanitisers and cleaning procedure.
3. Take the tools, trolleys, crates, utensils etc. available at the processing unit to the designated areas for cleaning.
4. Rinse with potable water and cleaning agents to wash them perfectly.
5. Sterilize the tools and other equipment for next use with 500 ppm sodium hypochlorite or the recommended disinfectant as per the SOP.
6. Remove gross debris from surfaces of work area.
7. Apply detergent solution to loosen soil and bacterial film and hold them in solution or suspension.
8. Rinse with potable water to remove loosened soil and residues of detergent.
9. Disinfect with subsequent rinsing (where necessary) as per manufacturers' instruction.

10. Dry clean using appropriate methods like blow dry for removing and collecting the residue and debris. (for eg: loosened threads from dusters, crumbs and burnt products etc.)
11. Check pest control measures are in place and work area is pest free.
12. Check that water waste is going to an Effluent Treatment Plant (ETP).
13. Check that solid waste is properly going into the solid waste treatment plant or composting unit.
14. Place the sanitiser and disinfectant in the designated store area after using it.
15. Prepare the list of machineries present in the processing unit.
16. Execute the cleaning of equipment and machineries as per the SOP.
17. Refer to the manufacturers' manual for recommended cleaning agents and sanitisers.
18. Execute CIP for the internal cleaning of the machines and equipment.
19. Carry out the COP for the parts like fittings, gaskets, valves, tank vents, grinders, pumps, knives and nozzles as per company SOP.
20. Carry out SIP process to sterilise, disinfect and sanitise the machineries.
21. If required apply high air pressure cleaning by removing the equipment parts and replacing them after cleaning.
22. Check for cleaning efficiency by swab test or rinse test.
23. Apply oil and grease to the required parts as part of routine maintenance.

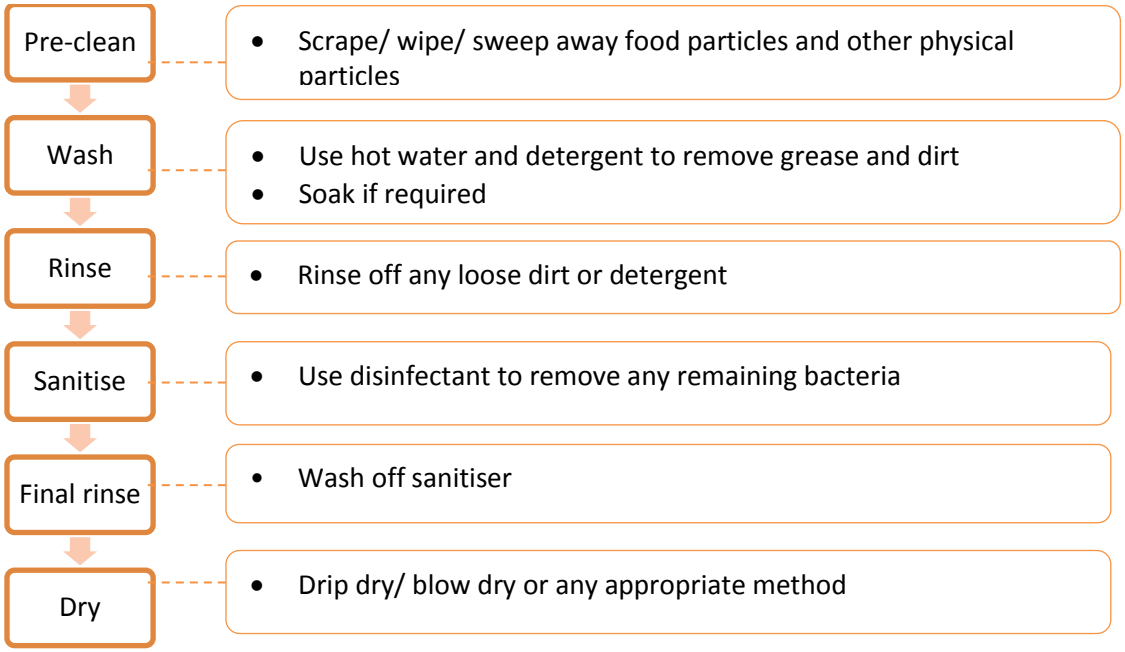

Fig. 5.7.2. SOP-Post production cleaning and regular maintenance process

Precautions:

- Ensure machines are unplugged from the power source before cleaning.
- Make sure that after cleaning the machines and equipment are ready for use.
- Report any discrepancies in the equipment or machineries to the supervisor/ required authority.
- Make sure cleaning agents and sanitisers are used judiciously.
- Wash your hands with sanitisers after cleaning and maintenance activity.

Observation:

Sr no	Work area cleaning (post production)	Cleaning done (Yes/no)
1		
2		
3		
4		
5		
6		

Sr no	Machines/equipment cleaning (post production)	Cleaning done (Yes/no)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Conclusion:

Write your conclusion here.

Sr no	Conclusion
1	
2	
3	
4	
5	
6	

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6. Complete Documentation and Record Keeping Related to Production of Fruit Pulp

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Food Industry Capacity and Skill Initiative

FIC/N0123

Key Learning Outcomes

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

1. Demonstrate the process of maintaining documentation for raw materials
2. Execute the process of documenting production schedule and process parameters
3. Execute the process of documenting details of finished products

UNIT 6.1: Raw Material Records

Unit Objectives

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

1. Demonstrate the process of maintaining documentation for raw materials

6.1.1 Materials required for the practical

- Raw material/stock register
- Processing book/register
- Sales book
- Weighing machine
- Hygrometer
- Refractrometer

6.1.2 Practical

Pre-requisite knowledge:

- Complete documentation and record keeping.

Method:

- Production unit has three types of register/book.

Fig. 6.1.1. Types of register/book

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.

Observation:

Sr no	Type of raw material	Moisture Content	Weight of raw materials
1			
2			
3			
4			
5			
6			

Conclusion:

Stock register updated for the following raw materials:

Sr no	Type of raw material
1	
2	
3	
4	
5	
6	

UNIT 6.2: Production Schedule and Process Parameters

Unit Objectives

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

1. Execute the process of documenting production schedule and process parameters

6.2.1 Materials required for the practical

- Process manual
- Production schedule
- Production register

6.2.2 Practical

Pre-requisite knowledge:

- Complete documentation and record keeping.

Method:

- Follow the production schedule:

Fig. 6.2.1. SOP - Production Schedule and Process Parameters

1. Refer the production schedule and enter the batch number of products in the production register which needs to be processed on the given date.
2. Check the machines available for processing of that lot as per the schedule.
3. Refer to the quality parameter chart and ensure that quality of the ingredients are checked and as per the accepted quality standards.
4. Enter the inputs of products in the respective register as per the SOP.
5. Enter the inputs of the products in the observation table.

Precautions:

- Ensure that the entries do not have any incorrect inputs by doing a thorough check.
- Ensure all records are up-to date as per SOP and are always ready for audits.

Observation:

Sr no	Production steps	Time taken at each step	Initial quantity of raw material	Final quantity of finished products
1				
2				
3				
4				
5				
6				

Conclusion:

Sr no	Raw material	Raw material quantity	Final quantity
1			
2			
3			
4			
5			
6			

UNIT 6.3: Finished Products Records

Unit Objectives

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

1. Execute the process of documenting details of finished products

6.3.1 Materials required for the practical

- Finished goods register
- ERP Software

6.3.2 Practical

Pre-requisite knowledge:

- Complete Documentation and Record Keeping.

Method:

1. Record the details of finished goods in the finished goods register.
2. Enter the details of finished goods in the ERP software, if available.
3. Maintain appropriate records of raw material receipt, stock of existing raw material, production, storage, distribution, service, laboratory test results, cleaning and sanitation, pest control and product recall etc. according to the SOP.
4. Retain the updated records for a period of one year or till shelf-life of the product whichever is more (as per the SOP) for periodic audits.

List of records as mandated under Part 2 of Schedule 4 of Food Safety & Standards (Licensing & Registration of Food Businesses) Regulation, 2011 are:

Sr. No.	Records for	Clause	Requirement
1	Facilities	4.1.3	Water storage tanks shall be cleaned periodically and records of the same shall be maintained in a register
2	Food operations and controls	5.1.3	Records of raw materials, food additives and ingredients as well as their source of procurement shall be maintained in a register for inspection
3	Audit, documentation and records	8.2	Appropriate records of food processing / preparation, production / cooking, storage, distribution, service, food quality, laboratory test results, cleaning and sanitation, pest control and product recall shall be kept and retained for a period of one year or the shelf-life of the product, whichever is more
4	Sanitation and maintenance of establishment premises	9.1.1	A cleaning and sanitation programme shall be drawn up and observed and the record thereof shall be properly maintained, which shall indicate specific areas to be cleaned, cleaning frequency and cleaning procedure to be followed, including equipment and materials to be used for cleaning. Equipment used in manufacturing will be cleaned and sterilized at set frequencies

Sr. No.	Records for	Clause	Requirement
5	Sanitation and maintenance of establishment premises	9.2.3	Pest infestations shall be dealt with immediately and without adversely affecting the food safety or suitability. Treatment with permissible chemical, physical or biological agents, within the appropriate limits, shall be carried out without posing a threat to the safety or suitability of food. Records of pesticides / insecticides used along with dates and frequency shall be maintained
6	Personal hygiene	10.1.2	Arrangements shall be made to get the food handlers / employees of the establishment medically examined once in a year to ensure that they are free from any infectious, contagious and other communicable diseases. A record of these examinations signed by a registered medical practitioner shall be maintained for inspection purpose
7	Personal hygiene	10.1.3	The factory staff shall be compulsorily inoculated against the enteric group of diseases as per recommended schedule of the vaccine and a record shall be kept for inspection
8	Condition of license	8	Maintain daily records of production, raw materials utilization and sales separately
9	Condition of license	14	The manufacturer/importer/distributor shall buy and sell food products only from, or to, licensed/registered vendors and maintain record thereof

5. Check the packaging of the finished goods is as per the SOP.
6. Check the labels of the finished goods for all the required entries as per the SOP and FSSAI guidelines.
7. Enter the details of the finished goods register/ ERP application as per the SOP.
    - Enter the date of packing.
    - Enter the date of manufacture.
    - Enter the date of expiry.
    - Mention the primary, secondary and tertiary packaging materials.
    - Mention the storage conditions as per organisation standards for light, air and temperature and humidity.
8. Use the observation table and enter the details of the finished goods.

