



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: VII

Course Code:

Course Title: Dairy Process Engineering

Course Group: Professional Core Course

Course Objectives: Dairy process engineering is a specialized field that deals with the design, development, and optimization of processes and equipment used in the production of dairy products. The subject gives insight to concentration, fluidization and drying process for bulk production of milk. The subject also encompasses the automation and mechanization for handling of dairy machines. Membrane Technology is one of the emerging areas which are invariably implicated for production of caseins, demineralized whey powders and many highly valued dairy products.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				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:

SN	Contents	Hours
1	Construction and working of evaporators Basic principles of evaporators, construction and operation, different types of evaporators used in dairy industry, calculation of heat transfer area and water requirement of condensers, basic concepts of multiple effect evaporators, operations and various feeding systems, economy of operation, thermo processor and MVR system, care and maintenance of evaporators	8
2	Drying operation Drying: Introduction to principle of drying, equilibrium moisture constant, bound and unbound moisture, rate of drying constant and falling rate, effect of shrinkage	6
3	Dryers classification and components Classification of dryers spray and drum dryers, spray drying, etc., air heating systems, atomization and feeding systems; factors affecting bulk density of power, spray dryer controls, theory of solid gas separation, cyclone separators, bag Filters, care and maintenance of drum and spray dryers	7
4	Effect of Fluidization on drying	6



	Mechanisms of fluidization characteristics of gas fluidization systems, minimum porosity, bed Weight, pressure drop in fluidized bed, application of fluidization in drying, batch fluidization, fluidized bed dryers	
5	Mechanization of equipment Manufacture of indigenous dairy products, butter and ghee making machine, ice cream and cheese making equipment; packaging machines for milk & milk products	7
6	Membrane processing Ultra-filtration, reverse osmosis and electro dialysis, materials for membrane construction, ultra-filtration of milk, effect of milk constituents on operation, membranes for electro dialysis	8
	Total	42

List of Practical:

1	Study of construction and operation of vacuum pan
2	Study of construction and operation of double effect evaporator
3	Spray dryer, vacuum and atmospheric drum dryers
4	Study and operation of butter making equipments
5	Study and operation of ghee making equipments
6	Study and operation of ice cream equipments
7	Study and operation of cheese making equipments
8	Study the reverse osmosis and ultra-filtration system
9	Study the ultra-filtration system
10	Design problems on double effect evaporator and vacuum pan

Reference Books:

1	Dairy Plant Engineering & Management by Tufail Ahmed, Kitab Mahal
2	Dairy Process Engineering (Practical book) by Seema Tanwar, Satish Serial Publishing House
3	Textbook of Dairy Engineering by S Ravi Kumar, Astral International Pvt Ltd
4	Dairy Science and Technology by Pieter Walstra, Taylor & Francis

Supplementary learning Material:

1	Dairy Technology , Advanced Technologies and their applications, https://doi.org/10.1201/9781315366210
2	Dairy Engineering: A Keystone to the Dairy Industry, http://dx.doi.org/10.1007/978-981-15-2608-4_3
3	Processing and Technology of dairy products, MDPI

Pedagogy: Following one or more points can be incorporated as relevant pedagogy methods.

<ul style="list-style-type: none">• Direct classroom teaching• Audio Visual presentations/demonstrations• Assignments/Quiz• Continuous assessment• Interactive methods• Seminar/Poster Presentation• Industrial/ Field visits



- Course Projects

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

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
15%	15%	20%	20%	20%	10%	

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):

S.N.	Course Outcome Statements	%weightage
CO-1	To know the components of evaporators and dryers and its function	20
CO-2	To get the knowledge of induced changes due to drying operation	25
CO-3	To interpret the various types of dryers for commercial application in dairy industry	20
CO-4	To assess the mechanization process for continuous production of various dairy products	20
CO-5	To examine the fluidization characteristics in milk powder for achieving instant soluble characteristics	15

Curriculum Revision:

Version:	2.0
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025