Syllabus For Dairy Product Producer and Quality Control Assistant

Course Name	**Dairy Product Producer and Quality Control Assistant**
Sector	**Food Processing**
Course Code	**FPT/2023/DPCA/197**
Level	**3**
Occupation	**Dairy Production Assistant / Quality Inspection Assistant for dairy product**
Job Description	This job title encompasses the broad range of responsibilities including understanding milk properties, equipment cleaning methods, various milk product production methods, ensuring safety and quality standards, and specifically covering processes for Milk Derived Products, Frozen Milk Products, and Fermented/Coagulated Milk Products. The title reflects the role's emphasis on expertise in both production processes and quality control, ensuring that dairy products meet consumer acceptability and safety standards.
Course Duration	**Total Duration 390 Hrs**
Trainees' Entry Qualification	Grade 10 OR Grade 8 with two year of (NTC/ NAC) after 8th OR Grade 8 pass and pursuing continuous schooling in regular school with vocational subject OR 8th grade pass with 2 yrs relevant experience OR Previous relevant Qualification of NSQF Level 2 with one yr experience OR Previous relevant Qualification of NSQF Level 2.5 with 6 months experience
Trainers Qualification	

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs)
1	**Introduction to Milk**	Assess the quality and safety of dairy products, including milk and its derivatives, through hands-on application of analytical techniques, microbiological evaluation, and equipment sanitation procedures.	10	20	30
2	**Different Milk Products Processing**	Assist in milk quality assessment, filtration, cream separation, homogenization, pasteurization, chilling, raw milk handling, and distinct processing methods for preparing condensed milk and milk powder.	20	40	60
3	**Milk Derived**	Demonstrate the production processes of	30	30	60

	Products from Milk Fats	sterilized cream, sour cream, butter, ghee, butteroil, and cooking butter, along with packaging of dairy products, cleaning of machineries/ equipment/ tool with recommended agents.			
4	**Frozen Milk Products**	Exhibit the production processes of ice cream, kulfi, Dried Ice Cream Mix, and packaging of frozen milk products including machinery and equipment cleaning procedures using recommended sanitizers and agents	30	30	60
5	**Fermented and Coagulated Milk Products**	Demonstrate the production processes and packaging of fermented products like misti dahi, paneer, cheddar cheese, cottage cheese, and mozzarella cheese etc. including machinery and equipment cleaning procedures using recommended sanitizers and agents.	30	30	60
6.	**OJT**			60	60
7.	**Employability Skill**		60	--	60
		TOTAL:	180	210	390

SYLLABUS:

Module No. 1: Introduction to Milk
Learning Outcome: Assess the quality and safety of dairy products, including milk and its derivatives, through hands-on application of analytical techniques, microbiological evaluation, and equipment sanitation procedures.

Module Outcomes:
Understand the various properties and composition of milk.
Illustrate the method of cleaning of equipment

Duration: 10:00	**Duration**: 20:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
1.1 Elucidate the PFA and FSSAI definitions of milk, detail the composition and nutritive value of milk, and explain the energy value of milk. 1.2 Outline the composition of milk across various species, portray the composition of Milk Fat, elucidate the fatty acid profile of milk fat, and analyze factors influencing milk composition. 1.3 Characterize the Physical Properties of Milk, encompassing density, boiling and freezing points, refractive index, acidity and pH, viscosity, and surface tension. 1.4 Explain the Chemical properties of milk, delve into the chemical properties of milk lipids, investigate fat destabilization, examine functional properties of milk lipids and proteins, classify milk protein	1.1 Display the process of receiving milk and assessing its quality. 1.2 Evaluate milk and milk product quality through various analytical techniques, encompassing Milk Fat, Moisture, Solids Not Fat, Milk Protein, Lactose, Added Sucrose, Titrable Acidity, Total Ash, Acid Insoluble Ash, Alkaline Phosphatase, Creaming Index, and Butyro Refractometer reading. 1.3 Analyze the microbiological quality of milk by conducting MBRT tests, identifying microorganisms in milk and milk products, and recognizing inhibitors present in milk. 1.4 Detect the presence of E. coli in milk samples. 1.5 Execute the cleaning and sanitization of

types, analyze casein micellar structure and aggregation, explore milk enzymes and coagulation, evaluate lactose, and detail vitamins and minerals present in milk. 1.5 Assess the quality of raw material by evaluating its physical parameters. 1.6 Examine the processes of procurement, handling, transportation, and reception of freshly produced milk. 1.7 Identify common detergents and sanitizers employed for cleaning work areas and machinery. 1.8 Articulate the methods employed for cleaning and sanitization. 1.9 Enumerate the necessary tasks to be completed before commencing production. 1.10 Enumerate the materials and equipment utilized in the cleaning and maintenance of a dairy plant.	processing equipment. 1.6 Conduct a thorough inspection to ensure all machinery is clean and in optimal working condition.
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual., gerber centrifuge, Lactometer, Butyrometer, Milk Analyser, Hot air oven, Muffle Furnes, Butyro refractometer, Milk protein analyser	

Module No. 2: Different Milk Products Processing

Learning Outcome: Assist in milk quality assessment, filtration, cream separation, homogenization, pasteurization, chilling, raw milk handling, and distinct processing methods for preparing condensed milk and milk powder.

