

Syllabus for the subject

of

MILK AND MILK PRODUCTS

Under

CRAFT INSTRUCTOR TRAINING SCHEME (CITS)

Designed in

- 2014 -

By

**Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training**

GENERAL INFORMATION

1. Name of the Course : Craft Instructor Training
2. Duration of Instructor Training : 1 Year (Two semesters each of six months duration including Vocational calculation and science (V.C.S) and P.O.T (Principle of Teaching).
3. Name of the Subject : Milk and Milk Products
4. Examination : AITT to be held at the end of each semester.
5. Space Norms :
Lab Space - **120 Sq. M**
Class Room Space - **30 Sq. M**
Quality lab- **40 Sq. M**
6. Power Norms : 10.00 Kw
7. Unit strength(Batch Size) : 20
8. Entry qualification : NTC / NAC from NCVT in Milk and Milk Products trade **OR** Diploma/Degree in Food Technology/ Food Engineering/Food processing/dairy technology from AICTE recognized Board / University.
9. Trainers' Qualification : Diploma or Degree in Food Technology/Food Engineering/Food processing/ Dairy technology from AICTE recognized Board / University with five / two years experience, respectively.

MILK and MILK PRODUCTS

SYLLABUS: FIRST SEMESTER

Week	Practical	Theory
1-5	<ul style="list-style-type: none"> • Handling and operating dairy equipments: • 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. • Cleaning and sanitizing of dairy equipments. • Washing of equipments used in dairy industry. • Steam sterilization of cans. • CIP of dairy equipments 	<ul style="list-style-type: none"> • 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. <p>Factors affecting washing operation.</p>
6-11	<ul style="list-style-type: none"> • Application of HACCP and GMP in a Dairy plant. • Utilization of dairy industry wastes: Whey utilization; production of casein and lactose. • Preparation and verification of normality of standard solutions. • Preparation of standard solutions for acid base titration. • Testing of packaging materials. 	<ul style="list-style-type: none"> • Study of Food safety Standards Act: 2006 BIS, Agmark, PFA, CAS & milk and milk product order 2006. • 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.

		<p>Packaging and function of packaging and packaging materials: Paper, Plastic, glass, metal, natural material.</p> <ul style="list-style-type: none"> • 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. <p>Understanding the label its importance, and labelling requirements.</p>
12-19	<p>Testing of milk quality.</p> <ul style="list-style-type: none"> • 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. • To perform presumptive test for coliforms in milk. 	<ul style="list-style-type: none"> • 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.
20-24	<ul style="list-style-type: none"> • To prepare different types of frozen dairy products. • Preparation of Softy and kulfi. <p>Quality evaluation of ice cream.</p> <ul style="list-style-type: none"> • To determine percentage overrun of ice-cream. • Analysis of ice cream for fat, % acidity, total solids, foreign fat. • Detection of metanil yellow in ice-cream • To evaluate quality attributes of 	<ul style="list-style-type: none"> • Principle of homogenization. • Working and application of homogenizer in dairy industry. • Factors effecting homogenization. • Efficiency of homogenization. • Ice cream: Definition and composition, Role of

	softy.	ingredients used, Principles and Technology of ice-cream manufacturing, grading and prevention of defects in ice creams. <ul style="list-style-type: none"> • Freezing method and equipment used. • Kulfi, Softy.
25-26	Revision/Examination	

MILK and MILK PRODUCTS

SYLLABUS: SECOND SEMESTER

Week	Practical	Theory
1-6	<p>Preparation of</p> <ul style="list-style-type: none"> • Pasteurized milk • Standard milk • Toned milk • Double toned milk • Flavoured milk. • Fermented milk • Concentrated milk. • Condensed milk • Bulgarian milk • Acidophilus milk <p>Practical Demonstration on Form fill seal machine. Measurement of viscosity of dairy products, creams, gums etc with viscometer.</p>	<ul style="list-style-type: none"> • 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. <p>Fermented milks: Production of bulgarian and acidophilus milk.</p>
7-11	<p>Preparation of</p> <ul style="list-style-type: none"> • Cream • Butter • Ghee <p>Analysis of various quality parameters of cream, butter and ghee. To study the various parts of cream separator. Ghee Adulterations. To analyze the quality of butter and ghee sample.</p>	<ul style="list-style-type: none"> • 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.
12-19	<p>Preparation and quality evaluation of</p> <ul style="list-style-type: none"> • Processed cheese • Paneer • Channa • Mawa • Dahi • Srikhand • Buttermilk • Milk cake 	<ul style="list-style-type: none"> • Cheese: Composition, types of cheese, production of cottage and cheddar cheeses; defects. • Paneer: Composition, Production and defects. <p>Indian dairy products: Rabri, kulfi, srikhand, lassi, Mawa, Dahi , Butter milk, Channa</p>
20-24	<p>Preparation and quality evaluations of spray dried milk.</p>	<ul style="list-style-type: none"> • 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.
25-26	Revision/Examination	

