MILK AND MILK PRODUCT TECHNICIAN

NSQF LEVEL-6

SECTOR- FOOD INDUSTRY

COMPETENCY BASED CURRICULUM
CRAFT INSTRUCTOR TRAINING SCHEME (CITS)

GOVERNMENT OF INDIA
Ministry of Skill Development & Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City, Kolkata – 700091

MILK AND MILK PRODUCT TECHNICIAN

(Non-Engineering Trade)

SECTOR – FOOD INDUSTRY

(Revised in 2019)

Version 1.1

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Developed By

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1. COURSE OVERVIEW

The Craft Instructor Training Scheme is operational since inception of the Craftsmen Training Scheme. The first Craft Instructors' Training Institute was established in 1948. Subsequently, 6 more institutes namely, Central Training Institute for Instructors (now called as National Skill Training Institute (NSTI)), NSTI at Ludhiana, Kanpur, Howrah, Mumbai, Chennai and Hyderabad were established in 1960's by DGT. Since then the CITS course is successfully running in all the NSTIs across India as well as in DGT affiliated institutes viz. Institutes for Training of Trainers (IToT). This is a competency based course of one year duration."Milk and Milk Product Technician" CITS trade is applicable for Instructors of "Milk and Milk Product Technician" Trade under CTS.

The main objective of Craft Instructor training programme is to enable Instructors explore different aspects of the techniques in pedagogy and transferring of hands-on skills so as to develop a pool of skilled manpower for industries, also leading to their career growth & benefiting society at large. Thus promoting a holistic learning experience where trainee acquires specialized knowledge, skills & develops attitude towards learning & contributing in vocational training ecosystem.

This course also enables the instructors to develop instructional skills for mentoring the trainees, engaging all trainees in learning process and managing effective utilization of resources. It emphasizes on the importance of collaborative learning & innovative ways of doing things. All trainees will be able to understand and interpret the course content in right perspective, so that they are engaged in & empowered by their learning experiences and above all, ensure quality delivery.

2. TRAINING SYSTEM

2.1 GENERAL

CITS courses are delivered in National Skill Training Institutes (NSTIs) & DGT affiliated institutes viz., Institutes for Training of Trainers (IToT). For detailed guidelines regarding admission on CITS, instructions issued by DGT from time to time are to be observed. Further complete admission details are made available on NIMI web portal http://www.nimionlineadmission.in. The course is of one-year duration. It consists of Trade Technology (Professional skills and Professional knowledge), Training Methodology and Engineering Technology/ Soft skills. After successful completion of the training programme, the trainees appear in All India Trade Test for Craft Instructor. The successful trainee is awarded NCIC certificate by DGT.

2.2 COURSE STRUCTURE

Table below depicts the distribution of training hours across various course elements during a period of one year:

S No.	Course Element	Notional Training Hours
1.	**Trade Technology**	
	Professional Skill (Trade Practical)	640
	Professional Knowledge (Trade Theory)	240
2.	**Soft Skills**	
	Practical	100
	Theory	100
3.	**Training Methodology**	
	TM Practical	320
	TM Theory	200
	Total	**1600**

2.3 PROGRESSION PATHWAYS

- Can join as an Instructor in vocational training Institute/ technical Institute.
- Can join as a supervisor in Industries.

2.4 ASSESSMENT & CERTIFICATION

The CITS trainee will be assessed for his/her Instructional skills, knowledge and attitude towards learning throughout the course span and also at the end of the training program.

a) The Continuous Assessment (Internal) during the period of training will be done by **Formative Assessment Method** to test competency of instructor with respect to assessment criteria set against each learning outcomes. The training institute has to maintain an individual trainee portfolio in line with assessment guidelines. The marks of internal assessment will be as per the formative assessment template provided on www.bharatskills.gov.in.

b) The **Final Assessment** will be in the form of **Summative Assessment Method**. The All India Trade Test for awarding National Craft Instructor Certificate will be conducted by DGT at the end of the year as per the guidelines of DGT. The learning outcome and assessment criteria will be the basis for setting question papers for final assessment**.** The external 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 CRITERIA

S No.	Subject		Marks	Internal Assessment	Full Marks	Pass Marks	
						Exam	Internal Assessment
1.	Trade Technology	Trade Theory	100	40	140	40	24
		Trade Practical	200	60	260	120	36
2.	Soft Skills	Practical	50	25	75	30	15
		Theory	50	25	75	20	15
3.	Training Methodology	TM Practical	200	30	230	120	18
		TM Theory	100	20	120	40	12
	Total Marks		**700**	**200**	**900**	**370**	**120**

The minimum pass percent for Trade Practical, TM Practical, Soft Skill Practical Examinations and Formative assessment is 60% & for all other subjects is 40%. There will be no Grace marks.

