

# DAIRY TECHNOLOGY

Full Marks: 100

1. **General Aspects of milk:** General introduction , History of Dairy Industry in Nepal, Definition of milk, Proximate Composition of milk, Major and Minor Constituents, Differences between milk produced from different herds. Biosynthesis and Secretion of milk. Factors affecting the Composition of MILK. 5

2. **Physio -chemical aspects of Milk:** Physio Chemical properties of milk: Color, flavor, Specific Gravity, Specific Heat capacity, Freezing point , Boiling point, Acidity (Natural & developed) & pH, Surface tension, Viscosity, Redox - potential, Action of Milk on metals

**Milk Components:** Water: Free, Bound and Crystallized water, Carbohydrates: Chemical properties of lactose, physiochemical aspects of lactose Lactic acid fermentation, Lipids: Composition, Some properties Auto oxidation, Crystallization, proteins Chemistry of proteins, Serum proteins, Casein & its precipitation,

**Enzymes:** Enzyme activity, some milk enzymes, inactivation, Salts: Composition and distribution among the phase properties of salt solution, Colloidal Calcium Phosphate, Changes in salt. Other Components: Natural components, contaminants, Radio nuclides, Flavor Components. Pigments: Carotenoids, Riboflavin etc. Colloidal particles of Milk: Fat globules: Properties Emulsion Stability, Interaction with air bubbles, Creaming, Lipolysis, and **Casein Miscells:** Description Changes, Colloidal Stability. Physical Properties, Optical Properties, Viscosity, Whey Proteins: Definition Composition, Manufacture of Whey Milk powder 26

3. **Milk Microbiology:** General Aspects, Milk as a substrate for bacteria Undesirable Micro organisms: Spoilage microorganisms, Pathogenic Microorganisms sources of Contamination (microorganisms present in the udder, contamination during and after milking, Hygienic Measures: Protection of the consumer against pathogenic microorganisms Measures against spoilage microorganisms 10

4. **Milk processing :** General Aspects: i) Introduction ii) Quality Assurance: Concepts, HACCP , Quality Assurance of raw milk, Milk storage & Transport i) Milk collection and reception ii) Milk Storage iii) Transport of milk in the dairy, Filtration & Clarification: Cloth and wire filters, Centrifugal Clarifier, Membrane Filtration, Processes, Standardizing. Heat Treatment: Changes caused by heating, Heating Intensity. Inactivation of enzymes, Method of heating, Centrifugation, Bacyofugation Homogenization: Objectives, Operation of the Homogenizer, Two stage Homogenizer, Factor affecting the fat globule size surface layers, Stability, Homogenization Clusters, Other effects of Homogenization, Creaming 16

5. **Milk of liquid Consumption:** i) Pasteurized milk: Manufacture, Shelf life, use of Micro filtration ii) Sterilized Milk: Description, Methods of manufacture Shelf life iii) Flavor iv) Nutritive value 5

6. **Cream products:** i) Sterilized cream: Manufacture, Heat stability, Stability in coffee, Clustering ii) Whipping Cream: Desirable properties, Manufacture, the whipping process 4

7. **Ice-cream:** Manufacture, Physical structure: Formation & stability, Role of various components in ice-cream, Over- run , Common defects and their removal 6

8. **Concentrated Milks:** i) Evaporated Milk: Description , Manufacture, Organoleptic Properties, Heat stability, Creaming, Age Thickening & Gelation, ii) Sweetened condensed milk, Description , Manufacture , Microbial Spoilage, Chemical Deterioration, Lactose crystals  
6
9. **Milk powder:** Objectives, Manufacture, Hygienic aspects ( Bacteria in the original milk, Growth during manufacture, sampling & Checking) ,physical properties, Ease of Dispersing, Instant milk power: Influence of process variables on product properties: Flavor, WPN index, insolubility, Specific Volume, Free Flowing ness, Free fat Content, Dispensability, Stability, Deterioration, Other types of Milk Powder, Reconstituted products. 6
10. **Butter:** i) Description & manufacture: Description of types, Manufacturing Scheme, The Churning Process, Working ii) Structure & properties: Microstructure Consistency, cold Storage defects iii) High fat products: Anhydrous milk fat, Recombined Butter, Butter products with a low fat content 6
11. **Ghee:** Description and manufacture, comparison of different methods, defects & removal .
12. **Fermented Milks:** a) General Aspects: Preservation, nutritive value b) Various Types: Types of fermentation, fat content, Concentration of the milk, withdrawal of whey, Milk of various animal species.
13. **Yogurt:** The yogurt bacteria, Manufacture of set and stirred yogurt, Physical properties, flavor defects & shelf life. 6
14. **Cheese:** Basic principles of cheese making, classification of cheese, chemical composition of different varieties of cheese, Varieties found in Nepal, manufacturing process of hard and soft varieties of cheese, Cheese milk , additives to cheese milk, curd treatment , moulding salting, cheese ripening , cleaning and packaging, grading of cheese, Cheese faults and their removal, Processed and spread cheese 12
15. **Dairy plant sanitation & Hygiene:** Sanitation of Dairy plants and milk handling equipments, importance of cleaning and sanitation, cleaning sanitizing and care of can/bottle washers, conveyors & bottle fillers CIP attached to the dairy plants, Centralized & Decentralized CIP systems used in dairy Industry, Common washing detergents and sanitizers, cleaning and sanitizing procedure.
16. **Organization in Dairy:** i) Organizational chart of small medium and large scale dairy industry ii) Costing & cost control in dairy. 4

## **PRACTICALS:**

1. Study the milk processing equipments in nearby milk and cheese industries.
2. Study the milk sampling techniques
3. Platform Testing of milk Physical Tests: Sediment Organoleptic, Lactometer, Clot on -boiling (COB) Alcohol Test, Specific Gravity, Freezing point, SNF/TS Chemical Tests: Acidity, water, Fat, Protein, Lactose
4. Cream separation and estimate the efficiency of cream separator.
5. Preparation of ice-cream and evaluation of it's quality.

6. Preparation of butter by sweet and ripened cream
7. Preparation of ghee.
8. Preparation of Yoghurt
9. Preparation of sweets such as Kalakand, Rasbari etc
10. Preparation of condensed Milk, Cheese.
11. MBRT, DMC. & SPC test of milk and milk products.

### **TEXT BOOKS:**

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