







Practical Guide

Sector

Food Processing

Sub-Sector

Fruits and Vegetables, Dairy Products, Meat and Poultry, Fish and Sea Food

Occupation

Refrigeration

Reference ID: FIC/Q7004, NSQF Level 4



Cold Storage Technician

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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 a 'Cold Storage Technician' in the 'Food Processing' sector. All the activities carried out by a specialist are covered in this course. Upon successful completion of this course, the candidate will be eligible to work as a Cold Storage Technician.

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

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

- Prepare work area for cold storage of food product
- Handle cold storage facility
- Perform documentation and record keeping related to cold storage
- Demonstrate the maintenance of hygiene and sanitation related to cold storage of food product

Symbols Used



Unit Objectives



Practical



Resource



Notes



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 Ø



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.

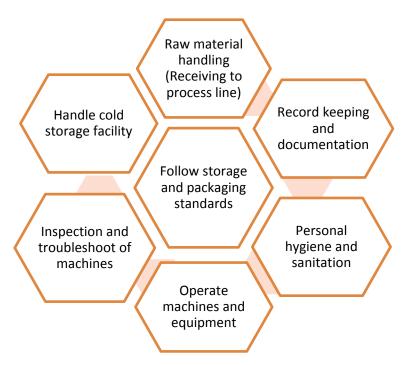


Fig . 1.1.1. Roles and responsibilities of cold storage technician

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 Cold Storage Technician	Has the function being carried out as per specifications?
1		
2		
3		
4		
5		
6		

Conclusion:

Based on the observations, write your conclusions here:

Sr	
no	
1	
2	
3	
4	
5	
6	

Notes 🛗	
Notes	











2. Prepare and Maintain Work Area and Refrigeration Equipments

Unit 2.1 - Prepare and Maintain Work Area

15 hrs

Unit 2.2 - Prepare and Maintain Process Machineries

15 hrs



Key Learning Outcomes \heartsuit



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

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

UNIT 2.1: Prepare and Maintain Work Area

Unit Objectives



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

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

2.1.1 Materials required for the practical



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

2.1.2 Practical



Pre-requisite knowledge:

• Prepare and Maintain Work Area and Process Machineries.

Method:

• Mark food and non-food contact surfaces.



Fig . 2.1.1. Area Layout

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

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

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

Fig . 2.1.2. Sample work area cleaning SOP



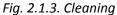




Fig. 2.1.4. Pressure

Precautions:

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

Observation:

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

Conclusion:

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

UNIT 2.2: Prepare and Maintain Process Machineries

Unit Objectives



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

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

2.2.1 Materials required for the practical



- Compressors
- Condensers
- **Evaporators**
- **Expansion Devices**
- SOP
- Safety manual

2.2.2 Practical



Pre-requisite knowledge:

• Prepare and Maintain Work Area and Process Machineries.

Method:

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

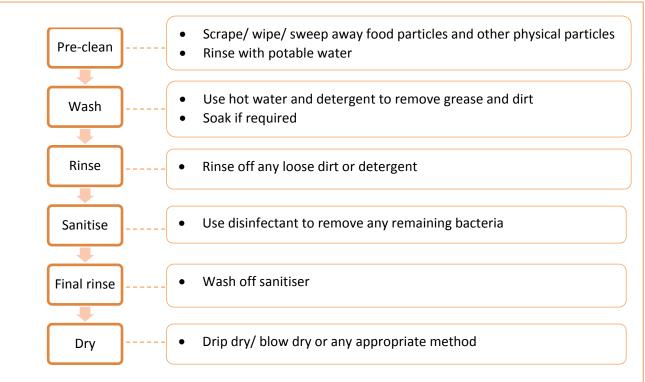


Fig 2.2.1. Steps in cleaning procedure

Precautions:

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

Observation:

Sr no	Name of the activities	Time taken to conduct the process (hrs)
1		
2		
3		
4		
5		
6		

Conclusion:

Sr no	Parts used for CIP	Parts used for COP	Parts used for SIP
1			
2			
3			
4			
5			
6			











3. Handle Cold Storage Facility for Storing Food

Unit 3.1 - Installation of Refrigeration Unit	8 hrs
Unit 3.2 - Start-up of Refrigeration System	8 hrs
Unit 3.3 - Storage of Food in Cold Storage Room	8 hrs
Unit 3.4 - Inspect, Repair/Replace Refrigeration Systems and Components	8 hrs
Unit 3.5 - Maintenance of Refrigeration System and Components	8 hrs



Key Learning Outcomes



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

- 1. Execute the installation process of all the components of refrigeration system
- 2. Execute the process for charging refrigerant in the refrigeration system
- 3. Identify faults in a refrigeration system
- 4. Execute the process for repairing and maintenance of the refrigeration system
- 5. Execute maintenance of refrigeration system

UNIT 3.1: Installation of Refrigeration Unit

Unit Objectives | 6



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

1. Execute the installation process of all the components of refrigeration system

3.1.1 Materials required for the practical



- Evaporator
- Compressor
- Condenser
- Expansion valve
- Refrigerant
- Calibrated thermometer
- Tools kit
- Sanitisers
- PPE
- Safety manual

3.1.2 Practical



Pre-requisite knowledge:

- Refrigeration unit installation.
- Read the installation manual carefully.

Method:

For the refrigeration cycle to operate successfully, five important components must be present within the refrigeration system.



