DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE
(AUTONOMOUS)
(Approved by AICTE & Affiliated to Anna University, Chennai)
Re-Accredited by NAAC with 'A' Grade
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PERAMBALUR-621212, TAMILNADU, INDIA.
Website: www.dsengg.ac.in

COURSE PLAN

Name of the Faculty				
Designation/Department	**Assistant Professor/Civil Engineering**			
Course Code/Name	**U23CET44 / Water Supply Engineering**			
Year/Section/Department	**II/-/Civil Engineering**			
Credits Details	**L: 3**	**T: 0**	**P: 0**	**C: 3**
Total Contact Hours Required	**45**			

Syllabus:

UNIT I / SOURCES OF WATER	**09**
Public water supply system – Planning, Objectives, Design period, Population forecasting; Water demand – Sources of water and their characteristics, Surface and Groundwater – Impounding Reservoir -Well hydraulics – Development and selection of source – Water quality –Characterization – Drinking Water quality standards.	
UNIT II / CONVEYANCE FROM THE SOURCE	**09**
Water supply – intake structures – Functions and drawings; Pipes and conduits for water – Pipe materials – Hydraulics of flow in pipes – Transmission main design- Laying, jointing and testing of pipes –appurtenances- Drawings;– Types and capacity of pumps – Selection of pumps and pipe Materials.	
UNIT III / WATER TREATMENT	**09**
Objectives – Unit operations and processes – Principles, functions design and drawing of flash mixers, flocculators, sedimentation tanks and sand filters; Disinfection –THM; Iron and Manganese removal, Defluoridation - Residue Management – Corrosion Control; Construction, Operation and Maintenance aspects-Layout and Hydraulic Profile of water treatment plants.	
UNIT IV /ADVANCED WATER TREATMENT	**09**
Water softening - Desalination -demineralization – Adsorption -Membrane Systems Construction And operation & Maintenance aspects – Recent advances.	

UNIT V / WATER DISTRIBUTION AND SUPPLY TO BUILDINGS	09
Requirements of water distribution -Components -Service reservoirs -Functions and drawings network design -Economics -Computer applications -Analysis of distribution networks Appurtenances – operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings –House service connection -Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.	

Objectives:

- To make the understudies familiar with sources and its interest of water.
- To Study the basic characteristics of water and its determination.
- To design various water treatment units
- Principles and design of water treatment
- To study difficulties in distribution and also water distribution design.

Text Books:

T1: Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2005.
T2: Punmia,B.C.,AshokKJainandArunKJain,"WaterSupplyEngineering",LaxmiPublications Pvt.Ltd.,New Delhi,2005
T3: Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi,2018

Reference Books:

R1: Howard S. Peavy, Donald R. Rowe, George T, "Environmental Engineering" - Tata McGraw Hill, New York, Indian Edition, 2013.
R2: Karia G.L., and Christian R.A, "Wastewater Treatment Concepts and Design Approach", Prentice Hall of India Pvt. Ltd., New Delhi. 3rd, Edition, 2017
R3: Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
R4: Gray N.F, "Water Technology", Elsevier India Pvt. Ltd., New Delhi, 2006.

Websites:

W1: Types of pipes (*nptel.ac.in/courses/105101082/41*)
W2: Filtration process (n*ptel.ac.in/courses/105104102/Lecture%2010.htm*)
W3: Rapid sand filtration process (*nptel.ac.in/courses/105104102/1*)
W4: Defluoridation (*nptel.ac.in/courses/105104102/)*

Online Mode of Study (if Any):

1. https://nptel.ac.in/courses/105/105/105105201/
Title: Water Supply Engineering
2. https://nptel.ac.in/courses/105/104/105104102/
Title: Water and Waste Water Engineering

Course Plan:

Topic Number	Topic	Books to be referred	Page no	Teaching Aids	No of periods required	Cumulative periods
UNIT I SOURCES OF WATER						
1	Public water supply system– Planning–Objectives	T1 R1	1 - 21 3 - 5	BB	1	01
2	Design period - Population forecasting, Arithmetic Increase Method	T1 R1	23- 42 5-7	BB	1	02
3	Population forecasting- Geometric Increase Method, Incremental Increase Method	T1 R1	23-42 5-7	BB	1	03
4	Population forecasting- The Logistic Curve Method	T2 T1	140-150 44 -46	BB	1	04
5	Water demand	T2 T2	156- 162 169-172	BB	1	05
6	Sources of water and their characteristics – Surface and Groundwater	T1	66-95	BB	1	06
7	Impounding Reservoir Well hydraulics - Development and selection of source	T1 R1	70-80 5-7	BB	1	07
8	Source water quality, Characterization, Significance –	T1	321 - 342	BB	1	08
9	Drinking Water quality standards	T2	208-211	BB	1	09
Outcome of Unit I: **CO1:** At the end of unit, Students should be able to Understand the availability of water and the demand of public with quality characteristics.						
UNIT II CONVEYANCE FROM THE SOURCE						
10	Water supply – intake structures	T1	199- 218	BB	1	10
11	Pipes and conduits for water	R1	81-94	BB	1	11
12	Pipe materials, Hydraulics of flow in pipes - Transmission main design	R1 T1	81-94 219- 264	BB	1	12

13	Laying, jointing and testing of pipes & Drawings appurtenances	T1 R1	265- 287 90-140	BB	1	13
14	Laying, jointing and testing of pipes & Drawings appurtenances	T1 R1	265- 287 90-140	BB	1	14
15	Types and capacity of pumps	T1 R1	289- 316 155-171	BB	1	15
16	Types and capacity of pumps	T1 R1	289- 316 155-171	BB	1	16
17	Selection of pumps materials	R1	155-171	BB	1	17
18	Selection of pipe materials	T1	289- 316	BB	1	18

Outcome of Unit II:

CO2: At the end of unit, Students should be able to the knowledge in various pipe materials and conduits for water conveyance.