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. While assessing; the major factors to be considered are approaches to generate solutions to specific problems by involving standard/non-standard practices.

Due consideration should also 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 of the following:

- Demonstration of Instructional Skills (Lesson Plan, Demonstration Plan)
- Record book/daily diary
- Assessment Sheet
- Progress chart
- Video Recording
- Attendance and punctuality
- Viva-voce
- Practical work done/Models
- Assignments
- Project work

Evidences and records of internal (Formative) assessments are to be preserved until forthcoming 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 be well versed with instructional design, implement learning programme and assess learners which demonstrates attainment of an ***acceptable standard*** of crafts instructorship with ***occasional*** **guidance** and engage students by demonstrating good	• Demonstration of ***fairly good*** skill to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field. • Average engagement of students for learning and achievement of goals while undertaking the training on

attributes of a trainer.	specific topic. • A fairly good level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Occasional support in imparting effective training.
(b) Weightage in the range of 75%-90% to be allotted during assessment	
For performance in this grade, the candidate should be well versed with instructional design, implement learning programme and assess learners which demonstrates attainment of a ***reasonable standard*** of crafts instructorship with ***little*** **guidance** and engage students by demonstrating good attributes of a trainer.	• Demonstration of ***good*** skill to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field. • Above average engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A ***good*** level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Little support in imparting effective training.
(c) Weightage in the range of more than 90% to be allotted during assessment	
For performance in this grade, the candidate should be well versed with instructional design, implement learning programme and assess learners which demonstrates attainment of a ***high standard*** of crafts instructorship with ***minimal or no support*** and engage students by demonstrating good attributes of a trainer.	• Demonstration of ***high*** skill level to establish a rapport with audience, presentation in orderly manner and establish as an expert in the field. • Good engagement of students for learning and achievement of goals while undertaking the training on specific topic. • A ***high*** level of competency in expressing each concept in terms the student can relate, draw analogy and summarize the entire lesson. • Minimal or no support in imparting effective training.

3. GENERAL INFORMATION

Name of the Trade	**MILK & MILK PRODUCT TECHNICIAN(CITS)**
Trade code	DGT/4041
NCO – 2015	7513.0100, 7513.0200, 7513.0300, 7513.0400, 7513.0500, 7513.9900, 2356.0100
NSQF Level	Level-6
Duration of Craft Instructor Training	One Year
Unit Strength (No. Of Student)	25
Entry Qualification	Degree / Diploma (Minimum 2 Years) in Food Technology/ Food Engineering/Food processing/dairy technology from recognized University. OR National Trade Certificate in "Milk and Milk Product Technician" trade or relevant trade. OR National Apprenticeship Certificate in"Milk and Milk Product Technician" trade or relevant trade.
Minimum Age	18 years as on first day of academic session.
Space Norms	Lab Space -120 Sq. m Quality lab - 40 Sq. M
Power Norms	10 KW
Instructor's Qualification for	
1. Milk & Milk Product Technician (CITS) Trade	B.Voc/ Degree in Food Technology/Food Engineering/Food processing/ Dairy technology from AICTE/ UGC recognized University with two years experience in relevant field. OR Diploma (Minimum 2 Years) in Food Technology/Food Engineering/Food processing/ Dairy technology from recognized University /Board or relevant Advanced Diploma (Vocational) from DGT with five years experience in relevant field. OR NTC/NAC passed in "Milk and Milk Product Technician" trade with seven years experience in the relevant field. **<u>Essential Qualification:</u>** National Craft Instructor Certificate (NCIC) inMilk and Milk Product

	Technician trade in any of the variants under DGT.
2. Soft skills	MBA/ BBA / Any Graduate/ Diploma in any discipline from AICTE/ UGC recognized College/ university with Three years' experience and short term ToT Course in Soft Skills from DGT institutes. (Must have studied English/ Communication Skills and Basic Computer at 12th / Diploma level and above).
3. Training Methodology	B.Voc/ Degree in any discipline from AICTE/ UGC recognized College/ university with two years experience in training/ teaching field. OR Diploma in any discipline from recognized board / University with five years experience in training/teaching field. OR NTC/ NAC passed in any trade with seven years experience in training/ teaching field. Essential Qualification: National Craft Instructor Certificate (NCIC) in any of the variants under DGT / B.Ed /ToT from NITTTR or equivalent.
4. Minimum Age for Instructor	21 Years

Distribution of training on Hourly basis: (Indicative only)

Total Hrs. /week	**Trade Practical**	**Trade Theory**	**Soft Skills**		**Training Methodology**	
			Practical	**Theory**	**Practical**	**Theory**
40 Hours	16 Hours	6 Hours	2.5 Hours	2.5 Hours	8 Hours	5 Hours

4. JOB ROLE

Brief Description of Job Roles:

Dairy Worker, General; performs all or several tasks in reparation 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 figures 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.