Fig. 3.1.1. Components of refrigeration system

- Check the following points prior to installation of the refrigeration unit:
 - The condenser coil (air inlet) should not restrict air flow to the coil. A minimum of 12" distance to be maintained (18" is preferred) between the face of the coil and the wall or other vertical obstruction.
 - A minimum of 6" distance to be maintained on the sides to allow access to the housing clamps.
 - A minimum of 24" distance to be maintained on the louvered end (air outlet) for clearance when opening housing and for ease of maintenance.
 - Do not position multiple units close to each other to avoid air discharge of one going into the condenser air intake of another.
- Remember the following points when installing the evaporator:
 - Do not install the evaporator too close to door openings to prevent icing problems.
 - Keep the minimum clearance between evaporator and the walls equal to or greater than the coil height for proper air flow and service access.
 - Refer to the evaporator coil drawing dimension for mounting holes location.
 - Install washers and secure with nuts.
 - Tighten until the coil is firm against the ceiling.
 - The evaporator coil must be level.

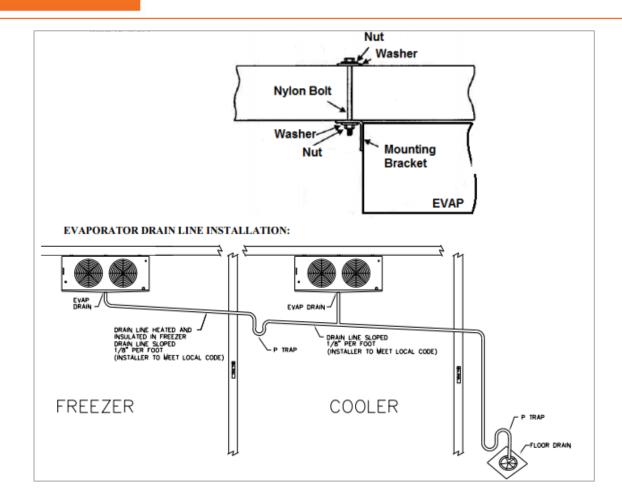


Fig. 3.1.2. Evaporator Installation Line

- 3. After installing the evaporator, install the refrigerant piping. Remember that the condensing unit must remain sealed and pressurized from the manufacturer until piping is complete and final connections are ready to be made.
- 4. Use only refrigeration grade copper tubing, (ACR), type "L", bright annealed, dehydrated, and properly sealed against contamination. Soft temper tubing may not be used for field interconnection of refrigeration components (condensing unit to evaporator assembly). Take extreme care to keep refrigeration tubing clean and dry prior to installation. Use an appropriate size tube cutter (**DO NOT CUT TUBING WITH A SAW**).
- 5. Keep the suction lines slope down 1/2 inch for each 10 feet of horizontal run towards the compressor.
- 6. If any portion of the suction line rises above the exit elevation of the evaporator, P-type oil traps should be located at the base of each suction riser for proper oil return to the compressor.
- 7. During brazing, it is a must to pass dry nitrogen through the lines at low pressure to prevent scaling and oxidation inside the tubing and fittings. Remove all flux from the joints after brazing.
- 8. Add the proper refrigerant to 60 psig, then boost to 175 psig with dry nitrogen. Leak check all joints with an electronic leak detector or a halide torch. If leaks are found, relieve the pressure and make repairs as necessary and recheck.

Precautions:

- During the testing period you should check the temperature holding range against the control setting.
- On low temperature units, check the defrost control system to see that all ice is removed from the coil during each defrosts cycle.
- Perform checks of door operation and all other component operations.

Observation:

Sr no	Installation completion checklist	Yes/No
1	Check high-low pressure control settings	
2	 Check setting of defrost timer Medium temperature 2 to 4 defrosts/24 hours, with 35 minutes fail safe Low temperature 3 to 4 defrosts/24 hours, with 44 minutes fail safe 	
3	Check operating pressure	
4	Check electrical requirements of unit to power supply voltage	
5	Set temperature control for desired temperature range	
6	Check setting of thermostatic expansion valve for proper operation	
7	Check sight glass for proper refrigerant charge	
8	Check compressor oil level	
9	Check system for proper defrost settings and operation	
10	Check condensing unit for vibrating or rubbing tubing. Dampen or clamp as required	
11	Open all valves completely counter clockwise	
12	Check packing nuts on all service valves	
13	Replace all service valve caps and latch unit covers	

Conclusion:

Sr no	Installation Activities	Installed Successfully (Yes/no)
1	Evaporator	
2	Compressor	
3	Condenser	
4	Expansion valve	
5	Refrigerant	

UNIT 3.2: Start-up of Refrigeration System

Unit Objectives | @



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

1. Execute the process for charging refrigerant in the refrigeration system

3.2.1 Materials required for the practical



- Refrigeration unit
- Refrigerant as per manufacturer specification

3.2.2 Practical



Pre-requisite knowledge:

Installation of refrigeration system.

Method:

Start-up of refrigeration system can be done in two ways:

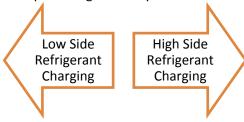


Fig. 3.2.1. Start-up of refrigeration

- 1. In low side refrigerant charging, connect the canister supplying refrigerant to the gauge service port and open it.
- 2. Check that the HVAC equipment or appliance is running which pumps refrigerant gas from the supply source in parallel with pumping from the outlet of the evaporator coil.
- 3. Keep the refrigerant canister upright so that only gas leaves the canister.
- 4. In high side refrigerant charging when charging an air conditioner, heat pump, or refrigeration appliance, keep the system being turned OFF.
- 5. Keep the refrigerant gas canister is placed upside down so that only pure liquid refrigerant leaves the canister.
- Keep in mind that once you start the system running you will not be able to charge on the high side because the head pressure out of the compressor will be higher than the evaporation pressure in the canister which will push refrigerant back into the canister.

Precautions:

Keep the system turned off while charging the unit.

Observation:

Write your key observation of starting up the refrigeration unit.

Sr no	Starting the refrigeration unit
1	
2	
3	
4	
5	
6	

Conclusion:

Prepare a checklist for low side and high side refrigerant charging.