Module Outcome

Illustrate the method of producing various milk products like condensed milk and milk powder.
Apply the safety and quality factors for determine the acceptability of the dairy products by consumers

Duration: 30:00	**Duration**: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
2.1 Explain the processes of filtration/clarification, standardization, sterilization, and pasteurization (LTLT, HTST), elucidate the purpose of Pasteurization, detail Pasteurization Unit, identify the indicator organism for Pasteurization, and enumerate the advantages of Pasteurization, while also covering homogenization. 2.2 Outline the working principles and functions of fluid milk processing machinery, including Filters and Clarifiers, describing the purpose of clarification, defining the location of clarifiers, discussing both cold	2.1 Perform a check if all the machineries are clean and in good working conditions 2.2 Demonstrate the receiving of milk and checking its quality 2.3 Show how to Use the filter to remove sediments from milk 2.4 Demonstrate the process of producing milk products from processed milk 2.5 Demonstrate use of separator for separation of cream from milk 2.6 Display use of homogenizer for getting desire fat

milk and warm milk clarification, examining factors affecting clarification, and assessing the impact of clarification on bacterial quality. 2.3 Elaborate on the working principles and functions of Vat Pasteurizer equipment, Plate Pasteurizer, and HTST pasteurization equipment, distinguishing different sections of the Pasteurizer, enumerating the main components of a Plate Pasteurizer, identifying Pasteurization Units, pointing out the indicator organism for Pasteurization, and explaining how to judge the efficiency of Pasteurization. 2.4 Detail the working principles and functions of the Homogenizer, covering both single-stage and two-stage homogenizers, discussing types of forces during homogenization, describing the main components of a homogenizer, emphasizing the Homogenizing valve, mentioning temperature and pressure considerations during homogenization, and explaining how to evaluate the efficiency of homogenization. 2.5 Discuss the production methods for recombined and reconstituted milk, Toned milk, Double toned milk, Lactose-free milk, and skimmed milk. 2.6 Explore the production methods for condensed milk (both Sweetened and unsweetened) and evaporated milk. 2.7 Examine the production methods for milk powders (WMP, SMP) and khoya, covering both the Traditional batch Method and continuous khoa making machine. 2.8 Describe the procedure for conducting organoleptic tests on milk products.	content 2.7 Demonstrate use of pasteurizer 2.8 Demonstrate chilling of milk in the chilling tank 2.9 Demonstrate the preparation of various dairy products like condensed (Sweetened, unsweetened) and evaporated milk , milk powders (WMP, SMP)etc. 2.10 Demonstrate the process of receiving and storing raw milk till it is send for processing 2.11 Demonstrate how to carry out processing of pasteurized milk for different types of milk 2.12Demonstrate the process of HTST pasteurization
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual., Filters, Clarifiers Vat Pasteurizer equipment, Plate Pasteurizer and HTST pasteurization equipment Homogenizer, milk Chillers. falling-film evaporator for condensed milk, Cooling and Crystallization equipment for Condensed Milk Drum and Spray Dryer	

Module No. 3: Milk Derived Products from Milk Fats

Learning Outcome: Demonstrate the production processes of sterilized cream, sour cream, butter, ghee, butteroil, and cooking butter, along with packaging of dairy products, cleaning of machineries/ equipment/tool with recommended agents.

