



GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

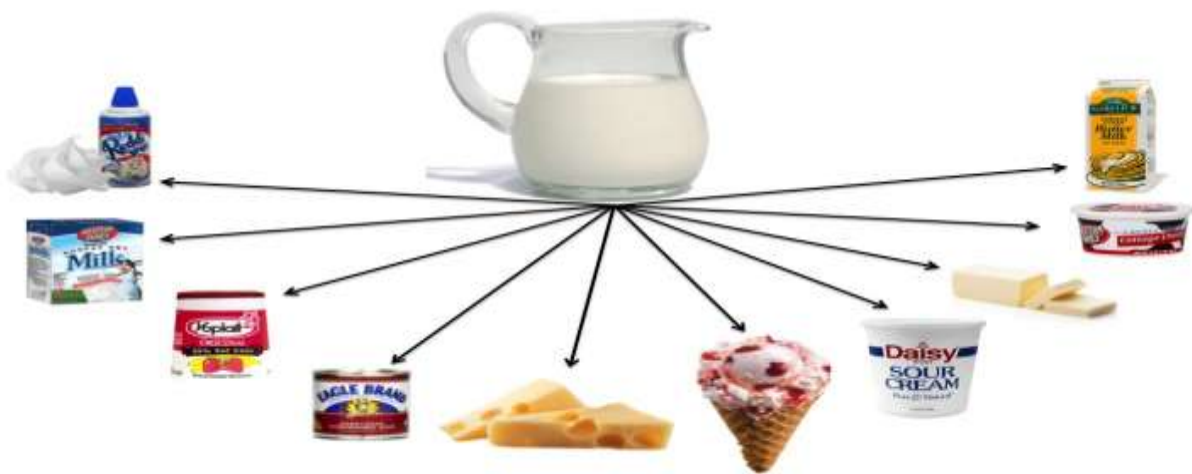
COMPETENCY BASED CURRICULUM

MILK & MILK PRODUCT TECHNICIAN

(Duration: One Year)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL- 4



SECTOR – FOOD PROCESSING & PRESERVATION

MILK & MILK PRODUCT TECHNICIAN

(Non-Engineering Trade)

(Revised in 2018)

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 4

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

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Industrial Training Institute

Milk & Milk Product Technician

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1. COURSE INFORMATION

During one year duration of “Milk & Milk Product Technician” trade, a candidate is trained on Professional Skill, Professional Knowledge and Employability Skill. In addition to this, a candidate is entrusted to undertake project work, extracurricular activities and on-the-job training to build up confidence. The broad components covered related to the trade are categorized in two semesters each of six months duration. The semester wise course coverage is categorized as below:

1st Semester – In the first semester, the trainee learns about elementary first-aid, firefighting, environment regulation and housekeeping, etc. The trainee identifies trade tools & equipments and milk operation process. He understands the importance of personal hygiene, cleanliness of Floor, equipments, milk products handling and hygiene protective clothing. He practices safe handling of dairy equipments and other tools. He identifies market of milk products and raw material of dairies. The trainee understands and practices different types of test of milk, estimate the fat and protein content of milk. Practice the test microbiological quality of milk by MBRT and SFC test.

2nd Semester – In the second semester, the trainee learns to prepare, cream, ghee and butter, analyse the quality parameter and determine the effect of temperature in cream separation. He learns to make srikhand, dahi, mawa, channa, paneer, cheese, butter milk and milk cake. Trainees learn to prepare different qualities of available ice-cream available in market and evaluate its quality. Trainees learn to prepare dried milk and determine and analyse solubility index of dried milk. He applies HCCP, GMP in dairy plant. He performs washing of equipment used in dairy plant and sterelise of canes.

2. TRAINING SYSTEM

2.1 GENERAL

The Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers a range of vocational training courses catering to the need of different sectors of the economy/ labour market. The vocational training programs are delivered under the aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programs of NCVT for propagating vocational training.

‘Milk & Milk Product Technician’ trade under CTS is one of the popular courses delivered nationwide through a network of ITIs. The course is of one year (02 semester) duration. It mainly consists of Domain area and Core area. In the Domain area, Trade Theory & Practical impart professional skills and knowledge. While the core area (Employability Skill) imparts requisite core skills, knowledge, and life skills. After passing out the training program, the trainee is awarded National Trade Certificate (NTC) by NCVT which is recognized worldwide.

Candidates broadly need to demonstrate that they are able to:

- Read and interpret technical parameters/documents, plan and organize work processes, identify necessary materials and tools;
- Perform tasks with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge & employability skills while performing jobs.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS

- Can join as Technician in dairy industries for handling machineries/ equipment used in the production of milk and milk products.
- Can join as milk collection technician in dairy industries.
- Can become entrepreneur in the field of milk and milk products.

