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

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-2023

Programme: **Bachelor of Technology (Dairy Technology)**

Semester: **IV**

Course Code: **202200404**

Course Title: **Dairy Industrial Microbiology**

Course Group: Mandatory Course

Course Objectives: To provide in-depth knowledge to students on different aspects of microbial growth and associated spoilage in foods. Demonstrate students on principles, different preservation methods of food and mode of action of various preservation methods on microbes. Acquaint students with types of fermentation processes and microbial production of industrial 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

Detailed Syllabus:

Sr.	Contents	Hours
1	**Scope of Dairy microbiology:** Fermentation processes: Microbial production of industrial products: Immobilization of enzymes/cells;	8

2	**Microbial Spoilage of dairy and non-dairy foods:** Microbial spoilage of fruits and vegetables, milk and milk products, canned foods; Sources of contamination; Control of spoilage.	**8**
3	**Preservation of dairy foods** – Principles of dairy food preservation: physical methods viz. low temperature and high temperature preservation (D, Z and F Values); Drying Methods; Chemical preservatives, Natural antimicrobial compounds and bio- preservation bacteriocins; Mode of action of various preservation methods like high and low temperature on microbes.	**10**
4	**Fermentation processes:** Historical development, the range, components and types (i.e. submerged, surface and solid state fermentation); criteria for selection of industrially important microorganisms; preservation and improvement of industrially important microorganisms using metabolic engineering/genetic engineering; media for industrial process; upstream and downstream processing. Types of fermenters: types (batch, fed batch and continuous), functions,; growth rate analysis, estimation of biomass; difference in chemostat and turbidostat.	**10**
5	**Microbial production of industrial products:** Immobilization of enzymes/cells; Microorganisms and processes involved in the production of single cell protein and dairy and non-dairy based alcoholic beverages, organic acids (citric and lactic), enzymes used in dairy processing (protease, lipase and rennet), vitamin (B 12), antibiotics; and fermented whey beverages.	**9**
	Total	**45**

List of Practicals / Tutorials:

1	To determine quality of milk by methylene blue reduction test
2	To isolate and identify *Staphylococcus aureus* and other bacterial pathogen in given milk sample
3	Preparation of Sauerkraut / yogurt/ kefir
4	Sterilization of microbial growth media using different methods
5	To identify the fungal in dairy product sample
6	To evaluate alkaline phosphatase activity in given milk sample
7	To determine starch hydrolytic activity of microorganisms

8	To determine β-galactosidase activity of microorganisms
9	To determine thermal death point of microorganisms
10	To determine thermal death time of microorganisms

Reference Books:

1	Food Microbiology, W C Frazier and D C Westhoff, McGraw Hill Book Company, NY.
2	Industrial Microbiology, S C Prescott and C G Dunn, McGraw Hill Book Co.
3	Industrial Microbiology, A H Patel Mac Millan Press

Supplementary learning Material:	
1	https://agrimoon.com/food-and-industrial-microbiology-icar-ecourse-pdf-book/
2	https://onlinecourses.swayam2.ac.in/cec19_ag03/preview

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.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the role of microorganisms in reducing shelf life of foods	15
CO-2	Understand and optimize the storage and processing treatment of foods to reduce the microbial load	20
CO-3	Mechanism and types of foodborne diseases	15
CO-4	Isolate and screen microorganism with potential to produce particular metabolite	15
CO-5	Enhance the efficiency of microorganisms to produce particular metabolite and produce the same at largescale.	15
CO-6	Processes involved in production of microbial metabolite	20

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