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MINISTRY OF SKILL DEVELOPMENT
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FICSI
Food Industry Capacity and Skill Initiative

Practical Guide

Sector
Food Processing

Sub-Sector
Fruits and Vegetables, Food Grain Milling, Dairy Products, Meat and Poultry, Fish and Sea Food, Bread and Bakery, Alcoholic Beverages, Aerated Water/Soft Drinks, Soya Food, Packaged Foods

Occupation
Quality Analysis

Reference ID: **FIC/Q7601, NSQF Level 4**

Assistant Lab Technician-Food and Agricultural Commodities

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

Shri Narendra Modi
Prime Minister of India

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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 an 'Assistant Lab Technician-Food and Agricultural Commodities' 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 an Assistant Lab Technician-Food and Agricultural Commodities.

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 machineries for packaging food products
- Prepare for packaging food products
- Package food products
- Complete documentation and record keeping related to packaging food products
- Food safety, hygiene and sanitation for packaging food products

Symbols Used

Unit Objectives

Practical

Resource

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Key Learning Outcomes

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1. Introduction

Unit 1.1 - Organisational Standards and Norms 10 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.

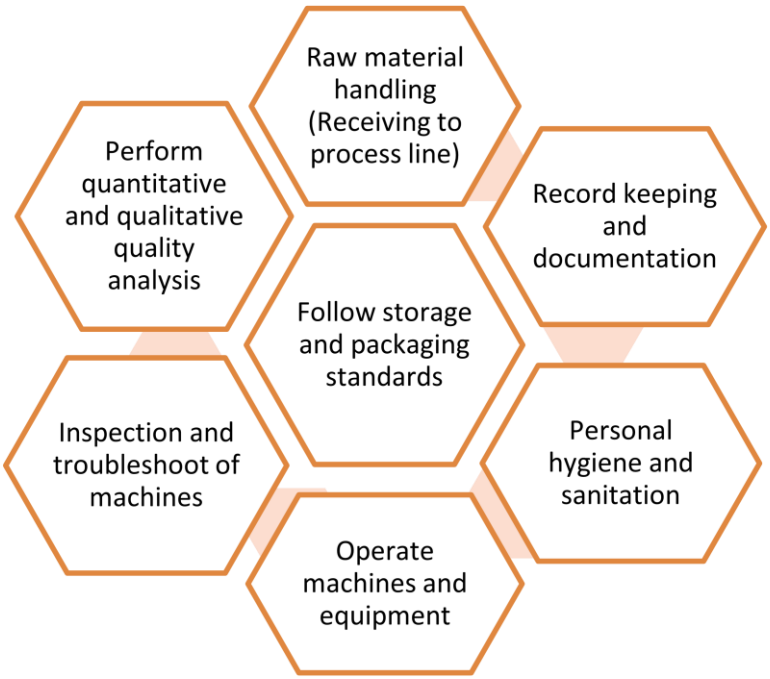

Fig. 1.1.1. Roles and responsibilities of Assistant Lab Technician

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 Assistant Lab Technician	Has the function being carried out as per specifications?
1		
2		
3		
4		
5		

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

Sr no	
1	
2	
3	
4	
5	

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2. Prepare and Maintain Work Area and Equipment for Food Lab Testing

Unit 2.1 - Prepare and Maintain Work Area	6 hrs
Unit 2.2 - Prepare and Maintain Equipment for Food Lab Testing	6 hrs

FIC/N7601

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 hypochlorites, liquid chlorine, hydrogen peroxide, and ozone, etc.)
- Sanitisers
- Disinfectants
- Floor area layout

2.1.2 Practical

Pre-requisite knowledge:

- Prepare and Maintain Work Area and Equipment for Food Lab Testing.

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 Equipment for Food Lab Testing

Unit Objectives

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

1. Check if the equipment and tools required for testing are in working condition
2. Clean lab testing equipments/apparatus using recommended cleaning agents and sanitisers

2.2.1 Materials required for the practical

- Lab testing apparatus
- Manufacturer's manual for the equipments and apparatus

2.2.2 Practical

Pre-requisite knowledge:

- Prepare and Maintain Work Area and Equipment for Food Lab Testing.

Method:

1. Prepare the list of lab equipment/ machines and apparatus present in the laboratory/testing unit.
2. Execute the cleaning of equipment/ machines and apparatus 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 equipment/ machines and apparatus as recommended in the manufacturer's manual.
5. Carry out the COP for the equipment/ machine parts and apparatus as recommended in the manufacturer's manual.
6. Carry out SIP process to sterilise, disinfect and sanitise the machines/ equipment and apparatus as recommended in the manufacturer's manual.
7. Record the type of cleaning done and place the equipment/ apparatus in its designated place for the next use.

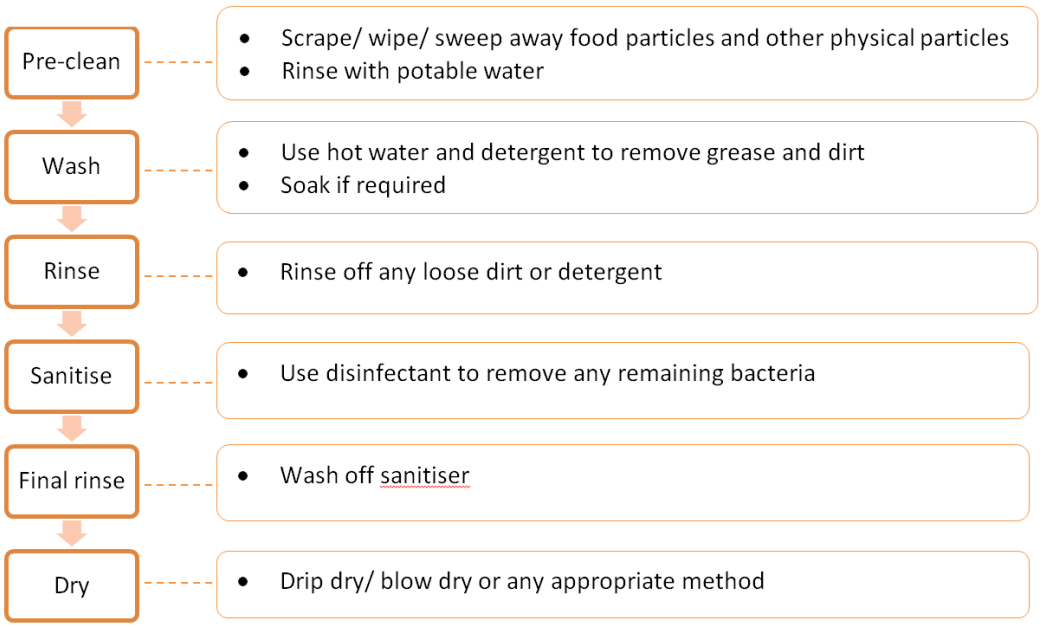

Fig. 2.2.1. Steps in cleaning procedure

Precautions:

- Ensure machines/ equipment are unplugged from power source before cleaning.
- Make sure that after cleaning the machines, equipment and apparatus are ready for use.
- Report any discrepancies in the equipment or apparatus 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/ apparatus used for CIP	Parts/ apparatus used for COP	Parts/ apparatus used for SIP
1			
2			
3			
4			
5			

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3. Prepare for Quality Analysis and Manage Housekeeping for Food Lab Activities

Unit 3.1 – Calibrate and Maintain Equipment	10 hrs
Unit 3.2 – Prepare Re-agents	10 hrs
Unit 3.3 – Manage Housekeeping	10 hrs

FIC/N7602

Key Learning Outcomes

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

1. Carry out the process of calibration and maintenance of equipment.
2. Carry out the process of preparing re-agents.
3. Carry out the process of managing lab housekeeping.

UNIT 3.1: Calibrate and Maintain Equipment

Unit Objectives

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

- Carry out the process of calibration and maintenance of equipment

3.1.1 Materials required for the practical

- Lab testing equipment
- SOP
- Safety manual

3.1.2 Practical

Pre-requisite knowledge:

- Prepare for quality analysis and manage housekeeping for food lab activities.

Method:

1. Refer to the SOP as per the organisational and industry standards.
2. Prepare the list of equipment available in the lab which needs to be calibrated.
3. Calibrate the equipment to a specified tolerance.
   - For example:

   If you know that a particular food is safe at 70°C and the instrument system is showing 70.7°C, then it is safe for that food item. This is because almost all systems have an accuracy of 1°C.
4. Now enter the calibration records and include the following:
   - Identity of the item of equipment and software
   - Name of manufacturer
   - Serial number or unique identifier
   - Date of calibration
   - Reference standard, certified reference material or reference material used for calibration.
   - Copies of all reports, results of calibration, and/or certificates of calibration.
   - Maintenance plan and due date for the next calibration.
   - Signature of the individual performing calibration.
5. Report any discrepancies in the equipment to the authorised personnel/ supervisor for timely action.

Precautions:

- Make sure you have calibrated the required equipments as per the industry standards.
- Refer to the manufacturer's manual for the calibration.

Observation:

Sr no	Name of Equipment	Industry Standard	Calibration reading	Calibration records maintained (yes/no)
1				
2				
3				
4				
5				

Conclusion:
Write your observations here

Sr no	
1	
2	
3	
4	
5	

UNIT 3.2: Prepare Re-agents

Unit Objectives

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

- Carry out the process of preparing re-agents.

3.2.1 Materials required for the practical

- Water hardness tester
- pH meter
- Re-agent bottles
- Pipette
- Test tubes
- Chemicals
- PPE (Personal Protective Equipment)

3.2.2 Practical

Pre-requisite knowledge:

- Prepare for quality analysis and manage housekeeping for food lab activities.

Method:

1. Prepare side bench re-agents.
    - **Ammonium acetate.**
      Dissolve 231 g of the salt in 1 liter of water. (3M)
    - **Ammonium carbonate.**
    - Dissolve 192 g of the salt in a mixture of 140ml concentrated ammonia solution and water to make up 1 liter of solution. (2M)
    - **Ammonium chloride**
    - dissolve 169 g of the salt in 1 liter of solution (3M).
    - **Ammonium nitrate**
    - dissolve 80 g of the salt in 1 liter of water. (1M)
    - **Ammonium oxalate**
      dissolve 71 g of the crystalline salt in 1 liter of water.(0.5M)
    - **Ammonium sulphate**
      dissolve 132 g of the salt in 1 liter of water.(1M)
    - **Ammonium thiocyanate**
      Dissolve38 g of the salt in 1 liter of water (0.5M)
    - **Barium chloride**
      dissolve 61 g of the salt in 1liter of water.(0.25M)
    - **Bromine water**
      dissolve 35g or 11ml liquid bromine with water. Add more bromine if necessary to a slight excess.
    - **Calcium chloride**
      dissolve 55 g of the hydrated salt in 1 liter of water (0.25M)
    - **Calcium sulphate**
      shake 3 g of the salt with 1 liter of water, filter and decant the saturated solution after several hours (0.015M)

