



Department of Civil Engineering		LP: CE18602 Rev. No: 01
B.E	: Civil Engineering Regulation:2018	Date: 02/03/2022
PG Specialisation	: NA	
Sub. Code / Sub. Name	: CE18602/Waste Water Engineering	
Unit	: I	

**Unit Syllabus: PLANNING AND DESIGN OF SEWERAGE SYSTEM** 9

Characteristics and composition of sewage - Sanitary sewage flow and Storm runoff estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Sewer appurtenances - Sewage pumping - Drainage in buildings-plumbing systems for drainage- Discharge standards for Effluents.

**Objective:** To impart knowledge on basic concepts about planning and design of sewerage system.

Session No *	Topics to be covered	Ref	Teaching Aids
01	Characteristics and composition of sewage and pictures of effects of improper disposal of sewage	T1 Page No.147to 177	PPT & Black Board
02	Estimation of sanitary sewage flow	T1Page No.1 to 35 T3 154 - 170	PPT & Black Board
03	Estimation of storm runoff	T1 Page No.1 to 35 T2 Page No 40 - 43	PPT & Black Board
04	Sewer materials	T1 Page No.92 to 101	PPT & Black Board
05	Hydraulics of flow in sanitary sewers	T1 Page No.36 to 73	PPT & Black Board
06	Design of sanitary and storm sewers	T1 Page No.36 to 73	PPT & Black Board
07	Appurtenances in sewerage systems and Sewage pumping	T1 Page No.127 to 146	PPT & Black Board
08	Drainage in buildings-plumbing systems for drainage	T1 Page No.466 to 487	PPT & Black Board
09	Effluent standards for sewage and Legislation requirements	T1 Page No.188 to 227	PPT & Black Board
<b>Content beyond syllabus covered (if any):</b> Pictures of effects of improper disposal of sewage on environment			

\* Session duration: 50 minutes



Sub. Code / Sub. Name: CE18602/Waste Water Engineering

Unit : II

**Unit Syllabus:** PRIMARY TREATMENT OF SEWAGE

9

Objectives – Unit Operations and Processes – Selection of treatment processes - Onsite sanitation - Septic tank- Primary treatment – Principles, functions and design of primary sewage treatment units - screens - grit chamber-primary sedimentation tanks –Operation and Maintenance aspects.

**Objective:** To impart knowledge on primary treatment of sewage.

Session No *	Topics to be covered	Ref	Teaching Aids
10	Objectives, Unit Operations and Processes	T1 page 230 – 239 and T2 Page No.190	PPT & Black Board
11	Selection of treatment processes	T1 page 311- 467 and T2 Page No.190 to 199	PPT & Black Board
12	Onsite sanitation	T1 Page No.390	PPT & Black Board
13	Principles, functions, design and drawing of Septic tank with dispersion	T1 Page No. 494 to 495	PPT & Black Board
	<b>CAT 1</b>		
14	Principles, functions and design of primary sewage treatment unit: Screens	T1 Page No.243 - 263	PPT & Black Board
15	Principles, functions and design of primary sewage treatment unit: Grit chambers	T1 Page No.243 to 263	PPT & Black Board
16	Principles and functions of primary sewage treatment unit: primary sedimentation tanks	T1 Page No. 266 to 277 and 356 to 377	PPT & Black Board
17	Design of primary sedimentation tanks	T1 Page No. 266 to 277 and 356 to 377	PPT & Black Board
18	Operation and Maintenance aspects of primary treatment units	T1 Page No. 266 to 277 and 356 to 377	PPT & Black Board
<b>Content beyond syllabus covered (if any): Nil</b>			

\* Session duration: 50 mins



Sub. Code / Sub. Name: CE18602/Waste Water Engineering

Unit : III

**Unit Syllabus:** SECONDARY TREATMENT OF SEWAGE

9

Objectives – Selection of Treatment Methods – Principles, functions and design of secondary sewage treatment units - Activated Sludge Process and Extended Aeration Systems –Rotating Biological Contactors-Trickling filters - Waste Stabilization Ponds – Operation and Maintenance aspects.