Module Outcome

Illustrate the method of manufacturing of various Milk Derived Products from Milk Fats

Apply the safety and quality factors for determine the acceptability of the dairy products by consumers

Duration: 30:00	**Duration**: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
3.1 - Investigate cream separation methods. 3.2 - Expand upon cream separation through gravity methods (Shallow Pan, Deep Pan, Water Dilution, Scalding, Jersey Creamery). 3.3 - Explain the cream separation process using centrifugal methods. 3.4 - Identify factors influencing cream's fat percentage, discuss cream standardization, and articulate its purpose. 3.5 - Illustrate cream pasteurization and elucidate methods for cooling pasteurized cream. 3.6 - Outline the manufacturing process of sterilized cream and sour cream. 3.7 - Conduct a quality test for cream assessment. 3.8 - Clarify butter-making processes, cream preparation flow diagrams, and butter manufacturing flow diagrams. 3.9 - Examine the impact of cream ripening on butter, particularly regarding flavor and aroma. 3.10 - Discuss factors influencing Diacetyl and Acetoin content in butter. 3.11 - Explore the influence of cream ripening on butter's keeping quality, focusing on cooling, aging, and milk fat crystallization. 3.12 - Explain the cream churning process, including churning theories (Phase Reversal, Foam, King's). 3.13 - State the factors affecting cream churnability (Butter fat composition, Cream richness, Viscosity, Fat globule size, Temperature, Cream volume, Agitation nature). 3.14 - Describe desirable butter color properties and types of butter colors (Vegetable, Mineral). 3.15 - Elaborate on butter salting, along with its purpose. 3.16 - Discuss the effects of salt on butter's keeping quality, moisture distribution, and texture. 3.17 - Explain salt addition methods, moisture content adjustment, butter working processes (Initial, Final, Vacuum), and butter removal from churn. 3.18 - Highlight the impact of working on moisture distribution in butter and the removal of worked butter. 3.19 - Outline butter overrun and its calculation. 3.20 - Cover desired butter attributes (Salt, Color, Texture, Flavor), butter grading, microbial sources, and defects. 3.21 - Describe Ghee manufacturing processes (Desi/Indigenous, Direct Cream, Creamery Butter), and Ghee Vat. 3.22 - Explain the granulation and cooling phenomena in	3.1 Skilfully generate sterilized cream and sour cream. 3.2 Present the steps involved in butter production. 3.3 Highlight the technique for ghee production. 3.4 Depict the process of creating butteroil. 3.5 Demonstrate the production method for cooking butter. 3.6 Display adept packaging strategies for dairy products. 3.7 Exhibit the correct cleansing of machinery using recommended sanitizers through the CIP procedure. 3.8 Illustrate the cleaning of equipment and tools using authorized cleaning agents and sanitizers.

Ghee, including granulation causes. 3.23 - Identify factors affecting ghee yield, quality, grading, flavor formation (Carbonyls, Lactones), flavor components, and texture. 3.24 - Discuss defects in Ghee and preventive measures (Flavor, Texture, Appearance). 3.25 - Explore butteroil manufacturing, packaging, and storage processes.	
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual., Filters, Vat Pasteurizer for cream, Homogenizer for cream, butter churner, ghee vat, butter extruder	

Module No. 4: Frozen Milk Products

Learning Outcome: Exhibit the production processes of ice cream, kulfi, Dried Ice Cream Mix, and packaging of frozen milk products including machinery and equipment cleaning procedures using recommended sanitizers and agents

Module Outcome:

Illustrate the method of manufacturing of various Frozen Milk Products

Apply the safety and quality factors for determine the acceptability of the Frozen Milk Products by consumers

Duration: 30:00	**Duration**: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
4.1 Delve into Dairy ingredients used in ice cream production, encompassing Milk Fat, Milk SNF, Stabilizers, and Emulsifiers. 4.2 Elaborate on the Manufacturing process flow sheet of Ice Cream, including insights into Ice Cream Freezers like Batch freezers and Continuous ice cream freezers. 4.3 Identify the Factors influencing freezing time, considering both Mechanical and Character of mix aspects. 4.4 Detail the Changes that occur during the freezing process, which involve lowering the mix temperature from aging to freezing point, freezing a portion of water, incorporating air, and finally cooling the ice cream. 4.5 Explain Overrun, providing an understanding of how to Calculate Overrun in ice cream. 4.6 State the factors depressing and enhancing overrun, along with methods for Controlling Overrun. 4.7 Discuss the packaging methods for ice cream, covering	4.1 Demonstrate the production process of ice cream. 4.2 Illustrate the procedure for producing kulfi. 4.3 Exhibit the method of creating Dried Ice Cream Mix. 4.4 Display the packaging of frozen milk products. 4.5 Demonstrate the proper cleaning of machinery with recommended sanitizers, following the CIP (clean-in place) procedure. 4.6 Present the cleaning of equipment and tools using approved cleaning agents and sanitizers.

Bulk containers and Wrappers. 4.8 Engage in a discussion about Ice Cream Hardening, explaining the Objectives of hardening ice cream, Hardening time, Hardening process conditions, and Factors influencing the rate of hardening. 4.9 Provide an explanation of the Manufacturing process of Dried Ice Cream Mix and its Uses. 4.10 Elaborate on the Manufacturing process of Kulfi.	
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual., Filters, Clarifiers, Vat Pasteurizer equipment, Homogenizer, Aging vat. Ice cream churner, ice cream hardener, candy trolly, drum dryer for drying of ice cream mix.	