Precautions:

- Ensure that the entries do not have any incorrect inputs by doing a thorough check.

Observation:

Sr no	Name of finished products	Batch number	Time of packing	Date of manufacture	Date of expiry	Packing materials used	Storage conditions
1							
2							
3							
4							
5							
6							

Conclusion:

Finished goods register updated for the following processed products:

Sr no	Products
1	
2	
3	
4	
5	
6	

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7. Food Safety, Hygiene and Sanitation

FIC/N9001

Key Learning Outcomes

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

1. Demonstrate the process of maintaining personal hygiene and sanitation
2. Identify the agents which are a potential food hazard and can cause adverse health effects
3. Demonstrate and apply food safety practices at workplace

UNIT 7.1: Safety and Sanitation Functions

Unit Objectives

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

1. Demonstrate the process of maintaining personal hygiene and sanitation

7.1.1 Materials required for the practical

- Cleaning agents
- Sanitisers
- PPE
- Food safetymanual
- First aid box
- Tool box

7.1.2 Practical

Pre-requisite knowledge:

- Food safety, hygiene and sanitation

Method:

Personal hygiene

1. Personal cleanliness of food handlers is the most important link in preventing foodborne illness.
2. These personal hygiene habits become a part of their behaviour.
3. Wear suitable clean protective clothing, head covering, face mask, gloves and footwear.

Dos		Don'ts
• Hair properly tucked inside the head mask/cap • No jewellery (earrings, necklace etc.) • No outer pockets • Wear neat and clean clothes • No wrist watch • Cover all wounds • Nails trimmed and clean • Torn clothes to be repaired/ replaced • Safety shoes		• Hair coming outside the head mask/cap • Jewellery (earrings, necklace etc.) • Outer pockets and contents • Dirty clothes • Wearing wrist watch • Cover all wounds • Long nails • Torn clothes • Bare feet/slippers

Fig . 7.1.1. Behavioural practices for food handlers – do's and don't's

4. Always clean your hands before beginning work, before handling food and after any activity which may contaminate the food and equipment you are working with.
5. Follow the six simple steps as given for hand sanitation.

Fig . 7.1.2. Hand sanitation

6. Follow the guidelines when to wash hands.

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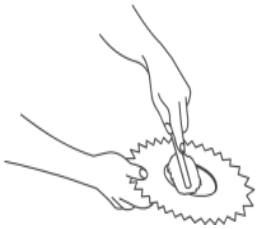
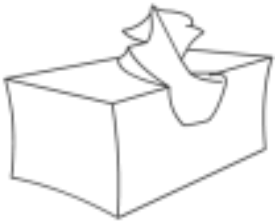
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Before and after using toilet/ urinals / rest room</td><td>Before serving food/beverages</td><td>Before putting on gloves and after taking it off</td><td>After eating/ drinking and breaks</td></tr>
<tr><td>  </td><td>  </td><td colspan="2" rowspan="2"> 
Before and after handling/preparing food items</td></tr>
<tr><td>After using a tissue or handkerchief</td><td>After sneezing/ coughing/ scratching any part of your body</td></tr>
<tr><td colspan="4">Fig . 7.1.3. When to wash hands</td></tr>
</table>

Raw material procurement

1. Check all raw materials for visible deterioration, off-odour and for any foreign matter while receiving and storing.
2. Raw materials received in tankers to be checked for seal integrity and only dedicated tankers to be used.
3. Check if the raw materials quantities purchased correspond to storage/preservation capacity of the establishment (follow the SOP).
4. Check for 'expiry date'/ 'best before'/ 'use by date, packaging integrity and storage conditions for packaged raw materials.

Safety symbols and warnings

1. Read the safety symbols, warnings and instructions very carefully.

Fig. 7.1.4. Safety Symbols

2. Before entering into the work area, check that it is not under the prohibited zone.
3. Wear the personal protective equipment before entering the processing line.
4. After entering the working zone, check that required machineries are working properly.
5. Before starting the machine, ensure that machines are plugged to the electric circuit properly.
6. Check if the tool box has the required tools for operations.
7. Ensure the first aid box is placed at the appropriate place and contains all the necessary medicines and equipment.

Fig. 7.1.5. First Aid Box

Precautions:

1. Follow the safety instructions completely.
2. Maintain proper hygiene and sanitation at workplace.
3. Report to the concerned person during any emergency and don't panic.
4. Do not receive or use raw material or ingredients that are spoilt or contain pesticides, veterinary drugs or toxic items or decomposed for processing.

Observation:

Sr no	Materials	Availability and maintenance
1.	**List of PPE**	
2.	**List of Cleaning agents**	
3.	**List of warnings and symbols present at workplace**	

Sr no	Materials	Availability and maintenance
4.	**Contents of the tool box**	
5.	**Contents of the first aid box**	

Conclusion:
Write your conclusions here.

Sr no	Why safety at workplace is very important?	
1	Are the necessary PPEs available to carry out the work? (Y/N)	
2	Are the cleaning agents (sanitisers, soaps, etc.) available at workplace? (Y/N)	
3	Are the safety and warning symbols displayed at the workplace? (Y/N)	
4	Is the first-aid kit available with necessary medical aid? (Y/N)	

UNIT 7.2: Food Safety Hazards

Unit Objectives

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

1. Identify the agents which are a potential food hazard and can cause adverse health effects

7.2.1 Materials required for the practical

- PPE
- Food safetymanual
- Food samples

7.2.2 Practical

Pre-requisite knowledge:

- Food safety, hygiene and sanitation.

Method:

1. Identify the types of hazards in food.
2. Check for the possible hazard in the entire process of fruit pulp production

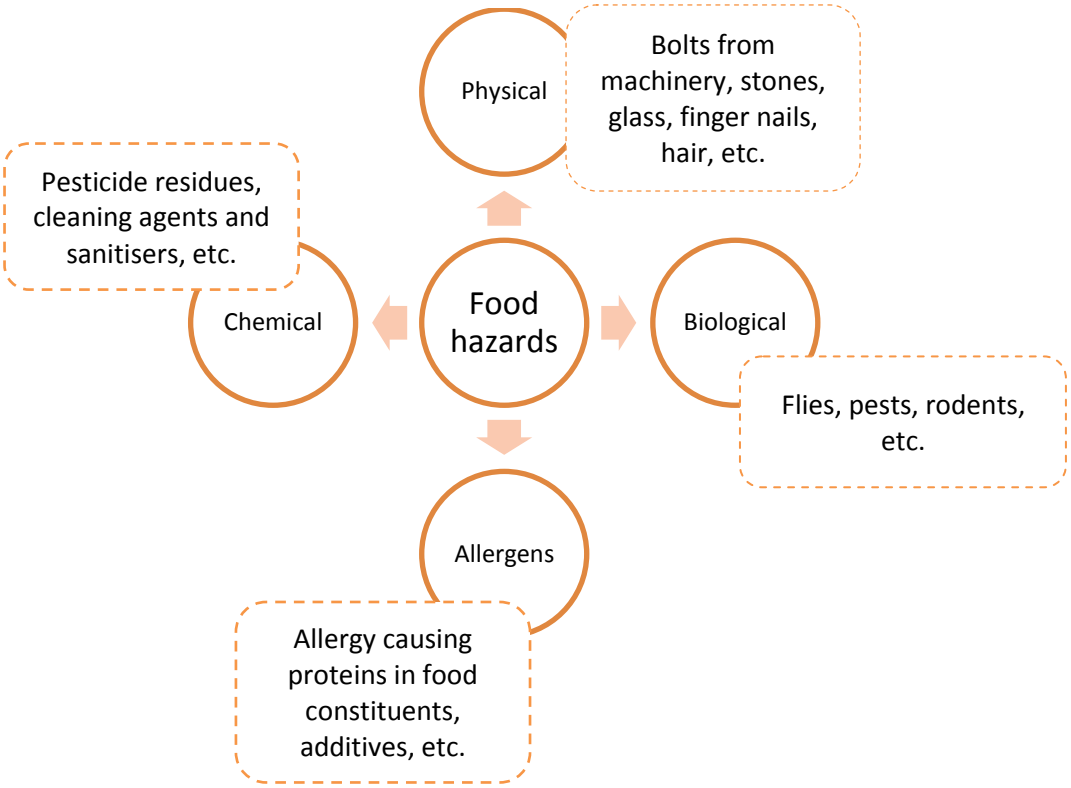


Fig . 7.2.1. Food hazards

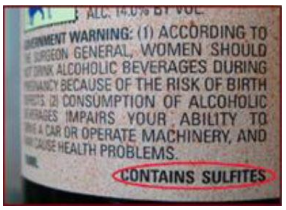
			
Cereals containing gluten	Eggs and egg products	Fish and fish products	Tree nuts and nut products
			
Peanuts soyabeans and its products	Crustacea and its products	Sulphite in concentrations of 10mg/kg or more	Milk products

Fig . 7.2.2. Food allergens

Biological	Hair, excreta, bone splinters, etc.   *Fig . 7.2.3. Biological contaminants*
Chemical	Pesticide residues, detergents, etc.   *Fig. 7.2.4. Chemical contaminants*
Physical	Bolts from machinery, stones, glass, etc.   *Fig. 7.2.5. Physical contaminants*

3. Check the labels of incoming raw materials for appropriate allergen information.
4. Tag the items as appropriate (follow SOP) to ensure that the allergen is clearly identified.
5. Handle the damaged containers appropriately as per SOP to minimise cross-contamination at receipt.
6. Store allergenic ingredients separately or in the designated storage area using clean and closed containers to minimise cross contamination.

