



National Vocational Qualification
CURRICULUM OF FOOD TECHNOLOGY

Level 2

(Skilled Worker/ Junior Lab Attendant)

National Vocational and Technical Training Commission
Islamabad



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1. INTRODUCTION

The agriculture sector is playing pivotal role to maintain the economy of the Pakistan where large number of individuals are directly or indirectly related to this sector to earn their livelihood. Pakistan has been bestowed with enormous climatic conditions conducive for producing multiple agricultural crops. However, much of the food produced is wasted due to negligence and lack of processing facilities. Alongside, there is always a huge need for food preservation and processing units capable of producing and ensuring availability of safe food for all necessary to maintain food security in the country. Hence, this course is specifically designed to develop basic to advanced skills and knowledge of the personnel related to Food Technology with special emphasis on requirements of the food industries with respect to safety and quality of the food products. The step by step training of the students in this course ensures polishing their skills to adapt and perform in the multidisciplinary environment of the food industries with variable food processing operations. The students are encouraged to implement their theoretical knowledge to wide range of food handling and processing environments such as raw material procurement, processing, storage, packaging and transportation while managing the quality and safety in the food systems. Furthermore, the students are introduced with new skills in a stepwise manner to increase their troubleshooting competencies in changing food operations. Notably, students are stimulated to polish their entrepreneurial skills and explore new horizons of the food processing industry. To improve the quality and relevancy of this training program, National Vocational & Technical Training Commission via Qualification Development Committee (QDC) developed National Competency Standards Level 5 for Food Technology. The learning outcomes through this curriculum provide enough grounds to enrich the food industry with demand-driven trained personnel in line with the latest industrial needs. Furthermore, this curriculum can be implemented in different sectorial pathways with flexibility in both public and private sector institutes.

2. PURPOSE OF THE TRAINING PROGRAMME

The purpose of this qualification is to give the trainee a thorough understanding of Food Technology in the industry with effective quality control and safety of the food products. Food Technology operations are diversified and continuously subject to various changes. Therefore, it is important to emphasize on a multidisciplinary approach to meet the requirements of the industry and cope the encountered challenges in the food sector. Upon successful completion of this course the trainees will be aware of:

- The core elements of food processing and preservation techniques
- The principles behind analytical techniques associated with food
- The laboratory techniques common to milk analysis
- The basic principles and practices of hygiene and sanitation in food processing operations
- Applying the principles of food science to assure the quality and safety of food products.

3. Overall objectives of training course

The primary objective of this training program is to provide the trainees with up-to-date knowledge and skills required by the food sector in a comprehensive way to cope the challenges of the food industries. After qualifying the course at different modules (Module 1 – 7), the students will be able to get job in the food industries and able to perform as entrepreneurs. The contents of the course are specifically designed in such a way that it covers all the major food sectors of Pakistan.

The overall objectives of developing this qualification are to:

- Improve the overall quality of training delivery and setting national benchmarks for training of Food Technology (Level 2) in the country
- Provide flexible and progressive learning opportunity for trainees to receive relevant and up-to-date skills of food industry

- Provide basis for competency-based assessment which is recognized and accepted by employers in modern days
- Establish a standardized and sustainable training in consultation with the food industry.

4. Qualification Validation Committee

The following members participated in the qualifications validation meeting from February 7-11, 2022 at Pakistan Industrial Technical Assistance Center (PITAC), Lahore:

Sr.	Name	Designation
1.	Mr. Muhammad Aasim	Convener/Assistant Director, NAVTTC Coordinator
2.	Mr. Muhammad Nasir Khan	DACUM Facilitator, Ex-Deputy Director, SS&C Wing, NAVTTC
3.	Mr. Naeem-ur-Rehman Zafar	Deputy Manager Technical Application, AB Mauri Pakistan Pvt. Ltd. (Industry)
4.	Dr. Shinawar Waseem Ali	Ex-Quality Assurance Officer K&N Pakistan Associate Professor, Institute of Agricultural Sciences, University of the Punjab, Lahore
5.	Mr. Muhammad Ahmad	Manager Projects LabOnline Bizware (Private) Limited (Industry)
6.	Mr. Mubeen Arshad Awan	Quality Assurance Head, YUM Group (Industry) Former Director PFA
7.	Mr. Hafiz Rehan Nadeem	Secretary General (NAFS), National Alliance for Safe Food, Pakistan
8.	Dr. Muhammad Ajmal	Representative P-TEVTA HOD, Food Technology, Govt. College of Technology, Sahiwal
9.	Dr. Tabussam Tufail	Assistant Professor, University of Lahore
10.	Dr. Iahtisham-UI-Haq	Assistant Professor, Kauser Abdulla Malik School of Life Science, Forman Christian College (A Chartered University), Lahore
11.	Mr. Muhammad Abdul Aziz	Ex-Manager, Munchies Food, Islamabad Ex-Manager, Dominos, Islamabad
12.	Dr. Sumaira Maqsood	Assistant Professor Entomology, Institute of Agricultural Sciences, University of the Punjab, Lahore
13.	Ms. Samina Kulsoom	Representative S-TEVTA GCT Girls, Karimabad, Karachi
14.	Mr. Engr. Kifayatullah Khan	Representative B-TEVTA HOD Food Technology, Govt. Polytechnic Institute, Khanozia
15.	Mr. Shaukat Ali Rana	Representative PBTE Deputy Controller Examination

5. Competencies to be gained after completion of course

After completing this course, the students will be capable of performing different food processing operations decently in the food industries. Furthermore, this skilled training program enables the students to develop multispectral competencies such as creative thinking, problem solving, research skills, personal and group management, presentation and communication skills, technical and professional negotiations related to food

processing operations. The below listed competencies imprinted by this training program are quite prominent to the students' profile to enhance their employability in their career in food sector:

- Knowledge and concepts of processing operations in food industry
- Creative thinking and troubleshooting skills in food manufacturing
- Potential to translate theoretical knowledge into practice
- Identify and explore potential areas of opportunities in food sector
- Time management, working in teams and conflict handling among co-workers
- Safe and secure use of workplace tools, techniques and materials at worksites
- Working in commercial setups and meeting the timelines

6. Job opportunities available immediately and in the future

The successful pass outs of this course may avail entrepreneurial opportunities and/or fetch job/employment in food sectors as

- Skilled Worker/ Junior Lab Attendant (Level-II)

7. Trainee Entry Level:

- Matric Science or equivalent.

8. Minimum Qualification of Trainer

- BS Food Science & Technology / DAE Food Technology with 2 years of professional experience in relevant field.

9. Recommended trainer: trainee ratio

- The recommended trainer and trainee ratio is 1:24 per class

10. Medium of Instruction:

- Urdu, English or Regional Language

11. Duration of Course (Total time, theory & practical) [20:80]

Module #	Title	Theory Total (Hours)	Practical Total (Hours)	Total (Hours)	Credit hours
1.	Maintain Occupational Health & Safety and Environment Standards	16	64	80	08
2.	Maintain Tools and Equipment	18	72	90	09
3.	Perform Food Cleaning and Sanitation Process	16	64	80	08
4.	Apply Basic Principles of Food Processing and Preservation	18	72	90	09
5.	Perform Milk Receiving	18	72	90	09
6.	Prepare Bread	18	72	90	09
7.	Prepare Cake	16	64	80	08
Total Hours		120	480	600	60

12. Summary of Competency Standards:

The proposed curriculum is composed of 07 modules that will be covered in 600 hrs. It is proposed that the course may be delivered in six months period. The distribution of contact hours (practical & theory) is given below:

- **Theory:** (20%) **Practical** (80%)
- **Theory:** 120 hours
- **Practical:** 480 hours

SUMMARY – OVERVIEW OF THE CURRICULUM

Module Title	Learning Units	Theory Days/hours	Workplace Days/hours	Timeframe of modules
Module 1. Maintain Occupational Health & Safety and Environment standards	LU1. Apply occupational health and safety (OHS) measures	16	64	80

	LU2. Contribute to continuous improvement in OHS practice Identify Hazards at Workplace LU3. Dispose of hazardous Waste/materials LU4. Interpret personal safety rules & regulations related to manufacturing industry LU5. Follow safe work procedures relating to own work LU6. Maintain First-aid Box LU7. Maintain Fire Extinguisher LU8. Follow Environmental, Health and Safety standards			
Module 2. Maintain tools and equipment	LU1. Perform cleaning of tools and equipment LU2. Apply food grade lubricants of tools/equipment LU3. Implement Internal Control Plan (ICP) for tools and equipment's LU4. Adopt housekeeping practices for tools/equipment (e.g. 5 S)	18	72	90
Module 3. Perform Food Cleaning and Sanitation Process	LU1. Ensure availability of all cleaning and sanitation materials LU2. Ensure all utilities are available LU3. Perform cleaning and sanitation as per schedule/procedure LU4. Verify cleaning and sanitation by analytical/swab test/ATP-testing LU5. Prepare log sheets as per procedure LU6. Control cleaning solution temperature to melt fats/meats LU7. Ensure equipment free of visible soil, haze or water beads LU8. Sanitize inaccessible parts of machinery prior to assembling LU9. Ensure pre-operation Inspection	16	64	80

Module 4. Apply Basic Principles of Food Processing and Preservation	LU1. Examine the characteristics of raw food LU2. Apply different food processing technologies LU3. Apply alternative existing technologies for food preservation LU4. Categorize Food Packaging	18	72	90
Module 5. Perform Milk Receiving	LU1. Inspect milk vehicle LU2. Perform milk analysis LU3. Maintain records	18	72	90
Module 6. Prepare Bread	LU1. Prepare for work LU2. Make bread/rusk/burger bun LU3. Perform packaging and labeling	18	72	90
Module 7. Prepare Cake	LU1. Prepare for work LU2. Make different cake types (muffins, sponge cake, pound cake, layer cake, cupcake etc.) LU3. Perform packaging and labeling	16	64	80

Module 1: Maintain Occupational Health & Safety and Environment Standards

Objective: After completing this module, the learner will be able to protect/apply personal health and safety at workplace according to the industry's approved guidelines, procedures and interpret rules/regulations. Trainee will be expected to identify and use Personal Protective Equipment (PPE) according to the work place requirements. The underpinning knowledge regarding personal safety will be sufficient to provide the basis for the job at workplace.