Module No. 5: Fermented and Coagulated Milk Products

Learning Outcome: Demonstrate the production processes and packaging of fermented products like misti dahi, paneer, cheddar cheese, cottage cheese, and mozzarella cheese etc. including machinery and equipment cleaning procedures using recommended sanitizers and agents.

Module Outcome

Illustrate the method of manufacturing of various Fermented and Coagulated Milk Products

Apply the safety and quality factors for determine the acceptability of the Fermented and Coagulated Milk Products by consumers

Duration: 30:00	**Duration**: 30:00
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
5.1 - Engage in a discussion about Fermented Milk Products, covering concepts of starter culture, various types of starter cultures employed in dairy industries, and probiotic milk products. Explore Fermented Milk Products like Dahi, Yoghurt, lassi, Acidophilus milk, bulgaricus milk, kumiss, and kefir. 5.2 - Delve into the method of Preparation of dahi, offering insight into the industrial process with a flow sheet, along with presenting a flow diagram for the production of misti dahi. 5.3 - Identify the Factors Affecting the Quality of Misti Dahi, considering aspects such as the level of fat, homogenization pressure, milk solids not fat (MSNF)	5.1 - Display the process of producing misti dahi. 5.2 - Illustrate the procedure for producing paneer. 5.3 - Showcase the process of producing cheddar cheese and cottage cheese. 5.4 - Exhibit the process of producing mozzarella cheese. 5.5 - Demonstrate the packaging of fermented products. 5.6 - Present the process of cleaning the machineries used with recommended sanitizers following the CIP (clean-in place) procedure.

level, and cane sugar level. 5.4 - Discuss the flow diagram for industrial production of lassi. 5.5 - Explore the manufacturing of yoghurt (both set and stirred yogurt), including composition details and the Probiotic Characteristics and Health Benefits associated with yogurt consumption. 5.6 - Engage in a discussion about the industrial method of paneer manufacturing, highlighting differences between Paneer from cow milk and buffalo milk. 5.7 - Pinpoint the Factors Affecting Quality of Paneer, which encompass type of milk, milk quality, type and strength of coagulant, heat treatment of milk, coagulation temperature, and pH of coagulation. Additionally, cover the shelf life of paneer and potential defects. 5.8 - Discuss the traditional method of manufacturing channa, and detail the industrial production of Chhana from cow milk. 5.9 - Identify the Factors influencing quality of chhana, which include type of milk, milk quality, type and quantity of coagulant, temperature and pH of coagulation, speed of stirring during coagulation, method of straining, and heat treatment given to milk. Also, consider yield of chhana, shelf life, and potential defects. 5.10 - Engage in a discussion about the Manufacturing process of cheddar cheese, cottage cheese, and mozzarella cheese. 5.11 - State the Requirements of a Good Starter, differentiate Mixed strain mesophilic cultures and Defined strain mesophilic cultures, and explore Factors Affecting Activity of Starter Culture. 5.12 - Enumerate problems associated with cheese starters, identify Defects in Starter, delve into Causes of Slow Starters and Starter Failures, and discuss Natural Inhibitory Substances in Milk. 5.13 - Discuss the properties of Rennin, explore Rennet substitutes such as Milk-clotting Enzymes from Plants (Papain, Ficin, Bromelain) and Microbial	5.7 - Exemplify the cleaning of equipment and tools using recommended cleaning agents and sanitizers.

Rennet, and explain the action of rennet on milk, Enzymatic Coagulation of Milk, and Enzymatic hydrolysis of casein. 5.14 - Identify the Factors Affecting Cheese Yield, highlight defects in cheese, their causes, and preventive measures. Cover Defects Related to Moisture Content, Acid Content, Flavors, Body, Texture, and Color defects in cheese.	
Classroom Aids:	
Computer, Projection Equipment, PowerPoint Presentation and software, Facilitator's Guide, Participant's Handbook	
Tools, Equipment and Other Requirements	
Protective Gloves, Head Caps, Aprons, Safety Goggles, Safety Boots, Mouth Masks, Sanitizer, Food Safety Manual., Filters, Clarifiers, **paneer** Vat equipment, paneer press, cheese vat, cheese fermenter, incubator	

Module No. 6: Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).

Outcome:
Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain.

Theory Content:

Practical Content:
Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for 60 Hours.)