List of Tools and equipments		
Sl. No	Name of Item	Quantity
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 for remote 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: <ul style="list-style-type: none"> • 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 390⁰C with an accuracy of $\pm 3^0$C. • Air ventilators should also be provided on the sides & Air Circulation fan be a standard feature. • Supply- 220/230 Volts A. C. Inner Size (W*D*H): 605*605*605 mm	01 no
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	01 no

	system	
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 Calliper: 15cm 0.01 mm LC	01 no
14.	Weighing balance (digital) 0.01gm (Min) ,5kg (Max),100kg (Max)	01 each
15.	Thermometer (Digital)	06 no
16.	Water Tank with tap 4'x4'z3'	01 no
17.	Stainless Steel Strainer/Sieve	06 no
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 with, colour Printer and photo copy Scanner	01 no
24.	LED multimedia Projector	01 no
25.	UPS 650 VA	02 no
26.	AC 5 star rating	As per requirement
27.	Labelling machine	01 no
28.	Gerber Centrifuge: 24 tests with reverse break, automatic timer 0-5 min.	01 no
29.	Incubator with thermostat	01 no
30.	Water Bath	01 no
31.	Mini dairy plant: Complete Mini milk processing unit upto 50 litre /hrs capacity. Stainless steel grade 304.	01 no
32.	Milk Chiller : For chilling milk up to a temperature of about -10 °C	01 no
33.	Milk cans : Made of steel/ Aluminium, 40 –100 lit capacity	As required
34.	Cream Separator: Cream separator, hand driven table model upto 60 liter capacity per hour with stainless steel bowl discs.	01 no
35.	Cheese vat : Made of heavy Stainless steel (306), size approx. 4'X 2.5'X 1' with proper outlet and taps	01 no
36.	Plate pasteurizer (Lab model)	01 no
37.	Butter churner	01 no
38.	Mawa machine	01 no
39.	Crown corking machine	01 no
40.	Form fill seal machine	01 no
41.	Ice cream plant	01 no
42.	Centrifuge : For Fat estimation in milk,	01 no
43.	Desicator	01 no
44.	Flash evaporator.	01 no
45.	Can body reformer	01 no
46.	Can Sealing Machine:	01 no

	Should be made of mild steel base, suitable of seaming cans of size 201 – 700 dia and of 9- 3/8” height. Hand operated, seaming roller and adopter plate.	
47.	Exhaust box: Straight line exhaust box, provided with motorized conveyer 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
48.	Cup sealer	01 no
49.	Vacuum pan (Capacity upto 50 litre evaporation/Driven by motor reduction gear box/inside vessel made up of thick stainless steel plate/outer jacket is of S.S./with mail hole and sight glasses on 2 sides/Stirrer are made of Teflon blades. Fitted with an outer at the bottom and a condensate receiving vessels.	1 no
50.	Vernier caliper : 15 cm. 0.01 mm LC	2 no
51.	Screw Gauge : Micrometer, 0.001 mm LC,10 cm cap	4 no
52.	Steel scale : 12 “ standard steel	2 no
53.	Steel Measuring tape : Scales 1 meter, and of 50 ft	2 no
54.	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
55.	Digital Weighing Balance Minimum 5kg	1 no
56.	Cutting equipments : Different knives,	As required
57.	Sinks : standard size	01 no
58.	Hot plate : Electrical 2 KW	01 no
59.	Spray drier (Lab Scale)	01 no
60.	Tanks SS : 50 litres capacity, cylindrical with cap	01 no
61.	Syrup tanks : 50, 100 lit capacity SS	01 no
62.	Pressure cooker : 5 Kg and 10 Kg SS	01 no
63.	SS filter : Sieve type cloth filter, hydraulic,	01 no
64.	Bottle opener : Heavy duty, Stainless Steel	01 no
65.	Working tables : Stainless Steel Size 6’ X 3’	01 no
66.	Stainless steel / Aluminium pots : Different Capacities	As required
67.	Plunger (S.S) of mixing of milk	02 no
68.	Magnet stirrer	01 no
69.	Weighing balance manual 10KG	01 no
70.	Homogenizer: Speed: 3500 to 24000rpm with digital display. Sample volume: 10ml to 500ml. Kit Includes: Stand with 11 ½”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. • Speed Adjustment of Motor with stepless control & digital display. • Out Put Energy: Not less than 300W. Noise Level : not more than 73 db	01 no
71.	Moisture meter	01 no
72.	Softy making machine	01 no