Duration:	Total hours	80	Practical	64	Theory	16
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Apply occupational health and safety (OHS) measures	<ul style="list-style-type: none"> Perform Work safely at all times, complying with health and safety precautions and other regulations related to food processing & packaging industry. Identify personal safety hazards in the workplace, so that the potential for personal injury, damage to equipment or the workplace is prevented, and corrective action is taken Deal with problems which are within your control, and report those that cannot be resolved to safety officer Keep work area clean and clear of obstructions and storing tools or equipment as per the procedure of industry to overcome any incident Remove personal articles (jewelry, watch, cell phone, etc.) before entering work area. Wear Personal Protective Equipment (PPE) as per job 	<ul style="list-style-type: none"> Define OHS Explain OHS practices concerning the food processing industry (PPEs, Labelling of material, machine safety etc.) Explain safety rules and regulations of food industry (Personal Safety, Plant Safety etc.) Describe the importance of safety related Standard Operating Procedure/guidelines Minimize risk, remove health hazards etc.) Enlist safety equipment in manufacturing area Interpret safety signs and symbols (CBR, First Aid, victim handling, firefighting, emergency response plan etc.) 	02 hours Theory 09 hours Practical Total: 11 hours	Personal Protective Equipment (safety shoes, gloves, goggles, helmet & ear plug etc.)	Class Room and workplace

		<ul style="list-style-type: none"> • Explain Current Good Manufacturing Procedures (CGMP) relating to clean work environment 			
LU2. Contribute to continuous improvement in OHS practice Identify Hazards at Workplace	<ul style="list-style-type: none"> • Interpret work processes and procedures correctly to identify risk of hazards at workplace • Recognize engineering processes, tools, equipment and consumable materials that have the potential to cause harm • Identify any potential hazards and take appropriate action to minimize the risk 	<ul style="list-style-type: none"> • Describe risks associated with each operation (Physical, chemical & biological hazards) • Explain repairment and replacement of parts the importance of work instructions, use of tools & PPEs according to the job. (maintenance of machinery) • Explain Potential hazards (electrical, mechanical, chemical, biological) and minimize those hazards (analyze previous incidents reports, risk assessment, root cause analysis) 	02 hours Theory 09 hours Practical Total:11 hours	Health and Safety Manual	Class Room and workplace
LU3. Dispose of hazardous Waste/materials	<ul style="list-style-type: none"> • Identify hazardous waste materials need to be disposed off • Collect hazardous or non-hazardous waste carefully from the designated area as per approved procedure • Use proper disposal hazardous containers for dispose-off hazardous waste as per procedure • Take necessary precautions like putting masks and gloves while dispose-off hazardous waste/materials as per standard operating procedure 	<ul style="list-style-type: none"> • Explain hazardous waste materials, (liquid, toxic, solid etc.) • Explain the procedure of collecting and disposing of waste (chemical and physical method) • Describe use of proper containers (color based, material based etc.) • Define use of PPEs, (safety gloves, shoes face mask, goggles etc.) while disposing of hazardous waste/materials 	02 hours Theory 09 hours Practical Total:11 hours	Maintenance box	Class Room and workplace

LU4. Interpret personal safety rules & regulations related to manufacturing industry	<ul style="list-style-type: none"> Keep work area ready for inspection as per Standard Operating Procedures of food industry Follow CGMP and Standard Operating Procedures to maintain a clean work environment that complies with regulatory requirements 	<ul style="list-style-type: none"> Describe SOP's for work area inspection (keep work area dry, sanitize and clean etc.) Importance of CGMP standards to maintain the friendly work environment; Safety is needed in the workplace; General safety rules 	2 hours Theory 06 hours Practical Total:09 hours	Safety Critical Devices (Fire Extinguishers, Smoke Detectors, Fire Hydrants, Self-Containing Breathing Apparatus (SCBA))	Class Room and workplace
LU5. Follow safe work procedures relating to own work	<ul style="list-style-type: none"> Follow industry's occupational safety rules/regulations and Current Good Manufacturing Practices (CGMP) Deal with problems which are within your control, and report those that cannot be resolved to safety officer Keep work area clean and clear of obstructions, and storing tools or equipment as per the procedure of industry to overcome any incident Use personal protective equipment (PPE) 	<ul style="list-style-type: none"> Define Safe work procedure step by step (work permits, log out tag out,) Purpose of safe work procedures Define the use of putting masks and gloves, while disposing of hazardous waste/materials List safe work practice Explain Waste disposal SOPs Importance of PPEs and their uses Interpret safety signs and symbols 	2 hours Theory 06 hours Practical Total: 08 hours	First Aid Box	
LU6.Maintain First-aid Box	<ul style="list-style-type: none"> Ensure availability of first aid box Check first aid box for requisite emergency medicines Check expiry of medicines 	<ul style="list-style-type: none"> Describe risks associated with each operation Importance of maintaining First aid kit/box 	2 hours Theory 6 hours Practical Total:08 hours	Air Vents	Class Room and workplace

	<ul style="list-style-type: none"> • Perform first aid treatment against electric shocks • Perform first aid treatment/bandages against minor injuries 	<ul style="list-style-type: none"> • Define Methods of reading of drug label (use by date, best before) • Define the procedure for electrical shocks treatment (AED method) • Describe the methods of bandage for minor injury (single knot, and double knot) 			
LU7.Maintain Fire Extinguisher	<ul style="list-style-type: none"> • Check expiry of fire extinguisher • Operate fire extinguisher • Replace fire extinguisher 	<ul style="list-style-type: none"> • Write the methods of checking expiry for fire extinguisher (use by date, best before use) • Describe the procedure for operating fire extinguisher (PASS: pin, aim, squeeze, sweep) • Describe the parameters for replacement (expiry, leakage, damage and less pressure) 	2 hours Theory 9 hours Practical Total:11 hours	Safety Siren	
LU8.Follow Environmental, Health and Safety standards	<ul style="list-style-type: none"> • Follow Health and Safety Rules • Ensure environmental safety • Ensure compliance of metrology effects • Ensure workplace safety by following safety standards of food industry • Ensure safety while food processing and packaging • Store all tools and equipment properly in a safe area 	<ul style="list-style-type: none"> • Define environmental health and safety at workplace (prevention of contamination from man, machine method etc.) • Describe EMS environment management systems, (maintain the resources, remove flame able material from work place) • Describe the safety standards for a work place (dry floor by water, chemical and lubricants spillage etc.) • Describe the safety parameters for food processing and packaging 	2 hours Theory 9 hours Practical Total: 11 hours		

		<p>(safe guards for moving parts, tag hot and cold surfaces, tags on under maintenance part)</p> <ul style="list-style-type: none"> • Explain work instruction for storage of tools and equipment's (tool coding, cleaning of tool after use etc.) 			
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Module 2: Maintain tools and equipment

Objective: After completing this module, the learner will be able to apply skills and knowledge to maintain tools and equipment.