Sr	Low side refrigerant charging	High side refrigerant charging
no		
1		
2		
3		
4		
5		
6		

UNIT 3.3: Storage of Food in Cold Storage Room

Unit Objectives



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

1. Determine the storage parameters for various type of food

3.3.1 Materials required for the practical



- Different food types
- Cold storage unit
- Storage parameter chart

3.3.2 Practical



Pre-requisite knowledge:

Storage parameters.

Method:

• There are mainly three types of food which are kept in cold storage:

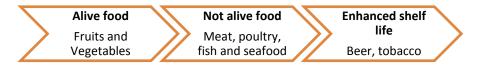


Fig. 3.3.1. Types of food kept in cold storage

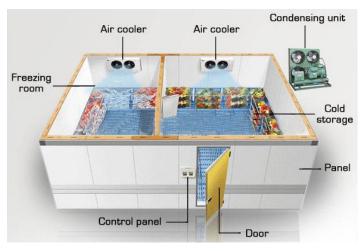


Fig .3.3.2. Cold storage room layout

- 1. Receive food for storage meeting the standard quality parameters.
- 2. Check for any damages or external contamination in the food received for cold storage.
- 3. Sort and grade the food received for cold storage as per quality standards/parameters specified in the SOP (keeping the high-quality/fresh produce for storage).
- 4. If required (for fresh vegetables/ fruits etc.) clean with potable water in order to avoid the spread of moulds and fungi before keeping it in the cold storage.
- 5. Store the food by analysing the storage parameters and the packaging used.

Temperature requirement for cold storage			
Recommended temperature ^o C	Food product		
Greater than 18	 Processed foods (pickled, dried, cooled) Cooking oils Onions 		
Between 10 to 18	Sub tropical fruits and seeds chocolate		
Between 0 to 10	 Fresh fruits and vegetables Milk and dairy products Flowers Eggs 		
Less than zero	 Meat Fish Poultry Frozen fruits and vegetables, ice cream 		

	Types of packaging for cold storage			
	Primary	Secondary	Tertiary	Transit
	Packaging	Packaging	Packaging	Packaging
Meaning	 Comes in direct contact with the food and holds the product and features labeling 	Creates ease of manual movement of products	Used for long distance transportation and distribution	Used to bundle the boxes or crates for ease of transportation and distribution overseas
Packaging Materials	Plastic film bags or pouches/Film wraps made of: LDPE (low-density polyethylene); HDPE (high density polyethylene); PP (polypropylene); OPP (oriented polypropylene); PVC (polyvinyl chloride);	 Plastic Laminated Cartons/ Cardboard box Double walled insulated moulded plastic containers Thermoformed boxes/cartons Wooden Crates 	 Palletised crates Plastic Laminated large Cartons/ Cardboard box Double walled insulated moulded plastic containers Thermoformed boxes/cartons Palletised crates Plastic Laminated large Cartons (For easy handling wrapped with shrink, stretch wrap or corrugated outers or may be packed in re-usable containers) 	 Palletised crates Plastic Laminated large Cartons (For easy handling wrapped with shrink, stretch wrap or corrugated outers or may be packed in re-usable containers)

	Primary	Secondary	Tertiary	Transit
		Packaging	Packaging	Packaging
Packaging Materials	Packaging Bags/wraps coated/laminated with: M (Metallized); Kraft (paper); DM (one side nitrocellulose coated); A (aluminium foil); TPP (this porous paper); XS (cellulosic film coated with PVDC). Polyester/polyet hylene laminates or nylon based five-layered co- extruded films	Secondary Packaging	Tertiary Packaging	Transit Packaging
	nylon based five-layered co-			
	 Thermocol Cartons (Other than fish) Waxed or polycoated Folding box boards - White bleached board or chip board (one sided) Kraft boards - Fully bleached materials Corrugated paper 			

	Primary Packaging	Secondary Packaging	Tertiary Packaging	Transit Packaging
Products Packed	 All Products related to Meat/Poultry/Fi sh/ Vegetable/Fruits / Agriculture Fresh Frozen, Cured, Thermo- processed/ ready to cook food etc. 	All products	All products	All products





Fig .3.3.3. Cold storage room

Fig .3.3.4. Cold storage room

Avoid storing foods together which has strong odours:

- Apples/pears with celery, cabbage, carrots, potatoes or onions
- Celery with onions or carrots
- Citrus with strongly scented vegetables
- Pears/apples with potatoes as the former acquire unpleasant taste
- Green pepper will taint pineapples
- Onions, nuts, citrus, potatoes should be stored separately

_							
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u	n2	CI	va	L	u		

Food items received for cold storage	Quantity	Temperatur e (ºC)	RH (%)	O ₂ (%)	CO ₂ (%)	Storage time

_					
$\Gamma \cap$	n	r	usi	\mathbf{a}	n

Write your conclusion here:

Sr	
no	
1	

UNIT 3.4: Inspect, Repair/Replace Refrigeration Systems and Components

Unit Objectives



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

- 1. Identify faults in a refrigeration system
- 2. Execute the process for repairing and maintenance of the refrigeration system

3.4.1 Materials required for the practical



- Faulty module
- Tool kit
- Replacement/repair module



Fig. 3.4.1. Tool box

It is a box to organize, carry, and keep the tools safe

3.4.2 Practical



Pre-requisite knowledge:

• Repair and maintenance

Method:

• Check for following common types of faults that occur in a refrigeration unit

Compressor Starts but Stops immediately

Compressor is Running Continuously

Unusual Sound from Compressor

High Compressor Discharge Temperature

Evaporator Coil Icing

Fig. 3.4.2. Common types of fault in refrigeration unit

- 1. When the compressor in the reefer circuit starts and suddenly stops, check for the following reasons, and fix them:
 - If low pressure cut out gets activated stop it.
 - If there is defective oil pressure cut out replace it
 - If defrosting timer is getting activated frequently replace it
 - If the lube oil level is below required level refill it
 - If foaming of oil leading to reduced oil pressure replace the oil
 - If motor overload cut-outs are activating stop it
- 2. If compressor is running continuously then check whether thermostat low pressure cutout is activated or not at low temperature/ pressure or else correctly reset the LP cutout.
- 3. Fix the unusual sound of compressor by tightening the driving belt, increasing the oil pressure.
- 4. Fix high compressor discharge temperature by reducing the suction pressure and replacing the safety valve from the leakage.
- 5. Start the defrosting to fix evaporator coil icing.

