SRI VIDYA COLLEGE OF

ENGINEERING & TECHNOLOGY

COURSE PLAN

DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR: 2018-19

Subject Code	CE6605		**L**	**P**	**T**	**C**
Subject Title	ENVIRONMENTAL ENGINEERING -II		3	0	1	4
Year / Dept / Sem	III/CIVIL/VI	Regulation Year	2013			
Faculty Name / Desg / Dept	Mrs.R.ANANDHALAKSHMI/AP/CIVIL					
Course Prerequisite	1. Know the types of waste water treatment process. 2. To make the student understand conveyance system of sewage.					

SYLLABUS REGULATION 2013

CE6605 ENVIRONMENTAL ENGINEERING II LT P C 3 0 0 3

UNIT I PLANNING FOR SEWERAGE SYSTEMS 7

Sources of wastewater generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – Factors affecting Characteristics and composition of Sewage and their significance – Effluent standards – Legislation requirements.

UNIT I I SEWER DESIGN 8

Sewerage – Hydraulics o ff low i n sewers – Objectives – Design period - Design of Sanitary and storm sewers – Small bore systems - Computer applications – Laying, Joining & t esting of sewers – appurtenances – Pumps – selection of pumps and pipe Drainage -. Plumbing System f or Buildings – One pipe and two pipe system.

UNIT I II PRIMARY TREATMENT OF SEWAGE 9

Objective – Selection otf Treatment processes – Principles, Functions, Design and Drawing of Units - Onsite sanitation - Septic tank with dispersion - Grey water Harvesting – Primary treatment – Principles functions design and drawing of screen, Grit chambers and primary sedimentation tanks – Construction, operation and Maintenance aspects.

UNIT I V SECONDARY TREATMENT OF SEWAGE 12

Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units - Activated Sludge Process and Trickling filter – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage - sewage Recycle in residential complex - Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants.

UNIT V 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 – Advanced in Sludge Treatment and disposal.

TOTAL: 45 PERIODS

OUTCOMES:

The students completing the course will have

 Ability to estimate sewage generation and design sewer system including Sewage pumping stations

 required understanding o nt he characteristics and composition of sewage, self Purification of streams

 Ability to perform basic design o ft he unit operations and processes that are Used in sewage treatment

TEXT BOOKS:

1. Garg, S.K .", Environmental Engineering" Vo l.I I, Khanna Publishers, New Delhi, 2003.

2. Punmia, B.C., Jain, A.K., and Jain. A .", Environmental Engineering", Vol.II, Lakshmi Publications, News letter, 2005.

REFERENCES:

1.Prof.V.Rajendran and S.Arulmozhi-Environmental Engineering –II, Hi Tech Publishing Company Pvt Ltd.

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.

Unit I: PLANNING FOR SEWERAGE SYSTEMS

Sources of wastewater generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – Factors affecting Characteristics and composition of sewage and their significance – Effluent standards – Legislation requirements.

Objective: To impart knowledge on basic concepts about sewerage system.

Session No *	Topics to be covered	Ref	Teaching Aids
01	Introduction to the subjects and its Importance	T1 Page no.1 to 8	BB
02	Sources of wastewater generation		BB
03	Effects of sewage on environment		BB
04	Estimation of sanitary sewage flow	T1 Page no.9	BB

05	Estimation of storm runoff	T1 Page no.17 to 18	BB
06	Factors affecting Characteristics and composition of sewage	T1 Page no.178 to 210	BB
07	Importance of sewage characteristics and composition	R1 Page no.1.43 to 1.47	BB
08	Effluent standards for sewage		BB
09	Legislation requirements		BB
10	Review	--	BB

Unit II: SEWER DESIGN

Sewerage – Hydraulics of flow in sewers – Objectives – Design period - Design of sanitary and storm sewers – Small bore systems - Computer applications – Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe Drainage -. Plumbing System for Buildings – One pipe and two pipe system.

Objective: To make the student understand conveyance system of sewage.

Session No *	Topics to be covered	Ref	Teaching Aids
11	Hydraulics of flow in sewers	T1 Page no.41 to 98	BB
12	Objectives of sewerage system and Design period		BB
13	Design of sanitary and storm sewers		BB
14	Small bore systems	T1 Page no.99 to 119	BB
15	Computer applications in sewerage system		BB
16	Laying, joining & testing of sewers		BB
17	Appurtenances in sewerage systems	R1 Page no.2.4 to2.52	BB
18	Sewerage pumps & selection of pumps	R1 Page no.2.53 to2.68	BB

19	Pipe Drainage, Plumbing System for Buildings	T1 Page no.582 to586	BB
20	One pipe and two pipe system	T1 Page no.582 to586	

Unit III: PRIMARY TREATMENT OF SEWAGE

Objective – Unit Operation and Processes – Selection of treatment processes – Onsite sanitation - Septic tank, Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and 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
21	Objectives - Unit operations and processes of sewage treatment	T1 Page no.456 to491	BB
22	Selection of treatment processes		BB
23	Onsite sanitation, Septic tank, Grey water harvesting		BB
24	Principles, functions design and drawing of Screen	T1 Page no.283 to287	BB
25	Principles, functions design and drawing of Grit chambers	T1 Page no.288 to304	BB
26	Principles, functions design and drawing of Grit chambers	R1 Page no.3.26	BB
27	Principles, functions design and drawing of primary sedimentation tanks	R1 Page no.3.33 to3.43	BB
28	Operation and Maintenance aspects		BB
29	Operation and Maintenance aspects	T1 Page no.304 to321	BB
30	Review	--	BB

Unit IV: SECONDARY TREATMENT OF SEWAGE

Objective – Selection of Treatment Methods – Principles, Functions, Design and

Drawing of Units - Activated Sludge Process and Trickling filter, other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants.