The trainees will be skilled to enhance skills for maintain tools and equipment.

Duration:	Total hours	90	Practical	72	Theory	18
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Perform cleaning of tools and equipment	<ul style="list-style-type: none"> Check the cleanliness status of machine after completion of each batch as per the instructions given in manual Take corrective measures in case of inappropriate cleaning Maintain related records 	<ul style="list-style-type: none"> Comprehend user's instructional manual of the machine Define dry cleaning and wet cleaning Describe Importance of lubricants for smooth functioning of machine Explain procedure of maintaining and filling up log-book as per standard procedures Define Cleaning-in-Place (CIP) 	6 hours Theory 21 hours Practical Total:27 hours	Detergents & cleaning agents Cleaning tools (brushes, trays etc.) Water	Class Room and workplace
LU2. Apply food-grade lubricants of tools/equipment	<ul style="list-style-type: none"> Check gauge of food-grade lubricants as per machine's manual Apply proper food-grade lubrication of machinery as per schedule 	<ul style="list-style-type: none"> Define machine gauge Define food-grade & non-food grade lubricants. Enlists food-grade lubricants Describe the importance of food-grade lubricants	6 hours Theory 18 hours Practical Total:24 Hours	Lubricant gun Food-grade lubricants Non-food grade lubricants	Class Room and workplace

		<ul style="list-style-type: none"> Describe the procedure to apply food grade lubricants 			
LU3. Implement Internal Control Plan (ICP) for tools and equipment	<ul style="list-style-type: none"> Inspect the tools/equipment regularly Identify damaged tools/equipment Perform minor repair/replace tools/parts Perform calibration as per defined frequency Maintain all record of tools/equipment's as per industry SOPs 	<ul style="list-style-type: none"> Define Calibration Explain the process for maintaining the tools and equipment Describe preventive and corrective measures for tools and equipment Explain the process for maintaining the records for respective tools and equipment 	3 hours Theory 18 hours Practical Total:21 hours	Calibration Equipment PPEs	Class Room and workplace
LU4. Adopt housekeeping practices for tools/equipment (e.g. 5 S)	<ul style="list-style-type: none"> Identify and eliminate all unnecessary items from the workplace Place every necessary item in good order, and focus on efficient and effective storage methods, Identify workplace equipment for defects Keep the workplace organized, orderly and clean Apply 5S standards 	<ul style="list-style-type: none"> Define 5S Define housekeeping Differentiate between GLP and GMP Elaborate 5S steps of housekeeping practices for tools and equipment 	3 hours Theory 15 hours Practical Total: 18 hours	Pressure guns for oiling Hand jacks Volt and ampere meters PPE's, chemical suit, safety helmet	Class Room and workplace

Module 3: Perform Food Cleaning and Sanitation

Objective: After completing this module, the learner will be able to apply skills and specific knowledge to perform cleaning and sanitation in accordance with the industry's approved guidelines and procedures.

Duration:	Total hours	80	Practical	64	Theory	16
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Ensure availability of all cleaning and sanitation materials	<ul style="list-style-type: none"> Verify cleaning and sanitation materials as per requirement Check quality parameters of cleaning chemicals (pH, Purity, Reactivity, Conductivity) 	<ul style="list-style-type: none"> Differentiate between cleaning and sanitation. Describe the handling procedures of cleaning & sanitation materials according to the nature of material. Define TDS and pH of water Explain the importance of quality and quantity of cleaning material in sanitization (e.g. concentration of cleaning material) 	2 hours Theory 6 hours Practical Total hours 8	Cleaning trolleys (Detergents & cleaning agents, Cleaning cloth, Water, Broom, Mop)	Class Room and workplace
LU2. Ensure all utilities are available	<ul style="list-style-type: none"> Check the availability of potable water for cleaning Check the availability of heating source Check the availability of compressed air 	<ul style="list-style-type: none"> Define potable water Enlist utilities used in cleaning & sanitation process Enlist the sources of heating <p>Describe the parameters of water, steam and compressed air used for</p>	2 hours Theory 6 hours Practical Total hours 8	Cleaning hose pips Shower guns Air compressor Steam generator/ boiler	Class Room and workplace

		cleaning/sanitation procedures			
LU3. Perform cleaning and sanitation as per schedule/procedure	<ul style="list-style-type: none"> • Select appropriate method of cleaning as per product nature (dry and wet cleaning) • Use color coded cleaning tools for food and nonfood surfaces • Apply 4Ts (Time, Temperature, Titration, Turbulence) of cleaning • Perform disinfection of food contact surfaces where required • Validate cleaning method as per requirement 	<ul style="list-style-type: none"> • Define acid and base. • Define sterilization. • Elaborate different cleaning techniques i.e. dry cleaning, wet cleaning, cleaning in place, Ritual Cleansing (<i>Sertu</i>) etc. • Explain different types of soils and microorganisms • Demonstrate color codes for different hygiene areas and their importance • Explain principles underlying sanitation / cleaning operations. • Elaborate different types of sanitizers used in food processing units. • Describe different sanitizing tools used in food processing plants. • Explain time-temperature relationship for killing of micro flora. • Explain scaling of pipelines or surfaces and its remedy. • Describe temperatures of different cleaning agents to be effective for sanitation process 	2 hours Theory 13 hours Practical Total hours 15	Conductivity meters, level switches, flow meters PPEs Sanitizers	Class Room and workplace
LU4. Verify cleaning and sanitation by	<ul style="list-style-type: none"> • Perform visual verification of surface after cleaning 	<ul style="list-style-type: none"> • Describe about food borne microbes and cross contamination 	2 hours Theory	PPE's (Goggles, face shield,	