Module No. 7: Employability Skills

Key Learning Outcomes

Introduction to Employability Skills Duration: 1.5 Hours

After completing this programme, participants will be able to:

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

Constitutional values - Citizenship Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that arerequired to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
7. Describe the benefits of continuous learning.

Basic English Skills Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e -mail using basic English

Career Development & Goal Setting Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity & Inclusion Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy Duration:5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely

19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

Entrepreneurship Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
29. Create a sample business plan, for the selected business opportunity

Customer Service Duration: 5 Hours

30. Describe the significance of analyzing different types and needs of customers
31. Explain the significance of identifying customer needs and responding to them in a professional manner.
32. Discuss the significance of maintaining hygiene and dressing appropriately

Getting Ready for apprenticeship & Jobs Duration: 8 Hours

33. Create a professional Curriculum Vitae (CV)
34. Use various offline and online job search sources such as employment exchanges, recruitment agencies,and job portals respectively
35. Discuss the significance of maintaining hygiene and confidence during an interview
36. Perform a mock interview
37. List the steps for searching and registering for apprenticeship opportunities

Learning Outcome – Assessment Criteria

Module No.	Outcome	Assessment Criteria
1	Introduction to Milk	**After completion of this module students will be able to:** 1.1 – Explain the method of receiving milk and evaluating its quality. 1.2 - Inspect the Quality of milk and milk products through various analytical techniques. 1.3 - Assess the Microbiological quality of Milk, including the MBRT test, identification of microbes in milk and milk products, and recognition of inhibitors in milk. 1.4 - Identify the presence of E. coli in milk. 1.5 - Conduct Cleaning and sanitization of processing equipment. 1.6 - Verify the cleanliness and operational state of all machineries.
2	. Different Milk Products Processing	**After completion of this module students will be able to:** 2.1 - Conduct an inspection to ensure the cleanliness and optimal functionality of all machinery. 2.2 - Demonstrate the utilization of a filter to eliminate sediments from milk. 2.3 - Comprehend the steps involved in producing milk products from processed milk. 2.5 - Apply the technique of employing a separator to separate cream from milk. 2.6 - Utilize a homogenizer to attain the desired fat content. 2.7 - Operate a pasteurizer effectively. 2.8 - Perform the procedure of chilling milk within the chilling tank. 2.9 - Acquire knowledge about the preparation of

Module No.	Outcome	Assessment Criteria
		various dairy products, including condensed (both sweetened and unsweetened), evaporated milk, and milk powders (WMP, SMP). 2.10 - Understand the sequence of receiving and storing raw milk until it is ready for processing. 2.11 - Execute the processes involved in treating pasteurized milk for different milk types. 2.12 – Explain the process of HTST pasteurization.
3	Milk Derived Products from Milk Fats	**After completion of this module students will be able to:** 3.1 - Demonstrate a comprehensive understanding of the steps and techniques involved in the production of sterilized cream and sour cream. 3.2 - Exhibit a clear understanding of the entire process associated with the creation of butter, including key ingredients and methods. 3.3 - Display a thorough comprehension of the process utilized in producing ghee, encompassing relevant procedures and considerations. 3.4 - Demonstrate the process employed for manufacturing butteroil, encompassing the necessary stages and insights. 3.5 - Explain the process engaged in producing cooking butter, highlighting key aspects and techniques. 3.6 - Illustrate of the packaging methods utilized for various dairy products, considering suitable approaches and considerations. 3.7 – Perform the procedures and techniques involved in cleaning the machineries using recommended sanitizers following the CIP (clean-in place) procedure. 3.8 - Demonstrate the steps and methods associated with cleaning the equipment and tools using approved cleaning agents and sanitizers.
	Frozen Milk Products	After completion of this module students will be able to: 4.1 Provide a clear and coherent explanation of the complete procedure involved in the production of ice cream, detailing key stages and relevant techniques. 4.2 Demonstrates comprehensive understanding of the process required to produce kulfi, including significant steps and essential factors. 4.3 Display thorough comprehension of the process employed in creating Dried Ice Cream Mix, incorporating key steps and essential considerations. 4.4 Exhibit the methods utilized for packaging frozen milk products, considering appropriate approaches and relevant factors.