2.3 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year (02 semesters): -

S No.	Course Element	Notional Training Hours
1.	Professional Skill (Trade Practical)	1350
2.	Professional Knowledge (Trade Theory)	270
3.	Employability Skills	110
4.	Library & Extracurricular activities	70
5.	Project Work	120
6.	Revision & Examination	160
	Total	2080

2.4 ASSESSMENT & CERTIFICATION

The trainee will be tested for his skill, knowledge and attitude during the period of the course and at the end of the training program as notified by the Government of India (GoI) from time to time. The employability skills will be tested in the first two semesters itself.

a) The **Internal Assessment** during the period of training will be done by **Formative Assessment Method** by testing for assessment criteria listed against learning outcomes. The training institute has to maintain an individual trainee portfolio as detailed in assessment guideline. The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NTC will be conducted by NCVT at the end of each semester as per the guideline of Government of India. The pattern and marking structure is being notified by Govt. of India from time to time. **The learning outcome and assessment criteria will be the basis for setting question papers for final assessment. The examiner during final examination will also check** the individual trainee's profile as detailed in assessment guideline before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percentage for practical is 60% & minimum pass percentage of theory subjects is 40%. For the purposes of determining the overall result, 50% weightage is applied to the result of each semester examination.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking the assessment. Due consideration should be given while assessing for teamwork, avoidance/reduction of scrap/wastage and disposal of scrap/waste as per procedure,

behavioral attitude, sensitivity to the environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examining body. The following marking pattern to be adopted while assessing:

Performance Level	Evidence
(a) Weightage in the range of 60%-75% to be allotted during assessment	
For performance in this grade, the candidate should produce work which demonstrates attainment of an acceptable standard of craftsmanship with occasional guidance, and due regard for safety procedures and practices	<ul style="list-style-type: none"> • Demonstration of good skill in the use of hand tools, machine tools and workshop equipment. • Below 70% tolerance dimension achieved while undertaking different work with those demanded by the component/job. • A fairly good level of neatness and consistency in the finish. • Occasional support in completing the project/job.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For this grade, a candidate should produce work which demonstrates attainment of a reasonable standard of craftsmanship, with little guidance, and regard for safety procedures and practices	<ul style="list-style-type: none"> • Good skill levels in the use of hand tools, machine tools and workshop equipment. • 70-80% tolerance dimension achieved while undertaking different work with those demanded by the component/job. • A good level of neatness and consistency in the finish. • Little support in completing the project/job.
(c) Weightage in the range of more than 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due	<ul style="list-style-type: none"> • High skill levels in the use of hand tools, machine tools and workshop equipment. • Above 80% tolerance dimension achieved



<p>regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.</p>	<p>while undertaking different work with those demanded by the component/job.</p> <ul style="list-style-type: none">• A high level of neatness and consistency in the finish.• Minimal or no support in completing the project.
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3. JOB ROLE

Dairy Worker, General: performs all or several tasks in preparation of various dairy products. Pasteurises raw milk or other dairy product to remove harmful bacteria. Develops bacterial culture for use in making butter, buttermilk, cheese and other products. Separates cream from milk and churns it into butter. Curdles milk and converts curds into cheese. May make ice-cream.

Separator Man: Cream Separator; Cream man (Dairy) operates milk separator to separate cream from milk. Assembles and adjusts separator as necessary, according to type of product for which separated cream or milk is to be used; places empty containers below cream and skimmed outlets; pours milk into separator; switches on centrifugal machine which automatically carries milk into bowl and separates milk into fat and skimmed milk; regulates separator to obtain required percentage of cream for making butter or ghee; cleans plant using hot water, soda and other detergent solutions. May also attend to pasteurizing plant.

Butter Maker: performs all or several tasks for making butter. Pasteurizes milk to eliminate harmful bacteria. Separates cream from milk in centrifuge. Adds lactic ferment to ripen cream. Pours or pumps cream into mechanical churn. Starts churn to make butter, controlling butter moisture, temperature and time of churning. May add salt to butter in churn. May take samples of butter for testing. May boil and strain butter to make 'ghee' and be designated as Ghee maker.

Cheese Maker: cooks milk and specified ingredients to make cheese according to formula. Pasteurizes and separates milk to obtain prescribed butter fat content; turns valves to fill vat with milk and heat milk to specified temperature; starts agitator to mix ingredients; tests samples of milk for acidity and allows agitator to mix ingredients until specified level of acidity is reached; dumps and mixes measured amount of rennet into milk; stops agitator to allow milk to coagulate into curd; cuts curd or separates curd with hand scoop to release whey (watery part); observes thermometer, adjusts steam valve, and starts agitator to stir and cook curd at prescribed temperature for specified time; squeezes and stretches sample of curd with fingers and extends cooking time to achieve desired firmness or texture; scoops curd into burlap containers to drain off excess moisture; places cheese in moulds and presses it into shape. May salt cheese by immersing them in brine or roll cheese in dry salt, pierce or smear cheese with cultured wash to develop mould growth, and place or turn cheese blocks on shelves to cure cheese. May supervise ripening of cheese. May specialize in making particular type of cheese. May Pasteurise milk and operate centrifugal machine to separate cream out of pure milk.

Dairy Products Makers, Others : Dairy Workers (non-farm), Other include all other dairy workers not elsewhere classified, for example, those salting cheese by immersing them in brine or by rubbing them with dry salt, sterilizing milk; operating machines which homogenise milk, moulding butter or cheese into shape, packing and wrapping butter with paper, making condensed or powdered milk, etc. and may be designated according to nature of work performed.