analytical/swab test/ATP-testing	<ul style="list-style-type: none"> Analyze pH of initial and final rinsing water Ensure all analytical/Swab/ATP results are as per standards 	<ul style="list-style-type: none"> Explain Pathogens (Coli forms, E. Coli and Total Plate Count). Define swab testing. Explain about the residual limits of chemical sanitizers 	09 hours Practical Total hours 11	comical suite, protective gloves) pH meter Disinfection liquid Swabs Lab glassware Autoclave Growth media	
LU5. Prepare log sheets as per procedure	<ul style="list-style-type: none"> Maintain record of all 4Ts Maintain records of all lab results 	<ul style="list-style-type: none"> Describe 4T's (Time, Temperature, Turbulence and Titration) <p>Explain development of log sheets and importance of monitoring frequency</p>	2 hours Theory 06 hours Practical Total hours 08	Log book / log sheets Files covers	Class Room and workplace
LU6. Control cleaning solution temperature to melt fats/meats	<ul style="list-style-type: none"> Check the water temperature & pressure during cleaning process Check cleaning solution temperature as per specification of food processing to remove product debris 	<ul style="list-style-type: none"> Explain purity and concentration of various cleaning agents. <p>Explain gauges of utilities (Hot water, steam, compressed air).</p>	2 hours Theory 06 hours Practical Total hours 08	Titration apparatus Conductivity meters Thermometers Pumps Air Blowers PPEs	Class Room and workplace
LU7. Ensure equipment free of visible soil, haze or water beads	<ul style="list-style-type: none"> Perform cleaning of stainless steel (SS) equipment with acid on regular basis Perform filtration of cleaning solutions and water before cleaning 	<ul style="list-style-type: none"> Explain suitability of cleaning operation in a certain machine, equipment and food. Enlist the types of cleaning filters 	1 hours Theory 06 hours Practical	Brushes, Scrappers, Sponge, Vacuum pump PPEs	Class Room and workplace

		Describe the purpose of filtration in cleaning.	Total hours 07		
LU8. Sanitize inaccessible parts of machinery prior to assembling	<ul style="list-style-type: none"> • Perform cleaning of hard-to-reach parts by dismantle cleaning • Rinse equipment from top to bottom 	<ul style="list-style-type: none"> • Describe the procedure of "Cleaning Out of Place" • Differentiate between CIP and COP • Demonstrate the tools used to clean inaccessible parts of machinery 	1 hours Theory 06 hours Practical Total hours 07	Dismantling Toolkit Cleaning Agents PPEs	Class Room and workplace
LU9. Ensure pre-operation Inspection	<ul style="list-style-type: none"> • Check by sight, feel and smell the workplace regularly • Use flashlights and other lights to see non-visible parts of machinery before start operation • Ensure equipment free of visible soil, haze or water beads • Examine visible parts and inaccessible parts of machinery after assembling • Check that equipment is free of chemicals, tools and cleaning supplies • Examine that guards are in place before starting equipment • Perform formal pre-operation inspection according to plant Sanitation Standing Operating Procedures (SSOP) 	<ul style="list-style-type: none"> • Describe the importance of cleaning verification before start of production. • Describe the techniques used for verification of cleaning. 	2 hours Theory 06 hours Practical Total hours 08	Flashlight Inspection Sheets Stationary items	Class Room and workplace

Module 4: Apply Basic Principles of Food Processing and Preservation

Objective: After completing this module, the learner will be capable to demonstrate the Basic Principles of Food Processing and Preservation. The trainees will be skilled to enhance skills for food processing and preservation.

Duration:	Total hours	90	Practical	72	Theory	18
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Examine the characteristics of raw food	<ul style="list-style-type: none"> Identify the characteristics of the raw food Examine the ingredients of the food product Identify the source of raw food materials 	<ul style="list-style-type: none"> Define peeling, shelling, skinning and removal of inedible contents of Raw materials. Define size reduction Explain handling and transportation of raw materials. Describe the categories of sorting and grading of raw materials with example. 	4 hours theory 15 hours practical Total = 19 hours	PPEs Raw materials. Washer, peeler, blender, cutter, slicer, tanks, Metal detector, Paddy separator	Class Room and workplace
LU2. Apply different food processing technologies	<ul style="list-style-type: none"> Perform unit operations required to produce a given food product Apply principles and current practices of processing techniques Check the effects of processing parameters on product quality Apply the basic principles and practices of cleaning and 	<ul style="list-style-type: none"> Explain the preparatory operations performed during food processing Describe size reduction of raw material during processing Enlist the preparatory operations performed during food processing 	4 hours Theory 21 hours Practical Total: 25 hours	Knife, cutting board, blancher, pasteurizer, mixture, grinder, boiler, evaporator, Filter paper, Fryer, Carbo cooler, Concentrator,	Class Room and workplace