Ice-Cream Maker; Ice-Cream Maker makes ice-cream by mixing milk, sugar and other ingredients and by freezing mixture in freezing machine. Measures and mixes ingredients according to recipe; pasteurises mixture to eliminate harmful bacteria; pumps ingredients through a homogeniser to break-down butter-fat globules; pours mixture into freezing machine; starts machine to stir and cool mixture; unloads machine when ice-cream of required consistency is obtained; cleans and sterilizes machines, and other equipment with hot water. May form ice-cream into special shapes. May operate ice-block washing machine

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.

Manual Training Teacher/Craft Instructor; instructs students in ITIs/ Vocational Training Institutes in respective trades as per defined job role. Imparts theoretical instructions for the use of tools & equipments of related trades and related subjects. Demonstrate process and operations related to the trade in the workshop; supervises, assesses and evaluates students in their practical work. Ensures availability & proper functioning of equipment and tools in stores.

Reference NCO 2015:

a) 7513-0100 – Dairy worker/ general
b) 7513-0200 - Separator man
c) 7513.0300 - Butter Maker
d) 7513.0400 - Cheese Maker
e) 7513.0500 - Ice-Cream Maker
f) 7513.9900 - Dairy Products Makers, Others
g) 2356.0100-Manual Training Teacher/Craft Instructor

5. LEARNING OUTCOMES

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

5.1 TRADE TECHNOLOGY

1. Demonstrate handling, operation, cleaning and sanitization of dairy equipments.
2. Monitor maintenance of international standards used in dairy plant, prepare standard solutions and test packaging material accordingly.
3. Test various milk quality parameters.
4. Plan & prepare different types of frozen dairy products and evaluate their quality attributes.
5. Demonstrate various production methods of different types of milks & check their standard parameters.
6. Demonstrate preparation of Cream, Ghee and Butter product and analyze their various quality parameters.
7. Plan & prepare different milk products and evaluate their quality.
8. Plan & prepare various dried milk products and evaluate their quality.

6. COURSE CONTENT

SYLLABUS FOR MILK AND MILK PRODUCT TECHNICIAN – CITS TRADE			
TRADE TECHNOLOGY			
Duration	**Reference Learning Outcome**	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
Practical 64 Hrs Theory 24 Hrs	Demonstrate handling, operation, cleaning and sanitization of dairy equipments.	1. Demonstrate handling and operating dairy equipment: • Single and two stage homogenizers. • 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. • Form fill seal machine. • Gerber centrifuge. • Can washer. 2. Demonstrate cleaning and sanitizing of dairy equipments. • Washing of equipments used in dairy industry. • Steam sterilization of cans. CIP of dairy equipments.	• Status of dairy industries in India. • Introduction of white revolution. • Importance of dairy industry. • Opportunities of employment in the dairy Industry. • Milk procurement and pricing pattern in India. • Working of milk processing equipments. • Care and maintenance of Milk processing equipments. • Corrective and preventive action for safe operation. **Cleaning and sanitizing of dairy equipments.** • Selection and use of dairy cleaners and sanitizers. • Cleaning in place system (CIP), • Various chemicals used for CIP of dairy plant. • Factors affecting washing operation.
Practical 80 Hrs Theory 30 Hrs	Monitor maintenance of international standards used in dairy plant, prepare	3. Apply food safety management system (FSMS) like GHP, GMP, HACCP, etc. in a Dairy plant.	• Study of Food safety Standards Act: 2006 BIS, Agmark, PFA, CAS & milk and milk product order 2006.