7. Check whether the allergens are declared on labels, for all products, including rework, and intermediate products.
8. Use appropriate cleaning methods for e.g. vacuum, soap and water wash, appropriate chemicals) and hand washing at appropriate times (for e.g. after handling a product containing allergens like peanuts etc., clean clothing and other PPE as specified in the SOP.
9. Note down the observations in the observation table.

Precautions:

- Do not store allergens and non-allergens materials together.
- Use safe practices while checking inside the equipment.
- Ensure adequate lighting at all processing and storage area while working.
- Ensure the traffic patterns of raw materials, packaging supplies, and employees are limited during the production of allergen containing products and do not lead to cross-contact.
- Document and use appropriate cleaning procedures for spills or damages of allergens.
- Use dedicated pallets and bins for allergen materials.

Observation:

Sr no	Sample description	Checklist	Observations	Action taken
1		Packing intact/ damaged?		
		Any food contaminants found?		
		Any allergens?		
		Information on the labels as per FSSAI guidelines?		
2		Packing intact/ damaged?		
		Any food contaminants found?		
		Any allergens?		
		Information on the labels as per FSSAI guidelines?		

Conclusion:
Write your conclusions here:

Sr no	Conclusion
1	

UNIT 7.3: Apply Food Safety Practices

Unit Objectives

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

1. Demonstrate and apply food safety practices at workplace

7.3.1 Materials required for the practical

- PPE
- Food safetymanual
- Food samples

7.3.2 Practical

Pre-requisite knowledge:

- Food safety, hygiene and sanitation.

Method:

- Every manufacturing / processing unit should have a Food Safety Management System (FSMS) Plan.
- The purpose of FSMS is to ensure the manufacture, storage, distribution and sale of safe food.

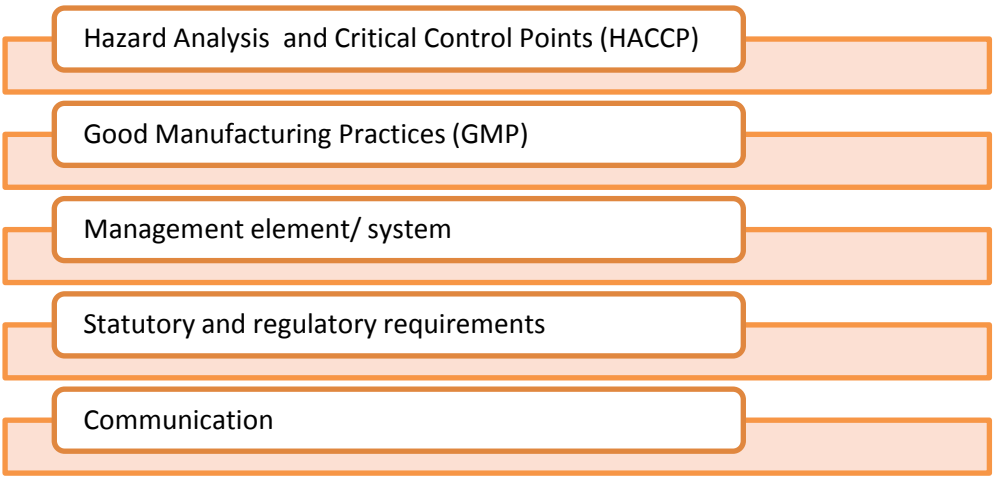


Fig . 7.3.1. Key elements of FSMS

1. As per HACCP principle,
   - Conduct hazard analysis to identify the types of hazard
   - Identify the critical control points.
2. Determine the critical control points (CCP).
3. Analyse the CCP at for each step in the production or process.
4. Refer to the critical limits from safety manual (organisation specific).
5. Establish the critical limits.
6. Monitor the critical limits using the monitoring systems.
7. Apply corrective measures to control the specified limits.
8. Enter the observation records in the log book.
9. Enter the CCP for raw materials in the observation table.

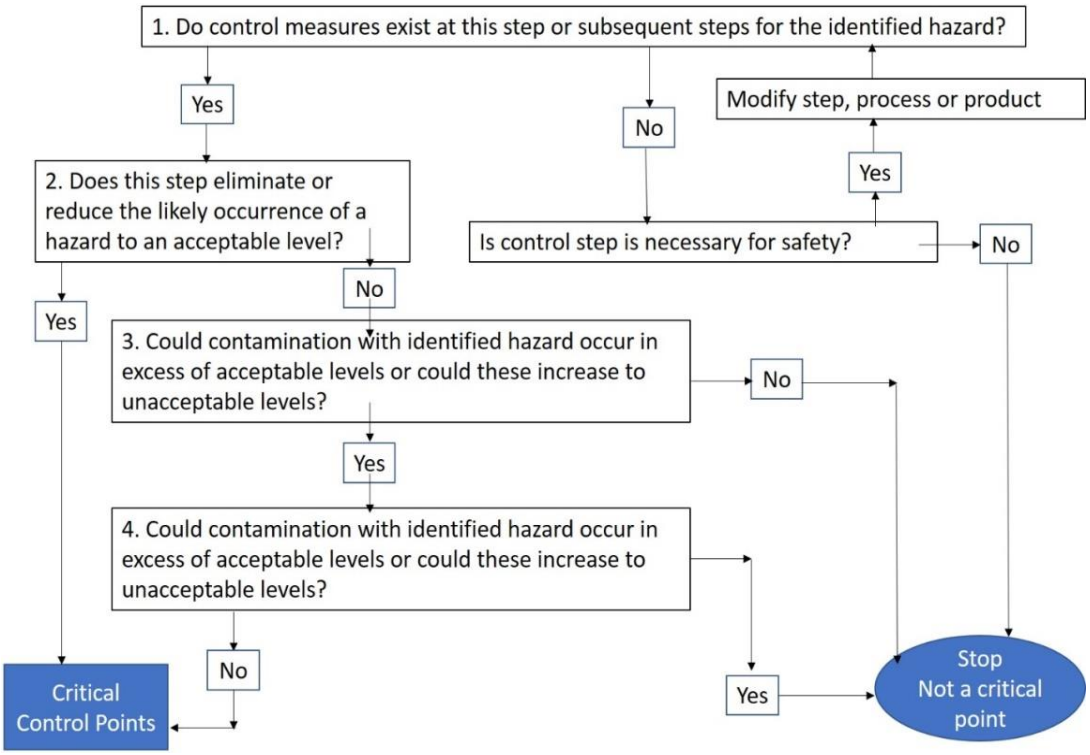


Fig . 7.3.2. CCP decision tree

10. Check for GMP (Good Manufacturing Practices) as per FSSAI guidelines.
    - GMP focuses on personal hygiene, process validation, maintenance of equipment, sanitation of the work area.

Fig . 7 3.3. GMP focus areas

GMP checklist		
Sr. No.	**Focus area**	**Observation and remarks**
1	**LOCATION AND LAYOUT OF FOOD ESTABLISHMENT**	
	• Ideally located away from industries which are emitting harmful gases, obnoxious odour, chemical etc.	
	• Ceiling roof is of permanent nature floor of building is cemented, tiled or laid in stone/ pakka floor • Production area walls are smooth, made with impervious material up to a height of not less than five feet and the junction between the walls and floors are curved • Premises of the factory is adequately lighted and ventilated, properly white washed or painted	
	• Provision for disposal of refuse and effluents is available • Food production/ food service area provided with adequate drainage facility • Proper outlets for smoke/ steam etc., like chimney, exhaust fan etc. are installed and the fans installed at a suitable height • Doors are provided with automatic door closer • Doors, Windows and other openings are fitted with net or screen to prevent insects etc.	
	• Antiseptic/ disinfectant foot bath is provided at the entrance • Sufficient number of latrine and urinals for worker are provided and located outside the processing hall • All the machinery is installed in such a manner which may allow continuous flow of production and do not occupy more than 50% of the total production and permits hygienic production and easy movement	
2	**EQUIPMENT AND FIXTURES**	
	• Equipments kept clean, washed, dried and free from moulds and fungi • No such Container/ Vessel/ Equipment's in use likely to cause metallic contamination • The table tops used for food preparation are made of close joint and impervious material. • The equipment's are made of stainless steel /galvanised iron/ non corrosive materials • Appropriate facilities for the cleaning and disinfecting of equipment's and instruments and preferably cleaning in place (CIP) system are adopted; wherever necessary	
3	**STORAGE SYSTEMS**	
	• Appropriate arrangement for storage of food & food ingredients provided and adequately segregated and labelled • Raw material, food additives and ingredients, wherever applicable are conforming to regulations laid down under the act	

Sr. No.	Focus area	Observation and remarks
	• Containers used for storage are made of non-toxic material	
	• Systems to adequately maintain time- temperature control at the time of storage • Cold Storage facility, wherever necessary/ provided	
4	**PERSONAL HYGIENE**	
	• Suitable aprons, head cover, disposable gloves & footwear are provided • Adequate facilities for toilets, hand wash and footbath, with provision for detergent/bactericidal soap, hand drying facility and nail cutter are provided	
	• No person suffering from any infection or contagious disease • Arrangements are made to get the staff medically examined once in six months to ensure that they are free from infectious, contagious and other diseases • The staff working in such factory are inoculated against the enteric group of disease and vaccinated • No employee of such factory who is suffering from a hand or face injury, skin infection or clinically recognisable infectious disease	
5	**WATER SUPPLY**	
	• Adequate supply of potable water • Appropriate facilities for safe & clean storage of water	
	• The water is examined chemically and bacteriologic ally by a NABL accredited laboratory • Ice and steam wherever in use during processing is made from potable water • Identifying marks have been applied to the pipelines for easy identification of potable and non-potable water	
6	**PEST CONTROL SYSTEM**	
	• Treatment with permissible chemical, physical or biological agents within the permissible limits are carried out • Adequate control measures are in place to prevent insect and rodents from the processing area	
7	**CONVEYANCE AND TRANSPORTATION**	
	• Conveyance and transportation of food being done in an appropriate state of cleanliness, particularly if the same vehicle has been used to carry non-food items • The conveyance and transportation are provided with temperature control system	
8	**CLEANING AND MAINTENANCE**	
	Cleaning and sanitation programme is drawn up, observed and the record of the same is properly maintained Food preparation areas are cleaned at regular intervals, with water, and detergent and with the use of a disinfectant	