	sanitation in food processing operations	<ul style="list-style-type: none"> • Explain the mixing unit operation during food processing. • Describe filtration operation in food processing industry. • Describe blanching. • Describe pasteurization. • Differentiate between pasteurization and sterilization. • Explain cleaning of raw materials take place during processing. 			
LU3: Apply alternative existing technologies for food preservation	<ul style="list-style-type: none"> • Perform different preservation techniques • Develop a process chart for the implementation of irradiation or high-pressure preservation • Check the physical, biochemical and microbiological changes to a food product preservation treatment <p>Observe the effectiveness and consumer acceptance of preservation technologies</p>	<ul style="list-style-type: none"> • Define Food Spoilage • Explain different methods of preservation. • Describe the importance of different preservation methods on quality of food • Differentiate the types of hazards (biological, physical and chemical) and the critical limits • Describe the principle and procedure of cold storage • Enlist types of freezers and methods of food freezing <p>Describe the use of chemical additives for preservation of foods</p>	<p>6 hours Theory</p> <p>21 hours Practical</p> <p>Total: 27 hours</p>	<p>Freezer, canning equipment, freeze dryer, refrigerator, smoking tools, salting tanks, irradiation sources, ozone treatment unit etc.</p> <p>Food additives</p>	Class Room and workplace

LU4. Categorize Food Packaging	<ul style="list-style-type: none"> • Identify important characteristics of a food package • Identify packaging materials for food preservation • Apply the information considered mandatory to appear on the label of prepared food. 	<ul style="list-style-type: none"> • Describe different types of packaging materials • Explain the characteristics of food packaging. • Define vacuum and aseptic packaging of food • Describe advantages and disadvantages of flexible and metallic food packaging materials. 	4 hours Theory 15 hours Practical Total: 19 hours	Packing machine, labeling, sealing, capping, plastic bags, vacuum packing machine, shrink paper, barcode scanner	Class Room and workplace
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Module 5: Perform Milk Receiving

Objective: After completing this module, the learner will be able to handle raw milk and perform milk analysis at workplace according to the industry's approved guidelines and procedures. The underpinning knowledge regarding raw milk receiving and testing will be sufficient to provide the basis for the job at workplace.

Duration:	Total hours	90	Practical	72	Theory	18
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Inspect milk vehicle	<ul style="list-style-type: none"> Check milk vehicle as per Standard Operating Procedure (SOP) Record milk temperature Perform Cleaning-in-place (CIP) of milk vehicle 	<ul style="list-style-type: none"> Explain importance of hygiene in milk supply chain Explain procedures for CIP of milk vehicles 	4 hours Theory 18 hours Practical Total:22 hours	Digital Thermometer Cleaning solutions (alkali and acids)	Class Room and workplace
LU2. Perform milk analysis	<ul style="list-style-type: none"> Perform milk sampling Perform sensory evaluation Perform milk analysis (Fat, SNF, pH, COB and APT tests) Perform adulteration tests (urea, starch, detergent, water, formalin, sorbitol, peroxides, glucose and sugar) 	<ul style="list-style-type: none"> Describe quality of raw milk Explain organoleptic evaluation for milk freshness Differentiate quantitative and qualitative analyses of raw milk Demonstrate adulteration tests for raw milk Demonstrate parameters for sensory evaluation of milk Demonstrate the procedures for milk reception tests i.e. (Fat, SNF, pH, COB and APT tests) 	10 hours Theory 42 hours Practical Total:52 hours	Dropper, pH meter Butyrometer Pipette Pipette sucker Isoamyl alcohol Ethanol Bardford reagent Ferric Sulphate NaOH Urease Solution Desiccator Phenol Red Indicator Titration Apparatus α -nephthol indicator HCL Iodine Solution H ₂ SO ₄ Potassium Bromide	Class Room and workplace

		<ul style="list-style-type: none"> Demonstrate microbiological testing of milk i.e. TPC <p>Discuss regulations for raw milk quality and storage</p>		Hydrometer China dish Spirit lamp / Burner Lactometer Gerber machine Lactoscan machine Titration apparatus Sediment tester	
LU3. Maintain records	<ul style="list-style-type: none"> Prepare log book Record milk test results in a standard format Document chemicals and equipment in milk reception lab 	<ul style="list-style-type: none"> Describe significance and methods of monitoring records Demonstrate different Performa sheets to monitor the processes Explain standard operating procedures for maintenance of milk reception lab equipment and CIP records 	4 hours Theory 12 hours Practical Total:16 hours	Log book Stationary items	Class Room and workplace

Module 6: Prepare Bread

Objective: After completing this module, the learner will be capable to demonstrate the preparation of bread. The trainees will be skilled to enhance skills for bread preparation.

Duration:	Total hours	90	Practical	72	Theory	18
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Prepare for work	<ul style="list-style-type: none"> Select and use workplace dress according to job requirement Arrange and select the tools, equipment and materials as per the job requirement. Pre-heat the oven to the required temperature as per the job requirement. 	<ul style="list-style-type: none"> Describe ingredients for bread Explain SOPs of different equipment used for bread preparation Demonstrate handling, storage and cleaning of bread ingredients. 	3 hours Theory 9 hours Practical 12 hours Total	Sieve Bread ingredients PPEs Measuring scale Dough Mixer machine Oven	Class Room and workplace
LU2. Make bread/rusk/burger bun	<ul style="list-style-type: none"> Receive ingredients as per specifications Weigh / measure the ingredients according to recipe. Mix the ingredients to make dough Bulk ferment the dough to the required size. Operate dough moulder Set temperature and humidity of proofer 	<ul style="list-style-type: none"> Define baking process Describe Mixing methods Enlist the recipe of bread/ Rusk/ Burger Bun Explain basic steps for preparing bread/ Rusk/ Burger Bun Differentiate between bread flour and all purpose flour. Demonstrate proofing process. 	8 hours Theory 39 hours Practical Total hours: 47	Dough Sheeter Proofing cabinet Oven Thermometer baking trays baking pans slicers	Class Room and workplace