	standard solutions and test packaging material accordingly.	4. Demonstrate utilization of dairy industry wastes: Whey utilization; production of casein and lactose. 5. Plan, prepare and verify normality of standard solutions. 6. Plan & prepare standard solutions for acid base titration. 7. Test packaging materials.	• HACCP and its benefits and application, ISO 22000, GMP. • International food laws and regulatory agencies: • International Organizations - FAO (Food & Agriculture • Organization), WHO (World • Health Organization), Codex Alimentarius, ISO, WTO. National Organizations - • ICMR, ICAR, Council for social welfare, International Food Control Systems including CODEX • Importance of personal Hygiene, Cleaning & Sanitary standards of dairy industry. • Good Handling Processes (GHP). • Traceability aspects of processed product, Forward and backward traceability. • Packaging and function of packaging and packaging materials: Paper, Plastic, glass, metal, natural material. • Packaging requirements and selection of packaging material for dairy products. • Packaging material for milk and dairy product. • Study of various types of containers like Glass, merits and demerits, types of packaging materials for milk products. • Labelling type, Function and regulations of package

			labelling. • Understanding the label its importance, and labelling requirements. • Registration process for 'FOSTAC' from FSSAI recognized training certification agencies.
Practical 96 Hrs Theory 36 Hrs	Test various milk quality parameters.	8. Test milk quality: ➢ Demonstrate • Sampling of milk. • Platform tests of milk like organoleptic tests, clot on boiling test, alcohol test, pH, and % acidity test. • Estimation of fat by Gerber method. • Estimation of specific gravity of milk by lactometer. • Estimation of SNF & TS content in milk. • Detection of various adulterants and neutralizers in milk. • Evaluation of milk quality by MBRT and phosphatase test. • Determination of salt content in milk sample. • Determination of protein content in milk by formal titration. • Determination of viscosity of milk. • Detection of preservatives in milk. • Presumptive test for coliforms in milk.	• Definition of milk. • Composition and physico-chemical properties of milk. • Factor affecting composition of milk. • Collection of raw milk. • Handling, Transportation and reception of milk. • Grading of milk • Method of Sampling of raw milk. • Plat form test. • Quality of raw milk. • Principle and methods used for milk processing. • Microbiology of Milk and Milk Products. • Overview of spoilage in Milk and Milk Products.
Practical 80 Hrs	Plan & prepare	9. Plan & prepare different	• Principle of homogenization.

Theory 30 Hrs	different types of frozen dairy products and evaluate their quality attributes.	types of frozen dairy products. 10. Plan & prepare Softy and kulfi. **Quality evaluation of ice cream.** 11. Determine percentage overrun of ice-cream. 12. Analyze ice cream for fat, % acidity, total solids and foreign fat. 13. Detect metanil yellow in ice-cream 14. Evaluate quality attributes of softy.	• Working and application of homogenizer in dairy industry. • Factors effecting homogenization. • Efficiency of homogenization. • Ice cream: Definition and composition, Role of ingredients used, Principles and Technology of ice-cream manufacturing, grading and prevention of defects in ice creams. • Freezing method and equipment used.
Practical 80 Hrs Theory 30 Hrs	Demonstrate various production methods of different types of milks& check their standard parameters.	15. Demonstrate preparation of • Pasteurized milk • Standard milk • Toned milk • Double toned milk • Flavoured milk. • Fermented milk • Concentrated milk. • Condensed milk • Bulgarian milk • Acidophilus milk 16. Demonstrate Practically on Form fill seal machine. 17. Measure& check viscosity of dairy products, creams, gums etc with viscometer.	• Introduction of basic unit operations involved in the processing of Milk and Milk Products. • Principle of thermal processing of milk processing. • Pasteurization and Sterilizations of milk. • UHT Processing of milk. • Methods for production of different types of milks - pasteurized, standard, toned, double toned, flavoured milk. Ingredients of special milks, fermented milk, concentrated milk. • Standards of Milk and Milk Products. • Condensed milk: Composition, production, and defects. • Fermented milks: Production of bulgarian and acidophilus milk.

Practical 80 Hrs Theory 30 Hrs	Demonstrate preparation of Cream, Ghee and Butter product and analyze their various quality parameters.	18. Demonstrate Preparation of • Cream • Butter • Ghee 19. Analyze various quality parameters of cream, butter and ghee. 20. Identify various parts of cream separator. 21. Check ghee Adulterations. 22. Analyze the quality of butter and ghee sample.	• Cream: Composition, production and defects. Different types of creams and their production method. • Butter: Composition, method of production, grading and prevention of defects. Quality of butter. • Ghee: Compositions, Different methods of Ghee production quality of ghee and its defects.
Practical 96 Hrs Theory 36 Hrs	Plan & prepare different milk products and evaluate their quality.	23. Demonstrate preparation and quality evaluation of • Processed cheese • Paneer • Channa • Mawa • Dahi • Srikhand • Buttermilk • Milk cake	• Cheese: Composition, types of cheese, production of cottage and cheddar cheeses; defects. • Paneer: Composition, Production and defects. • Indian dairy products: Rabri, kulfi, srikhand, lassi, Mawa, Dahi , Butter milk, Channa
Practical 64 Hrs Theory 24 Hrs	Plan & prepare various dried milk products and evaluate their quality.	24. Demonstrate preparation and quality evaluations of spray dried milk.	• 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.