- For any kind of repair/replacement, always wear the PPE.
- Follow safety guidelines completely.
- Make sure electric power is unplugged during maintenance of the unit.

Observation:

Sr no	Fault Identified	Repair/Replacement Activities
1		
2		
3		
4		
5		
6		

Sr				
no				
1				
2				
3				
4				
5				

UNIT 3.5: Maintenance of Refrigeration System and Components

Unit Objectives



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

1. Execute maintenance of refrigeration system

3.5.1 Materials required for the practical



- Refrigeration system
- PPE
- Tool Kit

3.5.2 Practical



Pre-requisite knowledge:

• Maintenance of refrigeration system.

Method:

- All mechanical equipment needs periodic service to keep it in the best operating condition.
- 1. Check the evaporators monthly for proper defrosting and do the following activities:
 - Tighten all electrical connections in the electrical panel.
 - Check fan motors and blades. Do the blades turn freely? Check the blades for unusual wear patterns or stress fractures. Clean the surface of each fan blade. Replace any worn blades and tighten the fan set screws.
 - Check all defrost heaters.
 - Clean the drain pan and check for proper drainage.
 - Clean the evaporator coil surface.
- 2. Check the compressor units and do the following activities:
 - Tighten all electrical connections. Check for frayed wiring insulation and corroded terminals. Replace damaged wiring.
 - Check all electrical components.
 - Check the safety controls. Make certain the oil safety and high-pressure controls are functioning.
 - Check the operation of the room temperature thermostat. Make certain the liquid line solenoid valve closes completely and the compressor pumps down and cycles off.
 - Check the oil level in the compressor. The oil level should be at or between one-third and two-thirds of the sight glass.
 - Check the operation of the defrost controls. Under most conditions, the timer should initiate the defrost. Make certain the defrost termination temperature control stops the defrost cycle and allows the evaporator fans approximately 2 min of delay time before restart.
 - Check the condition of refrigerant line insulation. Open, torn, or waterlogged insulation provides little benefit to the system. If the insulation is in poor condition, replace it.
 - Check for the proper refrigerant level in the system. The liquid line sight glass should be clear and full of liquid refrigerant during normal operation. If not, find and repair the leak, then charge enough refrigerant into the system to maintain a clear sight glass.

- Check the system superheat at the condensing unit. Measure the suction pressure at the suction service valve of the compressor and determine the saturation temperature corresponding to this pressure from a temperature-pressure chart. Measure the suction temperature of the suction line about 1 ft back from the compressor using an accurate thermometer. Subtract the saturated temperature from the actual suction line temperature. The difference is superheat.
- Check all capillary and super hose lines for signs of wear. Make certain all capillary and super hose lines are secure and do not rub against objects that can cause refrigerant leaks.
- Replace all missing valve caps and unit covers.
- 3. Check the condensers and do the following:
 - Clean periodically with a brush, vacuum cleaner, pressurized water, or commercially available coil cleaning foam. If a foam cleaner is used, it should not be acid based.
 Follow the label directions of the appropriate cleaner.
 - Check that each fan freely rotates.
 - o Tighten all fan set screws.
 - Check the fan blades for signs of stress or other wear features. If any unusual wear is seen, replace the blade.
 - o Lubricate the motors.

- For any kind of maintenance work, always wear the PPE.
- Follow safety guidelines completely.
- Make sure electric power is switched off during maintenance of the unit.

Observation:

Sr no	Components taken for maintenance	Activities conducted
1		
2		
3		
4		
5		
6		

Conclusion:

Write your conclusion here:

Sr	
no	
1	

Notes	
Notes	

Cold Storage Technician









4. Complete Documentation and Record Keeping related to the Cold Storage Facility



Unit 4.1 - Raw Material Records 2 hrs
Unit 4.2 - Production Schedule and Process Parameters 2 hrs
Unit 4.3 - Finished Products Records 2 hrs



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 4.1: Raw Material Records

Unit Objectives @



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

1. Demonstrate the process of maintaining documentation for raw materials

4.1.1 Materials required for the practical



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

4.1.2 Practical



Pre-requisite knowledge:

Complete documentation and record keeping.

Method:

• Production unit has three types of register/book.



Fig. 4.1.1. Types of register/book

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

Precautions:

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

Observation	:

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

Conclusion:

Stock register updated for the following raw materials:

Sr no	Type of raw material
1	
2	
3	
4	
5	

UNIT 4.2: Production Schedule and Process Parameters

Unit Objectives | 6

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

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

4.2.1 Materials required for the practical



- Process manual
- Production schedule
- Production register

4.2.2 Practical



Pre-requisite knowledge:

Complete documentation and record keeping.

Follow the production schedule:



Fig. 4.2.1. SOP - Production Schedule and Process Parameters

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

Precautions:

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

Observation:

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

Conclusion:

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

UNIT 4.3: Finished Products Records

Unit Objectives



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

1. Execute the process of documenting details of finished products

4.3.1 Materials required for the practical



- Finished goods register
- **ERP Software**

4.3.2 Practical



Pre-requisite knowledge:

Complete Documentation and Record Keeping.