	<ul style="list-style-type: none"> • Operate oven to bake the bread/rusk/burger bun • De-pan and cool the baked products to normal temperature 			dough dividers wooden table dough scrappers	
LU3: Perform packaging and labeling	<ul style="list-style-type: none"> • Slice the bread/rusk/burger bun • Pack and label bread/rusk/burger bun as per specifications • Store the product as per the product requirement. 	<ul style="list-style-type: none"> • Describe reasons and advantages of food packaging • Explain conventional packaging materials. • Explain modern packaging techniques. • Demonstrate labelling requirements 	7 hours Theory 24 hours Practical Total: 31 hours	Knife Slicer Packing and labeling Materials Printing and coding equipment	Class Room and workplace

Module 7: Prepare Cake

Objective: After completing this module, the learner will be able to prepare for work, make cake and carry out finishing work. It provides an introduction to the main practical and activities associated with cake making. It provides an introduction to the main practical and activities associated with cake making.

Duration:	Total hours	80	Practical	64	Theory	16
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials (Tools & Equipment) Required	Learning Place
LU1. Prepare for work	<ul style="list-style-type: none"> Select and use workplace dress according to job requirement Identify and select the tools, equipment and materials as per the job requirement. Pre-heat the oven to the required temperature as per the job requirement 	<ul style="list-style-type: none"> Differentiate between bread and cake Describe ingredients for cake Explain SOPs of different equipment used for cake preparation <p>Demonstrate handling, storage and cleaning of cake ingredients.</p>	5 hours Theory 12 hours Practical Total:17 hours	Sieve Wheat grains / flour PPEs Measuring scale Dough Mixer machine baking powder Sugar	Class Room and workplace
LU2. Make different cake types (muffins, sponge cake, pound cake, layer cake, cupcake etc.)	<ul style="list-style-type: none"> Receive ingredients as per specifications Weigh/measure the ingredients according to recipe. Mix the ingredients according to the methods to make batter as per the required consistencies and standard recipe. Pour the batter into baking dish as per the required shape 	<ul style="list-style-type: none"> Explain the raw materials required for cake preparation Describe culinary vocabulary related to specialized cakes that are commonly used in the industry Describe Mixing methods Describe the nutritional value of cakes 	8 hours Theory 42 hours Practical Total: 50 hours	Pans Batter Mixer Slicer Oven Baking trays Cooling units	Class Room and workplace

	<ul style="list-style-type: none"> • Bake the batter at the required temperature and time. • De-pan and cool the baked products to normal temperature 	<ul style="list-style-type: none"> • Demonstrate decorations and garnishing • Describe the quality parameters for cake 		Storage cabinets / racks	
LU3. Perform packaging and labeling	<ul style="list-style-type: none"> • Slice the cake • Pack and label cake • Store the product as per the product requirement. 	<ul style="list-style-type: none"> • Explain storage conditions for specialized cakes • Describe reasons and advantages of food packaging • Explain conventional and modern packaging techniques. <p>Demonstrate labelling requirements for cakes</p>	<p>3 hours Theory</p> <p>10 hours Practical</p> <p>Total:13 hours</p>	<p>Packing machine</p> <p>Refrigerator</p>	Class Room and workplace

List of Tool And Equipment		
Sr. No.	Tools	Required items for 24 candidates
1.	Food processing system with retort, pump, boiler, cooker, steamer, dehydrator, concentrator, separator, heat exchanger and all types, mixers, valves all type, actuators, thermocouples, transducers, flow meters, motors (induction & servo), conductivity meters, level switches, sensors type, angle encoders, VFD (variable flow drives), photocells, nozzles, gauges, Solenoid valves and operation, conveyors, weighing scales	1 Unit each
2.	Air compressors, RO (reverse osmosis), Filters.	1 Unit each
3.	Refrigerator, cooling appliances	1 Unit each
4.	Freezer, incubators	1 Unit each
5.	Stove	6 No.
6.	Food packaging system with filling and sealing, can seamer, shrink wrapper, stripper, case packer, labeler, cap applicators, case sealer, lifters, cardboard packer, milters	1 Unit each
7.	Jack lift, fork lifter, hand jack's lifter, material moving lifters, hydraulic lifters, palletizers	1 Unit each
8.	Trolley, liquid jacked tanks	1 Unit each
9.	Wheeler	1 No.
10.	Poly/temperature sealer, shrink machines, cylinders	1 Unit each
11.	Cap sealer	1 No.
12.	Pressure canner	1 No.
13.	Pressure cooker	2 No.
14.	Cap seal	1 No.
15.	Oven	1 No.
16.	Steam-jacketed kettle	1 No.
17.	Smoking trays	6 No.
18.	Meat grinder	1 No.
19.	Stuffer/linker	1 No.
20.	Silent cutter	1 No.
21.	Brix refractometers (0-90° brix)	2 No.
22.	Clinometers	1 No.
23.	Electronic scales (0.1 gm. capacity)	1 No.
24.	Vacuum pack machine	1 No.
25.	Laboratory scale cabinet drier or forced draft oven	1 No.
26.	Headspace gauge	2 No.
27.	Test equipment – pH meter, centrifuge, moisture meter, color chart/colorimeter, texture meter	2 Unit each