- **Chlorine water**
  saturate 250ml of water with chlorine. The chlorine may be prepared by dropping conc. Hcl upon KmnO4. Preserve in a dark coloured bottle.(6.8g/l)
- **Cobalt nitrate**
  dissolve 44 g of the salt in 1 liter of water. (0.15M)
- **Copper sulphate**
  dissolve 125 g of the salt in 1 liter of water containing 3ml of conc. Sulphuric acid.(0.5M)
- **Ferric chloride**
  dissolve 135 g of the hydrated salt in 1 liter of water containing 20ml of conc. Hcl (0.5M)
- **Ferrous sulphate**
  dissolve 140 g of the salt in 1 liter of water containing 7 ml of conc. Sulphuric acid (0.5M)
- **Hydrogen sulphide**
  H2S generated from a Kipps apparatus (~42g/l)
- **Iodine solution**
  dissolve 12.7 g of iodine in a solution of 20g of pure KI in 30 ml of water, and dilute to 1 liter with water.(0.05m)
- **Lead acetate**
  dissolve 95 g of the salt in 1 liter of water (0.25M)
- **Magnesium sulphate**
  dissolve 62 g of the salt in 1 liter of water (0.25M)
- **Magneson** (4-(4-nitrophenylazo) resorcinol
  0.001% in 1M NaOH.
- **Mercuric chloride**
  dissolve 27 g of the salt in 1 liter of water (0.1M)
- **Potassium chromate**
  dissolve 49g of the salt in 1 liter of water (0.25M)
- **Potassium ferricyanide**
  dissolve 55 g of the salt in 1 liter of water (0.25M)
- **Potassium ferrocyanide**
  dissolve 53 g of the salt in 1 liter of water (0.125M)
- **Potassium iodide**
  dissolve 83 g of the salt in 1 liter of water (0.5M)
- **Potassium permanganate**
  dissolve 3.2g of the salt in hot water, dilute to 1 liter, and filter through glass wool (0.01M)
- **Potassium thiocyanate**
  dissolve 49g of the salt in 1 liter of water (0.25M)
- **Silver nitrate**
  dissolve 17g of the salt in 1 liter of water (0.1M)
- **Silver sulphate**
  dissolve 8g of the salt in 1 liter of water. this is nearly a saturated solution (0.025M)
- **Sodium acetate**
  dissolve 408g of the crystalline salt in 1 liter of water (3M)
- **Sodium carbonate**
  dissolve 430g of the crystalline salt in 1 liter of water (1.5M)
- **Disodium hydrogen phosphate**
  dissolve 120g of the salt in 1 liter of water 0.34M)
- **Stannous chloride**
  dissolve with heat 56g of the salt in 100ml conc. HCl and dilute to 1 liter. Keep a few pieces of granulated zinc in the stored solution to avoid oxidation. (0.25M)
- **Thiourea**
  10g in 100ml of water (10%)

- **Titan yellow**
  dissolve 1g in 100ml of water (1%)
- **Zinc nitrate**
  dissolve 150g of the salt in 1 liter of water (0.5M)

2. Fill the reagents in clean and appropriate containers as specified in the SOP.
3. Label the containers.
4. Store the reagents in the designated place.

Precautions:

- Make sure you take recommended quantity to prepare the re-agents.
- Wear the required PPE while making the reagents.

Observation:

Sr no	Name of reagent	Materials used
1		
2		
3		
4		
5		

Conclusion:
Write your conclusions here

Sr no	
1	
2	
3	
4	
5	

UNIT 3.3: Manage Housekeeping

Unit Objectives

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

- Carry out the process of managing lab housekeeping

3.2.1 Materials required for the practical

- Sanitisers
- Cleaning agents
- Hand gloves
- Mask
- SOP
- Safety manual

3.2.2 Practical

Pre-requisite knowledge:

- Prepare for quality analysis and manage housekeeping for food lab activities

Method:

1. Keep bulk chemicals stored in cabinets or designated storage rooms.
2. Keep the lids on chemical containers.
3. Label your chemical bottles with easily identifiable labels.
4. Keep your inventory up to date.
5. Keep lab benches and hoods as uncluttered as possible.
6. Keep containers and equipment away from the edge of benches.
7. Keep emergency equipment in view and accessible.

Precautions:

- Make sure label is having all the information.
- Don't move unwanted items into the hallway.
- Always wear your PPE during housekeeping activities.

Observation:

Sr no	List of housekeeping activities
1	
2	
3	
4	
5	

Conclusion:
Write your conclusions here

Sr no	
1	
2	
3	
4	
5	

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4. Sampling and Quality Analysis for Food Lab Activities

FIC/N7603

Key Learning Outcomes

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

1. Demonstrate the process of collecting the samples for quality analysis.
2. Demonstrate the process of quality analysis of the samples following the SOP.
3. Record the quality analysis results and send it to the concerned authority/ department.

UNIT 4.1: Sampling for Quality Analysis

Unit Objectives

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

1. Demonstrate the process of collecting the samples for quality analysis.

4.1.1 Materials required for the practical

- Sampling tools
- Sterilised containers
- Samples for analysis
- Labels
- SOP
- Safety manual

4.1.2 Practical

Pre-requisite knowledge:

- Sampling and quality analysis for food lab activities.

Method:

1. Identify the category of the food.
2. Take the sampling tool to collect the sample for quality analysis.
3. Follow following table for reference about minimum quantity of samples that need to be collected or as per the SOP.

Sr no	Food Products	Sample quantity
1	Milk	500 g
2	Fruit Juice/Fruit Drink/Fruit Squash	400 ml
3	Tomato Sauce/Ketchup/Tomato Paste, Jam/ Jelly/ Marmalade/ Tomato Puree/Vegetable Sauce	300 g
4	Pickles and Chutneys	250 g
5	Bread/Cakes/Pastries	250 g

4. Keep the sample in the sterlised container.
5. Seal the container of sample.
6. Furnish the information on the labels and paste it on the container.

Precautions:

- Ensure you maintain hygiene while sampling.

Observation:

Sr no	Food Products	Quantity collected	Container sealed (yes/no)	Labeling done (yes/no)
1				
2				
3				
4				
5				

Conclusion:
Write your conclusions here

Sr no	
1	
2	
3	
4	
5	

UNIT 4.2: Quality Analysis of Samples

Unit Objectives

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

1. Demonstrate the process of quality analysis of the samples following the SOP.

4.2.1 Materials required for the practical

- Samples for quality analysis
- Centrifuge machine
- Butyrometer
- Butyrometer stand
- Rubber stopper
- Pipette
- pH meter
- Soxhlet extractor
- Kjeldahl apparatus
- Moisture meter
- Phenolphthalein
- Burette
- Burette clamp and stand
- Gram scale
- Graduated cylinder
- Beakers
- Stirrer
- Conical flask
- Glass plate
- Distilled water
- Refractometer
- Reagents/ chemicals for testing
- Labels
- SOP
- Safety manual

4.2.2 Practical

Pre-requisite knowledge:

- Sampling and quality analysis for food lab activities.

Method:

- Follow the method for as per the type of food identified and the quality analysis to be performed.

Fat content testing for milk (SNF)

1. Put the clean and dry butyrometer in a butyrometer stand.
2. Put 10 ml of sulphuric acid in the butyrometer.
3. Add 11 ml of milk from the average sample.
4. Add 1 ml of amyl alcohol.
5. Stopper the butyrometer.

6. Shake the butyrometer to dissolve the milk elements.
7. Put the butyrometers in the centrifuge and centrifuge for five minutes.
8. Next plunge the butyrometers vertically, cork down, into a water bath, temperature 65°–70° C, and leave them for five minutes.
9. Note the reading in the butyrometer. Reading should be taken from bottom of the fat column to lower border of meniscus on the scale.

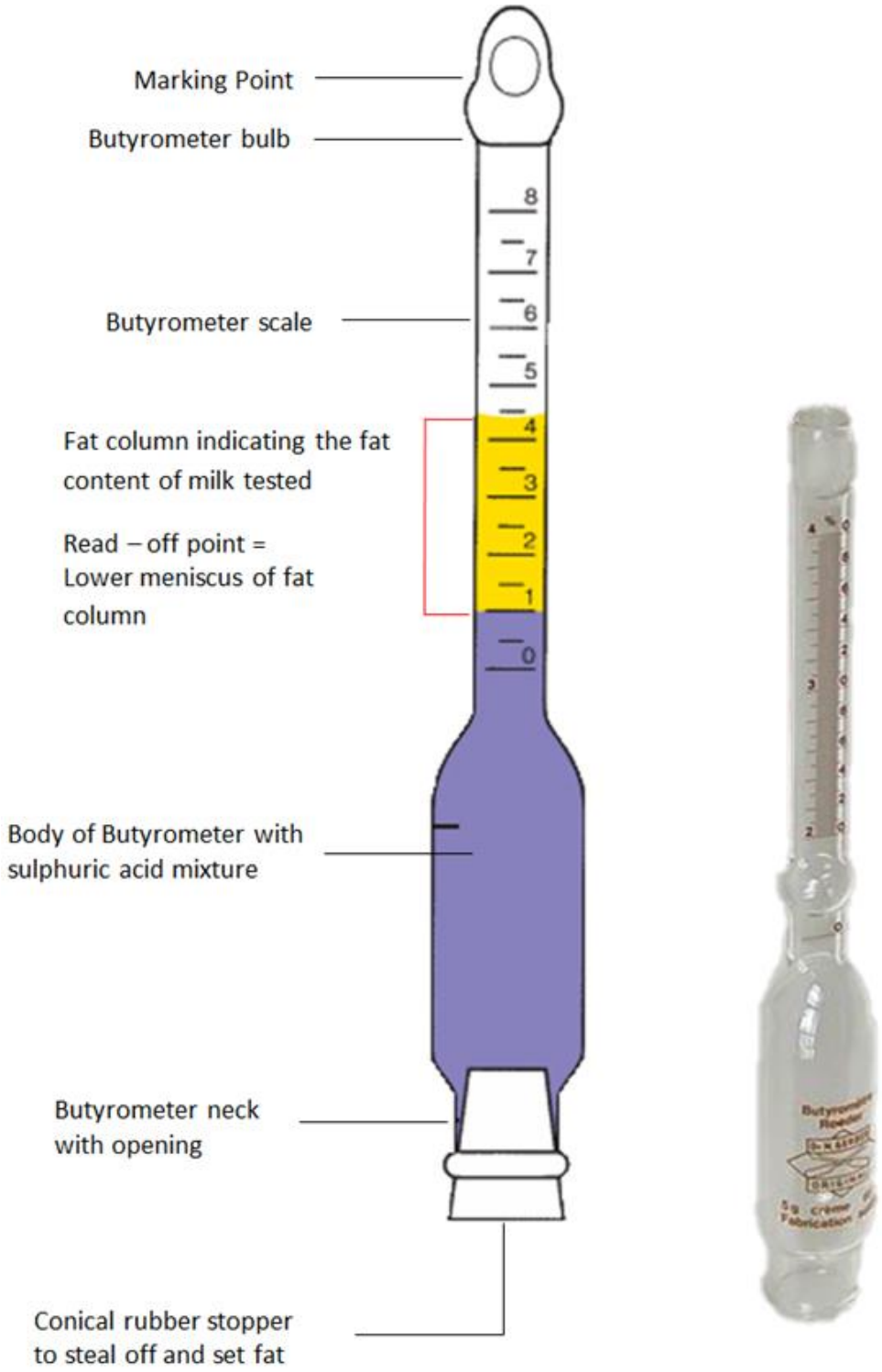


Fig. 4.2.1. Butyrometer

Butyrometer is a measuring instrument used to measure fat content in milk or milk products

10. Calculate and record the fat content in the sample.
- For example if the degree reading is 3.6, then the fat content in milk is 3.6 percent, or 36 g of fat in per litre of milk.

Precautions:
- Ensure that the butyrometer, cork down, is perfectly vertical when taking the reading at eye level.