**Objective:** To impart knowledge on the secondary treatment of sewage.

Session No *	Topics to be covered	Ref	Teaching Aids
19	Objectives – Selection of Treatment Methods	T1 Page No. 346 to 348	PPT & Black Board
20	Principles and functions of secondary sewage treatment unit: Activated Sludge Process (Video)	T1 Page No. 349 to 378	PPT & Black Board
21	Design of aeration tank	T1 Page No. 349 to 378	PPT & Black Board
22	Principles, functions and design of secondary sewage treatment unit: Extended Aeration Systems	T1 Page No. 380 to 389	PPT & Black Board
23	Principles, functions and design of secondary sewage treatment unit: Rotating Biological Contactors	T1 Page No.379	PPT & Black Board
24	Principles and functions of secondary sewage treatment unit: Trickling filters (Video)	T1 Page No. 278 to 313	PPT & Black Board
25	Design of Trickling filters	T1 Page No. 278 to 313	PPT & Black Board
26	Principles, functions and design of secondary sewage treatment units: Waste Stabilization Ponds	T1 Page No. 380 to 390	PPT & Black Board
27	Operation and Maintenance aspects of secondary treatment	T1 page 487 to 495	PPT & Black Board
	<b>CAT 2</b>		
<b>Content beyond syllabus covered (if any):</b> Videos of working principles of ASP, Trickling Filters			

\* Session duration: 50 mins



Sub. Code / Sub. Name: CE18602/Waste Water Engineering

Unit : IV

**Unit Syllabus:** ADVANCES IN SEWAGE TREATMENT 9  
Sequencing Batch Reactor – Moving Bed Biofilm Reactor-Membrane Bioreactor - UASB -  
Biogas recovery- Reclamation and Reuse of sewage – Constructed Wetland –Nutrient  
Removal Systems.

**Objective:** To impart knowledge on the advances sewage treatment.

Session No *	Topics to be covered	Ref	Teaching Aids
28	Sequencing Batch Reactor	T3 Page No. 720 and 780	PPT & Black Board
29	Moving Bed Biofilm Reactor	T3 Page No. 952	PPT & Black Board
30	Membrane Bioreactor	T3 Page No. 854 to 858	PPT & Black Board
31	UASB Reactor	T1 Page No. 418 to 422	PPT, Black Board & Video
32	Biogas recovery from anaerobic treatment	T1 Page No. 411 to 422	PPT & Black Board
33	Reclamation and Reuse of sewage	T1 page 487 to 495	PPT & Black Board
34	Reclamation and Reuse of sewage	T1 page 487 to 495	PPT & Black Board
35	Constructed Wetland	T3 page 962	PPT & Black Board
36	Nutrient Removal Systems	T3 page 623 and 649	PPT & Black Board

**Content beyond syllabus covered (if any): Nil**

\* Session duration: 50 mins



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Unit : V

**Unit Syllabus: DISPOSAL OF SEWAGE AND SLUDGE MANAGEMENT 9**

Standards for Disposal - Methods – dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.

**Objective:** To impart knowledge on the disposal of sewage and sludge.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Standards for Disposal and Methods	T1 Page No. 222 to 233	PPT & Black Board
38	Dilution and Self purification of surface water bodies	T1 Page No. 188 to 201	PPT & Black Board
39	Oxygen sag curve and Land disposal	T1 Page No. 188 to 201	PPT & Black Board
40	Sludge characterization	T1 Page No.353	PPT & Black Board
41	Sludge Thickening	T1 Page No.353 T2 Page No. 270 -	PPT & Black Board
42	Sludge digestion and Biogas recovery from sludge digestion	T1 Page No.322 - 324	PPT & Black Board
43	Sludge Conditioning and Dewatering	T1 Page No.333 - 337	PPT & Black Board
44	Disposal of sludge from treatment plant	T1 Page No.337 - 343	PPT & Black Board
45	Advances in Sludge Treatment and disposal	T1 Page No.343 - 346	PPT & Black Board
	<b>CAT 3</b>		

**Content beyond syllabus covered (if any): Nil**

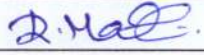
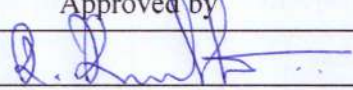
\* Session duration: 50 mins



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**REFERENCES:**

1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2015.
2. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1997.
3. Metcalf & Eddy, "Wastewater Engineering" – Treatment and Reuse, Tata McGraw Hill Company, New Delhi, 2003.

	Prepared by	Approved by
Signature		
Name	R.Mathiyazhagan	Dr. R.Kumutha
Designation	Assistant Professor	Professor and Head of the Department
Date	02/03/2022	02/03/2022
Remarks *:		
Remarks *:		

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD