CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Dairy Technology)

Semester: III

Course Code: 202200303

Course Title: Chemistry of Milk and Milk Products

Course Group: Mandatory Course

Course Objectives: To understand the definition, chemical composition and structure of milk and its products. To impart knowledge regarding classification of milk proteins, milk enzymes, milk carbohydrates, milk lipids and milk salts etc.

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	**Milk Definition and Composition** Definition and structure of Milk, Constituents and gross composition of milk, factors affecting composition of milk, Preservatives, neutralizers and adulterants in milk and their detection.	**04**
2	**Structure of Milk** Structural Elements of Milk: Fat Globules, Casein Micelles, Globular Proteins, Lipoprotein Particles and their Properties and Grading of Milk	**03**
3	**Milk Proteins** Nomenclature and classification of milk proteins, Casein: Isolation, fractionation and chemical composition, physicochemical properties of casein, Whey proteins: Preparation of total whey proteins: α-lactalbumin and β-lactoglobulin. Properties of α-lactalbumin and β- lactoglobulin, immunoglobulins and other minor milk proteins and non-protein nitrogen constituents of milk, Hydrolysis and denaturation of milk proteins Under different physical and chemical environments, Estimation of milk proteins using different physical and chemical methods, Importance of genetic polymorphism of milk proteins,	**09**
4	**Milk Enzymes**	**05**

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	Introduction and significance of Enzymes in Milk, Milk Enzymes, its Source and Significance with special reference to lipases, Xanthine oxidase, phosphatases, proteases and lactoperoxidase.	
5	**Milk Salts** Minerals in milk (a) major minerals (b) Trace elements, physical equilibria among the milk salts and Milk contact surfaces and metallic contamination.	**03**
6	**Chemical Composition and Legal Standards of Milk Products** Chemistry of creaming and factors affecting the same. Ripening and neutralization of cream. Theories of churning and factors affecting the same. Butter colour and its chemistry, Ghee: Physico-chemical changes during manufacture, flavour compounds and their chemistry. Chemistry of cheese - milk clotting enzymes from various sources, enzymatic coagulation of milk, physico-chemical changes during ripening, Milk powder: structure and properties, changes during storage. Properties of ice -cream mix, stability, chemistry of stabilizers, emulsifiers, Physico-chemical changes while manufacturing of fermented milks.	**15**
7	**Carbohydrates and Lipids** Milk carbohydrates their status and importance. Physical and chemical properties of lactose. Definition, general composition and classification of milk lipids. Milk phospholipids and their role in milk products, Unsaponifiable matter and fat soluble vitamins.	**06**
	Total	**45**

List of Practicals

Sr. No	Practical
1	To find the density and specific gravity of milk
2	Determination of viscosity of milk
3	Determination of surface tension of milk
4	To carry out fat calculation in milk by different methods
5	Determination of total solids and solids-not-fat in milk
6	Determine the lactose in milk
7	To estimate an acidity and fat in cream
8	Performance analysis of physicochemical constituents in ghee
9	Analysis of khoa and paneer/chhana
10	Analysis of Milk powder

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Reference Books:

1	Chemistry of Milk by : K S Sharma
2	Fat Rich Dairy Products: Kotilinga Reddy, Yogesh Khetra, M.H. Sathish Kumar
3	The Chemistry of Dairy Products: A Chemical analysis of Milk, Cream and Butter: Various, Atlantic Publishers.
4	Fundamentals of Dairy Chemistry by Webb B. H.; CBS Publication
5	Text Book of Dairy Chemistry by M.P.Mathur, D.D.Roy & P.Dinakar; ICAR
6	Textbook of Dairy Chemistry by A. N. Shukla; Discovery Publishing Pvt.Ltd
7	The Chemistry of Dairy Products - A Chemical Analysis of Milk, Cream and Butter by Frank Knowles and J Elphin Watkin; Read books publisher

Supplementary learning Material:	
1	aritoppers.com/2019/06/chemistry-of-milk-icar-e-course-pdf-book-download.html
2	http://ecoursesonline.iasri.res.in/course/view.php?id=88

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.	Course Outcome Statements	%weightage
CO-1	To study definition, structure, composition and variation of milk.	**20**
CO-2	Understand and study of milk Proteins as well as Whey Proteins classification and its preparation methods along with its properties.	**20**
CO-3	Studies on milk Enzymes, Carbohydrates, Lipids and phospholipids role in milk products.	**30**
CO-4	Understand and analyze the chemical composition of milk products: butter, Cheese, Ghee, Milk Powder and Ice creams	**30**

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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