SYLLABUS FOR CORE SKILLS
1. Soft Skills (Common for all Non-Engineering CITS trades) (100 Hrs + 100 Hrs)
2. Training Methodology (Common for all CITS trades) (320 Hrs + 200 Hrs)

Learning outcomes, assessment criteria, syllabus and Tool List of above Core Skills subjects which is common for a group of trades, provided separately in www.bharatskills.gov.in

7. ASSESSMENT CRITERIA

LEARNING OUTCOMES	ASSESSMENT CRITERIA
TRADE TECHNOLOGY (TT)	
1. Demonstrate handling, operation, cleaning and sanitization of dairy equipments.	Demonstrate handling of single and two stage homogenizers.
	Demonstrate operating Pasteurizer.
	Handle Spray Drier and Drum Drier.
	Operate Evaporators (Different Type).
	Demonstrate handling of Cream Separator.
	Demonstrate operating Deep freezer.
	Handle softy making machine.
	Operate Ice cream freezer.
	Demonstrate handling of Cheese vat.
	Demonstrate operating Jacket kettle.
	Handle Butter churner.
	Demonstrate Boiler operation.
	Operate Form fill seal machine.
	Demonstrate handling of Gerber centrifuge.
	Show performance to maintain can washer.
	Demonstrate washing of equipments used in dairy industry.
	Demonstrate steam sterilization of canes.
	Demonstrate CIP of dairy equipments.
2. Monitor maintenance of international standards used in dairy plant, prepare standard solutions and test packaging material accordingly.	Apply HACCP and GMP in a Dairy plant.
	Demonstrate utilization of dairy industry wastes: Whey utilization; production of casein and lactose.
	Plan, prepare and verify normality of standard solutions.
	Plan & prepare standard solutions for acid base titration.
	Test & check packaging materials.
3. Test various milk quality parameters.	Demonstrate milk sampling.
	Conduct platform tests of milk like organoleptic tests, clot on boiling test, alcohol test, pH, and % acidity test.
	Estimate fat by Gerber method.
	Estimate specific gravity of milk by lactometer.
	Estimate SNF & TS content in milk.
	Detect various adulterants and neutralizers in milk.
	Evaluate milk quality by MBRT and phosphatase test.
	Determine salt content in milk sample.
	Determine protein content in milk by formal titration.
	Determine viscosity of milk.
	Detect preservatives in milk.

	Conduct presumptive test for coliforms in milk.
4. Plan & prepare different types of frozen dairy products and evaluate their quality attributes.	Plan & prepare different types of frozen dairy products.
	Plan & prepare Softy and kulfi.
	Determine percentage overrun of ice-cream.
	Analyze ice cream for fat, % acidity, total solids, foreign fat.
	Detect metanil yellow in ice-cream.
	Evaluate quality attributes of softy.
5. Demonstrate various production methods of different types of milks & check their standard parameters.	Demonstrate preparation of pasteurized milk.
	Show preparation of Standard milk, Toned milk and Double toned milk.
	Demonstrate preparation of Flavoured milk, Fermented milk, Concentrated milk and Condensed milk.
	Show preparation of Bulgarian milk &Acidophilus milk.
	Demonstrate practically on Form fill seal machine.
	Measure& check viscosity of dairy products, creams, gums etc with viscometer.
6. Demonstrate preparation of Cream, Ghee and Butter product and analyze their various quality parameters.	Plan and demonstrate Cream and Ghee preparation.
	Make plan for Butter preparation.
	Analyze various quality parameters of Cream, Ghee & Butter.
	Demonstrate the temperature effect on the rate of cream separation.
	Check ghee Adulterations.
	Analyze the quality of butter and ghee sample.
7. Plan & prepare different milk products and evaluate their quality.	Plan &Prepare processed Cheese, Paneer, Channa & Mawa.
	Evaluate quality of prepared processed Cheese, Paneer, Channa & Mawa.
	Plan & Prepare Dahi, Srikhand, Buttermilk &Milk cake.
	Evaluate quality of prepared Dahi, Srikhand, and Buttermilk& Milk cake.
8. Plan & prepare various dried milk products and evaluate their quality.	Plan & perform to prepare spray dried milk.
	Demonstrate production by drum drying and air spray system.
	Check quality of spray dried milk as per the parameters.
	Evaluate quality of spray dried milk.