Reference NCO-2015:

- (i) 7513-0100 – Dairy worker/ general
- (ii) 7513-0200 - Separator man
- (iii) 7513.0300- Butter Maker
- (iv) 7513.0400- Cheese Maker
- (v) 7513.9900- Dairy Products Makers, Others

4. GENERAL INFORMATION

Name of the Trade	MIL & MILK PRODUCT TECHNICIAN
NCO - 2015	7513-0100, 7513-0200, 7513.0300, 7513.0400, 7513.9900
NSQF Level	Level-4
Duration of Craftsmen Training	1 Year (2 Semesters)
Entry Qualification	Passed 10 th class examination under 10+2 System of education
Unit Strength (No. of Student)	20 (Max. Supernumeraries seats: 6)
Space Norms	96 Sq. m
Power Norms	6 KW
Instructors Qualification for:	
(i) Mil & Milk Product Technician Trade	<p>Degree in Dairy Technology from recognized university with one year post qualification experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>Diploma in Dairy Technology from a recognized board of education with two-year post qualification experience in the relevant field.</p> <p style="text-align: center;">OR</p> <p>NTC passed on the trade with three-year post qualification experience in the relevant field.</p> <p>Desirable: Preference will be given to a candidate with Craft Instructor Certificate (CIC) in the relevant trade.</p> <p>Note: <i>Out of two Instructors required for the unit of 2 (1+1), one must have Degree/Diploma and other must have NTC/NAC qualifications.</i></p>



(ii) Employability Skill	MBA OR BBA with two-year experience OR Graduate in Sociology/ Social Welfare/ Economics with two-year experience OR Graduate/ Diploma with two-year experience and trained in Employability Skills from DGT institutes. AND Must have studied English/ Communication Skills and Basic Computer at 12 th / Diploma level and above. OR Existing Social Studies Instructors duly trained in Employability Skills from DGT institutes.				
List of Tools and Equipment	As per Annexure – I				
Distribution of training on hourly basis: (Indicative only)					
Total Hrs/ Week	Trade Practical	Trade Theory	Soft Skills	Employability Skills	Extracurricular Activity
40 Hours	25 Hours	6 Hours	5 Hours	2 Hours	2 Hours

5. NSQF LEVEL COMPLIANCE

NSQF level for ‘Milk & Milk Product Technician’ trade under CTS: **Level 4**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

- a. Process
- b. Professional knowledge
- c. Professional skill
- d. Core skill
- e. Responsibility

The Broad Learning outcome of ‘Milk & Milk Product Technician’ trade under CTS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

LEVEL	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice	Factual knowledge of field of knowledge or study	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	Language to communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social political and natural environment	Responsibility for own work and learning

6. LEARNING/ ASSESSABLE OUTCOME

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

6.1 GENERIC LEARNING OUTCOME

1. Apply safe working practices.
2. Comply with environment regulation and housekeeping.
3. Assist in exigencies and carry out elementary first-aid during emergencies.
4. Work in a team, understand and practice soft skills, technical English to communicate with required clarity.
5. Explain energy conservation, global warming and pollution and contribute in day-to-day work by optimally using available resources.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.

6.2 SPECIFIC LEARNING OUTCOME

7. Maintain hygiene and cleanliness of floor dairy equipments.
8. Operate machineries used in dairy plant and understand the basic milk product market and raw materials.
9. Perform various tests conducted on milk in dairy industries.
10. Perform handle dairy equipments.
11. Prepare or assist in Cream, Ghee & Butter.
12. Prepare or assist to produce different milk products.
13. Prepare or assist ice-cream.
14. Prepare or assist dried milk.
15. Regulate the milk safety as per norms of food.
16. Perform sterilisation of milk container and carry out maintenance of dairy machineries.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOME	ASSESSMENT CRITERIA
1. Apply safe working practices	1.1 Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements, and according to policy.
	1.2 Recognize and report all unsafe situations according to policy.
	1.3 Identify and take necessary precautions on fire and safety hazards and report according to work policy and procedures.
	1.4 Identify, handle and store/ dispose-off effluent substances according to policy and procedures following safety regulations and requirements.
	1.5 Identify and observe policies and procedures with regard to illness or accident.
	1.6 Identify and observe evacuation procedures according to site policy.
	1.7 Identify Personal Protective Equipment (PPE) and use the same as per related working environment.
	1.8 Identify basic first-aid and use them under different circumstances.
	1.9 Identify different fire extinguisher and use the same as per requirement.
2. Comply with environment regulation and housekeeping	2.1 Identify environmental pollution & contribute to the avoidance of instances of environmental pollution.
	2.2 Deploy environmental protection legislation & regulations.
	2.3 Take opportunities to use energy and materials in an environmentally friendly manner.
	2.4 Avoid waste and dispose waste as per procedure.
3. Assist in exigencies and carry out elementary first-aid during emergencies.	3.1 Demonstrate elementary first-aids.
	3.2 Demonstrate safety practices to be observed in kitchen.
	3.3 Demonstrate use of personal protective dresses.
	3.4 Identify emergency exit route.
	3.5 Demonstrate fire fighting procedure using fire extinguishers.
4. Work in a team, understand and practice soft skills,	4.1 Obtain sources of information and recognize information.
	4.2 Use documents, regulations and occupationally related provisions.