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

Session No *	Topics to be covered	Ref	Teaching Aids
31	Objective – Selection of Treatment Methods	T1 Page no.456 to491	BB
32	Principles, Functions, Design and Drawing of Activated Sludge Process	T1 Page no.408to 442	BB
33	Principles, Functions, Design and Drawing of Trickling filter	T1 Pageno.324 to 369	BB
34	Principles, Functions, Design and Drawing of Oxidation ditches	R1 Page no.4.26to 4.30	BB
35	**CAT – II**	--	--
36	Principles, Functions, Design and Drawing of UASB	T1 Pageno.456 to 483	BB
37	Waste Stabilization Ponds	T1 Page no.445 to 455,	BB
38	Reclamation and Reuse of sewage		BB
39	Recent Advances in Sewage Treatment		BB
40	Construction and Operation & Maintenance of Sewage Treatment Plants		BB

Unit V: DISPOSAL OF SEWAGE AND SLUDGE

Standards for Disposal - Methods – dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Deep well injection – Soil dispersion system - 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
41	Standards for Disposal and Methods	T1 Page no.428 to 274	BB
42	Dilution and Self purification of surface water bodies		BB
43	Oxygen sag curve and Land disposal		BB
44	Sewage farming and Deep well injection		BB
45	Soil dispersion system		BB
46	Sludge characterization, Thickening and Sludge digestion	R1 Page no.5.29 to 5.40	BB
47	Biogas recovery from sludge digestion	R1 Page no.5.44 to 5.47	BB
48	Sludge Conditioning and Dewatering		BB
49	Disposal of sludge from treatment plant	T1 Page no.371 to 407	BB
50	Advances in Sludge Treatment and disposal		BB

* Session duration: 45 mins

Sub Code / Sub Name: CE6605 / ENVIRONMENTAL ENGINEERING II

Course Outcome 1: The students would estimate sewage generation, understand the characteristics and composition of sewage.
Course Outcome 2: The students would design sewer system including sewage pumping stations.
Course Outcome 3: The students would perform the basic design of the unit operations and processes that are used in primary treatment of sewage treatment.
Course Outcome 4: The students would perform the basic design of the unit operations and processes that are used in secondary treatment of sewage treatment.

Course Outcome 5: The students would understand self purification of streams. The students would design disposal methods for treated sewage and would estimate sludge generation and understand management of sludge.

Programme Outcomes of Civil Engineering

a. Graduates of Civil Engineering program will be able to apply the fundamental knowledge of mathematics, science and engineering to solve problems pertaining to Civil Engineering.
b. Graduates of Civil Engineering program will be able to identify, analyze, formulate, and solve civil Engineering problems in accordance with Indian Standard codes of practice.
c. Graduates of Civil Engineering program will be able to design a system component, or process to meet desired needs within realistic constraint such as economic, environmental, social, political, ethical, health safety, manufacturability, and sustainability.
d. Graduates of Civil Engineering program will able be to design and conduct experiments, as well as to analyze and interpret data.
e. Graduates of Civil Engineering will be able to use the techniques, skills, and modern civil engineering tools, necessary for engineering practice.
f. Graduates of Civil Engineering program will be able to incorporate specific contemporary issues into the identification, formulation, and solution of specific civil engineering problems.
g. Graduates of Civil Engineering program will be able to work on the basis of broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
h. Graduates of Civil Engineering program will be able to understand the role of Civil Engineers and ethical responsibility.
i. Graduates of Civil Engineering program will be able to function on multidisciplinary teams.
j. Graduates of Civil Engineering program will be able to deliver effective verbal, written, and graphical communications.
k. Graduates of Civil Engineering program will be able to recognize the need for, and an ability to engage in life-long learning.
l. Graduates of Civil Engineering program will be able to perform economic analysis, quality checks, time/labour management and cost estimates related to design, construction, operations and maintenance of systems in the civil technical specialties.

Mapping CO – PO:

	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO7	PO 8	PO9	PO10	PO11	PO12
CO1	2			1	1	2						
CO2	2	1			2							
CO3	2				2			1				
CO4	2			2	2							

CO5	2			2	2	2		2				

Bridging the Curriculum Gap (Additional Topics beyond syllabus / Seminars / Assignments)	BCG1: Layouts of waste water treatment BCG2:Sewer Appurtenances BCG3: Sludge disposal methods
Related Website URLs	W1: freeit.free.fr/Knovel/.../31961_04.pdf W2: www.civil.iitb.ac.in/800-dir/Kalani_Book.pdf W3: https://en.wikipedia.org/wiki/**Moment_distribution_method** W4: https://en.wikipedia.org/wiki/**Slope_deflection_method**
Related Video Course Materials (min. 4 no.s)	V1: www.youtube.com/watch?v=GUOKSExdjq8 V2: www.youtube.com/watch?v=1P4fMETaa50 V3: www.youtube.com/watch?v=gSI2yBWvYUQ V4: www.youtube.com/watch?v=mdE6Box5lFM
Text books	1. Garg, S.K .", Environmental Engineering" Vo l.I I, Khanna Publishers, New Delhi, 2003. 2. Punmia, B.C., Jain, A.K., and Jain. A .", Environmental Engineering", Vol.II, Lakshmi Publications, New sl etter, 2005.

	Prepared by	***Approved by***
Signature		
Name	Mrs.R.ANANDHALAKSHMI	Dr.P.GANESAN
Designation	Assistant Professor / CIVIL	HoD / CIVIL
Signed date		