Sr. No.	Focus area	Observation and remarks
9	**OPERATIONAL FEATURES**	
	• The source and standards of raw material used are of optimum quality and as per regulation and standards laid down under the Act • Test report from own or NABL accredited/ FSSAI notified labs regarding microbiological contaminants in food items are available • Arrangements for monitoring temperature and relative humidity	
10	**DOCUMENTATION AND RECORDS**	
	• Records of daily production, raw material utilized and sales are available • A periodic audit of the whole system according to the Standard Operating Procedure (SOP) conducted regarding Good Manufacturing Practices/Good Hygienic Practices (GMP/ GHP) system • Appropriate records of food processing/ preparation, food quality, laboratory test results, pest control etc. for a period of 1 year or the shelf -life of the product; whichever is more • Records of sale and purchase that the food product sold to registered/licensed vendor and raw material purchased from registered/ licensed supplier • Recall plan	
11	**PRODUCT INFORMATION AND CONSUMER AWARENESS**	
	All packaged food products carrying label and requisite information as per Regulations are made	
12	**TRAINING**	
	Food production personnel and production floor managers/ supervisors underwent appropriate food hygiene training	

Fig.7.3.4.Waste water disposal system/effluent treatment plants

Fig.7.3.5.Well-guarded entrance

Fig.7.3.6.Demarcation of the area

Fig.7.3.7.Premises tarred and concreted to avoid dust

Fig.7.3.8.Entrance with hygiene station

Fig.7.3.9.Hand-wash stations

Fig.7.3.10.Locker room

	
Material storage on Pallets	Separate storage Area for Expired/damaged material
	
Proper stacking of raw materials on pallets	Proper stacking of raw material away from wall

Fig.7.3.11.Storage of raw materials and food

Colour Coding for material

	PASS
	UNDER TEST
	HOLD
	REJECT

Fig.7.3.12.Colour coding for easy identification of quality status

Fig.7.3.13.Clearly defined walkway water stagnation near the surroundings

Fig.7.3.14.Avoid vegetation growth near the premises

Fig.7.3.15.Avoid water stagnation near the surroundings

Fig.7.3.16.Walls: clean, durable, impervious to moisture

Fig.7.3.17.Avoid Cracks on walls as it allow bacteria and moulds to accumulate

Fig.7.3.18.PVC strip curtains

Fig.7.3.19.Automatic closing springdoors

Fig.7.3.20.Air curtain

Fig.7.3.21.Special stone flooring to avoid slipping and easy to clean

Fig.7.3.22.Epoxy and smooth flooring, easy to clean and avoids dust accumulation and microbial contamination

Fig.7.3.23.Covered drains to prevent insects and rodents

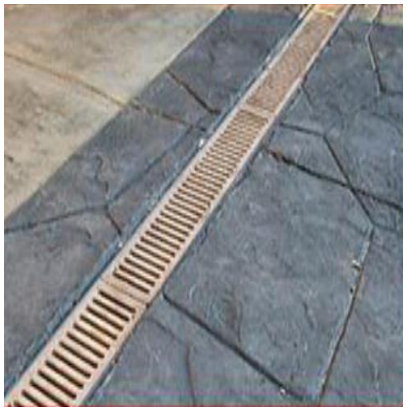


Fig.7.3.24.Floor with proper drainage

Fig.7.3.25.Nets and mesh on windows to avoid pest entry

Fig.7.3.26.Covered lights in the production area

Fig.7.3.27.Food Transportation

Fig.7.3.28.Proper lighting facility in the work area

Fig.7.3.29.Vehicle inspection before loading

Fig.7.3.30.Multilayer Tarpaulin to protect from water and dust

Fig.7.3.31. Display of Cleaning Status on Tankers and lock and key system provided for food defence

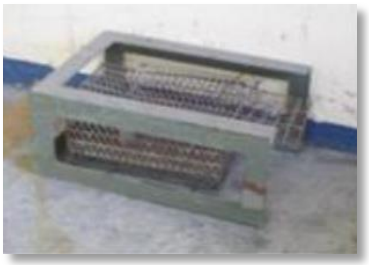
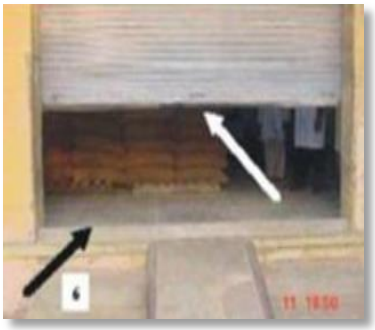
		
Rat cage protected by steel frame	Glue board for insect trapping in production	End seal for pipelines not in use
		
Insectocutor used outside production area	Temper resistant bait station secured onto ground hook up baits	Mesh and grit for drainage
		
Deny entry	Deny food	Deny shelter
		
Destruction		

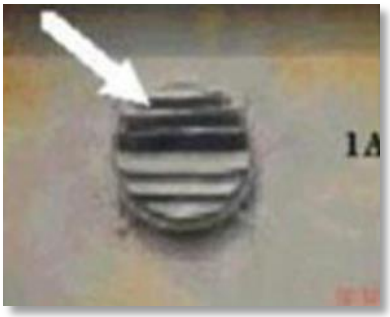
Fig.7.3.32.Some pest control methods

Broken glass at the window

Open exhaust



Gap in between shutter and floor



Space in blinds on exhaust

Fig.7.3.33.Some potential sources of pest entrance

Fig.7.3.34.Color coding of water pipes to avoid contamination

Sr. No.	Material	Dustbin Colour	SYMBOL
1	Oily Cotton Waste	Red	
2	Paper	Green	
3	Plastic Jars, Sampling Bottles	Blue	
4	Plastic Bags	Yellow	
5	Polish Filter	Grey	
6	Food Waste	Orange	
7	Glass Bottles	Black	

Fig. 7.3.35. Waste categorisation with dedicated bins

Precautions:

- Ensure that critical control points are maintained as per HACCP principle.

Observation:

Sr no	Raw material	CCP limit to be maintained as per specifications	CCP limit maintained (Y/N)

Conclusion:

Sr no	Are records relating to safety maintained in the Log Book (Y/N)?
1	

FSMS Plan						
Hazard	**Control measure**	**Critical limit**	**Monitoring method**	**Corrective action**	**Responsibility**	**Record**
Physical hazard (dirt, stone, particles)	Supplier guarantee specifications established by quality assurance department	As per company internal specifications	Supplier guarantee certificate is visually confirmed	Reject material if not accompanied by supplier	Reject material if not accompanied by supplier	Supplier Guarantee
Chemicals (toxins, pesticides from raw material)	Relative humidity-maintained store					
Relative humidity-maintained store	FIFO system should be established		Monitor temperature and humidity of storage			Store temperature log

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

FICSI
Food Industry Capacity and Skill Initiative

8. Professional and Core Skills

Unit 8.1 – SWOT Analysis	30 mins
Unit 8.2 – Decision Making	30 mins
Unit 8.3 – Plan and Organise	1 hr
Unit 8.4 – Customer Centricity	1 hr
Unit 8.5 – Problem Solving	1 hr
Unit 8.6 – Analytical Thinking	1 hr
Unit 8.7 – Critical Thinking	1 hr

Key Learning Outcomes

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

1. Undertake a self-assessment test
2. Identify personal strengths and weaknesses
3. Choose between two or more courses of action to solve problems quickly and effectively
4. Plan and schedule activities or task assigned in an organised way
5. Manage time effectively to complete the tasks assigned
6. Identify customer requirements and their priority and respond accordingly
7. Identify potential problems to make sound and timely decisions
8. Apply analytical skills and its attributes to make decisions and solve problems
9. Develop critical thinking skills to prevent potential problems
10. Develop critical thinking skills to resolve issues

UNIT 8.1: SWOT Analysis

Unit Objectives

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

1. Undertake a self-assessment test
2. Identify personal strengths and weaknesses

8.1.1 SWOT analysis

Write your strengths, weaknesses, opportunities, and threats in the 4 sections here.

Strengths	Weaknesses
Opportunities	**Threats**

Fig.8.1.1. SWOT Analysis

1. Was this activity helpful in doing a self-assessment?

   _____

2. What were some of the most interesting things you discovered about yourself during the activity?

   _____

UNIT 8.2: Decision Making

Unit Objectives

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

1. Choose between two or more courses of action to solve problems quickly and effectively

8.2.1 What is decision making?

Decision making is an act of choosing between two or more courses of action. There may not always be a 'correct' decision among the available choices. There may have been a better choice that had not been considered, or the right information may not have been available at the time.

8.2.2 Techniques of decision making

Decision making is an act of choosing between two or more courses of action. There may not always be a 'correct' decision among the available choices. There may have been a better choice that had not been considered, or the right information may not have been available at the time.
Many different techniques of decision making have been developed. The method used depends on the nature of the decision to be made and how complex it is. The stages of the method are as follows:

1. •Listing all possible solutions/options
2. •Setting a time scale and deciding who is responsible for the decision
3. •Weighing up the risks involved
4. •Deciding on values, or in other words what is important
5. •Deciding on values, or in other words what is important
6. •Making the decision

Fig.8.2.1 Steps for decision making

8.2.3 Develop Decision Making Skills

- Please answer each of the following questions as honestly as possible.
- Circle your answer for each question.
- Refer to the result table given below and evaluate the result of your answers.