technical English to communicate with required clarity.	4.3 Conduct appropriate and target oriented discussions with higher authority and within the team.
	4.4 Present facts and circumstances, possible solutions & use English and French terminology.
	4.5 Resolve disputes within the team.
	4.6 Conduct written communication.
5. Explain energy conservation, global warming, pollution, and contribute in day-to-day work by using available resources optimally.	5.1 Semester examination to test knowledge on energy conservation, global warming and pollution.
	5.2 Their applications will be assessed during execution of assessable outcome.
6. Explain personnel finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.	6.1 Semester examination to test knowledge on personnel finance, entrepreneurship.
	6.2 Their applications will be assessed during execution of assessable outcome.

SPECIFIC LEARNING/ ASSESSABLE OUTCOME	
LEARNING/ ASSESSABLE OUTCOME	ASSESSMENT CRITERIA
SEMESTER-I	
7. Maintain hygiene and cleanliness of floor dairy equipments and safety aspects.	7.1 Demonstrate safety practices to be observed in Trade.
	7.2 Demonstrate use of personal protective dresses.
	7.3 Demonstrate procedure to maintain personal hygiene, care of skin, hand, feet, food handlers etc.
	7.4 Demonstrate disposal procedure of effluent substances.
	7.5 Demonstrate use of hygienic protective clothing.
8. Operate machineries used in dairy plant and understand the basic milk product market & raw material.	8.1 Identify commonly used raw material in dairy firm.
	8.2 Demonstrate the need of survey of market in milk product.
	8.3 Demonstrate and identify commonly used packaging of milk product.
	8.4 Demonstrate and identify the need of proper storage and packaging of milk product.
	8.5 Explain the causes of milk spoilages and prevention.
9. Understand the various tests conducted on milk in dairy industries.	9.1 Demonstrate quality of milk.
	9.2 Demonstrate sampling, physical and chemical test of milk.
	9.3 Demonstrate estimation of fat of sample milk.
	9.4 Demonstrate protein content of milk.
	9.5 Demonstrate MBRT & SFC.
10. Perform handle dairy equipments.	10.1 Demonstrate handling of different dairy equipment and care.
	10.2 Demonstrate single and two stage homogenizers.
	10.3 Demonstrate Pasteurisers different method eg. Batch, Flash and continues.
	10.4 Demonstrate drum and spray drier.
	10.5 Demonstrate on cream separator, cheese vat, deep freezer, jacket kettle, butter churner and boiler.
	10.6 Prepare pasteurized milk, UHT processing of milk
	10.7 Prepare flavored milk, toned milk, double toned milk and concentrated milk .
	10.8 Prepare fermented milk and Bulgarian milk.
SEMESTER-II	
11. Prepare and assist in Cream, Ghee & Butter products.	11.1 Plan and demonstrate Cream and Ghee preparation.
	11.2 Make plan for Butter preparation.
	11.3 Plan and demonstrate the quality parameter Cream, Ghee & Butter.



	11.4 Demonstrate the temperature effect on the rate of cream separation.
	11.5 Able to pack the said dairy product and seal.
12. Prepare and assist to produce different milk products.	12.1 Prepare Srikhand & Dahi
	12.2 Prepare Mawa & Channa
	12.3 Prepare Paneer & Processed cheese.
	12.4 Prepare Buttermilk & Cake.
	12.5 Able to Pack the said dairy product and seal.
13. Prepare and assist ice-cream production.	13.1 Prepare different types of commercially available ice-cream.
	13.2 Demonstrate the defects of commercial available ice-cream.
	13.3 Able to quality evaluation of ice-cream.
	13.4 Able to pack, seal and storage ice-cream.
14. Prepare and assist dried milk product.	14.1 Plan & perform to prepare dried milk.
	14.2 Demonstrate to determinate solubility index if dried milk.
	14.3 Perform to quality check of dried milk as per the parameters.
	14.4 Able to pack, seal and storage dried milk.
15. Regulate the milk safety as per norms of food.	15.1 Demonstrate application HACCP in dairy plant.
	15.2 Demonstrate application GMP in dairy plant.
	15.3 Demonstrate the dairy waste.
16. Perform sterilisation of milk container and carry out maintenance of dairy machineries.	15.1 Demonstrate washing dairy used equipments.
	16.2 Demonstrate CIP of dairy equipments.
	16.3 Demonstrate steam sterilization of canes
	16.4 Perform to maintain can washer.
	16.5 Chalk the lay out of dairy plant
	16.6 Understand the capacity of equipment
	16.7 Demonstrate the plant utility.