Measurement of pH and Titratable acidity (for milk and fruits)

- Titratable acidity deals with measurement of the total acid concentration contained within a food it is also called total acidity.

1. Take at least 50 ml of sample (milk/ fruit juices).
   Collection of sample from fruits:
   - Cut fruit (longitudinal slices), press with a hand press, and filter through cheesecloth, or
   - Cut fruit into a blender, homogenize, centrifuge slurry, and pour off clear liquid for analysis.
2. Make sure samples are at room temperature before taking measurements.
3. Measure the pH of the samples with a pH meter and record the value.
4. Titrate each sample by mixing the sample in water as given.
   - For each fruit sample, weigh out 6 grams of juice into a 100 ml beaker and to each sample, add 50 ml of water.
   - Mix the milk sample thoroughly by avoiding incorporation of air. Transfer 10 gm milk to conical flask or beaker. Add equal quantity of distilled water.

   Titration:
   - Add 3-4 drops of phenolphthalein indicator to the sample and stir.
   - Rapidly titrate the contents with 0.1 N NaOH solution, continue to add alkali drop by the drop and stirring the content till first definite change to pink colour.
   - Record the amount (ml) of NaOH used.
   - Note down the final burette reading.

5. Calculate the titratable acidity using the following formula:

$$\% \text{ acid} = \frac{(mls\ of\ NaOH\ used) \text{ x } (0.1\ N\ NaOH) \text{ x } (milliequivalent\ factor)}{Weight\ of\ sample} \text{ x } 100$$

Sample	Predominant acid	Milliequivalent factor
Stone fruit, apples, kiwifruit	Malic acid	0.067
Citrus fruits	Citric acid	0.064
Grapes	Tartaric acid	0.075
Milk	Lactic acid	0.009

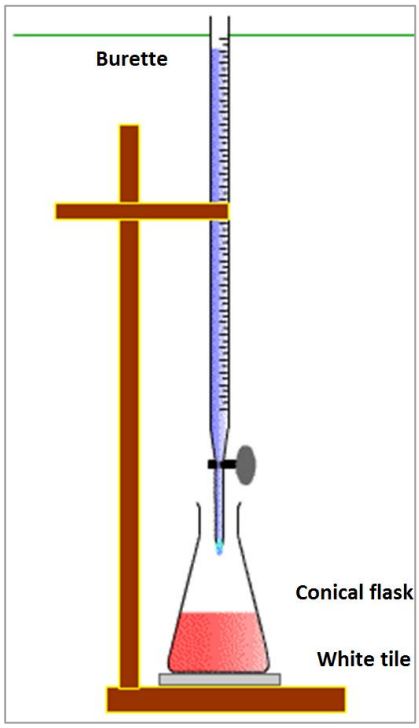


Fig. 4.2.2. Titration

Note down your calculations here

6. Record your observations.

Test for Total Soluble Solids (TSS)

- Total soluble solids content of a solution is determined by the index of refraction. This is measured using a refractometer, and is referred to as the degrees Brix.

Fig. 4.2.3. Refractometer

Instrument that measures the refractive index of a substance

1. Check the prism surface of the refractometer is clean and dry.
2. Place a small amount/ couple of drops of fresh juice onto the prism of the refractometer.
3. Look through the eyepiece while pointing the prism in the direction of good light (not directly at the sun).
4. Focus and take the reading of where the base of the blue colour sits on the scale and record the percentage sugar (°Brix).
5. Clean the refractometer immediately with a damp tissue, and dry thoroughly.
6. Take two more readings by repeating the process from steps 1 to 5.

Calculate the TSS by using the mean of the three trials using the formula given:

Note down your calculations here
$\text{TSS} = \frac{Trial\ 1 + Trial\ 2 + Trial\ 3}{3\ Trials}$ = Results of brix

Precautions:

- Handle the refractometer carefully.

Tests for adulterants in food

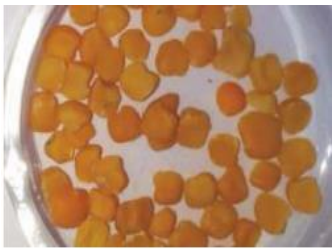
Sr. No.	Test/ Method	Test results	
1	**Detection of water in milk**		
	Method:	**Pure milk**	**Adulterated milk**
	1. Put a drop of milk on a polished slant surface. 2. Observe the results and record your observation. 3. Put a drop of milk on a polished slant surface. 4. Observe the results and record your observation.	Either stays or flows slowly leaving a white trail	Will flow immediately without leaving a mark
			

<table>
<tr><th>Sr. No.</th><th>Test/ Method</th><th colspan="2">Test results</th></tr>
<tr><td rowspan="3">2</td><td>Detection of detergent in milk</td><td>Pure milk</td><td>Adulterated milk</td></tr>
<tr><td rowspan="2">1. Take 5 to 10 ml of sample with equal amount of water.
2. Mix the contents thoroughly.
3. Observe the results and record your observation.</td><td>Will form a very thin foam layer due to agitation</td><td>If adulterated with detergent, it forms a dense lather</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td rowspan="4">3.</td><td colspan="3">Detection of starch in milk and milk products (khoya, paneer, chenna)</td></tr>
<tr><td>Method:</td><td>Pure milk/ milk products</td><td>Starch in milk/ milk products</td></tr>
<tr><td rowspan="2">1. Boil 2 to 3 ml of sample (milk products) with 5 ml of water. In case of milk as sample, addition of water and boiling is not required.
2. Cool and add 2-3 drops of tincture iodine.
3. Observe the results and record your observation.</td><td>No colour change</td><td>Formation of blue colour indicates the presence of starch</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td rowspan="4">4.</td><td colspan="3">Detection of mashed potatoes, sweet potatoes and other starches in ghee/butter</td></tr>
<tr><td>Method:</td><td>Pure ghee/butter</td><td>Presence of starch</td></tr>
<tr><td rowspan="2">1. Take ½ teaspoon of ghee/ butter in a transparent glass bowl.
2. Add 2-3 drops of tincture iodine.
3. Observe the results and record your observation.</td><td>No colour change</td><td>Formation of blue colour indicates the presence of starch</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Test/ Method</th><th colspan="2">Test results</th></tr>
<tr><td rowspan="4">5.</td><td>Detection of extraneous matter (dust, pebble, stone, straw, weed seeds, damaged grain, weed seeds, insects, rodent hair and excreta) in food grains</td><td colspan="2"></td></tr>
<tr><td>Method:</td><td>Pure grains</td><td>Adulterated</td></tr>
<tr><td rowspan="2">1. Take small quantity of sample in a glass plate.
2. Examine the impurities visually.
3. Observe the results and record your observation.</td><td>No impurities</td><td>Impurities present</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td rowspan="4">6.</td><td>Detection of ergot (a fungus containing poisonous substance) in food grains</td><td colspan="2"></td></tr>
<tr><td>Method:</td><td>Pure</td><td>Adulterated</td></tr>
<tr><td rowspan="2">1. Put some grains in a transparent glass containing 20% of salt solution (20g of table salt/iodised salt in 100ml of water).
2. Observe the results and record your observation.</td><td>Clear grains, no ergots on the surface</td><td>Ergot floats over the surface while sound grains settle down

Purple black, longer sized grains show the presence of ergots.</td></tr>
<tr><td>  </td><td>  </td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Test/ Method</th><th colspan="2">Test results</th></tr>
<tr><td rowspan="3">7.</td><td>Detection of dhatura in food grains</td><td colspan="2"></td></tr>
<tr><td>Method:</td><td>Dhatura seeds in food grains</td><td>Dhatura seeds</td></tr>
<tr><td>1. Take small quantity of food grains in a grass plate.
2. Examine the impurities visually.
3. Observe the results and record your observation.</td><td> 
Dhatura seeds in food grains</td><td>Dhatura seed which are flat with edges and blackish brown in colour can be separated out by close examination
 
Dhatura seeds</td></tr>
<tr><td rowspan="3">8.</td><td>Detection of excess bran in wheat flour</td><td colspan="2"></td></tr>
<tr><td>Method:</td><td>Pure wheat flour</td><td>Excess bran in wheat flour</td></tr>
<tr><td>1. Take a transparent glass of water.
2. Sprinkle a spoon of wheat flour on the surface of water.
3. Observe the results and record your observation.</td><td>No excess bran on water surface
 
Pure wheat flour</td><td>Excess bran floating on water surface
 
Excess bran in wheat flour</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Test/ Method</th><th colspan="2">Test results</th></tr>
<tr><td>9.</td><td>Detection of Khesari dal in dal whole and split</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Pure dal</td><td>Khesari dal</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Take small quantity of dal whole or split in a glass plate.
2. Examine the impurities visually.
3. Observe the results and record your observation.</td><td>No impurities</td><td>• Presence of khesari dal
• Khesari dal which has edged type appearance showing a slant on one side and square in appearance can be separated out by close examination.</td></tr>
<tr><td> 
Pure dal</td><td> 
Khesari dal</td></tr>
<tr><td>10.</td><td>Detection of added colour in food grains</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Pure grains</td><td>Adulterated grains</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Take a transparent glass of water.
2. Add 2 teaspoons of food grains and mix thoroughly.
3. Observe the results and record your observation.</td><td>Will not leave any colour in water</td><td>Leaves colour immediately in water</td></tr>
<tr><td> 
Pure</td><td> 
Adulterated</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Test/ Method</th><th colspan="2">Test results</th></tr>
<tr><td>11.</td><td>Detection of iron fillings in atta/maida/suji (rawa)</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Pure</td><td>Adulterated</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Take small quantity of sample in a glass plate.
2. Move the magnet through the flour.
3. Observe the results and record your observation.</td><td>No iron filings on the magnet</td><td>Iron filings on the magnet</td></tr>
<tr><td> 
Pure</td><td> 
Adulterated</td></tr>
<tr><td>12</td><td>Detection of foreign resin in asafoetida (hing)</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Pure</td><td>Adulterated</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Burn small quantity of asafoetida in a stainless steel spoon.
2. Observe the results and record your observation.</td><td>Will burn like camphor</td><td>Will not produce bright flame like camphor</td></tr>
<tr><td> 
Pure</td><td> 
Adulterated</td></tr>
<tr><td>13.</td><td>Detection of papaya seeds in black pepper</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Black peper</td><td>Papaya seeds</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Add some amount of black pepper to a glass of water.
2. Observe the results and record your observation.</td><td>Pure black pepper settles at the bottom</td><td>In the adulterated black pepper, papaya seeds float on the surface of water</td></tr>
<tr><td> 
Black pepper</td><td> 
Papaya seeds</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Test/ Method</th><th colspan="2">Test results</th></tr>
<tr><td>14.</td><td>Detection of artificial/water soluble synthetic colours in chilli powder</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Pure</td><td>Adulterated</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Sprinkle chilli powder on the surface of water taken in a glass tumbler.
2. Observe the results and record your observation.</td><td>The chilli powder remains on the surface without dispersing any colour in the water</td><td>he artificial colourants will immediately start descending in colour streaks</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>15.</td><td>Detection of cassia bark in cinnamon</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Cinnamon</td><td>Cassia</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Take small quantity of cinnamon in a glass plate.
2. Visually examine the sample closely.
3. Observe the results and record your observation.</td><td>Cinnamon barks are very thin that can be rolled around a pencil or pen. It has a distinct smell</td><td>Cassia bark comprises of several layers between the rough outer and inner most smooth layer</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Test/ Method</th><th colspan="2">Test results</th></tr>
<tr><td>16.</td><td>Detection of grass seeds coloured with charcoal dust in cumin seeds</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Pure</td><td>Adulterated</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Rub small amount of cumin seeds on palms.
2. Observe the results and record your observation.</td><td>No colour change when rubbed</td><td>If palms turn black, adulteration is indicated</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>17.</td><td>Detection of artificial colour in turmeric powder</td><td colspan="2"></td></tr>
<tr><td></td><td>Method:</td><td>Pure</td><td>Adulterated</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">1. Add a teaspoon of turmeric powder in a glass of water.
2. Observe the results and record your observation.</td><td>Will leave a light yellow colour while settling down</td><td>Will leave a strong yellow colour in water while settling down</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