		Mark where you stand (Circle your answer)				
Sr. No.	Decision making skills	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
1	Desire to actively participate in the process of solving/ improving a situation	5	4	3	2	1

2	Too much analysis of situation results in delaying decision	5	4	3	2	1
3	Respect other people's suggestion and recommendations	5	4	3	2	1
4	Analyse and calculate the risk and problems which may occur after taking a decision	5	4	3	2	1
5	Follow workplace rules and guidelines in situations involving high level of risk at work	5	4	3	2	1
6	Use your job specification to take appropriate decision	5	4	3	2	1
7	Do not hesitate to consult your supervisors and subordinates before arriving to a decision point	5	4	3	2	1
8	Do not make workplace decision based on emotions	5	4	3	2	1

- Evaluate your answers after you complete the above table.
- Check the result for each question if your answer is:

Score	Evaluation	Result
1 - 3	You need to work hard to develop this quality	Work hard
4	You possess this quality but need to enhance it for better success	Keep improving
5	You possess this quality and this is your strength use it to make timely and effective decision	Use this strength

My Score	What should you do?

UNIT 8.3: Plan and Organise

Unit Objectives

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

1. Plan and schedule activities or task assigned in an organised way
2. Manage time effectively to complete the tasks assigned

8.3.1 Ways to plan and organise yourself at workplace

- Organising and planning is a process of completing a given task efficiently and successfully.
- Organising and planning includes:

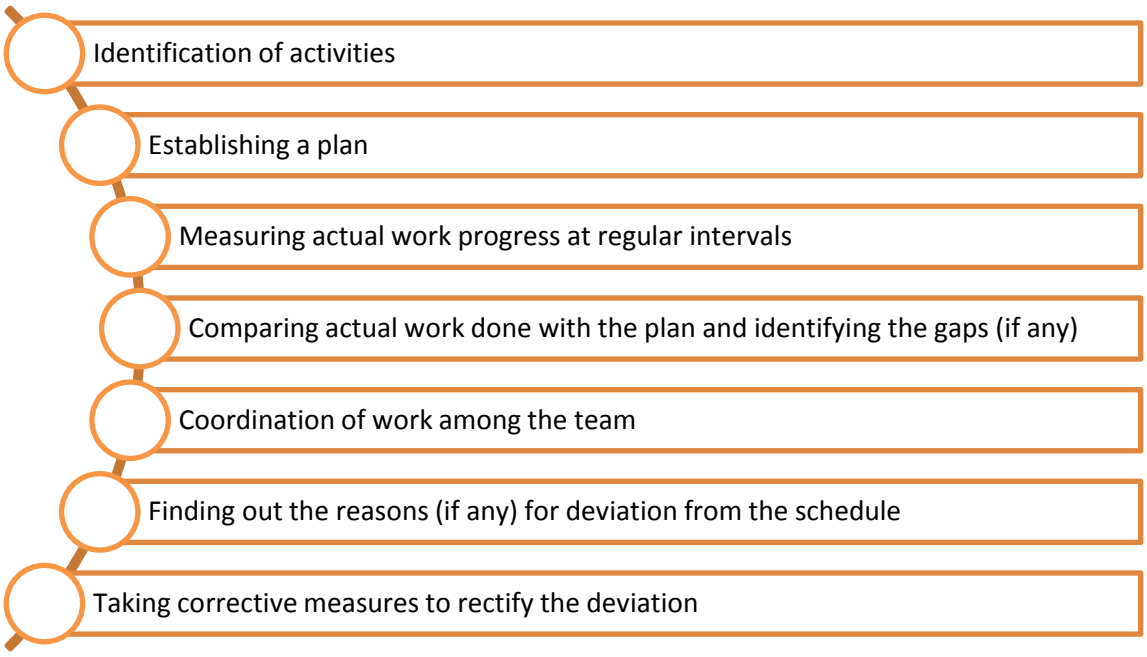


Fig.8.3.1 Ways to plan and organize yourself

8.3.2 Benefits of organising and planning

1. Write the benefits of organizing.

_____

_____

2. Write the benefits of planning.

_____

_____

8.3.3 Time management

It is easy to manage our time effectively, especially if we follow a few simple steps.

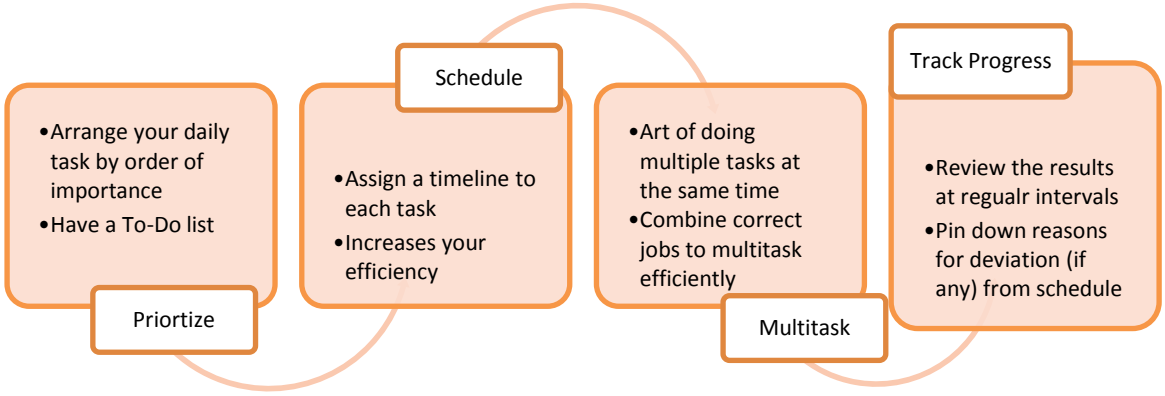


Fig: 8.3.2 Steps to manage time effectively

8.3.4 Ways to manage your work hours in the most effective

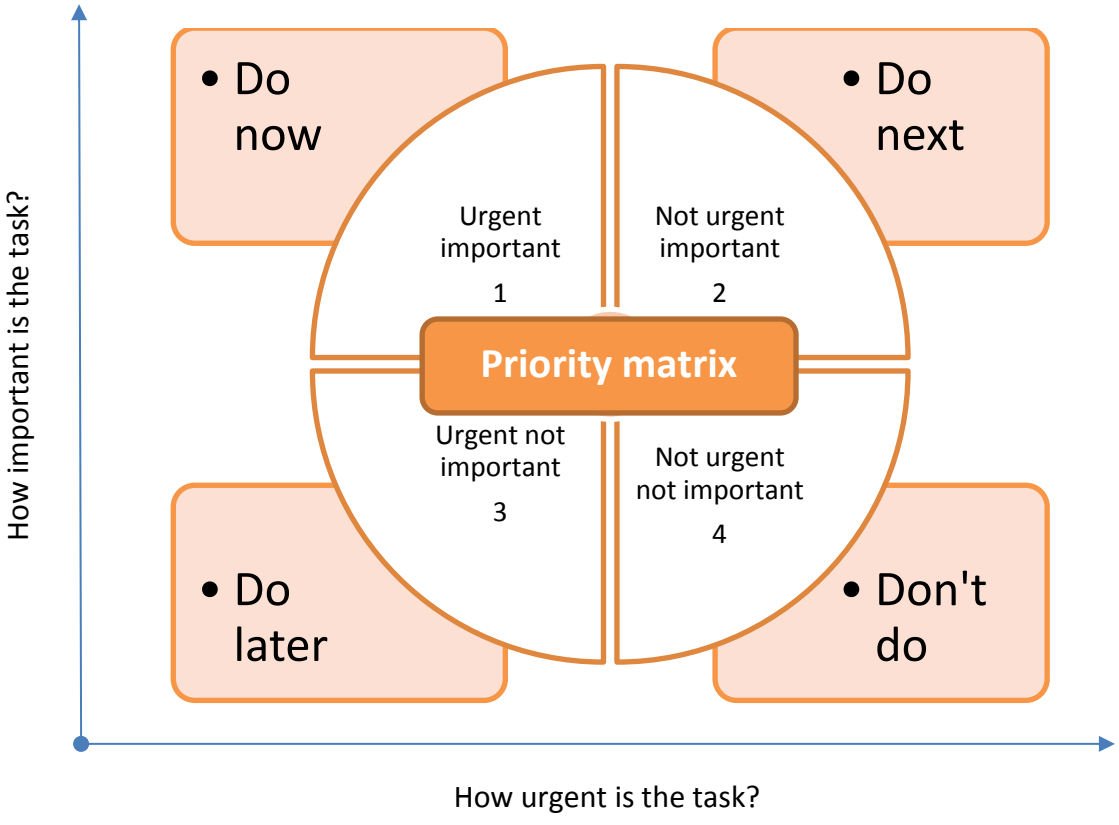


Fig . 8.3.3. Priority matrix

8.3.5 To-Do list

Create a To-Do list to keep track of the job received identifying the priority

Sr no	Date	Job code/ number	Task/ activities	Target completion	Priority
1					
2					
3					
4					
5					
6					

UNIT 8.4: Customer Centricity

Unit Objectives

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

1. Identify customer requirements and their priority and respond accordingly

8.4.1 How to maximise customer service?

Customer service is an integral part of any business. A good customer service can lead to:

- increase in sales and profit
- business goodwill
- most importantly, loyal customers.