SYLLABUS – MILK & MILK PRODUCT TECHNICIAN			
FIRST SEMESTER – 06 Months			
Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
1	<ul style="list-style-type: none"> Maintain hygiene and cleanliness of floor dairy equipments and safety aspects. 	Trade and Orientation <ol style="list-style-type: none"> Visit to shop floor outfit and generate general ideas about the work atmosphere trade. (04 hrs) Identify safety signs for danger, warning, caution & personal safety message and hygiene. (04 hrs) Use of personal protective equipment (PPE). (03 hrs) Practice elementary first-aid. (03 hrs) Preventive measures for electrical accidents & steps to be taken in such accidents. (04 hrs) Use of Fire extinguishers. (03 hrs) Importance of cleanliness, hygiene, sanitation in self life and milk product. (04 hrs) 	Familiarization with the working of Industrial Training Institute system. Importance of safety and precautions to be taken in the industry/shop floor. Introduction to PPEs. Introduction to First-Aid. Response to emergencies e.g. power failure, fire, and system failure. Importance of housekeeping & good shop floor practices. Occupational Safety & Health: Health, Safety and Environment guidelines, hygiene, legislations & regulations as applicable. Good Mfg. Practices. Good Hygiene Practices.
2-5	<ul style="list-style-type: none"> Operate machineries used in dairy plant and understand the basic milk product market & the raw material. 	<ol style="list-style-type: none"> Study of familiar Dairy Products and visit to market. (20 hrs) Visit to Milk Co-Op Society. (20 hrs) Study of packaging equipments and machinery used in dairy industry. (40 hrs) Collection of various types of packaging material used for the packaging of dairy products. (10 hrs) 	Status of dairy industries in India. Introduction of white revolution. Importance of dairy industry opportunities of employment in the Dairy Industry. Overview of Food Spoilage: Bacterial and fungal food spoilage. Food poisoning, Food born infection and Food born intoxication. Main causes of milk spoilage. Preventions of milk and milk products from spoilage (Microbial



		12. Need and importance of packaging methods and storage conditions of dairy products. (10 hrs)	spoilage)
6-10	<ul style="list-style-type: none"> Perform various test conducted on milk in dairy industries. 	13. Importance of cleanliness, hygiene, sanitation in self life and milk product. (05 hrs) 14. Sampling of milk and milk products. (10 hrs) 15. To perform physical examination of milk. (10 hrs) 16. To perform platform tests of milk like organoleptic tests, clot on boiling test, alcohol test and acidity test. (30 hrs) 17. Estimation of fat by Gerber method and Milk scan. (20 hrs) 18. Estimation of specific gravity of milk by lactometer.(10 hrs) 19. Estimation of SNF content in milk. (10 hrs) 20. Practice to detection of various adulterants in milk. (15 hrs) 21. Practice to perform ascertains microbiological quality of milk by MBRT and SPC and Qualiform. (15 hrs)	Definition of milk. Composition and physico-thermal property of milk Collection of raw milk. Method of Sampling of raw milk. Plat form test. Quality of raw milk. Different products made from the milk. Introduction to different dairy products useful for marketing. Principle and methods used for milk processing. General know how for microbiology of milk and milk products.
11-15	<ul style="list-style-type: none"> Perform handle dairy equipments and mfg. of milk and milk products. 	22. Care and maintenance of equipments. (35 hrs) 23. Handling of equipments safely. (30 hrs) 24. Fault identification and removal of faults (40 hrs) 25. Corrective and Preventive action for safe operation. (15 hrs) 26. Data Recording. (05 hrs)	Study and working of equipments used e.g. -Single and two stage homogenizers Batch, Flash, and Continues pasteurizer Spray Drier and Drum Drier. Evaporators (Different Type) Cream Separator. Deep freezer. Softy making machine. Ice cream freezer. Cheese vat. Jacket kettle. Butter churner. Boiler. Optionally mini dairy plant. Form fill seal machine. Centrifugal Machine.
16-22		27. Preparation of pasteurized milk. (20 hrs)	Principle of thermal processing of milk processing



		<p>28. Preparation of different types of Standard milk. (20 hrs)</p> <p>29. Preparation of Toned milk. (20 hrs)</p> <p>30. Preparation of Double toned milk. (20 hrs)</p> <p>31. Preparation of Fermented milk. (20 hrs)</p> <p>32. Preparation of Flavoured milk. (10 hrs)</p> <p>33. Preparation of Condensed milk. (10 hrs)</p> <p>34. Preparation of Concentrated milk. (10 hrs)</p> <p>35. Preparation of Bulgarian milk. (10 hrs)</p> <p>36. Preparation of Acidophilus milk .(10 hrs)</p> <p>37. Practice on Store product hygienically. Conduct primary processing of market milk & store. (12 hrs)</p> <p>38. Perform practice on Form fill seal machine. (13 hrs)</p>	<p>Pasteurization and Sterilizations of milk.</p> <p>UHT Processing of milk.</p> <p>Methods for production of different types of milks - pasteurized, standard, toned, double toned, flavoured milk.</p> <p>Ingredients of special milks, fermented milk, concentrated milk.</p> <p>Other dairy products like dried milk, condensed milk.</p> <p>Standards of milk and milk products.</p> <p>Condensed milk: Composition, production, and defects.</p> <p>Fermented dairy products: Production of Bulgarian milk, Acidophilus milk.</p>
23-24	<p>Project work/ Industrial visit/prepare reports</p> <p>Broad Areas:</p> <p>a) Preparation of toned milk</p> <p>b) Check the ingredient of milk</p> <p>c) Any of Milk Products (from milk standardization to finish product mfg.)</p> <p>d) Preparation of condensed milk</p>		
25	Revision		
26	Examination		

Note: -

1. An activity report to be submitted by the trainees and internal assessment marks (Max 10) will be awarded based on it.
2. One hour soft skill classes to be arranged on a daily basis. Some of the sample project works (indicative only) are given against each semester.
3. The instructor may design their own project and also inputs from local industry may be taken in designing such new project.