Sr. No.	Test/ Method	Test results	
18.	**Detection of sawdust and powdered bran in powdered spices**		
	Method:	**Pure**	**Adulterated**
	1. Take some water in a glass. 2. Sprinkle powdered spices on the water surface. 3. Observe the results and record your observation.	Will not leave any saw dust/ powdered bran on the surface of water	Saw dust/ powdered bran will float on the surface
			

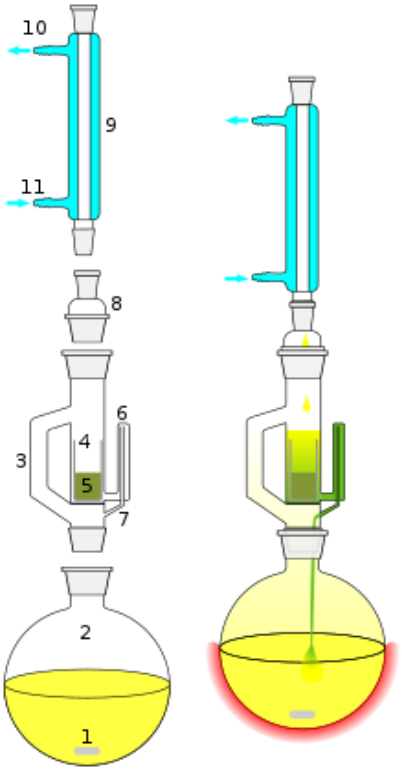
pH analysis in food (non-dairy products)

Fig.4.2.4. pH meter

Liquid Samples Homogenous/ blended or uniform liquid samples	**Solid-liquid mixtures/ Semisolid Food Products** (egs: thick sauces, puddings etc.)	**Food products with oil** (for eg: in pickles)
Method: 1. Dip the rinsed, standardized electrode into the center of a well-mixed sample until the reading stabilizes on the pH meter, which takes about a minute.	**Method:** 1. Drain to separate the solid and liquid parts using a number 8 sieve. 2. Using a blender, blend the drained sample into a homogenous (even-textured) paste. If your	**Method:** 1. Use a small amount of distilled water to blend the solids into a paste for the sample. 2. Measure the pH by dipping the electrode into the paste.

Liquid Samples Homogenous/ blended or uniform liquid samples	**Solid-liquid mixtures/ Semisolid Food Products** (egs: thick sauces, puddings etc.)	**Food products with oil** (for eg: in pickles)
2. Note the reading.	sample is dry or difficult to blend into a paste, a maximum of 20 milliliters of distilled water can be added to 100 grams of the product without changing the pH of the product. 3. Dip a clean, standardized electrode into the blended mixture and take a pH measurement. 4. Take two additional readings at different spots in the sample.	dipping the electrode into the paste.

Fat/lipid analysis by Soxhlet extractor



1: Stirrer bar
2: Still pot
3: Distillation path
4: Thimble
5: Solid
6: Siphon top
7: Siphon exit
8: Expansion adapter
9:Condenser
10: Cooling water out
11:Cooling water in

Fig.4.2.5.Schematic representation of Soxhlet extractor

1. Take 100g of sample was in Whatmann filter paper No.1 and made into pouch.
2. Add solvent petroleum ether.
3. Now insert the thimble into the Soxhlet extractor.
4. Fill the solvent into the solvent vessel at a temperature of 110-130˚C for 20-30 extraction cycles (4-6 h), depending on the sample nature and the solvent employed.
5. Dry the solvent into a suitable container.
6. Heat the solvent vessel until all of the solvent has been evaporated and condensed in the Soxhlet extractor. If required, the recovered solvent may be reused for subsequent extractions.
7. Place the vessel containing the fat residue in a drying oven at 103±2˚C and heat to constant weight.
8. Calculate the percent crude fat as follows:

$$\% \text{ crude fat} = \frac{Weight\ of\ sample\ after\ extraction\ (g) - Weight\ of\ sample\ before\ extraction\ (g)}{Weight\ of\ the\ sample\ (g)} \text{X } 100$$

Protein determination using Kjeldhal apparatus

- Kjeldhal Procedure of protein determination in food involves three steps:

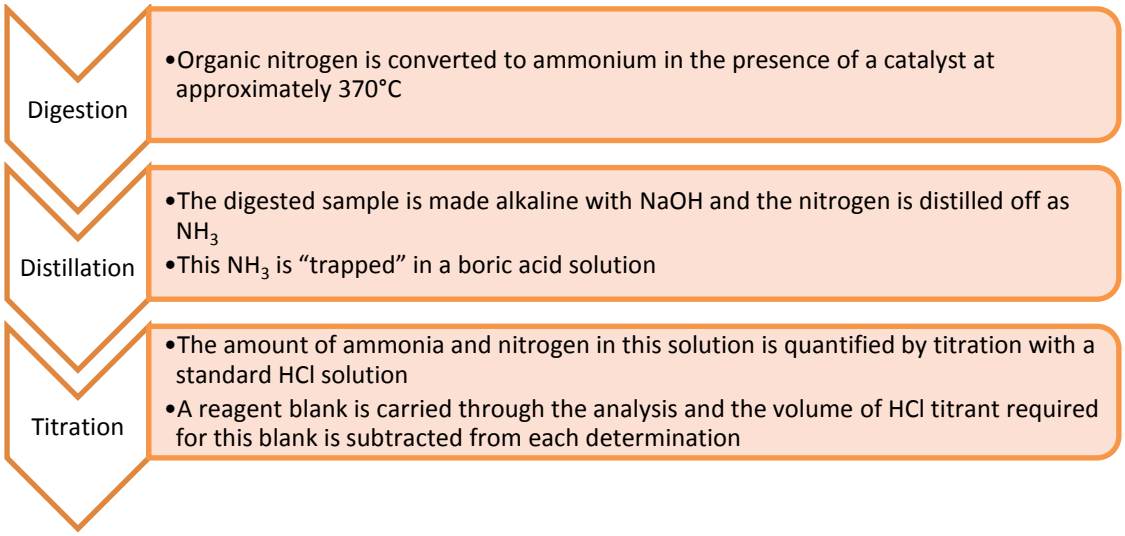


Fig.4.2.6. Three steps in Kjeldahl procedure for protein determination

Fig.4.2.7. Kjeldhal apparatus

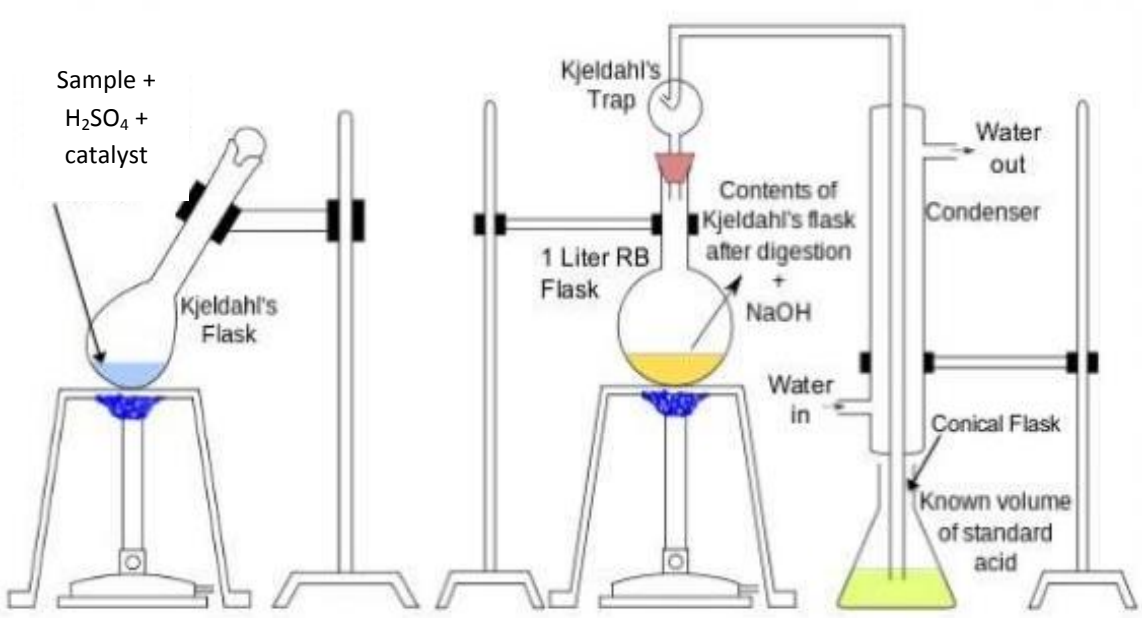


Fig.4.2.8 Schematic representation of Kjeldhal apparatus

- **Digestion:**
  1. Shake the sample carefully so that it does not foam.
  2. Weigh approximately 5 gms of the homogeneous sample.
  3. Place the sample into a digestion flask.
  4. Add 2 Kjeldhal tablets of 5 gms of the Missouri catalyst.
  5. Add 20 ml sulphuric acid 98%.
  6. Carefully suspend the sample by gently swirling the tube.
  7. Bring the digestion tube/flask and mixture into the digestion unit and into heating block.
  8. Heat the mixture (350 – 380 ^{O}C) until white fumes can be seen.
  9. Continue the heating for about 180 minutes.
  10. The vapours of water and sulphuric acid are bubbled through a solution of sodium hydroxide (scrubber) to neutralise them.
  11. The digestion is finished when the sample will be totally transparent with a slightly blue colour due to the copper (Cu) from the catalyst.
  12. The content of the glass tube is transferred then to the distillation unit.

- **Distillation:**
  1. Take the sample already digested with sulphuric acid 98%.
  2. 50 ml of sodium hydroxide 50% solution is added to the sample to neutralize the pH and to convert NH_4 + into NH_3
  3. A stream of water vapour is bubbled into the sample to entrain the NH_3 formed.
  4. NH_3 is condensed.
  5. NH_3 is captured in a 50 ml of boric acid solution 4% that contains 6-7 drops of Tashiro's indicator.
  6. When NH_3 reacts with boric acid the solution turns from red violet to green (pH 4.4 – 5.8) due to the colour change of the indicator from acid to basic medium
  7. Around 150 ml of condensate is captured in the boric acid solution. It can take approximately 5 minutes.

- **Titration**
  1. Titrate with HCl 0.25 mol/l until the solution has a slightly violet colour
  2. With the volume and concentration of HCl needed we can calculate the number of mol of nitrogen atoms in the sample and then the % of protein in the milk sample

$$\% \text{ Nitrogen} = \frac{(ml\ standard\ acid - ml\ blank) \text{x}\ N\ of\ acid \text{ x } 1.4007}{Weight\ of\ sample\ in\ grams}$$

If it is desired to determine % protein instead of % nitrogen, the calculated % N is multiplied by a factor, the magnitude of the factor depending on the sample matrix.