Module No.	Outcome	Assessment Criteria
		4.5 Reflect a solid understanding of the procedures and techniques involved in effectively cleaning the machineries using recommended sanitizers as per the CIP (clean-in place) procedure. 4.6 Evidence a strong grasp of the steps and techniques associated with cleaning the equipment and tools using approved cleaning agents and sanitizers.
	Fermented and Coagulated Milk Products	After completion of this module students will be able to: 5.1 Demonstrate step-by-step procedure involved in producing misti dahi, showcasing knowledge of critical stages and relevant techniques. 5.2 - Show an understanding of the entire process required to produce paneer, highlighting essential steps and key considerations. 5.3 - Exhibit comprehension of the comprehensive process of creating cheddar cheese and cottage cheese, covering significant stages and fundamental aspects. 5.4 - Display understanding of the process engaged in producing mozzarella cheese, including key stages and pertinent insights. 5.5 - Illustrate the packaging methods utilized for fermented products, including appropriate approaches and relevant considerations. 5.6 - Reflect comprehension of the procedures and techniques for effectively cleaning the machineries with recommended sanitizers as per the CIP (clean-in place) procedure. 5.7 - Demonstrate the steps and methods involved in cleaning the equipment and tools using approved cleaning agents and sanitizers.
4	OJT	**Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).**
5	Employability Skill	**As per NCVET guided curriculum**

List of Tools, Equipment & materials needed for 30 Trainees (Practical)

Sl No	Items Name	Specification	Qty
1	Gerber Centrifuge Machine	Description : Electric Gerber Machine for 24 Test with Mechanical Brake, 0-30 Minutes Timer, Stainless Steel Disc. & Protective cover. Supply with accessories Milk Testing Kit Type : For FAT/SNF Testing Unit : Set Description :2.0000 Each Kit Consisting of: Std. Pack a. Milk Butyrometer 0 - 10 % 20 "BENNY" - Tested b. Lock Stopper - Brass Cap 60 c. Lock Stopper Key - Aluminium 06 d. Milk Pipette 10.75 ml 06 "BENNY" e. Plastic Till Measure - 1ml 06 with bottle f. Plastic Tilt Measure - 10 ml 06 With bottle g. Sample Bottle 85 ml 50 h. Plastic Sample Bottle Stand 03 12 holes i. Plastic Butyrometer Shaking 03 Stand - 12 holes j. Plastic Butyrometer Holding 03 Stand - 12 holes k. Plastic Pipette Stand 02 l. Nylon Butyrometer Cleaning 01 gross Brush m. Nylon Pipette Cleaning Brush 01 gross n. Nylon Sample Bottle Cleaning Brush 01 gross o. Stainless Steel Sample Dipper 02 100 ml p. Plastic Dropping Bottle 06 250 ml q. Thermometer 0 - 110°C Alcohol 10 Research r. Lactometer 0 - 40° at T 84°F 12 Tested s. Plastic Lactometer Jar - small 06 t. Stainless Steel Can Plunger 01 u. Anyl Alcohol - Grade A 02 Ltr. v. Con sulphuric acid 02 Ltr.	0**1**
2	Batch Pasteurizer 25 litre with Stirrer	Electric Batch / Vat Pasteuriser: Capacity – 25 liters Completely made of SS 316 AISI (inner and outer) Motor – ½ HP Compton with gear box for stirring. Triple walled with glass wool insulated. Electric immersion heater 6KW for heating of water. Digital temp indicator for product (multispan/SELEC) and Digital temp. controller cum indicator for water medium (multispan /SELEC) in with separate panel, Water level indicator, glycerin Pressure Gauge , safety valve and necessary fitting. Operated on 440 volts 3 ph AC.	01
3	Cream Seperator	Cream separator machine: Capacity – 10 liters minimum maximum. Motor – ½ HP Compton , 2800 rpm. Contact parts are of SS 304. Operated on 230 volts AC.	01
4	Butter Churner	Butter churner: Capacity – 3-5 KG max. Tank volume – 10 liters Made of SS 304 grade. Motor – ½ HP Compton with gear box	01