28.	Computer	1 No.
29.	Firefighting equipment , fire extinguisher types and uses, fire hydrants, smoke detector, SCABA (Self containing and breathing apparatus), fire Alarms, manual and automatic emergency haters, safety shower, safety harness	2 unit each
30.	First aid kit	1 No.
31.	PPE – apron, face mask, gloves (chemical gloves, surgical, electrical & Steam gloves), gum shoes (rubber shoes) chemical suit, face shelled, safety helmet, air protectives, goggles	24 No.
32.	Computer system	1 No.
Tools / Supplies		
1.	Weighing scales and balances of various capacities and sensitivities	1 No.
2.	Paring knives	6 No.
3.	Peelers	6 No.
4.	Measuring spoons	6 Set
5.	Measuring cups (solid)	6 Set
6.	Measuring cups (liquid)	6 Set
7.	Wrench, screwdriver, belts, nuts and bolts, spanners (open, ring combinations) plier, L keys, star keys, stretched plier, gas pipe	
8.	Clocks/timer	6 No.
9.	Mixing bowls, stainless steel	6 No.
10.	Hard plastic chopping boards (white, blue, green)	6 unit each
11.	Thermometers of varying temperature range	10 No.
12.	Jar liter	24 No.
13.	Food processor set	2 No.
14.	Wire baskets	3 No.
15.	Casseroles stainless steel	3 No.
16.	Saucepan, stainless steel	6 No.
17.	Spoons, wooden	6 No.
18.	Spoon, basting	6 No.
19.	Paddles, wooden	6 No.
20.	Food tongs	6 No.
21.	Steamer	1 No.

22.	Soaking container	6 No.
23.	Fermented containers	2 No.
24.	Utility trays	6 No.
25.	Colanders, stainless steel	2 No.
Packaging machinery		
1.	Automatic can opener	1 No.
2.	Can seam saw	1 No.
3.	Can seam counter sink	1 No.
4.	Can seamer	1 No.
5.	Vacuum can sealer	1 No.
6.	Capping machine	1 No.
7.	Crown corking machine	1 No.
8.	Form fill seal machine (a) 3 side sealing (b) Pillow type	1 No.
9.	Cup filling & sealing machine	1 No.
10.	Horizontal packing machine	1 No.
11.	Twist wrap machine	1 No.
12.	Fold wrap machine	1 No.
13.	Barcode and QR Scanner	1 No.

Sr. No.	Consumable Items	Quantity for 24 candidates
1.	NaOH (PELLETS)	3 Kg
2.	H ₂ SO ₄	2.5 Ltr
3.	Ethanol (Absolute)	5 Ltr
4.	Phenolphthalein	1 Bottle (100 gm)
5.	Burette Set	6 No.

6.	Pipette 1ml	10 No.
7.	Pipette 5ml	10 No.
8.	Pipette 10 ml	10 No.
9.	Pipette 10.94 ml	5 No.
10.	Auto sucker	10 No.
11.	Volumetric flask 100 ml	5 No.
12.	Volumetric flask 250 ml	5 No.
13.	Volumetric flask 500 ml	5 No.
14.	Volumetric flask 1000 ml	5 No.
15.	Measuring Cylinder 100 ml	5 No.
16.	Measuring Cylinder 500 ml	5 No.
17.	Measuring Cylinder 1000 ml	5 No.
18.	Reagent Bottles	10 No.
19.	Glass Beaker 50 ml	5 No.
20.	Glass Beaker 100 ml	5 No.
21.	Glass Beaker 250 ml	5 No.
22.	Glass Beaker 500 ml	5 No.
23.	Pycnometer	5 No.
24.	Capillary tube	1 Box
25.	Filter paper (90 mm)	2 Box
26.	Butyrometer 8 %	5 No.
27.	Lactometer	10 No.
28.	Rubber stoppers	20 No.
29.	China Dish	10 No.
30.	Isoamyl alcohol	1 ltr
31.	Bardford reagent	1 ltr
32.	Test tube 20 ml	20 No.
33.	Thermometer (0-100 C)	10 No.
34.	Plate Count Agar	1 box
35.	Swab Sticks	1 Box
36.	Inoculating loops	5 No.
37.	Spirit lamp	5 No.
38.	CMC	1 kg
39.	Citric Acid	1 kg
40.	Pectin Powder	1 kg
41.	Sodium benzoate	100 gm
42.	Sodium Citrate	100 gm

43.	Baking Powder	1 kg
44.	Yeast (Sachet)	50 No.
45.	Table Salt	
COLORS		
1.	Caramel Liquid	100 ml
2.	Apple Green	100 gm
3.	Sunset Yellow	100 gm
4.	Apple Red	100 gm
5.	Cloudifying Agent	250 ml
6.	Lime YELLOW	100 gm
FLAVORS		
1.	Apple	250 ml
2.	Strawberry	250 ml
3.	Mango Chaunsa	250 ml
4.	Chocolate	250 ml
5.	Vanilla	250 ml
6.	Orange	250 ml
7.	Pineapple	250 ml
Grocery/fruits/vegetables		
1.	Chicken, Beef, Mutton, Fish	10 kg each
2.	Fine Flour	20 kg
3.	Sugar	50 kg
4.	Cooking Oil	10 ltr
5.	Ghee	5 kg
6.	Skimmed Milk Powder	1 Kg
7.	Condensed Milk	5 Jar
8.	Fresh Milk	20 ltr
9.	Empty Metal Can (500 gm)	25 No.
10.	Empty Plastic Bottles (750 ml)	50 No
11.	Empty Glass Jars (500 gm)	25 No.
12.	Plastic Wrapping Sheet	1 Roll
13.	Aluminum Foil	2 Roll