

## **SYLLABUS – DAIRYING (Diploma level)**

**Code No.178**

### **I. GENERAL:**

Dairy development in India – Dairy Cooperatives – NDRI, NDDDB, TCMPF - Operation Flood – Milk and Milk Products Order '92 – Nutritive value of milk ICMR recommendation of nutrients – Milk production in India and TamilNadu with reference to Global milk production – Per capita availability of milk in India and Tamil Nadu – Role of milk and milk products in human nutrition.

### **II. DAIRY HUSBANDRY:**

Dairy Cattle Breeds – Indigenous and exotic – Dairy Cattle – Anatomy – Nutrition – Physiology – Genetics and Breeding – AI Techniques – Frozen Semen technology – Dairy cattle management- Health and Hygiene- Vaccination schedule- Physiology of Mammary gland and Milk synthesis.

### **III. DAIRY CHEMISTRY:**

Milk Composition – Physico Chemical properties of milk – Animal, Feed and Environmental factors influencing the composition of milk – Milk lipids, Proteins, Sugar and their biosynthesis, classes and significance – Minerals and Vitamins in Milk – Thermal stability of Milk – Freezing Point depression of Milk.

### **IV. DAIRY MICROBIOLOGY:**

Milk and microbes – Common micro organisms in milk – spoilage of milk – Fermentation of milk - Desirable and undesirable fermentation – milk borne Diseases –clean milk production – Milk and Public Health – common starter cultures in dairy industry-their classification, characteristics and propagation.

### **V. DAIRY PROCESSING AND TECHNOLOGY:**

Dairy processing – Milk collection, transportation & Grading of milk – Standardization – Pasteurization – Homogenisation of milk - packaging of milk – cleaning and sanitation – Cleaning in Place (CIP)System of cleaning- Cleaning agents- Dairy technology – Manufacture of Fat rich dairy products- cream – butter – ghee – Ice cream – concentrated and dried milk products-

cheese and other fermented products – manufacture of Dahi – Yoghurt – Shrikand – Indigenous milk products – Effective utilization of dairy by - products.

**VI. DAIRY ENGINEERING:**

Pasteuriser, Homogeniser, Freezer, Evaporator – their Principles and designs - Boiler - Installation, operation and design - Boiler efficiency- Cream separators - Principle of Heat Exchange - Energy consumption in different milk processing operations – Refrigeration requirements in different dairy processing operations – Time/Temperature schedule for CIP of Tanker & Pipelines and Pasteurizers - Energy Conservation measures.

**VII. DAIRY PLANT MANAGEMENT AND TECHNOLOGY:**

Food safety and Quality assurance strategies – Implementation of HACCP/ ISO and certification – Packaging of Market Milk and Milk products – Advancements in Liquid Milk and Milk Products Packaging.

**VIII. QUALITY ANALYSIS OF MILK:**

Sensory analysis of Milk – Determination of Specific gravity, fat, SNF, TS, Acidity & pH in milk and their significance and interpretation – Determination and significance of MBR Test – SPC – Phosphatase activity in milk – Common adulterants in milk and their detection techniques – Advanced analytical techniques in milk and milk products.

**IX. STATUTORY SAMPLING OF MILK AND MILK PRODUCTS:**

Sampling – Sampling Personnel – Sealing & Labeling of samples – Preparation of a sampling report – Sampling equipment – sample containers – Sampling techniques – Preservation of samples – Storage and transport of samples – minimum sample size – Sampling for microbiological examination.

**X. STANDARDS FOR MILK AND MILK PRODUCTS:**

Definition of Milk and Milk Products under the PFA Rules, 1955/Food Safety Act 2006 – Classes of Milk – Legal / Statutory standards of milk and milk products – bacteriological standards for milk and milk products – BIS,

PFA standards – Maximum Permissible limits of Aflatoxin, Pesticides, Antibiotic residues and Heavy metals in Milk and Milk Products – Storage of Milk and Milk Products – Labeling of Milk and Milk Products.

**Reference Books:**

1. Dairy Science: Petersen (W.E.) Publisher – Lippincott & Company
2. Outlines of Dairy Technology – Sukumar (De) – Oxford University press
3. Indian Dairy Products – Rangappa (K.S.) & Acharya (KT) – Asia Publishing House.
4. The technology of milk Processing – Ananthkrishnan, C.P., Khan, A.Q. and Padmanabhan, P.N. – Shri Lakshmi Publications.
5. Dairy India 2007, Sixth edition
6. Economics of Milk Production – Bharati Pratima Acharya Publishers.