4. *The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned to a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit a project report.*
5. *If the instructor feels that for the execution of specific project more time is required than he may plan accordingly to produce components/ sub-assemblies in appropriate time, i.e., may be in the previous semester or during execution of normal trade practical.*



SYLLABUS – MILK & MILK PRODUCT TECHNICIAN			
2nd SEMESTER – 06 Months			
Week No.	Ref. Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
27-29	<ul style="list-style-type: none"> Prepare and assist in Cream, Ghee & Butter product. 	39. Preparation of Cream Ghee (20 hrs) 40. Preparation of Butter (10 hrs) 41. Analysis of various quality parameters of prepared dairy products as cream, butter and ghee. (20 hrs) 42. Packing the given dairy products and sealing and cost calculation. (25 hrs)	Cream: Composition, production and defects. Different types of creams and their production method. Butter: Composition, method of production, theories of churning, grading and prevention of defects. Quality of butter. Ghee: Compositions, Different methods of Ghee production Quality of ghee. To study the effect of temperature on the rate of cream separation under the influence of gravity.
30-38	<ul style="list-style-type: none"> Prepare and assist to produce different milk products. 	43. Preparation of Srikhand. (25 hrs) 44. Preparation of Dahi. (25 hrs) 45. Preparation of Mawa. (25 hrs) 46. Preparation of Channa. (25 hrs) 47. Preparation of Paneer. (25 hrs) 48. Preparation Processed cheese. (25 hrs) 49. Preparation of Buttermilk. (25 hrs) 50. Perform Pack the given dairy products and seal. (25 hrs) 51. Study visit of various dairy plants. (25 hrs)	Cheese: Composition, types of cheese, production of cottage and cheddar cheeses; defects. Paneer: Composition, Production; defects. Indian dairy products: Rabri, kulfi, srikhand, lassi, Mawa, Dahi, Butter milk, Channa. Introduction of diff. types of packaging materials, packaging technology and method of packaging.
39-41	<ul style="list-style-type: none"> Prepare or assist ice-cream production. 	52. To prepare different types of ice cream from a commercially available ice cream mix and to study	Principle of homogenization. Application of homogenization in dairy industry. Ice cream: Definition and



		<p>defects in ice cream. (20 hrs)</p> <p>53. Quality evaluation of ice cream. (20 hrs)</p> <p>54. To determine percentage overrun of commercially prepared ice-cream. (20 hrs)</p> <p>55. Pack the given dairy products and seal. Storage methods of ice-cream. (15 hrs)</p>	<p>composition, Role of ingredients used, Principles and Technology of ice-cream manufacturing, grading and prevention of defects in ice creams.</p> <p>Freezing method and equipment used.</p>
42-43	<ul style="list-style-type: none"> Prepare and assist dried milk product. 	<p>56. Demonstration on dairy products like Dried milk (spray dried and milk condensing plants). (25 hrs)</p> <p>57. Analysis of various quality parameters of prepared dried milk. Pack the given dairy products, seal and storage .(25 hrs)</p>	<p>Drying Theories, Dried milk: Definition and composition, production by drum drying and air spray system; defects; dried milk products–butter-milk powder, whey powder, cream powder, infant milk food. Drying Equipment: Spray Drier, Bag filter unit, Hepa filter, Evaporation plant(TVR/MVR)</p>
44-45	<ul style="list-style-type: none"> Regulate the milk safety as per norms of food. 	<p>58. Application of HACCP and GMP, GHP in a Dairy plant. Utilization of dairy industry wastes: Whey utilization; production. (50 hrs)</p>	<p>Food regulations : Overview of Food Safety and Standards Act, 2006 BIS, ISO-22000, Agmark, HACCP, International Food Standards GMP. Importance of personal Hygiene, Cleaning & Sanitary standards of dairy industry</p>
46-49	<ul style="list-style-type: none"> Perform sterilisation of milk container and carry out maintenance of dairy machineries. 	<p>59. Washing of equipments used in dairy industry. (15 hrs)</p> <p>60. CIP of dairy equipments. (15 hrs)</p> <p>61. CIP of Bulk Milk Cooler. (10 hrs)</p> <p>62. Maintenance of Bulk Milk Cooler. (10 hrs)</p> <p>63. Maintenance of crate-washer. (10 hrs)</p> <p>64. Industrial visit of utility and engg. Section of dairy plant. (40 hrs)</p>	<p>Selection and use of dairy cleaners and sanitizers.</p> <p>Cleaning in place system (CIP), Various chemical used for CIP of dairy plant.</p> <p>Factor affecting washing operation General overview and knowhow of utility section of dairy like refrigeration plant, air compressor units, ETP, Boiler and maintenance section.</p> <p>Energy efficiency and environmental protection.</p>



