FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Dairy Technology)

Semester: IV

Course Code: 202200401

Course Title: Market Milk

Course Group: Professional Core Course

Course Objectives: To introduce the students about cooperative dairy sectors and basic aspects related to milk processing. It also provides in-depth knowledge to students on different aspects of sanitization, separation, pasteurization, homogenization, relevant in dairy industries. Acquaint students with types of maintenance of sterilizer, homogenizer and packaging technology of industrial dairy products.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	2	4	50 / 18	50/ 17	25 / 9	25 / 9	150 / 53

* **J**: Jury; **V**: Viva; **P**: Practical

Sr. no.	Content	Hours
1	**Market Milk Industry in India and Abroad** Introduction, Distinctive features of tropical dairying as compared to those of the tropical climate of developed countries, Dairy development in India before and after operational flood, The Co-operative Movement, Milk Production, Collection and transportation of milk, Organization of milk collection routes, Dairy Animals, Clean Practices for collection of milk, preservation at farm, refrigeration, natural microbial inhibitors, lactoperoxidase system, Milk consumption, Platform test.	4
2	**Reception and Treatment of Milk in the Dairy Plant** General Practice of Reception, chilling, clarification, and storage, Homogenization: Definition, pre-treatments, theories, synchronization of homogenizer with operation of pasteurizer (HTST), Effect of homogenization on physical properties of milk, Bactofugation: Theory and microbiology; Thermal processing of milk, Principles of thermal processing: kinetics of microbial destruction, thermal death curve, Arrhenius equation, D value, Z value, Factors affecting thermal destruction of micro-organisms, Preparation of special milks; toned, double toned, standardized, flavored.	6

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3	**Physico-chemical and Nutritional Properties of Milk** Physical properties and composition of milk: Colour and optical properties, Flavor of milk, Specific gravity and density, Viscosity, Surface tension, Freezing and boiling points of milk, Acidity and pH, Heat stability of milk, Composition of milk, Macro components of milk - Fat and lactose: Fat, Lactose, Macro-components of milk – Protein: Milk Proteins, Caseins, Whey proteins, Milk enzymes and non-protein nitrogenous (NPN) substances, Micro Components of Milk: Vitamins, Minerals, Lactoferrin, Lactoperoxidase, Nutritional properties of milk: Milk Fat, Milk Sugar, Milk Proteins, Minerals	**9**
4	**Heat Treatment Process** Principles of heat treatment, Influence of Heat Treatment on Milk: Time and Temperature, Changes in Milk Components, Germ Inactivation, Heat Treatment Processes, Time-Temperature Profiles for Heating Process, Control of Heat Treatment, Kinetic parameters of heat induced changes: D-Value (Decimal Reduction Time), Z – Value, F_0 -Value, Q_{10} Values.	**8**
5	**Pasteurization Process** Principle and methods of pasteurization: Importance and drawback of Pasteurization, Methods of Pasteurization: Low-temperature long-time (LTLT)/Batch pasteurization, Water – jacketed vat, Water–spray type, Coil-vat type, High-temperature short-time (HTST) pasteurization: Operation of HTST Pasteurizer, Steps for starting and shutting down the plant, Maintenance of Milk Pasteurizers, Vacuum Pasteurization.	**6**
6	**Sterilization Process** Definition, Need of sterilization process, Method of In-bottle Sterilization, Types of Sterilization Process, Batch process (In-bottle sterilization), Inspection of Filled Bottles, De-crating and Re-crating of Bottles, Semi-continuous In-bottle Sterilization, Continuous in-bottle sterilization, In-can continuous sterilization, Ultra high temperature (UHT) method of sterilization, Shelf life of UHT milk and tests for UHT milk, Nutritive value of milk, Effect of heat processing on nutritive value, Efficiency of plant operation: product accounting, setting up norms for operational and processing losses for quantity, fat and SNF, monitoring efficiency, Maintaining plant hygiene & HACCP.	**12**
	Total	**45**

List of Practicals / Tutorials:

1	Performing the platform tests (like Sediment Test, Alcohol Test)
2	Study of various equipment's for reception of milk in dairy plant
3	Standardization of milk with using Pearson's square method
4	Standardization of milk with using algebraic method
5	Performing the test to check the efficiency of milk pasteurization
6	Determination of creaming index of milk
7	Assessing the quality of sterilized milk by suitable tests
8	Performance of a batch pasteurizer
9	Study of UHT Processing Plant
10	Study of HTST Pasteurizer

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Reference Books:

1	Dairy Product Technology Recent Advances by Subrota & Mandal Surjit & Mishra Hati, Daya Publishing House
2	India's Rural Co-operatives, Kainth, Daya Books, New Delhi.
3	Clean Milk Production – Strategies and Interventions, Singh, R.R.B., Sabikhi, L., Patil, G.R. and Sharma, N., NDRI Publication
4	Dairy Technology: Vol.01 Milk and Milk Processing by Shivashraya Singh, New India Publishing Agency
5	Quality Milk Production & Processing Technology, Thompkinson, D.K. and Sabikhi, New India Publishing Agency,
6	A textbook on Milk and Milk Products, D D Pantage and Dr. Rahul C. Ranveer, Jaya publishing house
7	Milk And Milk Products Technology, Biswas, Jaypee Brothers Medical Publishers

Supplementary learning Material:	
1	www.agricultureinformation.com
2	www.fao.org/docrep/T3080T/t3080T07.htm
3	www.nddb.org/aboutnddb/operationflood.html

Pedagogy:

- Direct Classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Interactive methods
- Seminar/Poster presentation

Internal Evaluation:

Teacher may consider some components for the continuous evaluation where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
15%	25%	20%	20%	15%	5%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

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Course Outcomes (CO):

Sr. No.	Course Outcome Statements	%weightage
CO-1	Describe the physical and chemical properties of milk and milk products.	**20**
CO-2	Maintain hygiene and cleanliness of floor dairy equipment following safety precautions.	**20**
CO-3	Perform various tests conducted on milk in dairy industries.	**25**
CO-4	Describe the use and control different types of microorganisms in the milk industry including spoilage, pathogenic and lactic acid bacteria	**20**
CO-5	Describe the different treatments of milk such heating, homogenization, centrifugation, agitation filtration and pasteurization	**15**

Curriculum Revision:	
Version:	1
Drafted on (Month-Year):	Dec-22
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	Jun-25

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