

Mohamed Sathak A.J College of Engineering, Chennai.

DEPARTMENT OF CIVIL ENGINEERING

LESSON PLAN

Course/Branch	:	B.E Civil Engineering	Total no. of hours given in syllabus:		
Subject Code	:	EN8592	Lecture	:	45
Subject Title	:	Wastewater Engineering	Tutorials	:	0
Year/Semester	:	III/VI	Practical	:	0
Faculty Name	:	M.B.Shanmuharajan	TOTAL	:	45
Regulation	:	2017	Credits	:	03

COURSE OBJECTIVES :

The student should be made to:

The objective of this course is to help students develop the ability to apply basic understanding of physical, chemical and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

- Estimate sewage generation and design sewer system including sewage pumping stations.
- Understand the characteristics and composition of sewage, self – purification of streams.
- Perform basic design of the unit operations and processes that are used in sewage treatment.
- Understand the standard methods for disposal of sewage.
- Gain knowledge on sludge treatment and disposal.

PREREQUISITE :

Basic knowledge in Engineering Chemistry and Water supply engineering

Sl.No.	Topic	No. of Periods	Text / Reference Books	Page No.	Method
UNIT I PLANNING AND DESIGN OF SEWERAGE SYSTEM					9
Objective: The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.					
1	Characteristics and composition of sewage	1	T1	1, 225	Chalk and Board
2	Population equivalent -Sanitary sewage flow estimation	1	T1	1 - 7	Chalk and Board
3	Sewer materials – Hydraulics of flow in sanitary sewers	1	T1	219, 11, 24, 28 - 30	Chalk and Board
4	Sewer design	1	T1	225 - 230	Chalk and Board
5	Storm drainage - Storm runoff estimation	2	T1	24	Chalk and Board
6	Sewer appurtenances – corrosion in sewers	1	T1	73 - 81	Chalk and Board
7	Prevention and control – sewage pumping-drainage in buildings	1	T3	165 – 179, 583	Chalk and Board
8	Plumbing systems for drainage - Rain Watering	1	T3	580 – 583	Chalk and Board
UNIT II PRIMARY TREATMENT OF SEWAGE					9
9	Objectives – Unit Operations and Processes	1	T3	256 – 274	Chalk and Board
10	Selection of treatment processes – Onsite sanitation	1	T1	230	Chalk and Board
11	Septic tank- Grey water harvesting	1	T1	390	Chalk and Board
12	Primary treatment – Principles, functions and design of sewage treatment units	2	T1	395	Chalk and Board
13	Screens - grit chamber	2	T1	235 – 242, 249	Chalk and Board
14	Primary sedimentation tanks	1	T3	306	Chalk and Board
15	Construction, Operation and Maintenance aspects.	1	T3	136	Chalk and Board
UNIT III SECONDARY TREATMENT OF SEWAGE					9
16	Objectives – Selection of	1	T1	278	Chalk and Board

	Treatment Methods				
17	Principles, Functions, - Activated Sludge Process	1	T1	346	Chalk and Board
18	Extended aeration systems	1	T1	386	Chalk and Board
19	Trickling filters	1	T3	337	Chalk and Board
20	Sequencing Batch Reactor(SBR)	1	-	-	PPT
21	Membrane Bioreactor - UASB	1	T1	416	Chalk and Board
22	Waste Stabilization Ponds	1	T3	457	Chalk and Board
23	Other treatment methods - Reclamation and Reuse of sewage	1	T1	188	Chalk and Board
24	Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.	1	T1	427 – 440	Chalk and Board
UNIT IV		DISPOSAL OF SEWAGE			9
25	Standards for Disposal	1	T3	225	Chalk and Board
26	Methods – dilution	1	T3	224	Chalk and Board
27	Mass balance principle	1	-	-	PPT
28	Self purification of river	1	T3	229	Chalk and Board
29	Oxygen sag curve	1	T3	229	Chalk and Board
30	Deoxygenation and reaeration	1	T3	229, 230	Chalk and Board
31	Streeter–Phelps model	1	T3	230	Chalk and Board
32	Land disposal – Sewage farming	1	T3	248	Chalk and Board
33	Sodium hazards - Soil dispersion system.	1	-	-	PPT
UNIT V		SLUDGE TREATMENT AND DISPOSAL			9
34	Objectives - Sludge characterization	1	T3	478	Chalk and Board
35	Thickening	1	T3	487	Chalk and Board
36	Design of gravity thickener	1	T3	490	Chalk and Board
37	Sludge digestion	1	T3	491	Chalk and Board

38	Standard rate and High rate digester design	1	T3	501	Chalk and Board
39	Biogas recovery – Sludge Conditioning and Dewatering	2	T3	505 – 508	Chalk and Board
40	Sludge drying beds- ultimate residue disposal	1	T3	506 – 510	Chalk and Board
41	Recent advances	1	-	-	PPT

Assignment / Case Studies / Tutorials /Quiz / Mini Projects / Model Development / Task

1. Problems on sewer design
2. Problems on septic tank.
3. Describe about Activated sludge process.

TEXT BOOK

- Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2015.
- Duggal K.N., “Elements of Environmental Engineering” S.Chand and Co. Ltd., New Delhi, 2014.
- Punmia, B.C., Jain, A.K., and Jain, A.K., Environmental Engineering, Vol. II, Laxmi Publications, 2010.

REFERENCES:

- Manual on Sewerage and Sewage Treatment Systems Part A, B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
- Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2010.
- Syed R. Qasim “Wastewater Treatment Plants”, CRC Press, Washington D.C., 2010
- Gray N.F, “Water Technology”, Elsevier India Pvt. Ltd., New Delhi, 2006.

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