Food		% Nitrogen	Factor	%Protein
Cereals, pasta	Brown Rice	1.3	6.25	7.9
	Wheat flour, whole-grain	2.4	5.7	13..7
	Macaroni, spaghetti	1.9	5.7	11.0
Pulses, nuts and seeds	Red beans	3.4	6.25	21.2
	Soy and soy products	6.3	5.71	36.0
	Almonds	4.9	5.18	25.3
	Peanuts	4.8	5.46	26.0
	Nuts	2.9	5.3	15.2
	Sunflower seeds	3.2	5.3	17.2
Dairy Products	Milk, whole	0.5	6.38	3.3

Moisture Measurement

- Thermogravimetric analysis using moisture analyzer

Fig.4.2.9. Moisture analyser

1. Weigh the sample to be tested.
2. Heat the sample to a point where it releases its moisture completely.
3. Allow the sample for some time for cooling (this is to analyze if it is absorbing the moisture again from the surroundings).
4. Finally, take the sample and weigh again.
5. The weight observed is the moisture content value of the food.
6. For more accuracy about the value, repeat the testing process.
7. Make sure while repeating the test process, the sample taken should be of the same weight.

Observation:

Sr no	Product sample	Quality test done for	Result
1			
2			
3			
4			
5			

Conclusion:

Write your conclusions here

Notes

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5. Complete Documentation and Record Keeping Related to Performing Lab Activities

FICSI
Food Industry Capacity and Skill Initiative

FIC/N7604

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 5.1: Document and Maintain Records of Samples

Unit Objectives

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

1. Demonstrate the process of maintaining documentation and record keeping of samples

5.1.1 Materials required for the practical

- Sample record register

5.1.2 Practical

Pre-requisite knowledge:

- Complete documentation and record keeping.

Method:

1. Maintain the details of raw material samples received for testing and the test results.
2. Use the observation table and enter the details of the samples received and tested.
   - Raw material sample
   - Weight of the sample
   - Date of receipt
   - Batch number
   - Tests done
   - Test results
3. Send the test results to the concerned department after proper authorization/ signature (as per company SOP).

Precautions:

- Make sure that you make the correct entries of the samples received.

Observation:

Sr no	Type of raw material sample	Weight of raw materials	Test done	Quality test passed (Y/N)
1				
2				
3				
4				
5				

Conclusion:

Sr no	Type of raw material
1	
2	
3	
4	
5	

UNIT 5.2: Document and Maintain Records of Equipment and Calibration

Unit Objectives

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

1. Execute the process of documenting and record keeping of equipment and calibration

5.2.1 Materials required for the practical

- Equipment calibration register
- Lab testing equipment
- SOP
- Safety manual

5.2.2 Practical

Pre-requisite knowledge:

- Complete Documentation and Record Keeping.

Method:

1. Maintain the details of calibration of equipment with the findings and evaluation in the machine calibration register.
2. Use the observation table and enter the details of the calibrations of equipment.
   - Enter the date of calibration.
   - Enter the name of the machine calibrated.
   - Enter the reading of machine before calibration.
   - Enter the reading of machine after calibration.
   - Enter the remarks (if any).

Precautions:

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

Observation:

Sr no	Date of calibration	Name of machine	Reading before calibration	Reading after calibration
1				
2				
3				
4				
5				

Conclusion:

Sr no	
1	
2	
3	
4	
5	

Notes

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6. Food Safety, Hygiene and Sanitation for Packaging Food Products

FIC/ N7605

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 6.1: 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

6.1.1 Materials required for the practical

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

6.1.2 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.

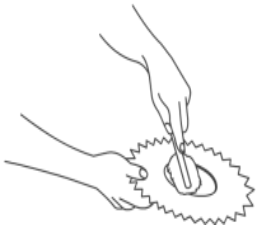
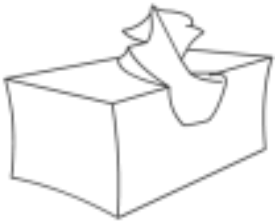
Dos		Don'ts
• Hair properly tucked inside the head mask/cap • No jewellery (earrings, necklace etc.) • No outer pockets • Wear neat and clean clothes • No wrist watch • Cover all wounds • Nails trimmed and clean • Torn clothes to be repaired/ replaced • Safety shoes		• Hair coming outside the head mask/cap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

Fig . 6.1.1. 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 . 6.1.2. Hand sanitation

6. Follow the guidelines when to wash hands.

<table>
<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 . 6.1.3. 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. 6.1.4. 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. 6.1.5. 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 6.2: 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

6.2.1 Materials required for the practical

- PPE
- Food safetymanual
- Food samples

6.2.2 Practical

Pre-requisite knowledge:

- Food safety, hygiene and sanitation.

Method:

1. Identify the type of hazards in food.
2. Check for the possible hazard in the entire process of food processing while testing samples.

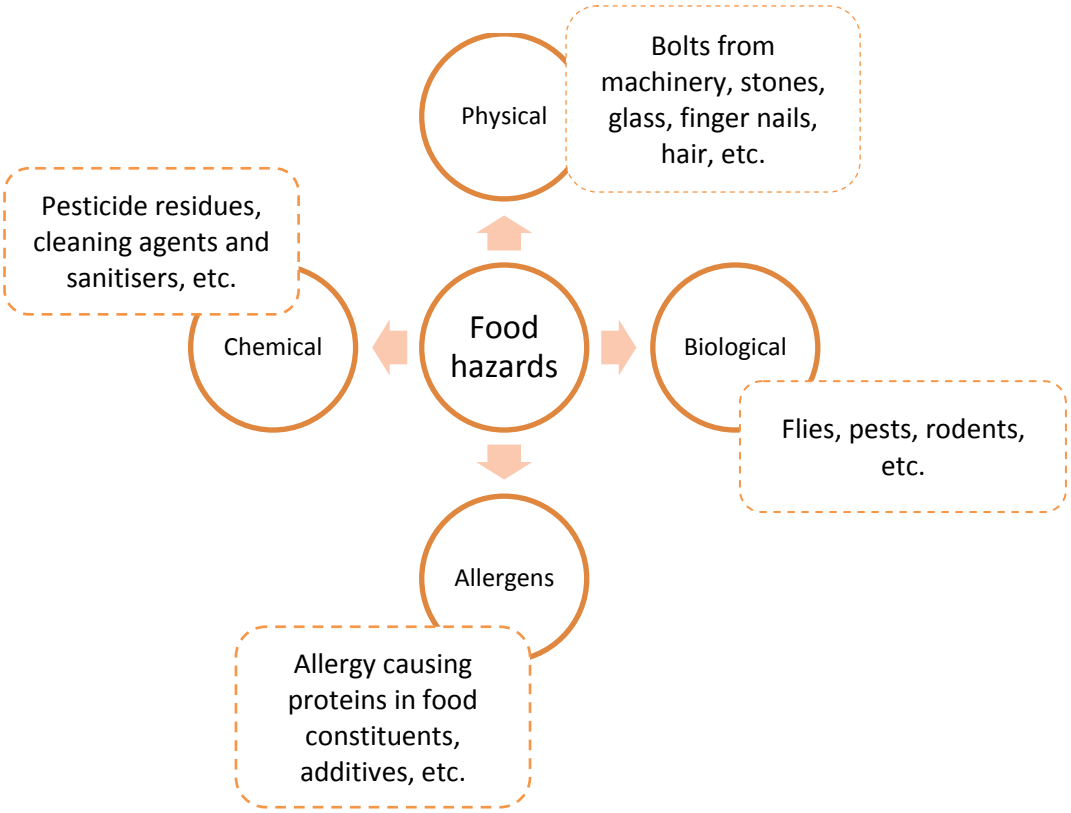


Fig . 6.2.1. Food hazards

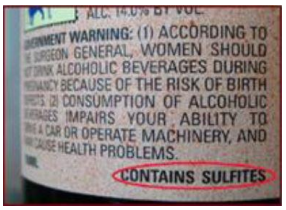
			
Cereals containing gluten	Eggs and egg products	Fish and fish products	Tree nuts and nut products
			
Peanuts soyabeans and its products	Crustacea and its products	Sulphite in concentrations of 10mg/kg or more	Milk products

Fig . 6.2.2. Food allergens

Biological	Hair, excreta, bone splinters, etc.   *Fig . 6.2.3. Biological contaminants*
Chemical	Pesticide residues, detergents, etc.   *Fig. 6.2.4. Chemical contaminants*
Physical	Bolts from machinery, stones, glass, etc.   *Fig. 6.2.5. 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 6.3: 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

6.3.1 Materials required for the practical

- PPE
- Food safetymanual
- Food samples

6.3.2 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.

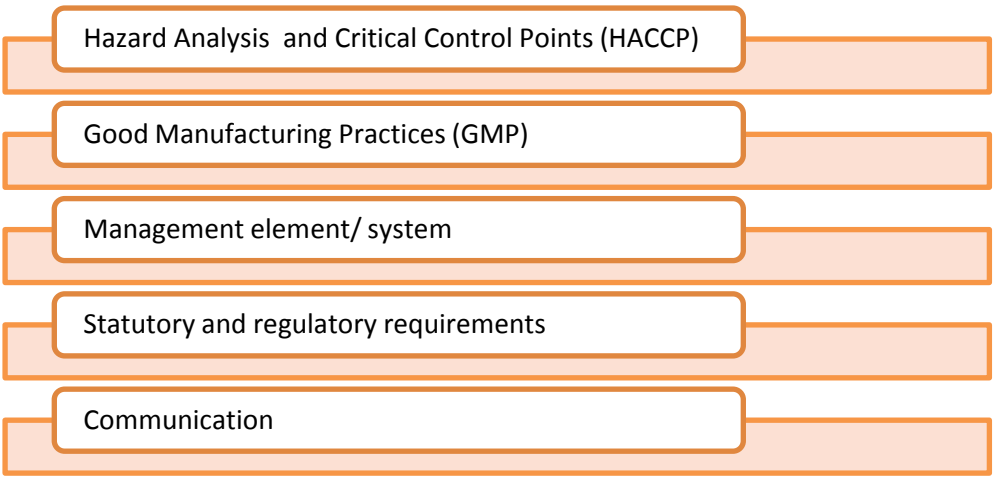


Fig . 6.3.1. Key elements of FSMS

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.

