



## FACULTY OF ENGINEERING & TECHNOLOGY

### First Year Master of Technology

#### Semester I

**Course Code:** 102380106

**Course Title:** Advances in Dairy Engineering and Technology

**Type of Course:** Program Elective I

**Course Objectives:** The objective of this course is to impart a thorough understanding of advanced dairy engineering and technological aspects involving design, selection, operation, production and maintenance related to dairy industry practice.

#### Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Internal		External		Total
				Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	30 / 15	20 / 10	70 / 35	30 / 15	150 / 75

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

#### Detailed Syllabus:

Sr.	Contents	Hours
1	Engineering properties of dairy products and their significance in equipment design, processing and handling.	4
2	Homogenization of milk: Principle of homogenization, effect of homogenization, operation, care and maintenance of homogenizers, Efficiency of homogenization, design principle of homogenizers, recent advances in homogenization	7
3	Thermal processing of milk and milk products: Pasteurization; batch, flash and continuous pasteurizer, HTST pasteurizer and design principle and thermal death kinetics, UHT processing of milk, quality changes during processing of milk and milk products.	6
4	Tanks, pumps, stirrer, mixers and centrifugation: Design of tank, types of tanks, pumps in dairy industry, Agitation and mixing, heat transfer in mixers, power requirement, transmission, separation by gravity and centrifugal force, clarifiers and separators, centrifugal separator and efficiency of separation, flow rate and power consumption	7
5	Spray and drum dryer: Theory, estimation of drying rates and drying time, particle size calculation, skim milk and whole milk powder manufacturing methods. Fluidized bed drying, principle of fluidized bed method, agglomeration.	7
6	Dairy Material handling: System and devices, design of screw, belt, flight, apron conveyors, bucket elevators, power requirements, and applications	5
7	Overview of dairy plant production planning, operation and maintenance.	3



## 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	
20	25	25	20	10	0	

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.

## Reference Books:

1	Das H. 2005. Food Processing Operations and Analysis. Asian Books.
2	Fellows PJ. 1988. Food Processing Technology, Principle & Practices. Ellis Horwood
3	Toledo RT. 2007. Fundamentals of Food Process Engineering. Springer.
4	Ahmed T. 1997. Dairy Plant Engineering and Management. 4th Ed. Kitab Mahal
5	Gary Krutz, Lester Thompson & Paul Clear. 1984. Design of Agricultural Machinery. John Wiley & Sons.
6	Hall CW & Davis DC. 1979. Processing Equipment for Agricultural Products. AVI Publ.
7	Higgins L & Morrow LC. 1977. Maintenance Engineering Hand-Book. McGraw Hill
8	Stanier W. 1959. Plant Engineering Hand-Book. McGraw Hill

## Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	To understand and apply advanced milk processing operations	20
CO-2	To understand the operation of various dairy equipments.	20
CO-3	To be familiar with dairy engineering operations	20
CO-4	To gain competence in operation of dairy evaporators and dryers	25
CO-5	Overview of dairy plant production planning, operation and maintenance	15

## List of Practicals / Tutorials: [Click or tap here to enter text.](#)

1	Performance evaluation of HTST and associated components
2	Study of IS, British SMS and DIN standards for dairy equipment
3	Troubleshooting of few selected equipments, maintenance organization of experimental dairy
4	Estimation of the dairy plant running and maintenance cost
5	Identification of hygienic characteristics of pipes and fittings; technical specifications of milking and storage equipment, equipment for chilling & pasteurization
6	Determination of water activity and sorption isotherms of milk products.
7	Determination of thermal load during retort processing of milk and milk products.
8	Visit to a UHT Processing plant.
9	Functional properties of powders: porosity, interstitial air content, occluded air content, flowability



<b>10</b>	PERT for overhauling – case study and with group discussion, various records, equipment date card, card file, log books of a dairy plant.
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### Supplementary learning Material:

<b>1</b>	International Journal of Dairy Technology - Wiley Online Library
<b>2</b>	Asian Journal of Dairy and Food Research
<b>3</b>	<a href="http://ecoursesonline.iasri.res.in/course/view.php?id=74">http://ecoursesonline.iasri.res.in/course/view.php?id=74</a>
<b>4</b>	<a href="https://www.sarvgyan.com/courses/dairy-technology">https://www.sarvgyan.com/courses/dairy-technology</a>
<b>5</b>	Click or tap here to enter text.

### Curriculum Revision:

Version:	<b>1</b>
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22