73.	Lab burner with cylinder	02 no
74.	Can washer	01 no
75.	Lactometer with Assembly: Zeal lactometer with lactometer jar.	01 no
76.	Viscometer (For viscosity measurement of food products, dairy products, creams, gums etc.): Brookfield viscometer, Min. Viscosity range: 15 Cps Max. Viscosity range: 60 Lac Cps Speeds : 0.01-200 rpm Spindles: 4 Complete with appropriate spindles, DV loader program, viscometer stand, guard leg and carrying case. The model can be used with RheoCalc software.	01 no
77.	Bursting strength machine,	01 no
78.	Tensile strength machine,	01 no
79.	Tearing strength machine	01 no
80.	Drop tester machine.	01 no

Consumables Tools & Items		
Sl. No	Name of Item	Quantity
1.	Beaker 50, 100, 250 ml, 500 ml	12 no
2.	Conical flask 50, 100, 250 ml, 500 ml	12 no
3.	Measuring cylinder 100ml,250ml, 200 ml, 500ml,	12 no
4.	Measuring flask of assorted sizes	12 no
5.	Burette of assorted sizes with Burette stands	12 no
6.	Pipettes of assorted sizes	12 no
7.	Thermometer (10°C to 110°C) Digital	16Pcs
8.	Rubber Gloves	12 pair for each trainee
9.	Aprons	01 for each trainee
10.	Glass Funnels of assorted sizes	12 no
11.	Funnels 500ml. & 100ml. Separating	12 no
12.	Test Tube With Test tube stand	25 no
13.	Glass rod	10 no
14.	Gas lighter	06 no
15.	Ph meter Rod	02 no
16.	Petri dish with cover	16 no
17.	Glass slides	16pcs
18.	Refilling of gas cylinder for lab	As per required
19.	Decaling agent for boiler coil	As per required
20.	Fuel (Light oil) for boiler	As per required
21.	Label for Labelling machine	As per required
22.	Empty Glass Bottles 200ml,500ml,1000ml	As per required
23.	Butyrometer	As per required
24.	Tiltometer	As per required
25.	Lactometer	02 no
26.	Lab glassware's : Different sizes and types	As per required
27.	Volumetric cylinder of assorted sizes	As per required
28.	Packing material for packing of dairy products	As per required

29.	Raw Milk	As per required
30.	Adulteration kit	As per required
31.	Plastic bottle for sampling	As per required
32.	Muslin cloth	As per required

Consumables items & chemicals		
Sl. No	Name of Item	Quantity
1.	Photo Copy Paper A4	As per required
2.	Scale	As per required
3.	Correcting Fluid pen	As per required
4.	Dusting Cloth	As per required
5.	Pen	As per required
6.	Temporary marker	As per required
7.	Stapler (Small & Big)	As per required
8.	Puncher	As per required
9.	Fevi stick	As per required
10.	Stapler Pin	As per required
11.	Ruled Register	As per required
12.	File Folder	As per required
13.	Vim Liquid	As per required
14.	Dettol Hand wash	As per required
15.	Scotch Bright	As per required
16.	Colin	As per required
17.	Aluminium Foils	As per required
18.	Duster	As per required
19.	Juna	As per required
20.	Chemicals required for tests mentioned in the syllabus	As per required
21.	Chemicals for CIP of machines	As per required
22.	Chemicals for cleaning and sanitization	As per required

Furniture		
Sl. No	Name of Item	Quantity
Sl. No.	Class Room	Qty. for 20 trainees
1.	Instructor Chair & Table with Glass	01 no
2.	Magnetic White Board	01 no
3.	Display Board	01 no
4.	Table for computer/printer/scanner with chair	01 Set
5.	Dual Desk	10 no
Sl. No.	Workshop/Lab	Qty. for 20 trainees
1.	Working table with 6-3x21/2 Aluminium tops	05 no
2.	Stools	20 no
3.	Laboratory Table with rack (8*2'-6"-6") and sinks	04 no
4.	Racks for keeping books (glass panel)etc	01 sets
5.	Trainee Locker with space for 20	01 no
6.	Storage Rack for Chemicals	01 no
7.	Cup Board (large)	04 no
8.	First Aid Box	01 no
9.	Goodrej Almirha	02 no

10.	Wooden Show Case For keeping & Display sample	02 no
11.	White Board	01 no

- Remaining Raw material, Testing chemicals & equipments and consumables are not included in the list.
- All machines with Annual AMC.
- Proper facility for removal of waste water used for cleaning of machines from lab.
- Proper pest control facility in lab.