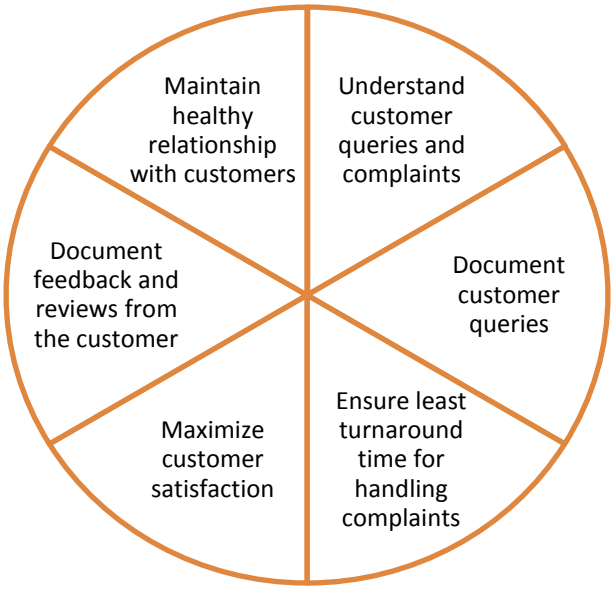


Fig.8.4.1. Ways to maximise customer service

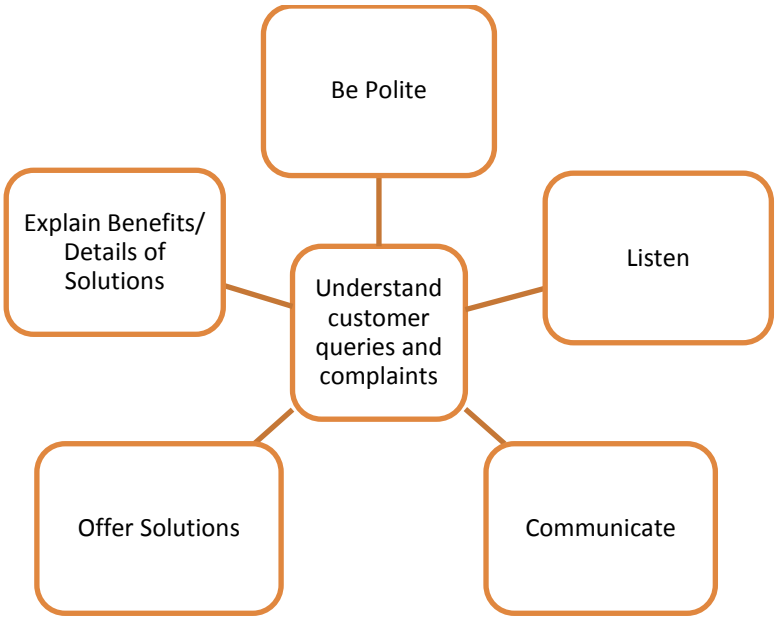


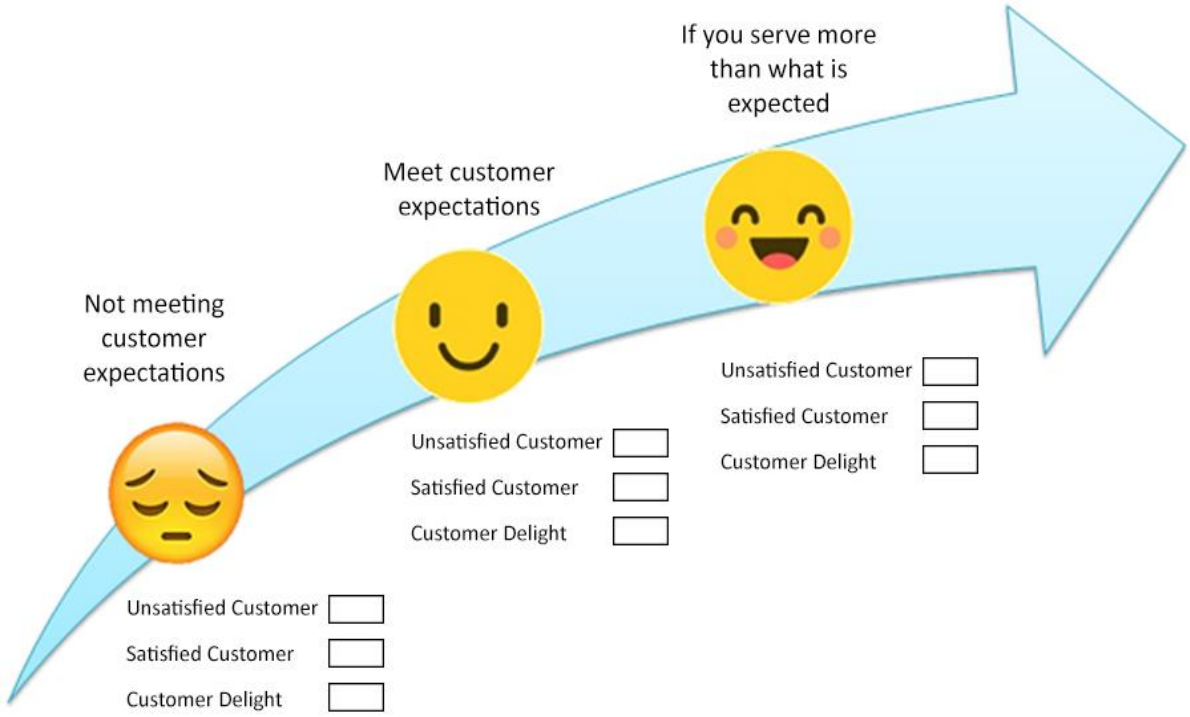
Fig.8.4.2. Understand customer queries and complaints

8.4.2 Maximise customer satisfaction

- Understand customer needs and expectations
- Provide high quality service
- Provide assistance before, during and after customer requirements are met

Fig.8.4.3. Customer satisfaction parameters

Select the right customer against the service quality given (mark a tick against the correct answer):



List the benefits of a good customer service:

A satisfied customer will become a repeat customer

One satisfied customer will bring in 10 other customers

_____

_____

_____

UNIT 8.5: Problem Solving

Unit Objectives

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

1. Identify potential problems to make sound and timely decisions

8.5.1 What is a problem?

A problem is a situation faced by an individual or a group that requires resolution. The apparent path for the solution may or may not be visible to people initially. Problem is what is different between 'what is' and 'what can' or 'should be'. It is usually an unwelcome and difficult situation that everybody faces in their lives.

Whether it is the personal life or a professional one, problems are a part of everybody's life because life is unpredictable. Surrendering to the problem and resigning to it is not always a good solution. A person needs tactics to solve it, learn from it and prevent it in the future.

8.5.2 Steps in problem solving

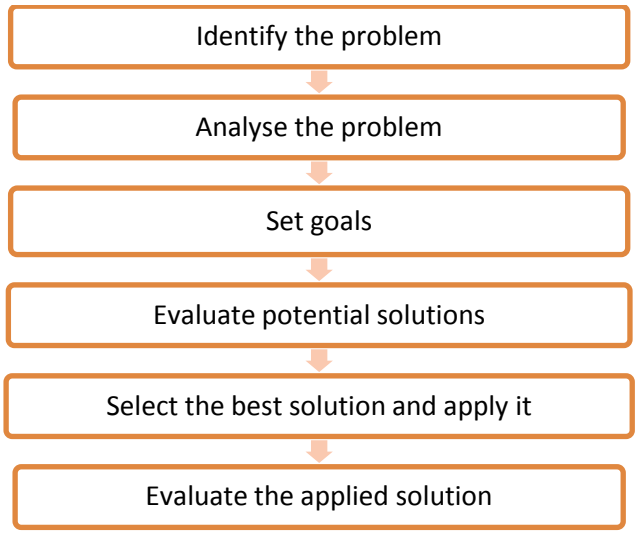


Fig .8.5.1. Steps in problem solving

Write your problem statement here (for eg: The output or product is not as per the desired quality and specifications) and use the template given to solve the problem.

_____

_____

_____

_____

Sr no	Steps to solve the problems	Notes for problem solving
1	**Identify the problem**	
	Identify what is wrong	
	Speak about it to your peers	
2	**Analyse the problem**	
	What is the issue?	
	Why did it happen?	
	When did it get noticed?	
	Who is going to get affected by it	
3	**Set goals**	
	What do I want?	
	What is the current state and what is the desired state?	
	What are the steps that I should take to resolve the issue?	
	Am I following the steps and finishing on time?	
	What is getting in my way of reaching the desired outcome?	
4	**Evaluate potential solutions**	
	What are the different options that will solve the problem?	
	What are the positives and negatives of each option?	
5	**Select the best solution and apply it**	
	Which one do you think is the best solution?	
	How will you apply the best solution?	
6	**Evaluate the applied solution**	
	Was my solution the best one?	
	Did I have a better way of solving the issue?	
	Did I judge the problem correctly?	
	Could I stop the loss?	
	Can I apply this solution next time for a similar problem?	

UNIT 8.6: Analytical Thinking

Unit Objectives

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

1. Apply analytical skills and its attributes to make decisions and solve problems.

8.6.1 What are analytical skills?

Analytical skills refer to the ability to collect information, analyse information, make decisions, and solve problems.

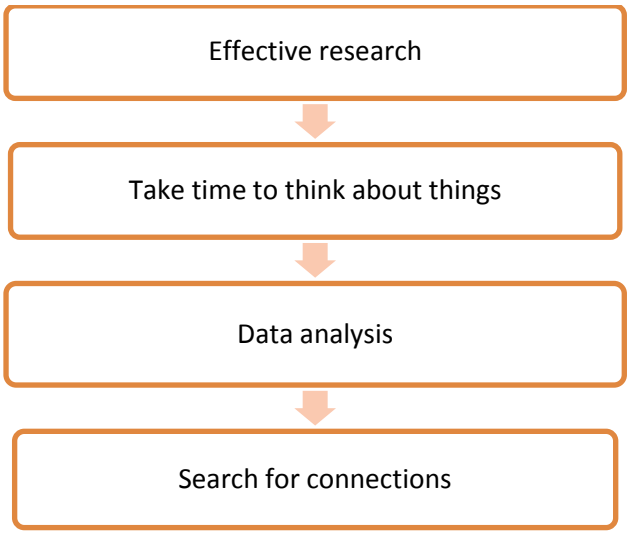


Fig.8.6.1. Analytical skills

8.6.2 How can you develop analytical skills?

- Use this template for developing your analytical skills.
- If you already possess analytical skills, you may continue enhancing them, and if you don't then work on developing it.