Method:

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

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

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

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

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

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

Observation:

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

Conclusion:

Finished goods register updated for the following processed products:

Sr no	Products
1	
2	
3	
4	
5	

Notes	
Notes —	
	
	

_











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

Unit 5.1 - Safety and Sanitation Functions 5 hrs
Unit 5.2 - Food Safety Hazards 15 hrs
Unit 5.3 - Apply Food Safety Practices 15 hrs



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 5.1: 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

5.1.1 Materials required for the practical



- Cleaning agents
- Sanitisers
- PPE
- · Food safety manual
- First aid box
- Tool box

5.1.2 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

- 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



Don'ts

- 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



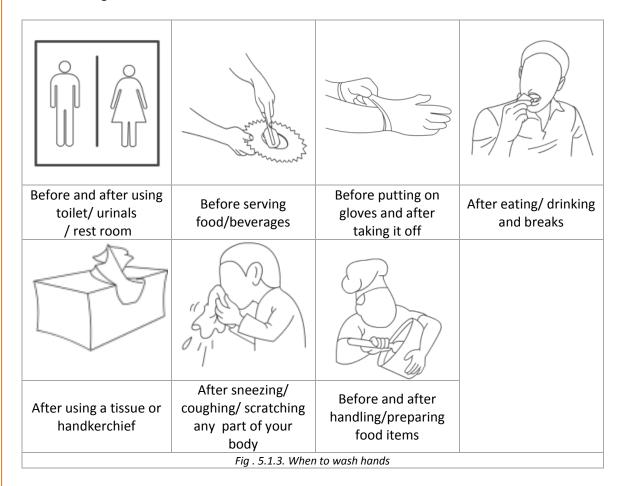
Fig . 5.1.1. Behavioural practices for food handlers – do's and don't's

- 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.
- Follow the six simple steps as given for hand sanitation.



Fig. 5.1.2. Hand sanitation

6. Follow the guidelines when to wash hands.



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.



Caution



Danger Fragile Roof



Dangerous Chemicals



Do Not Enter



Danger Scaffolding Incomplete



Beware of Electric Shock



Electric Hazard



Never put your Hand Inside During the Operation



Highly Flammable



Hot Surface Do Not Touch



Mind Your Head



Never Open the Cover During the Operation

Fig .5.1.4. 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 . 5.1.5. First Aid Box

- Follow the safety instructions completely.
- Maintain proper hygiene and sanitation at workplace.
- Report to the concerned person during any emergency and don't panic.
- 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	
	List of Classics assets	
2.	List of Cleaning agents	
3.	List of warnings and symbols present at workplace	

4.	Contents of the tool box	
5.	Contents of the first aid box	
5.	Contents of the first aid box	
5.	Contents of the first aid box	
5.	Contents of the first aid box	
5.	Contents of the first aid box	
5.	Contents of the first aid box	
5.	Contents of the first aid box	
5.	Contents of the first aid box	
5.	Contents of the first aid 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 5.2: 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

5.2.1 Materials required for the practical



- Food safety manual
- Food samples

5.2.2 Practical 🖄

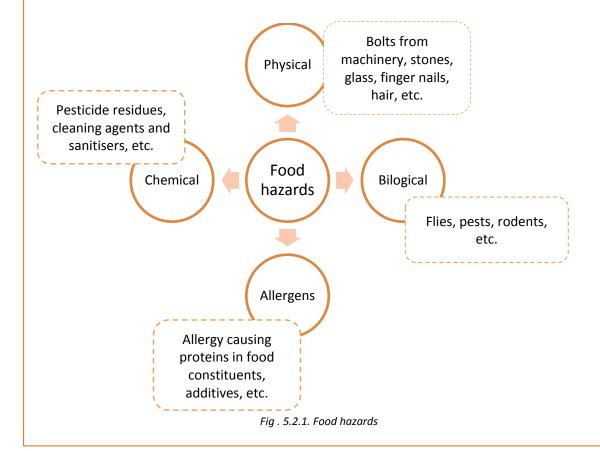


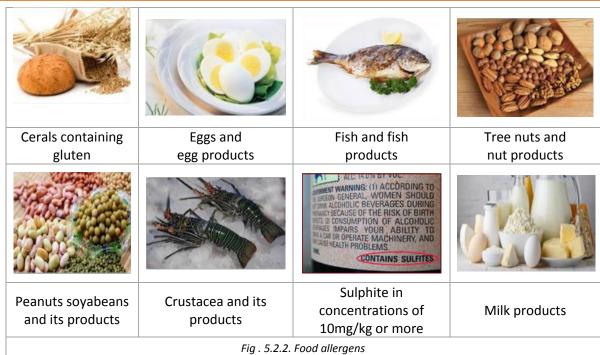
Pre-requisite knowledge:

Food safety, hygiene and sanitation.

Method:

- 1. Identify the type of hazards in food.
- Check for the possible hazard in the entire process of preparing baked products.





Biological

Hair, excreta, bone splinters, etc.

Fig. 5.2.3. Biological contaminants

Chemical

Pesticide residues, detergents, etc.

Fig. 5.2.4. Chemical contaminants

Physical

Bolts from machinery, stones, glass, etc.

3. Check the labels of incoming raw materials for appropriate allergen information.

Fig. 5.2.5. Physical contaminants

- 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.

- 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?		

Sr	Conclusion	Conclusion		
no				
1				

UNIT 5.3: 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

5.3.1 Materials required for the practical



- PPE
- Food safety manual
- Food samples

5.3.2 Practical



Pre-requisite knowledge:

Food safety, hygiene and sanitation.

Method:

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

Hazard Analysis and Critical Control Points (HACCP)

Good Manufacturing Practices (GMP)

Management element/ system

Statutory and regulatory requirements

Communication

Fig. 5.3.1. 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.

