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UNIVERSITY

Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Master of Technology (Food Technology)

Semester: 2

Course Code: 202380206

Course Title: Food Bio-waste Management and Utilization

Course Group: Program Elective III

Course Objectives:

1. To impart a thorough understanding and knowledge of food bio-waste and plant utilities generation, classification and its management for environmental pollution control and increasing profitability of food business.

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	50/20	50/20	25/10	25/10	150/60

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

Detailed Syllabus

Sr.	Contents	Hours
1	Basic considerations: Emission standards for environmental pollutants from food processing plants as per the provisions of Environment (Protection) Act, 1986. Importance and necessity of efficient food bio-waste management.	4
2	Types of waste generation in food industry and its classification. Characterization of food industry effluents, physical, chemical and biological parameters, oxygen demands, forms of Nitrogen, Sulphur and Phosphorus, Anions and Cations, Surfactants, Colour, Odour, Taste, Toxicity	6
3	Biological oxidation of food waste: Objects, Organisms, Reactions, Oxygen requirements, Aerators, Aerated Lagoons, Activated sludge process, Oxidation ponds, Rotating biological contactors.	6



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4	Advanced bio-waste treatment systems: Physical separations, Micro-strainers, Filters, Ultra filtration and reverse osmosis. Physico-chemical separations: activated carbon adsorption, Ion-exchange electro dialysis and magnetic separation. Chemical oxidation and treatment, Coagulation and flocculation.	7
5	Disinfection. Handling disposal of sludge	2
6	Plant utilities: Boiler operation, performance and selection, compressed air supply and applications, water supply system for food industry, fundamentals of electrical power generation and distribution.	8

List of Practicals / Tutorials:

1	Study of effluent generation processes of the food processing industry.
2	Study of various treatment processes for food processing effluents.
3	Characterization of selected effluents. Design calculations for specific effluent treatment systems
4	Visit to effluent treatment plants in food processing industry.
5	Determination of BOD and COD of Food Bio-waste and their correlation.
6	To study integrated water system for a large food processing plant.
7	To determine the criteria for removal of nitrogenous waste from bio-waste.
8	To study the electrical power generation, transmission and supply system for food plants.
9	To understand and operate industrial boiler and calculate its performance indices.

Reference Books:

1	Arvanitoyannis, I. S. Waste Management for the food industries, (Academic Press, 2008)
2	Zall, R. R. Managing food industry waste: common sense methods for food processors, (BlackWell Publishing Asia, 2004)
3	Shuller, K. Bioprocess Engineering- Basic Concepts, (Prentice Hall of India, 2002)
4	Waldron, K. Handbook of Waste Management and Co-product Recovery in Food Processing, (Woodhead Publishing, 2007)
5	Mattsson, B. and Sonesson, U. Environmentally Friendly Food Processing, (CRC Press, 2003).
6	Food Engineering and Dairy Technology, by Professor Dr.-Ing. H.G. Kessler, 1981, Published by VERLAG. A. KESSLER, Germany.
7	Waldron K. 2007 Handbook of waste management and co-product recovery in food processing Vol 1. Woodhead Publishing Limited, Cambridge, England



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Supplementary learning Material:

1	https://www.journals.elsevier.com/waste-management
2	https://lecturenotes.in/subject/494/solid-waste-management-swm
3	https://www.classcentral.com/tag/waste-management

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits
- Course Projects

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. 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	
25	25	20	20	10	00	

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	Understanding of emission standards for environmental pollutants from food processing plants.	20
CO-2	Understanding of types of waste generation in food industry, its classification and characterization.	25
CO-3	Design and operation of biological treatment systems and advanced bio- waste treatment systems.	30
CO-4	To gain competence in operation of various essential plant utilities.	25



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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):	June-2025