Sr.No.	How can I develop my analytical skills	I need to .....
1	**Do effective research**	
	Read books or newspapers, watch documentary movies, attend lectures etc.	
2	**Take time to think about things**	
	Think and reflect about things, instead of making quick and rash decisions	
	Consider multiple sides of a problem before picking a solution	
3	**Do data analysis**	
	After procuring information you should analyse it	
	Data analysis is simply the ability to find and detect patterns in a volume of information	

4	**Search for connections**	
	Correlation about things in terms of cause and effect (for eg: The output or product is not as per the desired quality and specifications)	
	Think about the similarities between things (for example, bread making and biscuit making, wheat flour and maida, paneer and cheese, pulp and juice, etc.)	

UNIT 8.7: Critical Thinking Skills

Unit Objectives

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

1. Develop critical thinking skills to prevent potential problems
2. Develop critical thinking skills to resolve issues

8.7.1 Critical thinking

- Critical thinking includes the ability to think clearly and rationally. It also involves the ability to engage in reflective and independent thinking.
- In critical thinking, there is no conclusion; it is constant interaction with changing circumstances and new knowledge.

8.7.2 How to develop critical thinking skills?

1. Write your problem statement here:

_____

_____

2. Use critical thinking skills to solve the problem. Here are some tips to do it.

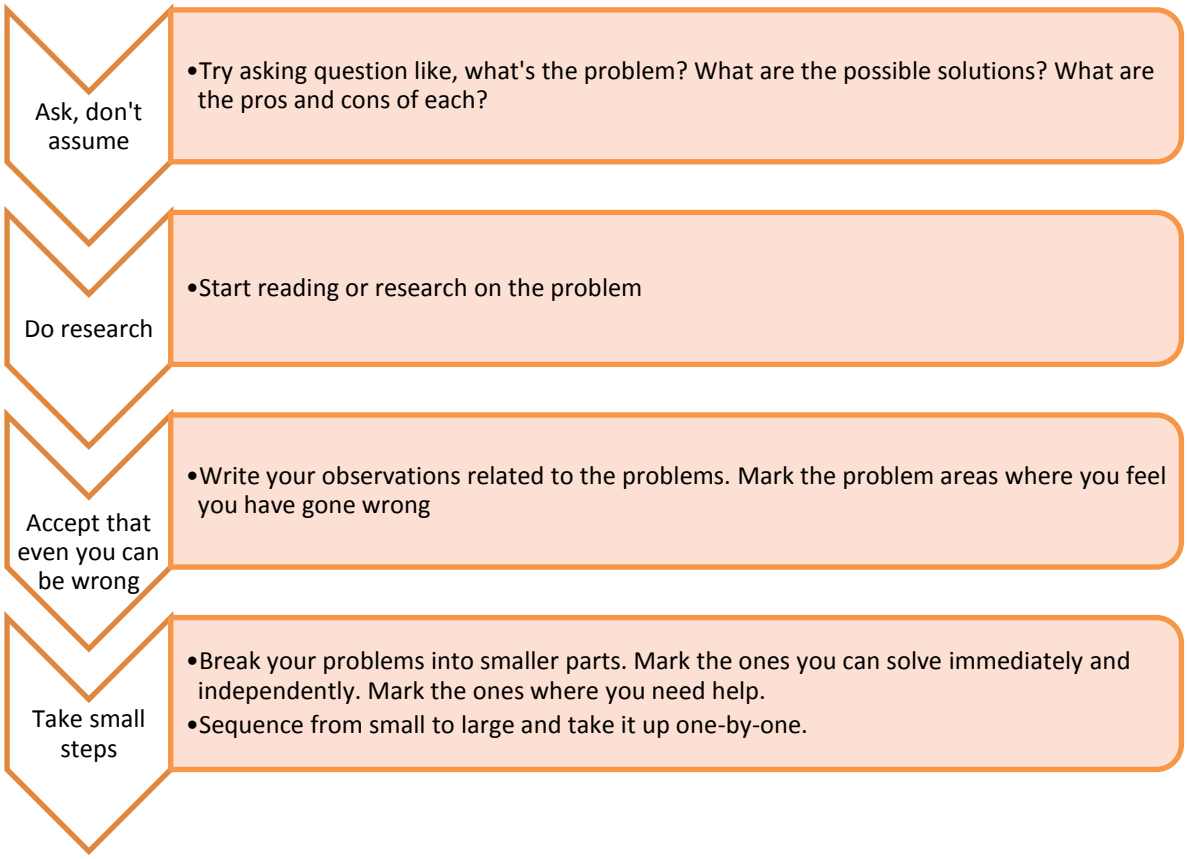


Fig.8.7.1. Tips to solve problems

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9. IT Orientation

Unit 9.1 - Basics of Information Technology 10 hrs

FIC/N0123

Key Learning Outcomes

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

1. Identify the different parts of a computer
2. Use the keyboard and mouse effectively
3. Use the applications Word processor and Spreadsheet effectively

UNIT 9.1: Basics of Information Technology

Unit Objectives

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

1. Identify the different parts of a computer
2. Use the keyboard and mouse effectively
3. Use the applications Word processor and Spreadsheet effectively

9.1.1 Computer Basics

Computing is an important part of everyday life in the twenty-first century. From music and photos to banking and communicating, computers have changed the way we work and live. This course introduces you to the fundamentals of computing, explains the components of a computer, explores operating system basics, and shows you how to use a mouse and a keyboard. Also explains how computers can be used in different aspects of life.

Benefits

Computers are used in every field. They help organizations and individuals to conduct business transactions efficiently and quickly. Today, one of the basic skills necessary to succeed at a workplace is to know how to use the computer. To be able to get better jobs, you need to know how to use a computer.

9.1.2 Introduction to Computers

What is a Computer?

Computer plays a very important role in our personal and professional lives. It has become an integral part of our lives.

Computers are electronic devices that perform the basic operations of input, processing storage, and output under the direction and control of a program. It has the ability to store, retrieve and process data. A computer is used to:

- Send e-mails
- Make Presentations
- Maintain Records
- Write Text
- Organize Files
- Surf the internet for relevant information
- And more

Fig.9.1.1. Process of computer

9.1.3 How does the Computer Work

The different parts of the computer need to talk to each other to do things for us. When you type letters on the keyboard, the keyboard sends a message through a wire to the System Unit which in turn sends a message to the monitor, they shows those letters on screen. So, only when all the parts are connected the computer can function properly.

Hardware is nothing but the internal and external physical components of a computer system.

The external components are the:

- Monitor
- Keyboard
- Mouse
- System Unit
- Printer and Speakers

The internal components are the:

- Motherboard
- Central Processing Unit (CPU)
- RAM
- Internal Buses, etc

These internal components present inside the System Unit make it possible for the computer to process commands received from the input devices and perform a particular task.

Software is a collection of computer programs and related data that provide instructions telling a computer what to do. In contrast to hardware, software is intangible, meaning it "cannot be touched".

Few examples of Computer Software

Application Software	Word Processors or Video games
Programming Software/ Languages	Define the syntax and semantics of computer programs
System Software	Operating Systems that allow the user to interface with the computer

Important Characteristics of a Computer

Speed: Computers provide the processing speed required by all sectors of service. The quick service we expect at the bank, at the grocery store, on the stock exchange, and on the Internet are dependent on the speed of computers.

Reliability: Humans, not computers, cause most errors.

Storage: Computers are capable of storing enormous amounts of data that must be located and retrieved very quickly.

Capacity: The capability to store and retrieve volumes of data is crucial for the Information Age.

Productivity: Computers provide the processing speed.

Applications of Computer

Business: To track inventories with bar codes and scanners, check the credit status of customers, and transfer funds electronically.

Homes: The tiny computers embedded in the electronic circuitry of most appliances control the indoor temperature, operate home security systems, tell the time, and turn video cassette recorders on and off.

Automobiles: They regulate the flow of fuel, thereby increasing petrol mileage.

Entertainment: They are used to create digitised sound on stereo systems or computer – animated features from a digitally encoded laser disc.

Education: Computers are used to track grades and prepare notes; with computer – controlled projection units, they can add graphics, sound, and animation to enrich lectures.

Scientific Research: Computers are used to solve mathematical problems, display complicated data, or model systems that are too costly or impractical to build, such as testing the airflow around the next generation of space shuttles.

Defence/Military: Computers are used in sophisticated communications to encode and unscramble messages, and to keep track of personnel and supplies.

The Different Components; Peripherals and it's Uses of a Computer

Input Devices: They are devices that convey information to the computer
Eg.: Keyboard; Scanner; Mouse; Mic or Microphone

Output Devices: Wherein the information is processed and displayed
Eg.: Printer; Monitor; Speaker etc.

Fig. 9.1.2. Components of a Computer

9.1.4 Mouse

Mouse is used to point and select. Always place the mouse on a mouse pad.

The different types of mouse available are:

Fig.9.1.3. Trackball mouse

Fig.9.1.4. Optical mouse

Fig.9.1.5. Touchpad

Fig.9.1.6. Ball mouse

Mouse is used to point and select.

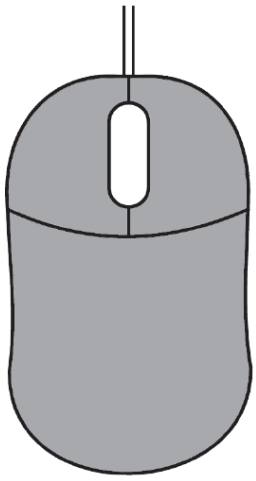


Fig.9.1.7. Mouse

Click	Use	How to Use
(Left) Click	Select	Press and release the button without moving the mouse.
Click and Drag	Move	Press and do not release the left mouse button, and then move the mouse with the button still held down, and finally release the button.
(Left) Double-click	Open	Press and release the left mouse button twice in rapid succession without moving the mouse.
Right-click	Display usable dropdown menu	Press and release the right mouse button, without moving the mouse.

9.1.5 Keyboard

The Keyboard is made up of Number and Letter keys. Keyboard is used for typing and the monitor shows what is typed. But first the keyboard tells the System Unit what to do and the System Unit gives this message to the monitor.

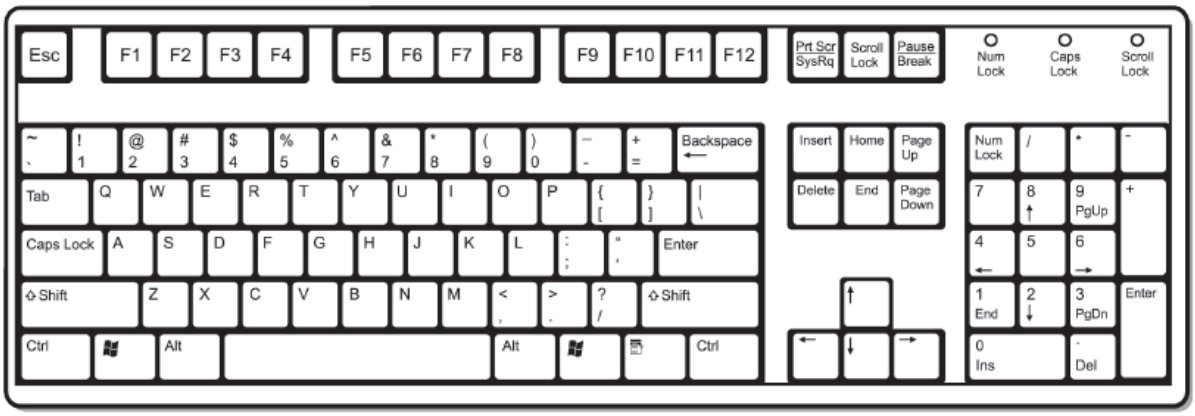


Fig.9.1.8. Keyboard

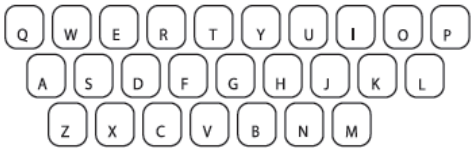
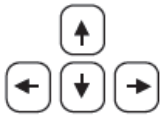
Different Set of Keys	Description
 *Fig.9.1.9. Alphabet Keys*	The keyboard has 26 letter keys from A to Z called the alphabet keys.
 *Fig.9.1.10. Numeric Keys*	The number keys (0 to 9) are called ‘numeric keys’.

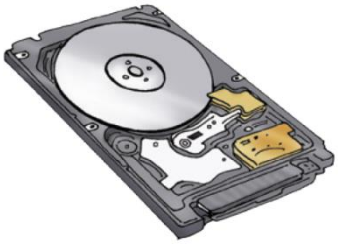
 *Fig.9.1.11. Symbol on the number keyboard*	The longest key on the keyboard is the 'spacebar.'
 *Fig.9.1.12. Spacebar*	It is used to put an empty space in between letters and numbers.
 *Fig.9.1.13. Esc key*	The key that stands alone on the top left corner is the 'escape key'.
 *Fig.9.1.14. Arrow keys*	The set of four keys that have arrows on them are the 'arrow keys'.

Finger Key Coordination

Fig.9.1.15. Finger Key Coordination

9.1.6 Computer Peripherals

 *Fig.9.1.16. Printer*	It is a device that prints text or illustrations on paper. There are different types of printers like dot-matrix, ink-Jet, laser etc. All the parts are connected to system unit with cables or wires. The system unit in turn is connected to the main power supply.
 *Fig.9.1.17. Speakers*	Speakers are devices used to listen to music, voices and other sounds.
 *Fig.9.1.18. Microphone*	The microphone converts sound inputs by the user into a format understood by the computer. It is used for sound recording.
 *Fig.9.1.19. Web camera*	These are small cameras (usually, though not always, video cameras), whose images can be accessed using the World Wide Web, instant messaging like hotmail, Google talk, or a PC video conferencing application.
 *Fig.9.1.20. Scanner*	The scanner converts print data into electronic data. Images and text available in books, newspapers and magazines can be scanned and used as computer data. The scanner is similar to a photocopier machine, except here the copy comes in electronic format.

 *Fig.9.1.21. Hard Disk*	Stationary (fixed) storage devices are fixed on the hard disk drive inside the system unit. They can store large amounts of data (eg. 40 to 300 GB data), and can be used only in a particular machine.
 *Fig.9.1.22. CD-ROM*	Compact Disk- Read Only Memory is a mobile storage device. It can store around 800 MB of data. Data copied to a CD-ROM cannot be edited directly.
 *Fig.9.1.23. Flash Drives*	They are mobile storage devices. They can store from 540 MB to 16 GB of data and the data can be edited directly.

9.1.7 Using a Computer

How to Start your Computer

- First, plug in the computer and switch it on.
- Turn on the UPS.
- Turn on the system unit by pressing the power button.
- This may cause a small light to turn on and then the monitor to turn on. Let the computer start. The computer will check all of its components and if everything is running smoothly, it will display the welcome screen, and then to the user screen.
- Type in the password if you have set one.
- Once the booting process is over the following window is displayed.

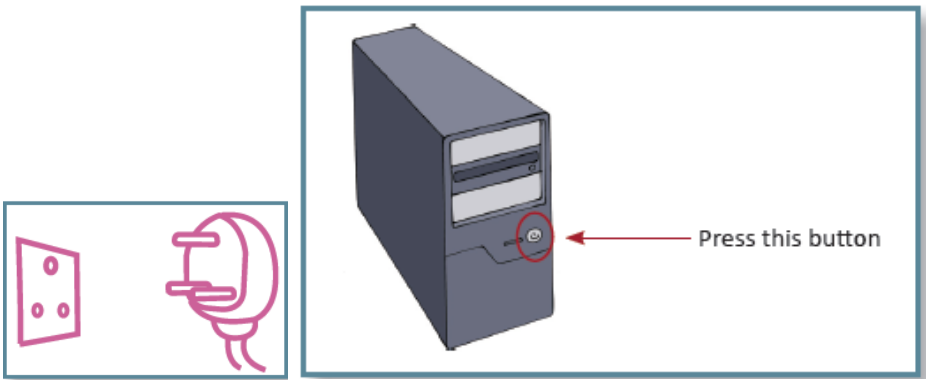


Fig.9.1.24. Plug in the computer to switch it on

Fig.9.1.25. Displayed Window

How to Shut down your Computer

- Never just switch off your computer – you may lose unsaved information and damage your computer's hard disk drive or may lose the saved information too!
- To shut down your computer properly, close all open applications.
- Click on the Start button.
- Select the 'Turn off' option by clicking on it.
- Click on the 'Yes' button to confirm selection.

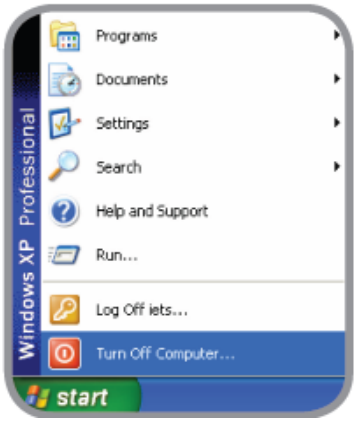


Fig.9.1.26. Start bar

Fig.9.1.27. Turn off option

9.1.8 Word Processor (MS Word 2010)

Introduction to MS Word

Microsoft Word 2010 is a word-processing program, designed to help you create professional-quality documents. With the finest document-formatting tools, Word helps you organize and write your documents more efficiently. Word also includes powerful editing and revising tools so that you can collaborate with others easily.

Getting Started

Now that you have an understanding of where things are located, let's look at the steps needed to create a document.

Opening Outlook

You may have a shortcut to Word on your desktop, if so double click the icon and Word will open. If not follow the steps below:

1. Click on the Start button
2. Highlight Programs
3. Highlight Microsoft Office
4. Click on Microsoft Word 2010

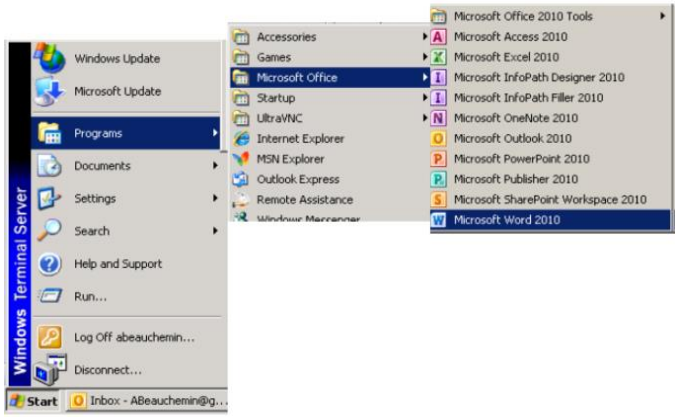


Fig.9.1.28. Start →Programs → Microsoft Office→ Microsoft Word 2010

Create a New Document

1. Click the File tab and then click New.
2. Under Available Templates, click Blank Document.
3. Click Create.

9.1.9 Spreadsheet (MS Excel 2010)

Introduction to MS Excel

This is to introduce you to using Microsoft Excel if you're unfamiliar with any major aspect of it. The topics will lead you through the fundamentals of creating and working with Excel spreadsheets.
Today's Excel spreadsheet isn't just for financial professionals. Microsoft Excel offers intuitive tools that make it easy to access, connect, and analyze critical data—regardless of your profession.
The first step in learning to use your new software is to start (or in computer parlance: launch) the Excel Program.

Launch Excel:

1. SELECT (Click) the Windows **Start** button; this will bring up a set of choices in a menu.
2. Select **Programs**. Another menu will appear to the right.
3. Locate and Select **Microsoft Office** and another menu will appear on the right.
4. Locate and Select **Microsoft Office Excel 2010.** You have now launched Excel.

When Excel starts, it creates a new blank workbook, called **Book 1**. The **Workbook** is similar to a notebook. Inside you have sheets, each of which is called a **worksheet**. Each worksheet has a name that appears on a **sheet tab** at the bottom of the workbook.

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