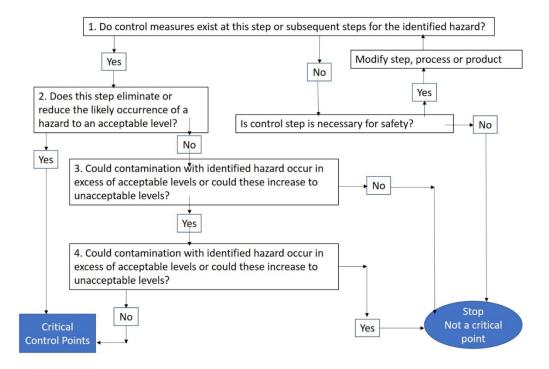


Fig. 5.3.2. CCP decision tree

- 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.

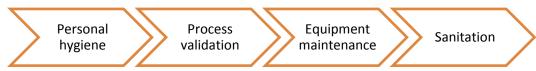


Fig . 5.3.3. GMP focus areas

	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	
	Frowsion for disposal of refuse and emidents 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. 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 waterAppropriate 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 	
8	temperature control system 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.5.3.5. Well-guarded entrance

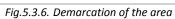




Fig.5.3.7. Premises tarred and concreted to avoid dust



Fig.5.3.8. Entrance with hygiene station



Fig.5.3.9. Hand-wash stations



Fig.5.3.10. 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.5.3.11. Storage of raw materials and food

Colour Coding for material

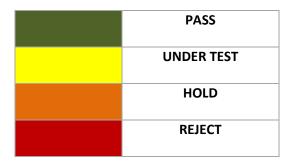


Fig.5.3.12. Colour coding for easy identification of quality status



Fig.5.3.13. Clearly defined walkway water stagnation near the surroundings



Fig.5.3.14. Avoid vegetation growth near the premises



Fig.5.3.15. Avoid water stagnation near the surroundings



Fig.5.3.16. Walls: clean, durable, impervious to moisture



Fig.5.3.17. Avoid Cracks on walls as it allow bacteria and moulds to accumulate



Fig.5.3.18. PVC strip curtains



Fig.5.3.19. Automatic closing spring doors



Fig.5.3.20. Air curtain



Fig.5.3.21. Special stone flooring to avoid slipping and easy to clean



Fig.5.3.22. Epoxy and smooth flooring, easy to clean and avoids dust accumulation and microbial contamination



Fig.5.3.23. Covered drains to prevent insects and rodents



Fig.5.3.24. Floor with proper drainage



Fig.5.3.25. Nets and mesh on windows to avoid pest entry



Fig.5.3.26. Covered lights in the production area



Fig.5.3.27. Food Transportation



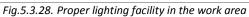




Fig.5.3.29. Vehicle inspection before loading



Fig.5.3.30. Multilayer Tarpaulin to protect from water and dust





Fig.5.3.31. Display of Cleaning Status on Tankers and lock and key system provided for food defence

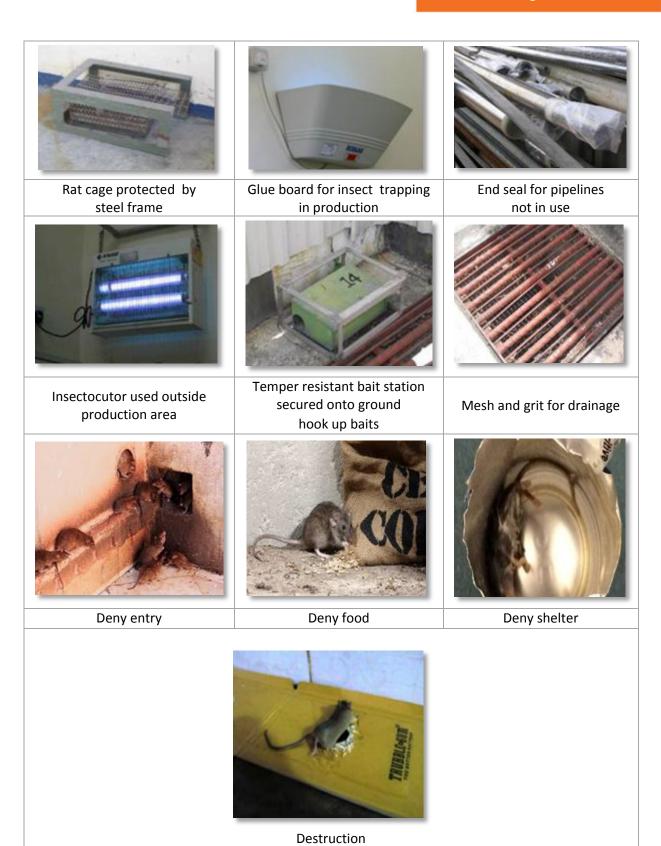


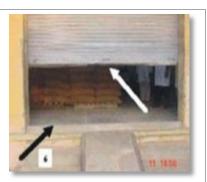
Fig.5.3.32. Some pest control methods



Broken glass at the window



Open exhaust



Gap in between shutter and floor



Space in blinds on exhaust

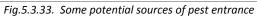






Fig.5.3.34. Color coding of water pipes to avoid contamination



Fig 5.3.35. 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	Are records relating to safety maintained in the Log Book (Y/N)?
no	Are records relating to safety maintained in the Eog Book (1714):
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 📋		











6. Professional and Core Skills

Unit 6.1 – SWOT Analysis	30 mins
Unit 6.2 – Decision Making	2 hrs
Unit 6.3 – Plan and Organise	2 hrs
Unit 6.4 – Customer Centricity	1 hr
Unit 6.5 – Problem Solving	2 hrs
Unit 6.6 – Analytical Thinking	1 hr
Unit 6.7 – Critical Thinking	2 hrs



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 6.1: 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



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

Weaknesses
Threats

Fig.6.1.1. 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 6.2: 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

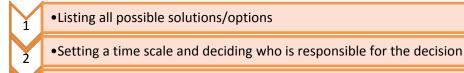
6.2.1 What is decision making?