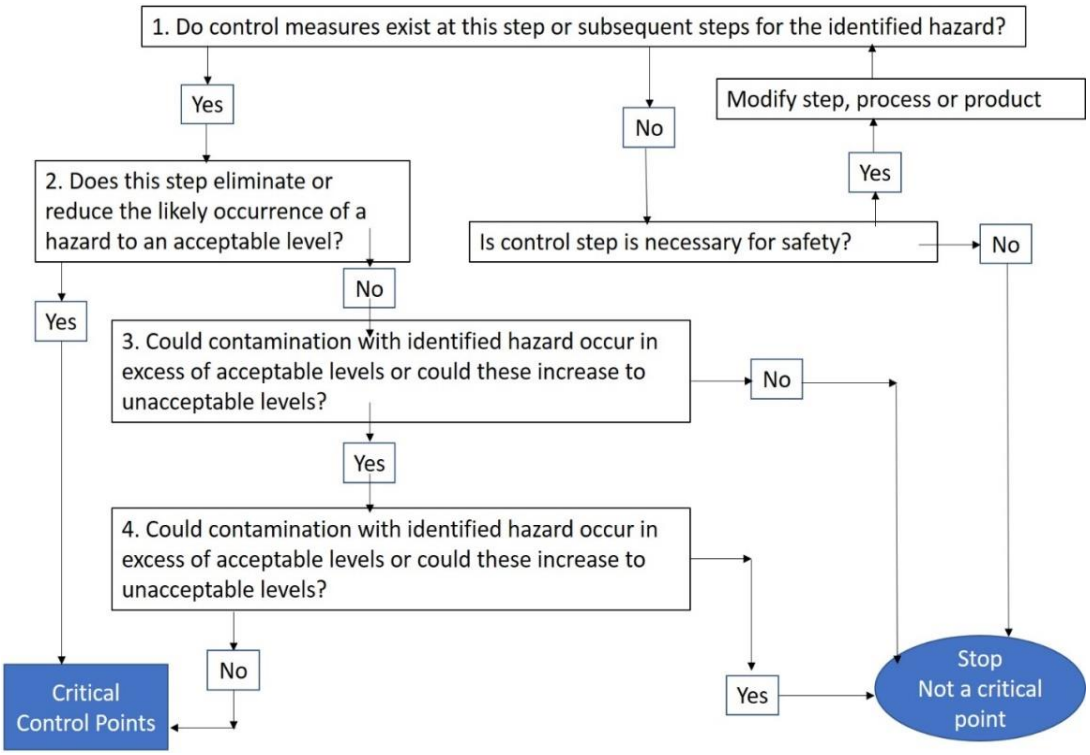


Fig . 6.3.2. CCP decision tree

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 . 6.3.3. 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.6.3.4.Waste water disposal system/effluent treatment plants

Fig.6.3.5.Well-guarded entrance

Fig.6.3.6.Demarcation of the area

Fig.6.3.7.Premises tarred and concreted to avoid dust

Fig.6.3.8.Entrance with hygiene station

Fig.6.3.9.Hand-wash stations

Fig.6.3.10.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.6.3.11.Storage of raw materials and food

Colour Coding for material

	PASS
	UNDER TEST
	HOLD
	REJECT

Fig.6.3.12.Colour coding for easy identification of quality status

Fig.6.3.13.Clearly defined walkway water stagnation near the surroundings

Fig.6.3.14.Avoid vegetation growth near the premises

Fig.6.3.15.Avoid water stagnation near the surroundings

Fig.6.3.16.Walls: clean, durable, impervious to moisture

Fig.6.3.17.Avoid Cracks on walls as it allow bacteria and moulds to accumulate

Fig.6.3.18.PVC strip curtains

Fig.6.3.19.Automatic closing springdoors

Fig.6.3.20.Air curtain

Fig.6.3.21. Special stone flooring to avoid slipping and easy to clean

Fig.6.3.22.Epoxy and smooth flooring, easy to clean and avoids dust accumulation and microbial contamination

Fig.6.3.23.Covered drains to prevent insects and rodents

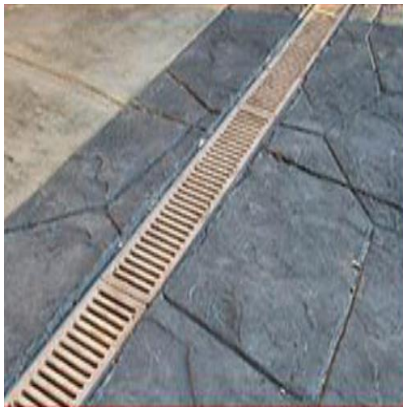


Fig.6.3.24.Floor with proper drainage

Fig.6.3.25.Nets and mesh on windows to avoid pest entry

Fig.6.3.26.Covered lights in the production area

Fig.6.3.27.Food Transportation

Fig.6.3.28. Proper lighting facility in the work area

Fig.6.3.29.Vehicle inspection before loading

Fig.6.3.30.Multilayer Tarpaulin to protect from water and dust

Fig.6.3.31. Display of Cleaning Status on Tankers and lock and key system provided for food defence

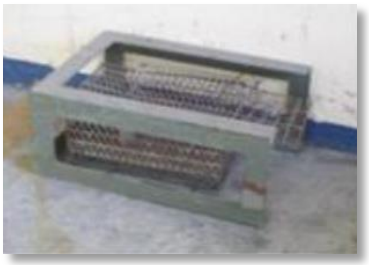
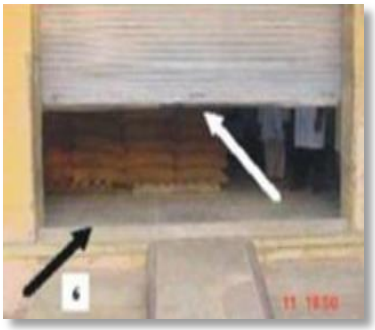
		
Rat cage protected by steel frame	Glue board for insect trapping in production	End seal for pipelines not in use
		
Insectocutor used outside production area	Temper resistant bait station secured onto ground hook up baits	Mesh and grit for drainage
		
Deny entry	Deny food	Deny shelter
		
Destruction		

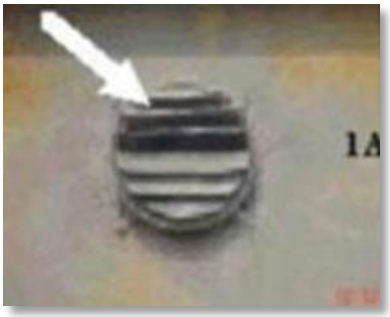
Fig.6.3.32.Some pest control methods

Broken glass at the window

Open exhaust



Gap in between shutter and floor



Space in blinds on exhaust

Fig.6.3.33.Some potential sources of pest entrance

Fig.6.3.34.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. 6.3.35. 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

7. Professional and Core Skills

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 7.1: 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

7.1.1 SWOT analysis

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

Strengths	Weaknesses
Opportunities	**Threats**

Fig.7.1.1. 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 7.2: 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

7.2.1 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.

7.2.2 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:

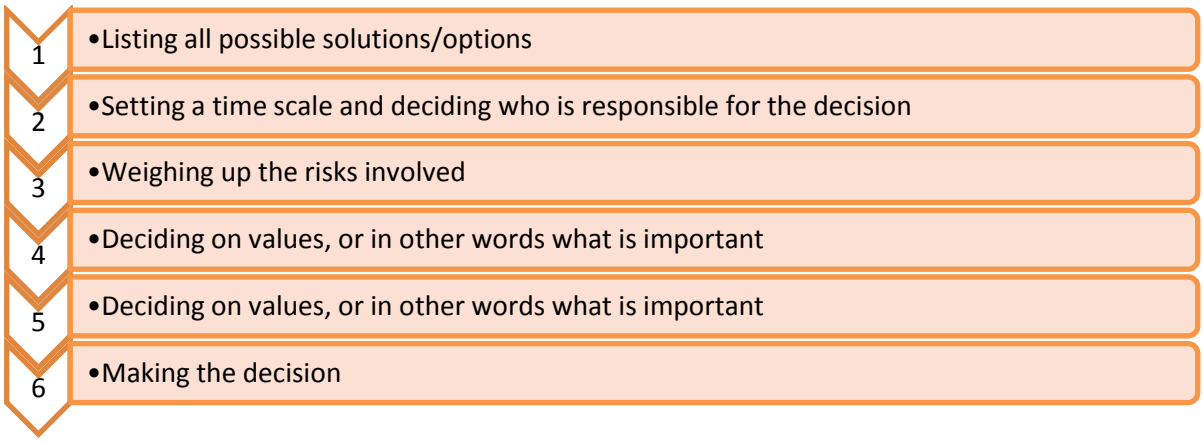


Fig.7.2.1 Steps for decision making

7.2.3 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 7.3: 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

7.3.1 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:

