

**TAMIL NADU PUBLIC SERVICE COMMISSION**

**SYLLABUS**

**Dairy Science**

**(UG Degree Standard)**

**CODE: 457**

**UNIT I:**

**Dairy Husbandry- I**

Breeds of Dairy cattle. Indigenous, Exotic and Cross bred Cattle breeds. Lactogenesis and Galactopoiesis. Let down of milk. Milking procedure and practices for clean milk production: Methods of milking. Economic traits of Dairy cattle. Systems of Dairy cattle breeding. Breeding systems suitable to enhance milk production in India.

**UNIT II:**

**Dairy Husbandry- II**

Diseases of Dairy cattle – bacterial, viral, parasitic, nutritional and metabolic deficiency diseases and their control. Significance of mastitis and other diseases of economic importance. Management of milch animals, pregnant animals, dry animals, heifers and calves.

**UNIT III:**

**Dairy Cattle Nutrition**

Digestive system and role of nutrients in dairy cattle. Classification of Feeds and Fodder. Importance of proteins, fats and carbohydrates in livestock feeding. Types of Fodder varieties- Legumes and non-legumes, Seasonal and Perennial fodder crops. Feeding Standards; Colostrum feeding, balanced rations for dairy cattle, silage and hay making, General feeding practices with regard to management. Utilization of agricultural and industrial by-products for livestock feeding.

**UNIT IV:**

**Dairy Development and Cooperative Societies**

Advantages of Dairying. Principles involved in successful dairying. Systems of dairy farming- Mixed farming and specialized dairy farming.

Methods of procurement of milk; Transportation of milk; Pricing of milk and marketing of milk. Cooperative Dairying – AMUL pattern-Structure of Dairy cooperatives; Primary milk producers Cooperative Society; District milk producers Cooperative Union; Objectives and functions. Dairy development programs implemented in India. Operation Flood program. Economics of maintaining Dairy Farm – Income and expenditure. Estimating the production cost of milk.

## **UNIT V:**

### **Basics of dairy chemistry**

(a) Composition of milk: Definition of milk, Composition of cow milk, buffalo milk, sheep milk, goat milk and human milk. Differences between the composition of cow and buffalo milks. Constituents of milk: Minor and major constituents. (b) Colostrum: Significance, Composition, difference between normal milk and colostrum. Factors affecting composition and yield of milk. Physico-chemical properties of milk – Colour, Flavour, Density, Specific gravity, Freezing point, Boiling point, Surface tension, Viscosity, Specific heat, Refractive index, Electrical conductivity, Germicidal property, pH and acidity. (a) Chemistry of major constituents of milk (b) Nutritive value of milk (c) Platform tests; Tests for detection of adulteration of milk; Preservatives and Neutralizers. (d) FSSAI specifications for milk.

## **UNIT VI:**

### **Technology of Dairy Products-1**

Procurement and reception of milk: Unloading, Grading, Sampling, Testing, Weighing and Recording. Storage of milk. Straining, filtration and clarification of milk. Definition and objectives of Pasteurization of milk, Objections to Pasteurization and Principles of heat exchange. Methods of Pasteurization: LTLT, HTST, Uperization and UHT milk. Sterilization of milk. Factors influencing homogenization and effect of homogenization on milk. Standardization of milk. Packaging of milk: Desirable characters and types of packaging materials; Forms of packaging. Disposal of dairy effluents: Sources of dairy waste.

Necessity of treatment of dairy waste; Methods of treatment: Low cost methods and Conventional methods - Activated sludge process and trickling filters. Market milk: Toned milk, Double toned milk, Reconstituted milk, Standardized milk and Full cream milk – Standards

and methods of manufacture. Cream: Types of cream, composition, methods of cream separation, gravity and centrifugal methods, types of cream separators; factors affecting fat losses in skim milk and fat percentage in cream.

## **UNIT VII:**

### **Technology of Dairy Products – II**

Butter: Classification, Composition, Method of manufacture of butter by Creamery butter method, Overrun in butter, Ghee, Butter oil: Composition, uses and method of manufacture. Cheese: Composition, Classification, method of manufacture of Cheddar cheese and Cottage cheese. Ice cream: BIS Standards, Composition, Classification, Method of manufacture and Overrun in ice cream. Fermented milk products. Condensed and Evaporated milks: Types of condensed milks, Standards, Composition and method of manufacture. Milk powder: BIS Standards, Types of drying systems, Manufacture of Roller dried and Spray dried milk powder. Indigenous Milk products, FSSAI specifications for milk products.

## **UNIT VIII:**

### **Basics of Dairy Microbiology**

Types of Microorganisms (Bacteria, Yeast, Mould) present in milk: acid producing, gas producing, protein splitting, fat splitting, pathogenic and inert organisms. Types of microorganisms based on temperature requirement: Psychrophilic, mesophilic, thermophilic and thermoduric microorganisms. Chemical changes observed during storage of milk and abnormal fermentations observed in milk: Souring, gassy fermentation, proteolysis, lipolysis, ropiness and flavour fermentations. Sources of contamination of milk and their control. Methods of clean milk production. Microbiological examination of milk: Direct microscopic count, Standard plate count, Methylene blue reduction test, Resazurin reduction test and Coliform test. Advanced methods in milk analysis. Cleaning and sanitization of dairy equipment: Desirable properties of detergents and sanitizers; commonly used detergents and sanitizers; Methods of cleaning and sanitization: (i) Hand washing (ii) Mechanical washing (iii) Cleaning in place. Antibiotic, Pesticide residues in milk.

## **UNIT IX:**

### **Market milk and special milks**

Market milk definition, Collection, transportation Storage and preservation of raw milk. Definition, Methods of manufacture and uses of Processed Special Milk: a. Sterilized milk b. Homogenized milk. Methods of manufacture and uses of Value Added Special Milk:a. Flavoured milk b. Vitaminized milk/Irradiated milk/Fortified milk 3. Introduction, Definition, Methods of manufacture and uses of Fermented Special Milk: a. Cultured Butter milk b. Acidophilus milk. Introduction, Definition, Methods of manufacture and uses of Standardized Special Milk, Methods of manufacture and uses of Special Milks. Functional and probiotic milk. Utilization of whey for WPC in dairy industry. Role of whey protein in sports nutrition. Dairy Whiteners- casein hydrolysates.

## **UNIT X:**

### **Milk hygiene and public health**

Milk borne diseases, prevention and control measures. Importance and need of quality control of milk. Quality assurance in dairy industry. GMP, GHP, HACCP, ISO certification and FSMS. Contaminants and pollutants. CAC, Sanitary and phytosanitary (SPS) measures for dairy industry.