8. INFRASTRUCTURE

LIST OF TOOLS AND EQUIPMENT FOR MILK & MILK PRODUCT TECHNICIAN - CITS TRADE			
for batch of 25 candidates			
S No.	**Name of the Tool & Equipment**	**Specification**	**Quantity**
A. General Shop Outfit			
1.	Baby Boiler coil type, Fuel light oil, force circulation	3 pass design Capacity of steam output upto 150kg/hr, fuel firing automatic, Electric supply AC,3 PH, 415 V,50HZ,4 Wire system, Qualified attended not required.	01 No.
2.	Steam jacket kettle	upto 25 litre double jacketed with indenting lever, steam inlet and outlet with steel trolley and accessories to be fitted with boiler.	01 No.
3.	Deep freezer: High performance freezers with lock, digital display and contact for remote monitoring. Flexible grid dividers can be configured to suit your individual requirement. Features: Digital display, visual alarm, low energy consumption, contact forremote alarm, pull-out defrost drain for easy defrosting, lock,castors and baskets.	Technical specifications: Gross Capacity: 130 Liters. Net Capacity: 130 Liters. Temperature Range: -10^{0}C to -45^{0}C. Ambient Temperature: 30^{0}C. Dimensions Exterior: 725W*655D*865H. Dimensions Interior: 520W*450D*650H. Power supply: 230Volt. Insulation: 100mm.	01 No.
4.	Water purifier with pre filter, activates charcoal / resin unit and UV exposure units. Complete with water supply tank and piping.		01 No.
5.	Hot Air Oven: • Should be double walled unit:- outer chamber should made up of M.S. Sheet duly painted & inner must be made up of S.S. Sheet. • Temperature should be controlled by Microprocessor Based PID Digital Temperature Indicator-cum- Controller from ambient to	Supply- 220/230 Volts A. C. Inner Size (W*D*H): 605*605*605 mm	01 No.

	390^{0}C with an accuracy of ±3^{0}C. • Air ventilators should also be provided on the sides & Air Circulation fan be a standard feature.		
6.	Refrigerator	Capacity: 310 Liter, dimensions Approx.580x 1680x 650 mm, door cooling system, humidity controller,deodorizer, door finish vinyl, vegetable tray. Sixth sense cooling system	01 No.
7.	Auto claves	20 lit cap	01 No.
8.	Crown corking machine hand/paddle operated one.		01 each
9.	pH Meter (Digital)		01 No.
10.	Improved stove made up of MS with proper safety measures, with gas cylinders		01 No.
11.	Heat Sealing Machine Hand/Pedal Operated		01 No.
12.	Liquid filling machine: For filling liquid in bottles,	200ml, 500ml, 1000ml. Manually operated	01 No.
13.	Vernier Caliper:	15cm 0.01 mm LC	01 No.
14.	Weighing balance (digital)	0.01gm (Min) ,5kg (Max),100kg (Max)	01 each
15.	Thermometer (Digital)		06 Nos.
16.	Water Tank with tap	4'x4'z3'	01 No.
17.	Stainless Steel Strainer/Sieve		06 Nos.
18.	Electronic Geyser	25 litre	01 No.
19.	Exhaust fan for lab		As per requirement
20.	Fire Extinguisher CO2,	25kg for Lab and near Boiler	As per requirement
21.	Pressure pump for the washing of machines	with 2 nozzle	01 No.
22.	Continuous water supply for lab		
23.	Computer /Laptop for Faculty with Internet Connection	CPU: 32/64 Bit i3/i5/i7 or latest processor, Speed: 3 GHz or Higher. RAM:-4 GB DDR-III or Higher, Wi-Fi Enabled. Network Card: Integrated Gigabit Ethernet, with USB Mouse, USB	01 No.