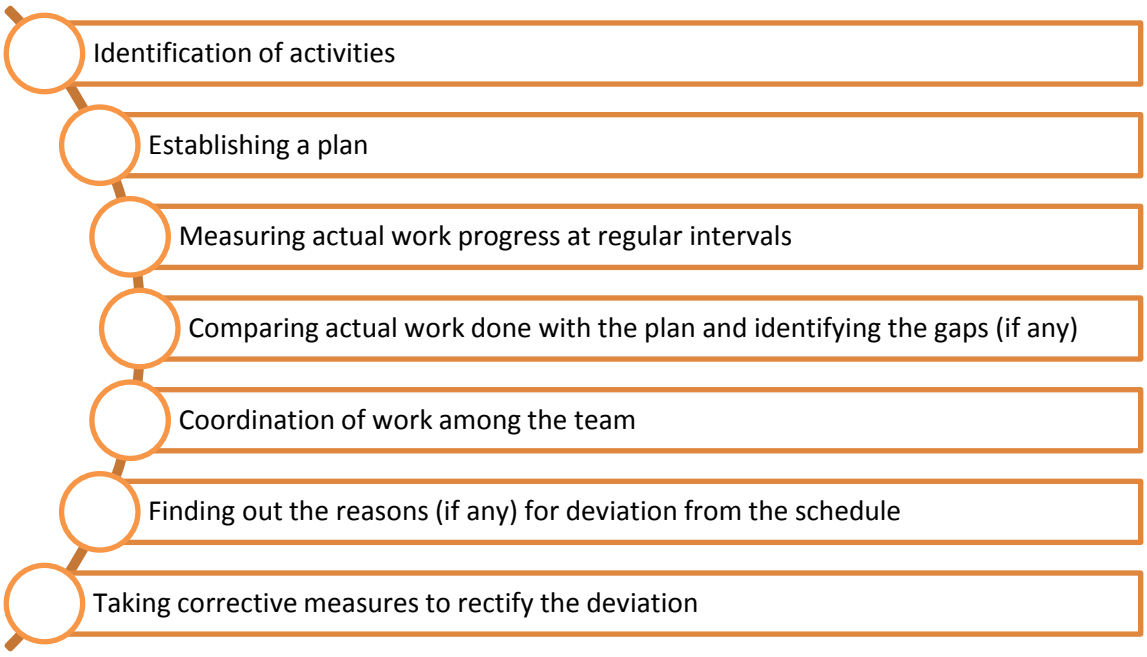


Fig.7.3.1 Ways to plan and organize yourself

7.3.2 Benefits of organising and planning

1. Write the benefits of organizing.

_____

_____

2. Write the benefits of planning.

_____

_____

7.3.3 Time management

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

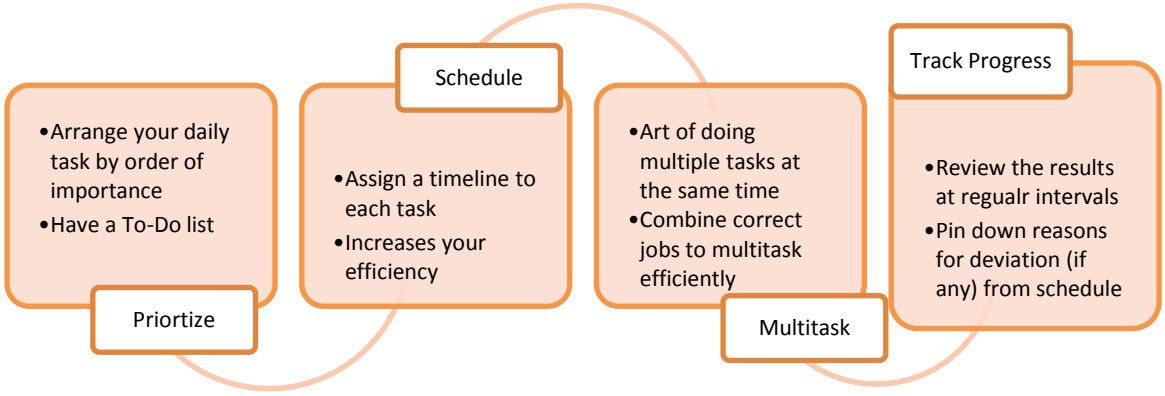


Fig. 7.3.2 Steps to manage time effectively

7.3.4 Ways to manage your work hours in the most effective

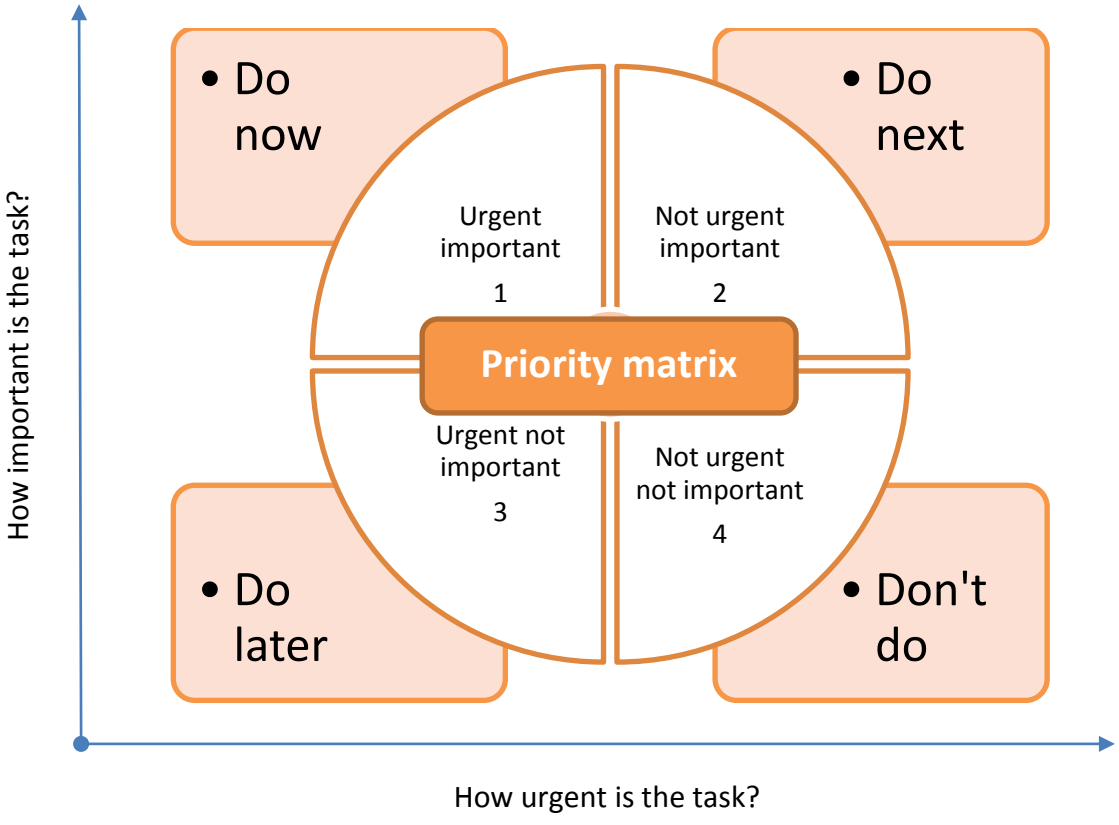


Fig . 7.3.3. Priority matrix

7.3.5 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					

UNIT 7.4: 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

7.4.1 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.

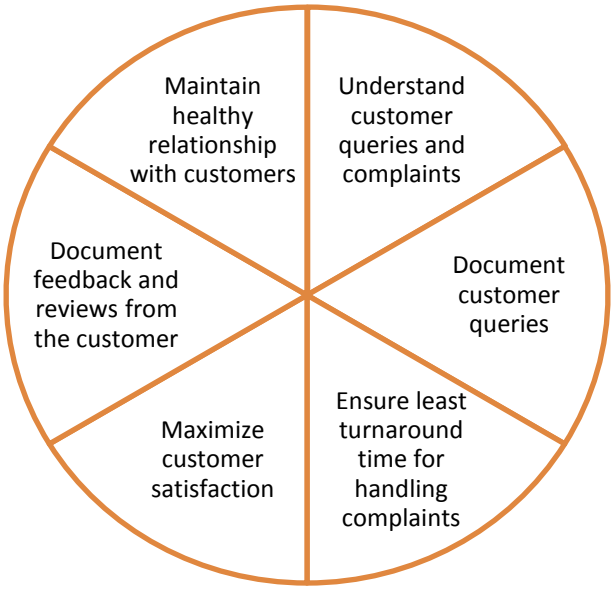


Fig.7.4.1. Ways to maximise customer service

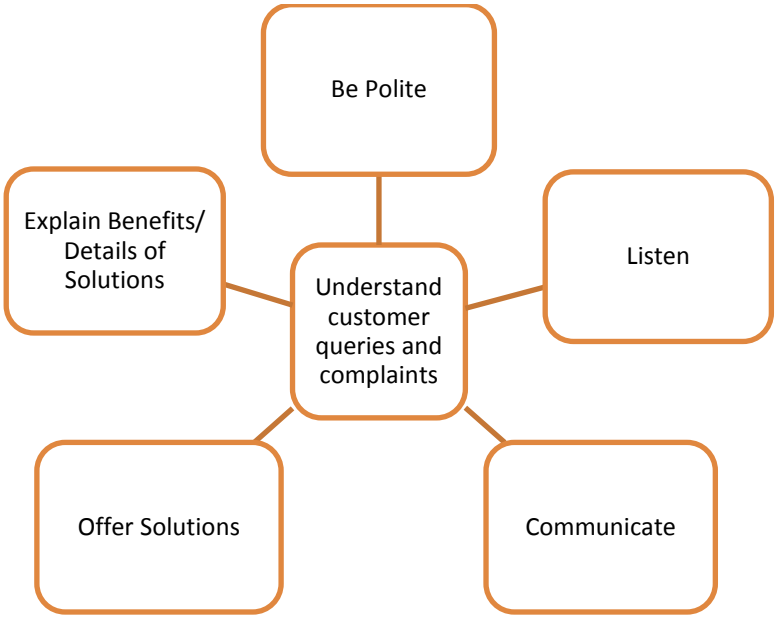


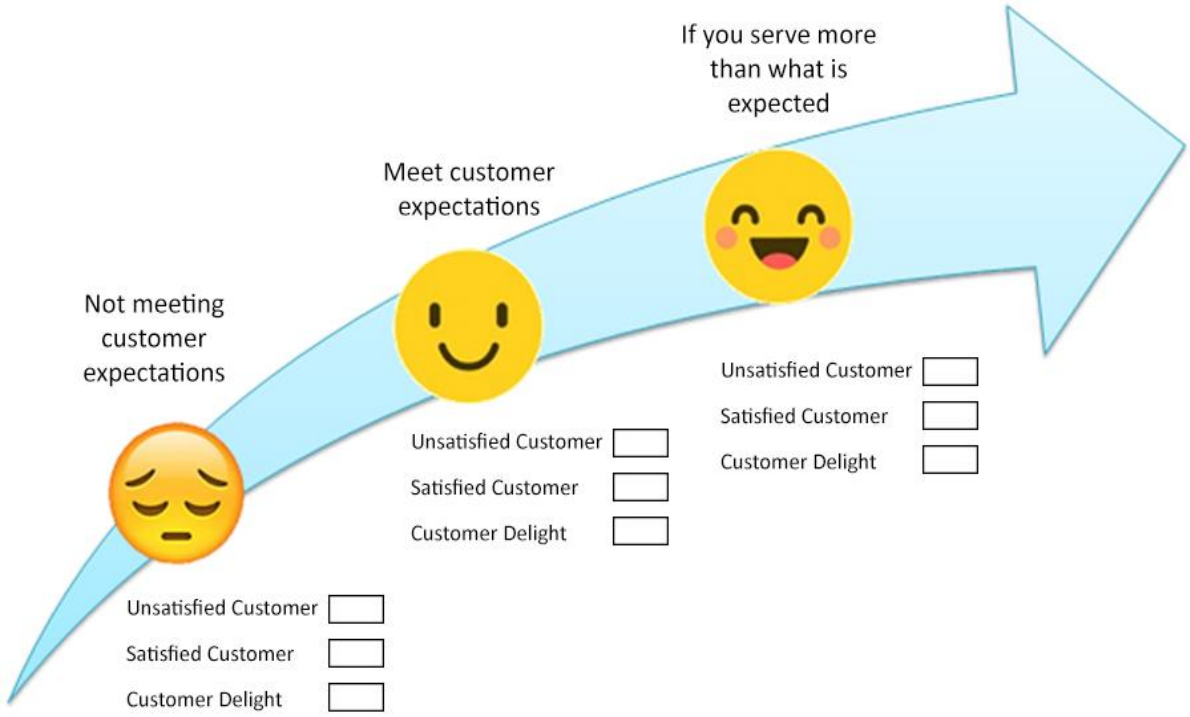
Fig.7.4.2. Understand customer queries and complaints

7.4.2 Maximise customer satisfaction

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

Fig.7.4.3. 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 7.5: 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

7.5.1 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.

7.5.2 Steps in problem solving

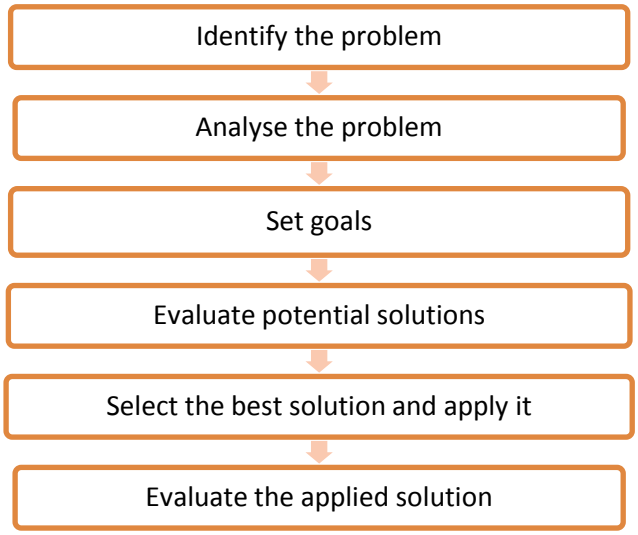


Fig .7.5.1. Steps in problem solving

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 7.6: 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.

7.6.1 What are analytical skills?

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

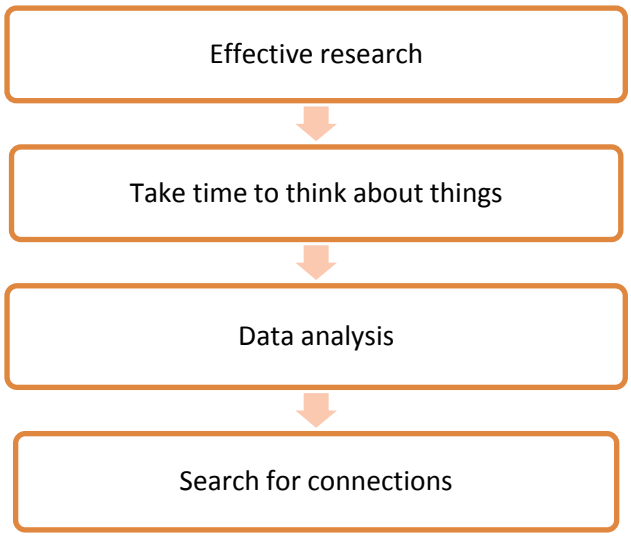


Fig.7.6.1. Analytical skills

7.6.2 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 7.7: 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

7.7.1 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.