Sl No	Items Name	Specification	Qty
		Operated on 230 volts AC. Supply with one butter cake former extruder of capacity 10-15 kg per hour. Motor 2HP with gear box.	
5	Homogenizer 50lit	Two stage Homogeniser completely made of SS 304 AISI (inner and outer). Capacity – 25-40 liters/hour Motor – 1HP Compton Pressure regulator – double stage, 140 Bar (max. pressure at 200 bar) with Electric Motor along with standard accessories. and Homogenising Valve and Valve Seats are made of Stellite. Plungers and valve made of SS 316. The Homogeniser is supplied with standard accessories like glycerin Pressure Gauge and tool kit etc. Operated on 440 volts AC.	01
6	Manual Paneer Press	Manual Paneer Press: Made of SS 304. Complete with pressure bolt and net trays.	01
7	Ice cream Ageing Vat 25 Lit	Ice Ageing VAT – Capacity – 20 liters volume. Ageing vat comes in to two section: a) **Primary ageing vat** – 20liters volume. To cool down the ice cream mix temp. to the ambient from pasteurization temp. Unit having 20 liter SS 304 double jacketed tank for cooling water recirculation. Inner and outer tank made of 1.5mm Tank has ½ HP stirrer motor with gear and SS 304 shaft and blade at 36 rpm or whichever required. Outer jacketed will connected through PVC pipe line to Cooling tower for cooling water recirculation. Cooling tower should be provided with the unit of compatible capacity. Operated on 415 volts AC. b) **Secondary or final ageing vat** – 20 liters. To cool down ice mix temp. ambient to 4 deg.C and keep the temp. maintain for 24 hours. Tank made of SS 304 grade 1.5mm. this will a double walled tank. Temp. controlled by copper cooling and compressor with refrigerant gas (toxic free). Cooling coil will be fitted surrounding the outer wall of inner tank and sealed with PUF for prevent leakage. Tank fitted with ½ HP gear motor with stirrer and agitation. Operated on 415 volts AC.	01
8	Ice Cream Churner Machine	**Ice Cream Churner Machine** This will be continuous freezer to make the ice cream with 100 % overrun. The unit will have mix pump, dasher, outlet control valve, and refrigeration unit. Completely made from AISI SS316 inner and outer part. The unit capacity 10 lts of ice cream mix in one time, The unit will have control panel. Motor – 1HP compton motor. Cooling compressor with 404 cooling gas. operated on 440 volts AC	01
9	Ice Cream hardner -30℃	**Ice cream hardener chamber:** Capacity 20liters Temp. range:(- 30)deg. C Inside made of SS 304 and outer made of SS 304 with PUF insulation. Cooling compressor with digital temp. Controller cum indicator. Operated on 230 volts AC.	01
10	Ice Cream Candy trolley Tank	Ice Cream Candy trolley Tank fitted with suitable refrigeration system(glycol) and circulator. Capacity – 02 nos moulds of 12 candy. It would be fitted with stick holder to make the Ice candies. Inside made of SS 304 and outer made of SS 304 with PUF	01

Sl No	Items Name	Specification	Qty
		insulation. complete with cooling compressor and digital temp. controller cum indicator (multispan /SELEC). Operated on 230 volts AC. Supply with one Chocolate coating pan: rectangular shape chocolate melting pan with hot water bath. Chocolate holding capacity – 8 to 10 liters. This unit will be used for making chocolate bar from ice cream candy. This unit has the capacity of coating 10 ice cream bar at a time. 230 volts 1 ph AC operated.	
11	Milk testing analysis	**Ultrasonic Milk Analyzer and ultrasonic stirrer for testing of milk sample.** a) *Milk Analyzer Specification* Usage/Application Laboratory Use Relative Humidity 30% to 80% Interface RS 232 Display 2 Line, 16 Character, Big LCD Display, 10mm Character Height Operating Facilities Cleaning, Single Curve Calibration, Error List, Suitable for Cow/Buffalo/Mixed Milk Operating Voltage:230 V + 15-20%, AC, 50 Hz, 12V DC +/- 8% Ambient Air Temperature:- 15 Degree Celsius to 50 Degree Celsius Milk Temperature: 5 Degree Celsius to 35 Degree Celsius b) *Ultrasonic stirrer Specification* Stirring removes air from fresh milk samples by vibrations created in the milk before testing Available in Powder Coated/Stainless Steel housing Vibrator – SS Ball type/Aluminium Ball Type.	0**1**
12	Drum Dryer	**Drum dryer with rotating cylinder** Drum Dryer: Single drum Dryer. Made of Stainless steel 304 AISI grade. Drum size – 460 x 400 mm (Diameter x Length) with applicator rollers 02 nos. and doctor blade scrapper for drum and flakes collector tray. Drum rotate through 1HP Compton motor with Gear box and Speed controller VFD with digital RPM indicator. Drum heated through mini hot water steam generator. Mini hot water steam generator with 9 KW electric heater and pressure gauge, safety valve and supply valve and pipeline. Operated on 440 volts 3 phase AC. **Supply with Accessories for above Drum Dryer:** One Mini Pulveriser of standard design & specifications, compact model. It comprises of a feeding hopper with feed regulator slide. Grinder body is inlaid with ratchet teeth liner on top and perforated screen at the bottom, with delivery trough attached to the discharge end. Rotor with beaters mounted on S.S. shaft running in ball bearing housing at a speed of 2800 R.P.M., Complete with set of 6 screens, cotton dust bag balloon and standard set of tools. Fitted with 3 H.P. 440 Volts drive motor. All Contact Parts from Stainless Steel 304.	0**1**
13	Laboratory spray dryer	Laboratory spray dryer The dryer has ease of operations. The inlet air temperature is precisely controlled by the inlet temperature PID controller. The panel includes: Inlet temperature controller. Outlet Temperature indicator. On/Of switch and indicator for blower.	01

