SEMESTER S8

FOOD INDUSTRY WASTE MANAGEMENT

Course Code	OEFTT834	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	Nil	Course Type	Theory

Course Objectives:

1. To provide knowledge of Food Processing Industry Waste Management.
2. To provide knowledge of the various aspects and methods adopted for Waste Management.
3. To provide knowledge regarding the environmental considerations and Laws pertaining to these.

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SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Types of waste and magnitude of waste generation in different food processing industries, concept, scope and importance of waste management and effluent treatment, Standards for emission or discharge of environmental pollutants from food processing Industries as per the updated provision of Environment (Protection) Act, 1986.	9
2	Characterization and Effective Utilization of by-products from Cereals, Pulses and Oilseeds Industries. Fruits, Vegetables and Plantation products, Fermented foods, Dairy Industry and Milk Products Industry, Fish, Meat, Egg and Poultry processing industries.	9
3	Characterization of food Industry effluents, Physical and Chemical parameters, Oxygen demands and their interrelationships, Residues (Solids), Fats, Oils and Grease, Forms of Nitrogen, Sulphur and Phosphorus, Anions and Cations, Surfactants, Colour, Odour, Taste,	9

	Toxicity. Unit concept of treatment of Food Industry Effluent. Screening, Sedimentation and Floatation as pre and primary treatments.	
4	Food effluent treatment: Biological oxidations: Objects, Organisms, Reactions involved, Oxygen requirements, Aeration devices / Equipment used. Systems: Lagoons, activated sludge process, oxidation ditches. Bio Remediation. Advanced wastewater 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.	**9**

Course Assessment Method
(CIE: 40 marks , ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

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Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Recall the laws and regulations pertaining to Waste Management and Disposal.	**K1**
CO2	Develop the byproducts associated with various types of food processing industries and its utilization.	**K3**
CO3	Utilize the different parameters associated with the characterization of food industry waste.	**K3**
CO4	Demonstrate various food industry effluent treatment operations.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3	3	2										
CO4	3		1				1					

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Food Processing Waste Management	J.H. Green, A.Kramer	AVI Publishing Company	1979/1981
2	Handbook of Waste Management and Co-Product Recovery in Food Processing	K. Waldron	Elsevier Science	Volume 1 2007
3	Food Processing Waste Management: Treatment and Utilization Technology	V K Joshi & S K Sharma	New India Publishing Agency	2011
4	Environmental Pollution Control Engineering	C S Rao	New Age International Publishers	2006
5	Waste Management for the Food Industries	Ioannis Arvanitoyannis	Elsevier Science	2010
6	The Environment (Protection) Act 1986.		(Act No.29 of 1986)	1986, amended 1991

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Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1.	Food Processing Waste and Utilization: Tackling Pollution and Enhancing Product Recovery	Ajay Singh, Pradyuman Kumar, Sanju Bala Dhull	CRC Press/Taylor & Francis Group	2022
2.	Food Waste Recovery: Processing Technologies, Industrial Techniques, and Applications	Charis M. Galanakis	Elsevier Science	2020
3.	The Complete Book on Managing Food Processing Industry Waste	Dr. H. Panda	Asia Pacific Business Press Inc.	2011

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Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://nptel.ac.in/courses/126105023
2	https://www.youtube.com/watch?v=rOOQB4hZHC4
3	https://nptel.ac.in/courses/126105023
4	https://www.youtube.com/watch?v=rOOQB4hZHC4

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