50	Project work/ Industrial visit/prepare reports Broad Areas: <ul style="list-style-type: none">a. Preparation of srikhandb. Preparation of dahic. Preparation dried milkd. Preparation of paneere. Preparation of butter milk
51	Revision
52	Examination

Note: -

1. *An activity report to be submitted by the trainees and internal assessment marks (Max 10) will be awarded based on it.*
2. *One hour soft skill classes to be arranged on a daily basis. Some of the sample project works (indicative only) are given against each semester.*
3. *The instructor may design their own project and also inputs from local industry may be taken in designing such new project.*
4. *The project should broadly cover maximum skills in the particular trade and must involve some problem solving skill. Emphasis should be on Teamwork: Knowing the power of synergy/ collaboration, work to be assigned to a group (Group of at least 4 trainees). The group should demonstrate Planning, Execution, Contribution and Application of Learning. They need to submit a project report.*
5. *If the instructor feels that for the execution of specific project more time is required than he may plan accordingly to produce components/ sub-assemblies in appropriate time, i.e., may be in the previous semester or during execution of normal trade practical.*

CORE SKILL – EMPLOYABILITY SKILL	
First Semester	
1. English Literacy	Duration : 20 hrs Marks : 09
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking/ Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on known people, picture reading, gain confidence through role- playing and discussions on current happening, job description, asking about someone's job, habitual actions. Cardinal (fundamental) numbers, ordinal numbers. Taking messages, passing on messages and filling in message forms, Greeting and introductions, office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. IT Literacy	Duration : 20 hrs Marks : 09
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of the computer.
Computer Operating System	Basics of Operating System, WINDOWS, and The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc. Use of Common applications.
Word Processing and Worksheet	Basic operating of Word Processing, Creating, Opening and Closing Documents, Use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & Creation of Tables. Printing

	document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and Internet	Basic of Computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet, Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Website, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	
Duration : 15 hrs Marks : 07	
Introduction to Communication Skills	Communication and its importance Principles of effective communication Types of communication - verbal, non-verbal, written, email, talking on phone. Non-verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening, guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active listening skills.
Motivational Training	Characteristics essential to achieving success. The power of positive attitude. Self awareness Importance of commitment Ethics and values Ways to motivate oneself Personal goal setting and employability planning.
Facing Interviews	Manners, etiquettes, dress code for an interview Do's & don'ts for an interview

Behavioral Skills	Problem solving Confidence building Attitude
Second Semester	
4. Entrepreneurship Skills	Duration : 15 hrs Marks : 06
Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises: Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & record, Role & function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing Analysis	Qualities of a good entrepreneur, SWOT and risk analysis. Concept & Application of PLC, Sales & Distribution management. Difference between small scale & large scale business, Market survey, Method of marketing, Publicity and advertisement, Marketing mix.
Institution's Support	Preparation of project. Role of various schemes and institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non-financing support agencies to familiarize with the policies / programmes, procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop act, Estimation & costing, Investment procedure - Loan procurement - Banking processes.
5. Productivity	Duration : 10 hrs Marks : 05
Benefits	Personal/ Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working aids, Automation, Environment, Motivation - How it improves or slows down productivity.
Comparison with Developed Countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in select industries, e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and insurance.
6. Occupational Safety, Health and Environment Education	Duration : 15 hrs Marks : 06



Safety & Health	Introduction to occupational safety and health Importance of safety and health at workplace.
Occupational Hazards	Basic hazards, chemical hazards, vibro-acoustic hazards, mechanical hazards, electrical hazards, thermal hazards. occupational health, occupational hygiene, occupational diseases/ disorders & its prevention.
Accident & Safety	Basic principles for protective equipment. Accident prevention techniques - control of accidents and safety measures.
First Aid	Care of injured & sick at the workplaces, First-aid & transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. Safety, health, welfare under legislative of India.
Ecosystem	Introduction to environment. Relationship between society and environment, ecosystem and factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of energy, re-use and recycle.
Global Warming	Global warming, climate change and ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and harvesting of water.
Environment	Right attitude towards environment, Maintenance of in-house environment.
7. Labour Welfare Legislation	
Duration : 05 hrs Marks : 03	
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's Compensation Act.
8. Quality Tools	
Duration : 10 hrs Marks : 05	
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality



	circle, Roles and function of quality circles in organization, Operation of quality circle. Approaches to starting quality circles, Steps for continuation quality circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of housekeeping, Practice of good housekeeping.
Quality Tools	Basic quality tools with a few examples.