Sl No	Items Name	Specification	Qty
		On/Of switch and indicator for heater. On/Of switch and indicator for air compressor. On/Of switch and indicator for feed pump. Pump speed control with LCD display. Compressor air pressure control with LCD display of air pressure. Technical Information Evaporation rate of water at inlet temperature of 250ºC: Approx 1500 ml/hr. Air inlet temperature range : Up to 250ºC Heater capacity : 3 Kwh Spray System : 2 Fluid nozzles. Spray / hot air flow : Downward Co-current/ Upward Counter Co-current. Air Compressor : Inbuilt. Power Supply : 230V-50HZ. 15 Amps. Dimensions : 700 (H) x 600 (W) x 450 (D)mm	
14	B.O.D cooling incubator	**B.O.D COOLING INCUBATOR** Cooling BOD incubator, combined low & high temperature, provided with precise electronic temperature control with digital readout a) Construction: Double-walled with adequate polystyrene and glass wool insulation. b) Inner Chamber: Stainless Steel, (304SS of 20gauge) duly polished with different shelf positions. c) Outer Walls: CRC Steel Sheet, scraped and treated with anti-corrosive primer and finished with powder coating. d) Outer Door: The outer door will be double walled duly insulated and provided with magnetic strip gasket with proper sealing and locking device with anti-corrosive primer and finished with powder coating. e) Inner Door: An Acrylic door is provided. f) Inner chamber made of 304 grade quality Stainless Steel. Wall side 20 gauge thickness sheets & Tray side 18 gauge thickness perforated sheets. g) Temp. Digital controller - Multispan brand. Temperature Range : 5ºC to 60ºC Temperatures Accuracy of Control : ± 0.50 Working Chamber Made of : Stainless Steel Sheet. Volume=285 Lt/ 10cft No. of Tray : 3 Numbers Perforated 304SS Trays of 18 gauge. Operable on : 220/230 Volts, Single Phase Proper white light illumination is necessary in inner chamber.	01
15	Thermometer,0deg C to 250 deg C	Thermometer,0degC to 250 deg C glass	03
16	Digital Thermometer	Temperature scale: deg C User-Selective Resolution: 1 ^{o}C Measurement Range: 0^{o}C to 250^{o}C Display: LCD	03

Sl No	Items Name	Specification	Qty
17	Gas oven	Design: Gas oven Colour: Silver Material: Stainless Steel Special Feature: Manual Ignition Heating Elements 2 burner Material: Top-quality stainless-steel material with a glossy finish that ensures the durability and longevity of the product. Burners: Equipped with two high-efficiency brass burners (1 Big and 1 Small) that ensure uniform distribution of heat on the utensils. Heavy-duty Pan Supports - The pan supports are designed to accommodate all major sizes of pans as it is reliable and rigid in construction. Knobs: Ergonomic and safe-handling knobs not only offers beauty & safety but also grants easy and quick access to lit the stove.	01

Marks Distribution

Outcome code	Outcome	Total marks Th	Total marks Pr
FPT/1105/OC1	Assess the quality and safety of dairy products, including milk and its derivatives, through hands-on application of analytical techniques, microbiological evaluation, and equipment sanitation procedures.	20	100
FPT/1105/OC2	Assist in milk quality assessment, filtration, cream separation, homogenization, pasteurization, chilling, raw milk handling, and distinct processing methods for preparing condensed milk and milk powder.	30	120
FPT/1105/OC3	Demonstrate the production processes of sterilized cream, sour cream, butter, ghee, butteroil, and cooking butter, along with packaging of dairy products, cleaning of machineries/ equipment/ tool with recommended agents.	40	150
FPT/1105/OC4	Exhibit the production processes of ice cream, kulfi, Dried Ice Cream Mix, and packaging of frozen milk products including machinery and equipment cleaning procedures using recommended sanitizers and agents	30	140

FPT/1105/OC5	Demonstrate the production processes and packaging of fermented products like misti dahi, paneer, cheddar cheese, cottage cheese, and mozzarella cheese etc. including machinery and equipment cleaning procedures using recommended sanitizers and agents.	30	140
FPT/1105/OC6	Work in real job situation with special emphasis on basic safety and hazards in this domain.	0	150
DGT/VSQ/N0102	Employability Skill-60 Hrs	50	0