

Dairy Engineering Paper-I

Importance and scope of milk and Dairy in India. Present scenario, limitations and future possibilities of dairy industries. Scheme and programmes of Dairy Development running in Uttar Pradesh and National Level. Limitations and ways of enhancing dairy marketing.

History, Status and processing technologies of market milk. Indian Dairy Product – Khoa, Chhana, Rabri, Paneer, Basundi, Shrikhand, Dahi and Kheer. Fat rich dairy product – Cream, Butter, Ghee and Butter oil. Condensed and Dried milk products – Condensed Milk, Sweetened Condensed Milk, Evaporated milk, Separated milk powder, Whole milk powder, Cheese spread powder, Ice-cream powder and Whey powder. Frozen dessert – Ice-cream and kulfi. Fermented milk products – Yoghurt, Keffir, Koumiss, Acidophilus and bifido milk. By products - Whey, Butter milk, Ghee residue, Casein and Lactose etc.

Packaging of milk and milk product – History, Importance, Need. Characteristic of packaging material and modern packaging techniques.

Dairy microbiology – Introduction and scope of bacteriology, principle of classification and taxonomy of micro-organisms. Nutritional group of bacteria. Phase, factors affecting growth of Bacteria. Microbiology of fluid milk, microflora present in raw milk, Clean milk production, mastitic milk. Pathogen in raw milk and their control. Bacteriological aspects of boiling, pasteurization, sterilization, UHT and bactofugation of milk. Heat resistant organism in milk and their role in spoilage. Microbiology of different milk products and starter culture.

Dairy Chemistry – Definition and structure of milk. Constituents and gross composition of milk, factors affecting composition of milk, preservatives, neutralizers and adulterants and their detection. Chemistry of various milk product.

✓

## Dairy Engineering Paper-II

Materials and sanitary features of the dairy equipments. Sanitary pipes and fittings, care and maintenance of pipes and fittings. Working and maintenance of can washers and bottle washers. CIP cleaning and deigning of systems. Mechanical separation principles involved in separation and filtration. Principles of centrifugal separation. Different types of centrifuge, clarifiers, cream separator, self dislodging. Care and maintenance of separators, clarifiers, centrifuge, bactofuge, sterilizers. Classification, care and maintenance of homogenizer, pasteurizer UHT. Aseptic packaging. Filling operation. Different types of stirrers, paddles and agitators. Selection of mixing equipments in dairy industry.

Dairy process engineering – basic principles, constructions, operations, types, care and maintenance of evaporators and dryers used in dairy industry. Fluidization – mechanism of fluidization, characteristics of gas fluidization systems. Mechanization and equipment used in manufacture of indigenous dairy products, butter, ghee, ice-cream and cheese making equipments. Packaging machines for milk and milk products. Membrane processing.

Principle of dairy machine design – basic concept in statics and dynamics. Force systems. Friction, parallel axis theorem. Dynamics equation of motion. Work and mechanics of materials – Stress axial load classification, strain hooke's law. Machine design – processors specification, design factor, factor of safety material and properties. Bearing – Journal and antifriction bearings.

Food Engineering – Rheology of processed food method and measurement of rheological parameters. Properties of solid foods. Measurement of food texture. Food frizzing. Food dehydration. Freeze dehydration.

Dairy plant design and layout – introduction of dairy plant design and layout. Types of dairies. Classification of dairy plants, location and selection of site for dairy plant, location problems , importance of planning, principles of dairy layout, space requirement for dairy plants and different dairy buildings, model planning, choice of building construction materials. General points of consideration for designing of different dairy building. Dairy plant management and pollution control. Refrigeration and air conditioner.