LIST OF TOOLS & EQUIPMENTS			
MILK & MILK PRODUCT TECHNICIAN (for batch of 20 Candidates)			
S No.	Name of the Tools and Equipments	Specification	Quantity
A. List of Equipments			
1.	Mini dairy plant: Complete Mini- processing unit for milk.		1 No.
2.	Milk Chiller for chilling milk	up to a temperature of about – 10 °C	1 No.
3.	Milk cans :	Made of steel/ Aluminium, 40 – 100 lit capacity	As required
4.	Cream separator	Motor operated, Centrifugal, capacity up to 1-2 Kg/ cream per min.	1 No.
5.	Cheese vat	Made of heavy Stainless steel (306), size approx. 4'X 2.5'X 1' with proper outlet and taps	1 No.
6.	Plate pasteurizer (Lab model)		1 no.
7.	Butter churner		1 No.
8.	Boiler (Lab scale)		1 no.
9.	Deep fridge		1 no.
10.	Steam jacketed kettle with surface scrapper		1 No.
11.	Mawa machine		1 No.
12.	Crown corking machine		1 No.
13.	Form fill seal machine		1 No.
14.	Centrifuge : For Fat estimation in milk,		1 No.
15.	Ice-cream plant		1 no.
16.	Gerber tubes for fat estimation		1 no.
17.	Electric oven		1 no.
18.	Desiccators		2 nos. each
19.	Weight balances Digital	min 10 gm to max 5 kg	4 nos.
20.	Jacket Kettle		4 nos.
21.	Flash evaporator.		1 no.
22.	Can body reformer		1 no.
23.	Can seamer		1 no.



24.	Exhaust box		1 no.
25.	Cup sealer		1 no.
26.	Vacuum pan		1 no.
27.	Vernier caliper : 15 cm. 0.01 mm LC		2nos.
28.	Screw Gauge : Micrometer,	0.001 mm LC,10 cm cap	4 NOS.
29.	Steel scale	12 " standard	2 nos.
30.	Steel Measuring tape	Scales 1 meter, and of 50 ft	2 nos.
31.	Weight balances Digital	min 0.01gm to max 1kg	1 no.
32.	Cutting equipments : Different knives,		As required
33.	Sinks : standard size		1 no.
34.	Hot plate : Electrical	2 KW	1 no.
35.	Spray drier (Lab Scale)		1 no.
36.	Heat sealing machine : Hand / pedal operated		1 no.
37.	Tanks SS	50 litres capacity, cylindrical with cap	1 no.
38.	Syrup tanks	50, 100 lit capacity SS	1 no.
39.	Pressure cooker Stainless Steel	5 Kg and 10 Kg	1 no each
40.	Liquid filling machine : For filling liquid in bottles, 200 ml, 500 ml, 1000 ml. Manual		As required
41.	SS filter : Sieve type cloth filter, hydraulic		1 no.
42.	Sugar Coating pan : SS, Revolving type with speed control		1 no.
43.	Bottle opener : Heavy duty, Stainless Steel		1 no.
44.	Burette with stand : 50 ml ordinary glass		1 no.
45.	Pipette : 5-50 ml capacities, glass		As required
46.	Lab glassware's : Different sizes and types		As required
47.	Working tables : Stainless Steel Size 6' X 3'		1 no.
48.	Improved stoves : Made of MS with proper safety Measures, Valves etc		1 no.
49.	Stainless steel / Aluminium pots : Different Capacities		1 no.



50.	Wooden spoons : Different sizes		As required
51.	Bulk Milk Cooler	Suitable capacity	1 no.
52.	Automation Skid - Small PLC and SCADA sys. - Variable frequency drive - Soft Starter - level switch, level transmitter, flow switch, flow transmitter - Pressure switch, pressure transmitter	Suitable Integration Cap.	1 no.
B. Shop Floor Furniture and Materials (For 2 (1+1) units no additional items are required)			
53.	Instructor's table		1 no.
54.	Instructor's chair		2 nos.
55.	Metal Rack	100cm x 150cm x 45cm	4 nos.
56.	Lockers with 16 drawers standard size		2 nos.
57.	Steel Almirah	2.5 m x 1.20 m x 0.5 m	2 nos.
58.	Black board/white board	12' x 4'	2 no.(one for lab and one classroom)
59.	Fire Extinguisher		2 nos.
60.	Fire Buckets		2 nos.
61.	Classroom furniture (dual desk)		10 nos.
62.	Lab tables (work bench)		6 nos.
63.	Stools for lab		20 nos.

Note: All the tools and equipment are to be procured as per BIS specification.



TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
S No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software.	10 nos.
2.	UPS - 500VA	10 nos.
3.	Scanner cum Printer	01 no.
4.	Computer Tables	10 nos.
5.	Computer Chairs	20 nos.
6.	LCD Projector	01 no.
7.	White Board 1200mm x 900mm	01 no.

Note: Above Tools & Equipments not required, if Computer LAB is available in the institute.

FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor:			Year of Enrollment:											
Name & Address of ITI (Govt./Pvt.):			Date of Assessment:											
Name & Address of the Industry:			Assessment location: Industry/ ITI											
Trade Name:		Semester:		Duration of the Trade/course:										
Learning Outcome:														
S No.	Maximum Marks (Total 100 Marks)		15	5	10	5	10	10	5	10	15	15	Total Internal Assessment Marks	Result (Y/N)
	Candidate Name	Father's/Mother's Name	Safety Consciousness	Workplace Hygiene	Attendance/ Punctuality	Ability to Follow Manuals/ Written Instructions	Application of Knowledge	Skills to Handle Tools & Equipment	Economical Use of Materials	Speed in Doing Work	Quality in Workmanship	VIVA		
1														
2														