		Keyboard and Monitor (Min. 17 Inch. Licensed Operating System and Antivirus compatible with trade related software.	
24.	Printer and photo copy Scanner		01 No.
25.	LED multimedia Projector		01 No.
26.	UPS		As required
27.	AC 5 star rating		As per requirement
28.	Labelling machine		01 No.
29.	Gerber Centrifuge: 24 tests with reverse break, automatic timer 0-5 min.		01 No.
30.	Incubator with thermostat		01 No.
31.	Water Bath		01 No.
32.	Mini dairy plant: Complete Mini milk processing unit upto 50 litre /hrs capacity. Stainless steel grade 304.		01 No.
33.	Milk Chiller : For chilling milk up to a temperature of about -10 °C		01 No.
34.	Milk cans : Made of steel/ Aluminium, 40 -100 lit capacity		As required
35.	Cream Separator: Cream separator, hand driven table model upto60 liter capacity per hour with stainless steel bowl discs.		01 No.
36.	Cheese vat	Made of heavy Stainless steel (306), size approx. 4'X 2.5'X 1' with proper outlet and taps	01 No.
37.	Plate pasteurizer (Lab model)		01 No.
38.	Butter churner		01 No.
39.	Mawa machine		01 No.
40.	Crown corking machine		01 No.
41.	Form fill seal machine		01 No.
42.	Ice cream plant		01 No.
43.	Centrifuge : For Fat estimation in milk,		01 No.
44.	Desicator		01 No.
45.	Flash evaporator.		01 No.
46.	Can body reformer		01 No.

47.	Can Sealing Machine: Should be made of mild steel base, suitable of seaming cans of	Size201 - 700 dia and of 9- 3/8" height. Hand operated, seaming roller and adopter plate	01 No.
48.	Exhaust box: Straight line exhaust box, provided with motorized conveyor belt and mild steel steam piping, top is to be covered with aluminum cover and unit to be mounted on heavy mild steel stand, 10 feet long conveyorized belt, fitted with 1 H. P. motor		01 No.
49.	Cup sealer		01 No.
50.	Vacuum pan (Capacity	upto 50 litre evaporation/Driven by motor reduction gear box/inside vessel made up of thick stainless steel	
51.	plate/outer jacket is of S.S./with mail hole and sight glasses on 2		1 No.
52.	Sides/Stirrer are made of Teflon blades. Fitted with an outer at the		
53.	Bottomand a condensate receiving vessels.		
54.	Vernier caliper :	15 cm. 0.01 mm LC	2 No.
55.	Screw Gauge : Micrometer	0.001 mm LC,10 cm cap	4 Nos.
56.	Steel scale :	12 " standard steel	2 Nos.
57.	Steel Measuring tape :	Scales 1 meter, and of 50 ft	2 Nos.
58.	Digital Weighing Balance (Shimadzu, AND Japan, Citizen, Mattler Toledo or Equivalent make):	Capacity: 220 gm Readability: 0.1 mg or 0.0001 gm Weighing Pan: 80 mm or large, with wind draft shield. Auto Calibration should be provided with respect to temperature.	1 No.
59.	Digital Weighing	Balance Minimum 5kg	1 No.
60.	Cutting equipments : Different knives,		As required
61.	Sinks : standard size		01 No.
62.	Hot plate : Electrical	2 KW	01 No.

63.	Spray drier (Lab Scale)		01 No.
64.	Tanks SS	50 litres capacity, cylindrical with cap	01 No.
65.	Syrup tanks :	50, 100 lit capacity SS	01 No.
66.	Pressure cooker :	5 Kg and 10 Kg SS	01 No.
67.	SS filter : Sieve type cloth filter, hydraulic,		01 No.
68.	Bottle opener : Heavy duty, Stainless Steel		01 No.
69.	Working tables :	Stainless Steel Size 6' X 3„	01 No.
70.	Stainless steel / Aluminiumpots : Different Capacities		As required
71.	Plunger (S.S) of mixing of milk		02 Nos.
72.	Magnet stirrer		01 No.
73.	Weighing balance manual	10KG	01 No.
74.	Homogenizer: • Speed Adjustment of Motor with stepless control & digital display. • Out Put Energy: Not less than 300W. Noise Level :not more than 73 db	Speed: 3500 to 24000rpm with digital display. Sample volume: 10ml to 500ml. Kit Includes: Stand with 11 %"X7 5/8" base and 24" rod with two clamps for Homogenizer & beaker/ test tube holder. With rotor motor generator to use with volume 10-500ml.	01 No.
75.	Moisture meter		01 No.
76.	Softy making machine		01 No.
77.	Lab burner with cylinder		01 No.
78.	Can washer		01 No.
79.	Lactometer with Assembly: Zeal lactometer with lactometer jar.		01 No.
80.	Viscometer (For viscosity measurement of food products, dairy products, creams, gums etc.): Brookfield viscometer, Complete with appropriate spindles, DV loader program, viscometer stand, guard leg and carrying case. The model can be used with RheoCalc software.	Min. Viscosity range: 15 Cps Max. Viscosity range: 60 Lac Cps Speeds : 0.01-200 rpm Spindles: 4	01 No.
81.	Bursting strength machine		01 No.

