Faculty of Engineering & Technology
Master of Technology (M. Tech)
(W. E. F.: 2023-24)

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Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Technology (M. Tech)
Course Code	:	2MEE01
Course Title	:	Waste Management
Type of Course	:	M. Tech Environment Engineering
Year of Introduction	:	2023-24

Prerequisite	:	Basic knowledge of environmental science, Environmental engineering, Chemistry and biology
Course Objective		To learn about the methods used for the treatment of wastewater biologically and to make the students understand modelling & design aspects of biological techniques available.
Course Outcomes		Upon successful completion of this course, students will be able to do
	CO1	The understand concept, objectives and design of wastewater treatment
	CO2	The fundamental scientific processes underlying the design and operation of wastewater treatment plant.
	CO3	The management of residuals from water and wastewater treatment.
	CO4	The methods that are used for the design of a water and wastewater treatment plant.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
3	2	0	4	70	30	30	20	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Objectives of wastewater treatment:** Flow variations , characteristics, analysis of BOD, COD, solids and volatile solids & their significance, BOD progression & its formulation, types of reactors and reactors analysis. Wastewater Treatment, Flow Diagrams and Hydraulic Profile. **Theoretical principles and design**: Screens, equalization basin, grit chamber, primary and secondary settling tanks.	10	24%	CO1
2	**Kinetics of biological treatment systems:** Bio-kinetic constants and their determination, batch and continuous systems.	14	33%	CO1
3	**Theoretical principles and design:** Suspended growth system - conventional activated sludge process and its modifications. **Theoretical principles and design :** Attached growth system – trickling filter, bio-towers and rotating biological contactors. Principles and design of stabilization ponds	10	24%	CO1 CO2
4	**Sludge Processing:** Separation, sludge thickeners, volume reduction, conditioning and digestion – aerobic and anaerobic. **Advanced Wastewater Treatment**: Need and technologies used. Nitrification and Denitrification Processes, Phosphorous removal. Wastewater disinfection.	08	19%	CO3 CO4

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**20**	**30**	**25**	**15**	**5**	**5**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Tutorials

Sr. No.	Name of Tutorial	Teaching Hours
1	Analysis of BOD, COD	1
2	Types of reactors and reactors analysis.	3
3	Bio-kinetic constants and their determination	2
4	Suspended growth system	3
5	Attached growth system	2
6	Principles and design of stabilization ponds	3
7	Sludge Processing	3
8	Advanced Wastewater Treatment	4
9	Denitrification Processes, Phosphorous removal	3
10	Wastewater disinfection	3

Suggested Learning Websites

Sr. No.	Name of Website
1	https://www.teachengineering.org/activities/view/uok-2216-wastewater-treatment-plant-model-water-quality
2	https://www.britannica.com/technology/wastewater-treatment

Reference Books

Sr. No.	Name of Reference Books
1	Metcalf and Eddy Inc., "Wastewater Engineering - Treatment and Reuse", 4th Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2003.
2	Karia G.L., and Christian R.A., "Wastewater Treatment Concepts and Design Approach", Prentice Hall of India Pvt. Ltd., New Delhi, 2001.
3	Lee C.C., and Lin S.D., "Handbook of Environmental Engineering Calculations", McGraw Hill, New York, 1999