7.7.2 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.

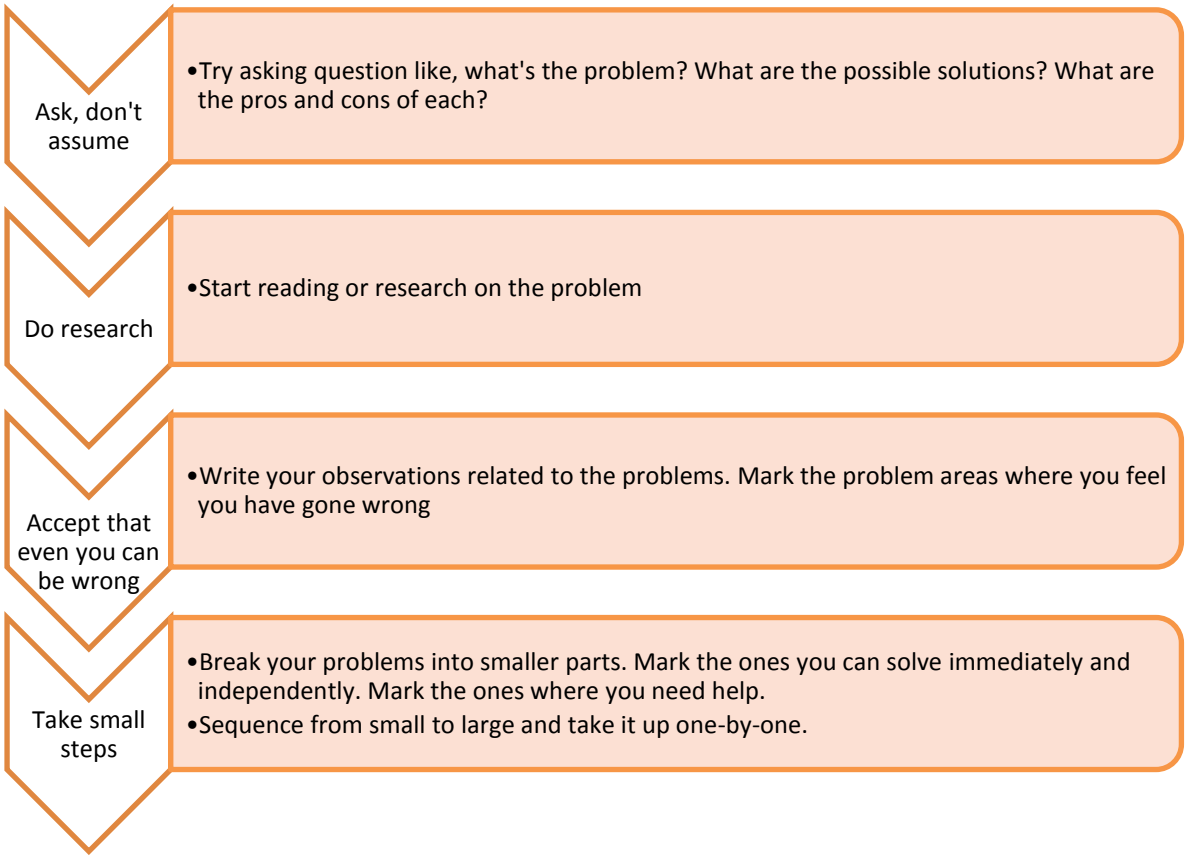


Fig.7.7.1. Tips to solve problems

Notes

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8.IT Orientation

Unit 8.1 - Basics of Information Technology 8 hrs

FIC/N7064

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 8.1: 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

8.1.1 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.

8.1.2 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.8.1.1. Process of computer

8.1.3 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. 8.1.2. Components of a Computer

8.1.4 Mouse

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

The different types of mouse available are:

			
Fig.8.1.3. Trackball mouse	*Fig.8.1.4. Optical mouse*	*Fig.8.1.5. Touchpad*	*Fig.8.1.6. Ball mouse*

Mouse is used to point and select.

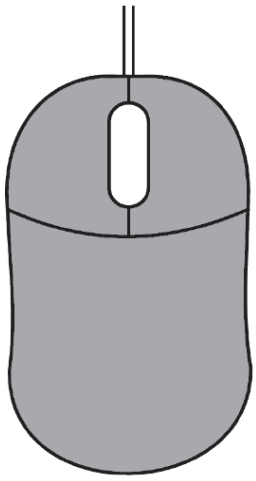


Fig.8.1.7. Mouse

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.

8.1.5 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.

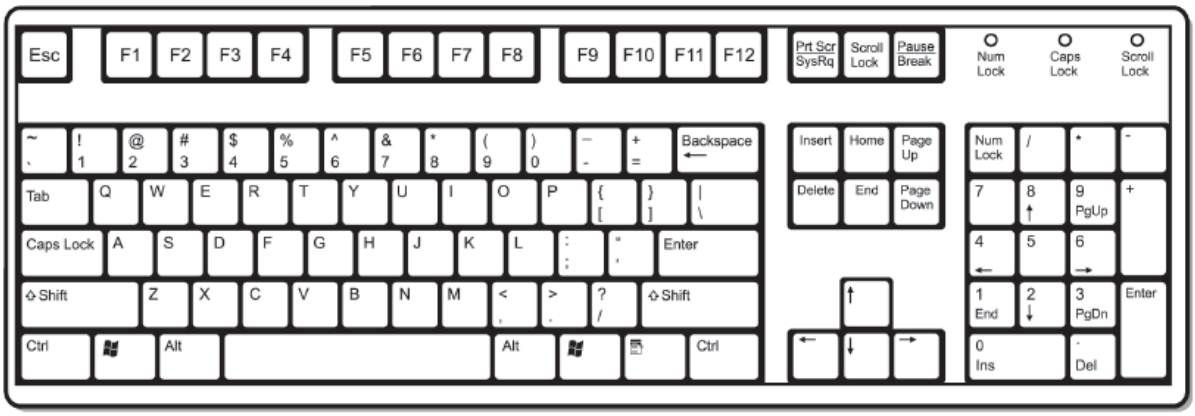


Fig.8.1.8. Keyboard

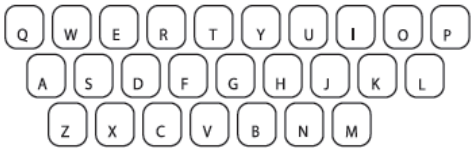
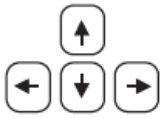
Different Set of Keys	Description
 *Fig.8.1.9. Alphabet Keys*	The keyboard has 26 letter keys from A to Z called the alphabet keys.
 *Fig.8.1.10. Numeric Keys*	The number keys (0 to 9) are called ‘numeric keys’.

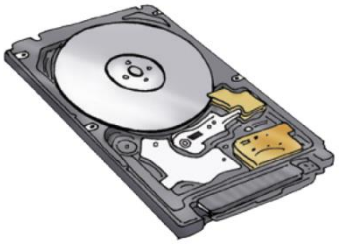
 *Fig.8.1.11. Symbol on the number keyboard*	The longest key on the keyboard is the 'spacebar.'
 *Fig.8.1.12. Spacebar*	It is used to put an empty space in between letters and numbers.
 *Fig.8.1.13. Esc key*	The key that stands alone on the top left corner is the 'escape key'.
 *Fig.8.1.14. Arrow keys*	The set of four keys that have arrows on them are the 'arrow keys'.

Finger Key Coordination

Fig.8.1.15. Finger Key Coordination

8.1.6 Computer Peripherals

 *Fig.8.1.16. 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.8.1.17. Speakers*	Speakers are devices used to listen to music, voices and other sounds.
 *Fig.8.1.18. Microphone*	The microphone converts sound inputs by the user into a format understood by the computer. It is used for sound recording.
 *Fig.8.1.19. 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.8.1.20. 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.8.1.21. 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.8.1.22. 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.8.1.23. 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.

8.1.7 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.

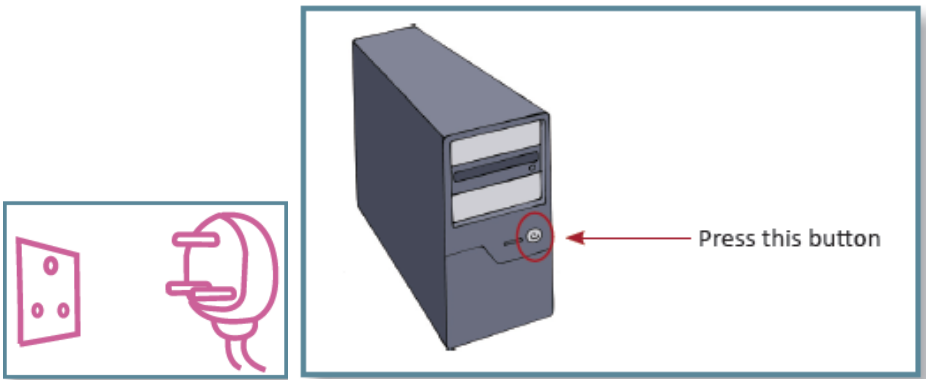


Fig.8.1.24. Plug in the computer to switch it on

Fig.8.1.25. 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.

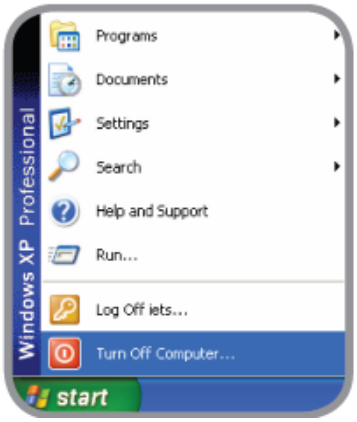


Fig.8.1.26. Start bar

Fig.8.1.27. Turn off option

8.1.8 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

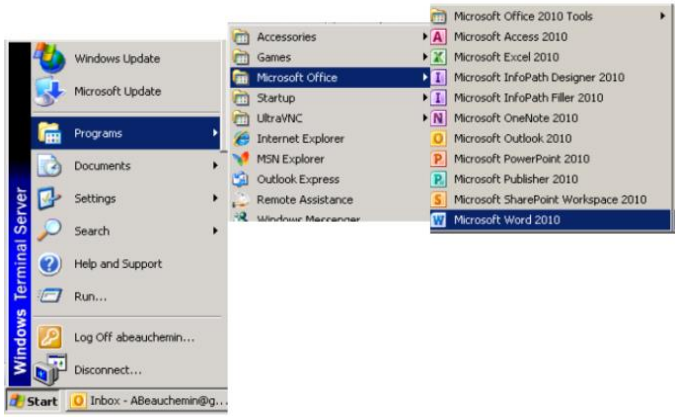


Fig.8.1.28. Start →Programs → Microsoft Office→ Microsoft Word 2010

Create a New Document

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

8.1.9 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.

Notes

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