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.

6.2.2 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:



- Weighing up the risks involved
- Deciding on values, or in other words what is important
- Deciding on values, or in other words what is important
- Making the decision

Fig.6.2.1 Steps for decision making

6.2.3 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.

		Ma	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 6.3: 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

6.3.1 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:

Identification of activities

Establishing a plan

Measuring actual work progress at regular intervals

Comparing actual work done with the plan and identifying the gaps (if any)

Coordination of work among the team

Finding out the reasons (if any) for deviation from the schedule

Taking corrective measures to rectify the deviation

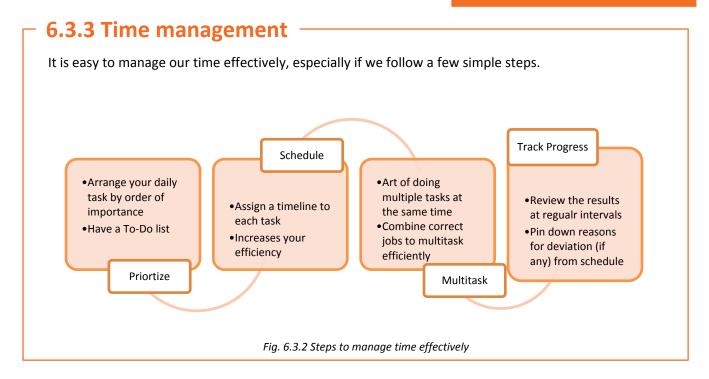
Fig.6.3.1 Ways to plan and organize yourself

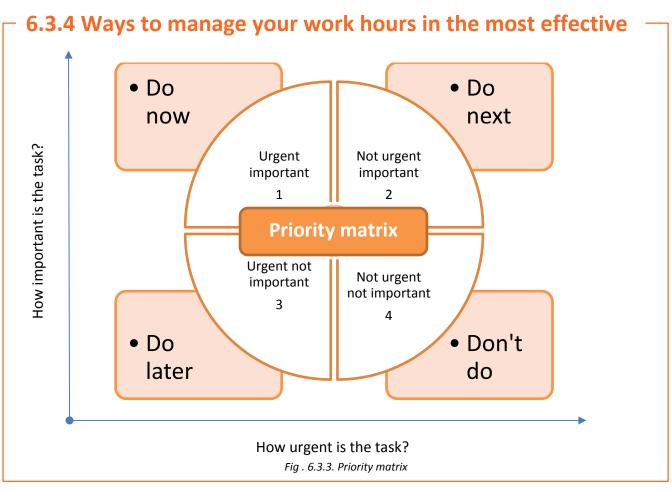
6.3.2 Benefits of organising and planning



1. Write the benefits of organizing.

2. Write the benefits of planning.





- 6.3.5 To-Do list

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

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

UNIT 6.4: Customer Centricity

Unit Objectives ③

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

1. Identify customer requirements and their priority and respond accordingly

6.4.1 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.

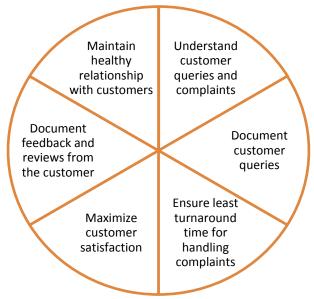


Fig.6.4.1. Ways to maximise customer service

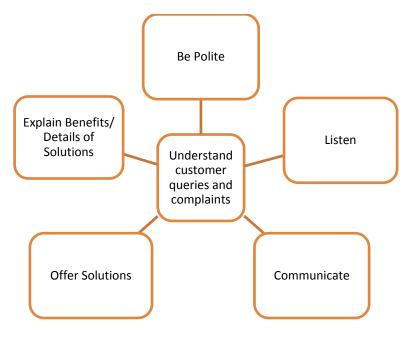


Fig.6.4.2. Understand customer queries and complaints

6.4.2 Maximise customer satisfaction Understand customer needs and expectations Provide high quality service Provide assistance before, during and after customer requirements are met Fig.6.4.3. Customer satisfaction parameters Select the right customer against the service quality given (mark a tick against the correct answer): If you serve more than what is expected Meet customer expectations Not meeting customer Unsatisfied Customer expectations Satisfied Customer **Unsatisfied Customer** Customer Delight Satisfied Customer Customer Delight Unsatisfied Customer Satisfied Customer Customer Delight 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 6.5: Problem Solving

Unit Objectives 6

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

1. Identify potential problems to make sound and timely decisions

6.5.1 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.

6.5.2 Steps in problem solving





Fig .6.5.1. Steps in problem solving

and specifications) and use the template given to solve the problem.

Write your problem statement here (for eg: The output or product is not as per the desired quality

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	
	Analyse the problem	
	What is the issue?	
2	Why did it happen?	
	When did it get noticed?	
	Who is going to get affected by it	
	Set goals	
	What do I want?	
	What is the current state and what is the desired state?	
3	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?	
	Evaluate potential solutions	
4	What are the different options that will solve the	
T	problem?	
	What are the positives and negatives of each option?	
	Select the best solution and apply it	
5	Which one do you think is the best solution?	
	How will you apply the best solution?	
	Evaluate the applied solution	
	Was my solution the best one?	
6	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 6.6: 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.

6.6.1 What are analytical skills?

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

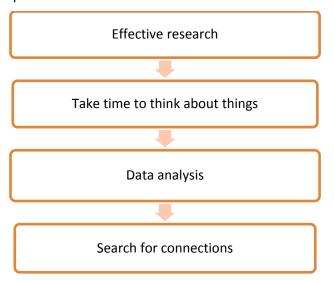


Fig.6.6.1. Analytical skills

6.6.2 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 6.7: 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

6.7.1 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.