82.	Tensile strength machine		01 No.
83.	Tearing strength machine		01 No.
84.	Drop tester machine		01 No.
B. CONSUMABLE TOOL & ITEMS			
85.	Beaker	50, 100, 250 ml, 500 ml	12 Nos.
86.	Conical flask	50, 100, 250 ml, 500 ml	12 Nos.
87.	Measuring cylinder	100ml,250ml, 200 ml, 500ml,	12 Nos.
88.	Measuring flask of assorted sizes		12 Nos.
89.	Burette of assorted sizes with Burette stands		12 Nos.
90.	Pipettes of assorted sizes		12 Nos.
91.	Thermometer	(10°c to 110°C) Digital	16Pcs
92.	Rubber Gloves		12 pair for each trainee
93.	Aprons		01 for each trainee
94.	Glass Funnels of assorted sizes		12 Nos.
95.	Funnels	500ml. & 100ml. Separating	12 Nos.
96.	Test Tube With Test tube stand		26Nos.
97.	Glass rod		10 Nos.
98.	Gas lighter		06 Nos.
99.	Ph meter Rod		02 Nos.
100.	a) Petri dish with cover		16 Nos.
101.	Glass slides		16pcs
102.	Refilling of gas cylinder for lab		As required
103.	Decaling agent for boiler coil		As required
104.	Fuel (Light oil) for boiler		As required
105.	Label for Labelling machine		As required
106.	Empty Glass Bottles	200ml,500ml,1000ml	As required
107.	Butyrometer		As required
108.	Tiltometer		As required
109.	Lactometer		As required
110.	Lab glassware's	Different sizes and types	As required
111.	Volumetric cylinder of assorted sizes		As required
112.	Packing material for packing of dairy products		As required
113.	Raw Milk		As required
114.	Adulteration kit		As required
115.	Plastic bottle for sampling		As required
116.	Muslin cloth		As required

C. FURNITURE			
117.	Instructor Chair & Table with Glass		01 No.
118.	Magnetic White Board		01 No.
119.	Display Board		01 No
120.	Table for computer/printer/scanner with chair		01 Set
121.	Dual Desk		13 Nos.
122.	Wooden Show Case For keeping & Display sample		05 Nos.
123.	Stools		25 Nos.
124.	Laboratory Table with rack	(8'*2'-6"-6") and sinks	04 Nos.
125.	Racks for keeping books (glass panel)etc		01 sets
126.	Trainee Locker with space for 20		01 No.
127.	Storage Rack for Chemicals		01 No.
128.	Cup Board (large)		04 Nos.
129.	First Aid Box		01 Nos.
130.	Almirah		02 Nos.
131.	Wooden Show Case For keeping & Display sample		02 Nos.
132.	White Board		01 No.

ANNEXURE - I

The DGT sincerely acknowledges contributions of the Industries, State Directorates, Trade Experts, Domain Experts and all others who contributed in revising the curriculum. Special acknowledgement is extended by DGT to the following expert members who had contributed immensely in this curriculum.

List of Expert Members contributed/ participated for finalizing the course curriculum of Milk and Milk Product Technician (CITS) trade			
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2.	S. A. Pandav RDD, Vadodara	DET Gujarat	Member/ Coordinator
3.	Nikunj Kumar R. Patel	Baroda, Dairy, Vadodara	Member
4.	Nirmal N. Patel	Baroda, Dairy, Vadodara	Member
5.	Birendra Kumar Manager (Production)	Vidya Dairy, Anand	Member
6.	Ajay M. Zala Dy. Manager (Dairy)	Vidya Dairy, Anand	Member
7.	M. G. Meghani OSD	KDCMPU Ltd., Anand	Member
8.	Mayank I. Patel Dy. Manager	KDCMPU Ltd., Anand	Member
9.	Hiren J. Purohit HR Officer	Laxmi Cukezone Pvt. Ltd., Anand	Member
10.	HarunSaiyad Store Incharge	Laxmi Cukezone Pvt. Ltd., Anand	Member
11.	R. S. Kate, Sales Head	R. K. Foods, Tarsali, Gujarat	Member
12.	Jitendra, Manager	Dungee Dum Ltd., Tarsali, Gujarat	Member
13.	Y. B. Joshi, Pricipal	ITI Khambat, Gujarat	Member
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