



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: Waste Disposal and Pollution Control

Course Group: Program Elective Course - III

Course Objectives: This course explores waste management in the dairy industry, focusing on waste types, collection, segregation, and treatment methods. It emphasizes sustainable practices like recycling, recovery, composting, and biogas production. Students will also learn about effluent treatment, pollution control, and compliance with environmental regulations.

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 | 0 | 3 | 50 / 18 | 50 / 17 | - | - | 100 / 35 |

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

| Sr. no. | Content | Hours |
|---------|--|-------|
| 1 | Introduction to Dairy Industry Waste Classification of Waste (Solid, Liquid, Gaseous), Types of Waste Generated in Dairy Processing (Organic, Chemical, Biological), Types of Dairy Products and their Waste Streams, Waste Collection Methods in Dairy Industries, Waste Segregation: Importance and Techniques | 03 |
| 2 | Waste Management in Dairy Industry Waste Management Hierarchy: Prevention, Minimization, Recycling, Recovery, and Disposal, Waste Management Techniques: Waste Treatment (Physical, Chemical, Biological), Source Reduction Strategies, Waste-to-Energy (Biogas, Biomass, etc.), Types of Waste Management Systems: Centralized vs. Decentralized Waste Management, Role of Waste Management (Automation, IoT, etc.) | 06 |
| 3 | Agricultural and Dairy Waste Disposal Techniques Types of Agricultural Waste from Dairy Production :Manure, Straw, and Organic Residues, Potential for Composting and Biogas Generation, Dairy Waste Disposal Techniques : Composting and Vermicomposting, Anaerobic Digestion and Biogas Production, Land Application of Organic Waste (Manure as Fertilizer), Vermiculture and Use of Dairy Waste in Organic Farming, Regulations for Agricultural and Dairy | 09 |



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| | Waste Disposal : Sustainable Waste Disposal Practices in Agriculture, Guidelines for Safe Manure Disposal. Effluent Characteristics in Dairy Industries : Composition and Properties of Dairy Effluent (BOD, COD, TSS, pH, etc.), Sources of Effluent in Dairy Processing Plants Effluent Treatment Technologies : Primary, Secondary, and Tertiary Treatment, Anaerobic and Aerobic Treatment Systems, Membrane Bioreactor (MBR) Systems and Reverse Osmosis (RO), Coagulation and Flocculation Techniques, Reuse of Treated Effluent: Agricultural and Industrial Reuse Applications | |
| 4 | Waste Minimization, Sustainability, and Pollution Control Waste Minimization Strategies in Dairy Industry : Lean Manufacturing and Waste Reduction Techniques, Resource Efficiency (Energy, Water, Raw Materials), Sustainability in Dairy Industry: Sustainable Practices in Milk Production and Processing, Circular Economy Approaches, Case Studies of Successful Sustainability Models, Pollution Control in Dairy Industry : Types of Pollution (Air, Water, Solid), Causes and Effects of Pollution in Dairy Industry, Pollution Control Measures and Technologies ,Air Pollution Control (Scrubbers, Filters, Biofilters), Water Pollution Control (Effluent Treatment, Resource Recovery), Solid Waste Management (Composting, Landfilling, Recycling) | 12 |
| 5 | Pollution Causes, Effects, and Control Measures Pollution Causes and Effects: Air Pollution in Dairy Plants (Emissions from Boilers, Refrigeration), Water Pollution (Effluent Discharge to Water Bodies, Eutrophication), Soil and Land Pollution (Waste Disposal on Land). Pollution Control Measures :Control Technologies for Air Pollution (ESP, Wet Scrubbers), Water Pollution Control (Effluent Treatment, Reuse, Resource Recovery), Waste Management (Solid Waste Handling, Recycling, Composting) National and International Pollution Control Standards: Indian Environmental Regulations (CPCB, MoEFCC), International Standards (ISO, EU Directives), Compliance and Enforcement: Role of Government and Regulatory Bodies, Industry Best Practices for Compliance. Environmental Auditing and Reporting: Environmental Impact Assessments (EIA), Compliance Monitoring Systems, Case Studies of Compliance in Indian Dairy Industry | 12 |
| | Total | 42 |

Reference Books:

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|---|---|
| 1 | Waste Management in Dairy Processing" by S. K. Soni, New India Publishing Agency |
| 2 | Dairy Waste Management by R. S. Sengar, Agrotech Publishing Academy |
| 3 | Organic Farming and Dairy Waste Management" by P. K. Aggarwal, APH Publishing Corporation |
| 4 | Dairy Effluent Treatment and Waste Minimization by P. K. Gupta, Kalyani Publishers |
| 5 | Effluent Treatment in the Dairy Industry by M. M. K. Ramaswamy, CRC Press |



Supplementary learning Material:

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| 1 | https://www.coursera.org/learn/waste-management |
| 2 | https://www.sciencedirect.com/topics/earth-and-planetary-sciences/air-pollution-in-dairy |
| 3 | https://globaldairyplatform.com/sustainability/ |

Pedagogy:

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| <ul style="list-style-type: none">• Direct Classroom teaching• Audio Visual presentations/demonstrations• Assignments/Quiz• Interactive methods• Seminar/Poster presentation |
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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 classification of waste in dairy industries (solid, liquid, and gaseous) and identify different types of waste generated during dairy processing, such as organic, chemical, and biological waste. | 25 |
| CO-2 | Evaluate and apply various waste management techniques, including waste treatment methods (physical, chemical, biological), waste-to-energy solutions (biogas, biomass), and strategies for waste minimization and recycling in the dairy industry. | 20 |
| CO-3 | Analyze dairy effluent characteristics (e.g., BOD, COD, TSS) and implement appropriate effluent treatment technologies, including primary, secondary, and tertiary treatments, as well as reuse strategies for agricultural and industrial applications. | 35 |
| CO-4 | Develop sustainable waste disposal practices and pollution control measures for dairy industries, focusing on air, water, and solid waste | 20 |



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| | management. Understand regulatory compliance with Indian and international standards. | |
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| Curriculum Revision: | |
|--------------------------------|-----------|
| Version: | 2.0 |
| Drafted on (Month-Year): | June-2022 |
| Last Reviewed on (Month-Year): | - |
| Next Review on (Month-Year): | Jun-2025 |