6.7.2 How to develop critical thinking skills?

- Write your problem statement here:
- 2. Use critical thinking skills to solve the problem. Here are some tips to do it.

Ask, don't assume

•Try asking question like, what's the problem? What are the possible solutions? What are the pros and cons of each?

Do research

•Start reading or research on the problem

Accept that even you can be wrong

•Write your observations related to the problems. Mark the problem areas where you feel you have gone wrong

Take small steps

- •Break your problems into smaller parts. Mark the ones you can solve immediately and independently. Mark the ones where you need help.
- •Sequence from small to large and take it up one-by-one.

Fig.6.7.1. Tips to solve problems

Notes	<u> </u>	
More?		











7. IT Orientation

Unit 7.1 - Basics of Information Technology

20 hrs



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 7.1: 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

7.1.1 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.

7.1.2 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. 7.1.1. Process of computer

7.1.3 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. 7.1.2. Components of a Computer

7.1.4 Mouse

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

The different types of mouse available are:



Mouse is used to point and select. Fig. 7.1.7. 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.

7.1.5 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.

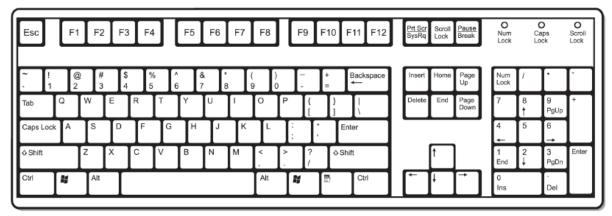
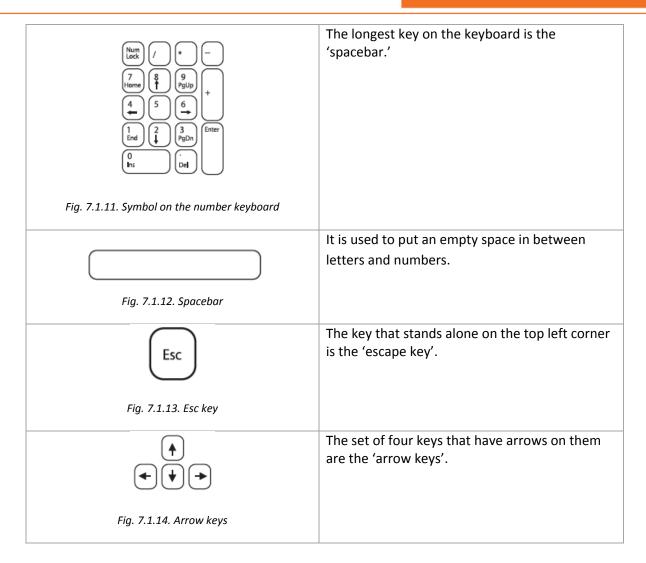
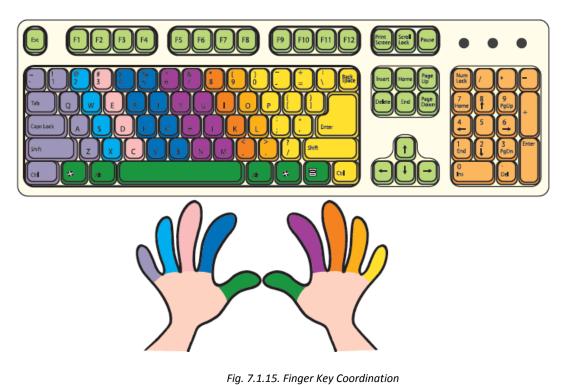


Fig. 7.1.8. Keyboard

Different Set of Keys	Description
Q W E R T Y U I O P A S D F G H J K L Z X C V B N M	The keyboard has 26 letter keys from A to Z called the alphabet keys.
Fig. 7.1.9. Alphabet Keys	
(1) (a) (b) (c) (c) (c) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d	The number keys (0 to 9) are called 'numeric keys'.
Fig. 7.1.10. Numeric Keys	



Finger Key Coordination



7.1.6 Computer Peripherals



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. 7.1.16. Printer



Speakers are devices used to listen to music, voices and other sounds.

Fig. 7.1.17. Speakers



The microphone converts sound inputs by the user into a format understood by the computer. It is used for sound recording.

Fig. 7.1.18. Microphone



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. 7.1.19. Web camera



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.



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. 7.1.21. Hard Disk



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.7.1.22. CD-ROM



They are mobile storage devices. They can store from 540 MB to 16 GB of data and the data can be edited directly.

Fig. 7.1.23. Flash Drives

7.1.7 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.

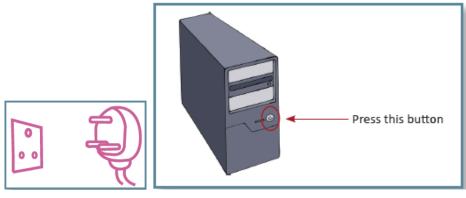


Fig. 7.1.24. Plug in the computer to switch it on



Fig. 7.1.25. 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. 7.1.27. Turn off option



Fig. 7.1.26. Start bar

7.1.8 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

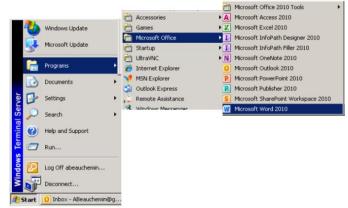


Fig. 7.1.28. Start \rightarrow Programs \rightarrow Microsoft Office \rightarrow Microsoft Word 2010

Create a New Document

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

7.1.9 Spreadsheet (MS Excel 2010)

Introduction to MS Excel

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

Launch Excel:

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

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

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