UNIT III WATER TREATMENT

19	Objectives – Unit operations and processes	R1	141-146	BB	1	19
20	Principles, functions, design and drawing of Flash mixers	T1 R1	420-424 154-156	BB	1	20
21	Principles, functions design and drawing of flocculators	T1 R1	424- 431 156-163	BB	2	21
22	Principles, functions design and drawing of sedimentation tanks	T1 R1	383- 410 163-174	BB	1	22
23	Principles, functions design and drawing of sand filter	T1 R1	383- 410 163-174	BB	2	23
24	Disinfection, Iron and Manganese removal, Defluoridation	T1 R1	474- 545 204-228	BB	2	24
25	Residue Management Corrosion Control	T1	152	BB	1	25
26	Construction and Operation & Maintenance aspects of Water Treatment Plants.	T1	735 - 740	BB	1	26
27	Layout and Hydraulic Profile of water treatment plants.	T1 R1	463-484 350-360	BB	1	27

Outcome of Unit III:

CO3: At the end of unit, Students should be able to design the various functional units in water treatment and know the various treatment units available to treat water.

UNIT IV ADVANCED WATER TREATMENT

28	Principles and functions Water softening	T1	495 - 520	BB	1	28

29	Principles and functions Water softening	T1	495 - 520	BB	1	29
30	Desalination	T1	528 - 536	BB	1	30
31	Principles and functions of demineralization	T1 R1	514 - 520 256 - 262	BB	2	31
32	Adsorption	T1	957	BB	1	32
33	Membrane Systems	T1	525 - 536	BB	1	33
34	Construction operation & Maintenance aspects	T1	463 - 484	BB	1	34
35	Construction operation & Maintenance aspects	T1	463 - 484	BB	1	35
36	Recent advances	T1	499 - 502	BB	1	36
Outcome of Unit IV: **CO4:** At the end of unit, Students should be able to Understanding of water quality criteria and standards, and the advanced treatment methods.						
UNIT V WATER DISTRIBUTION AND SUPPLY TO BUILDINGS						
37	Requirements of water distribution – Components – Service reservoirs -Functions and drawings	T1 R1	579- 594 307-317	BB	01	37
38	Network design –Economics	T1 R1	616-636 317-326	BB	01	38
39	Net work design –Economics	T1 R1	616-636 317-326	BB	01	39
40	Computer applications – Analysis of distribution net works	T1	616-636	BB	01	40
41	Appurtenances- Operation and maintenance –Leak detection, Methods	T1	636–643	BB	01	41
42	Appurtenances- Operation and maintenance –Leak detection, Methods	T1	615–616	BB	02	42
43	Principles of design of water supply in buildings	T1	646–660	BB	01	43
44	House service connection - Fixtures and fittings	T1	646–660	BB	01	44
45	Assembling of Transmission Systems	T2	408-410	BB	1	45
Outcome of Unit V: **CO5:** At the end of unit, Students should be able to the ability to design and evaluate water supply project alternatives on basis of chosen.						

Course Outcome:

At the end of the course the students would be able to

CO1: An insight into the structure of drinking water supply systems, including water transport, treatment and distribution.

CO2: The knowledge in various unit operations and processes in water treatment.

CO3: An ability to design the various functional units in water treatment.

CO4: An understanding of water quality criteria and standards, and their relation to Public health.

CO5: The ability to design and evaluate water supply project alternatives on basis of Chosen criteria.

CO6: Understand the standards of water.

Course Outcome Vs Program Outcome Mapping:

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	2	-	-	-	1	1	-	-	-	3	-
CO2	2	3	-	2	-	-	-	1	1	-	-	-	3	-
CO3	3	3	3	-	-	3	2	2	2	-	2	-	3	2
CO4	3	3	3	-	2	3	3	2	2	-	2	-	3	2
CO5	3	3	3	2	2	3	3	2	3	2	2	3	3	2
CO6	3	3	3	2	2	3	3	2	3	2	2	3	3	2
AVG	**3**	**3**	**3**	**2**	**2**	**3**	**1**	**2**	**2**	**2**	**2**	**3**	**3**	**2**

Content beyond Syllabus:

- Irrigation water supply

Internal Evaluation Components:

Webportal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Webportal 1	**--**	**Assessment – I (60)**	**Unit I and II**	**CO 1 & CO2**
	1	**Assignment – Handwritten (20)**	**1.** Population forecasting methods and problems **2.** Laying, jointing and testing of pipes and appurtenances	**CO1** **CO2**

	2	**Assignment – Poster Presentation / PPT (20)**	**1.** Sources of water and their characteristics **2.** Types and capacity of pumps and Selection of pumps and pipe Materials.	**CO1** **CO2**
Webportal 2	**--**	**Assessment – II (60)**	**Unit III and IV**	**CO3 & CO4**
	3	**Seminar (20)**	1. Water treatment - sedimentation tanks and sand filters. 2. Desalination and demineralization treatment process.	**CO3** **CO4**
	4	**Case Study Report (20)**	1. Construction, Operation and Maintenance aspects, Layout and Hydraulic Profile of water treatment plants. 2. Recent advances in water treatment.	**CO3** **CO4**
Webportal 3	**--**	**Model Exam (75)**	**Unit I to V**	**CO1 to CO6**
	5	**MCQ (15)**	**Unit I to V**	**CO1 to CO6**
	-	**Course Attendance (10)**	**--**	**--**

Submission Details:

Phase 1(Before AT 1)		**Phase 2 (Before AT 2)**		**Phase 3 (Model)**
Assignment 1	**Assignment 2**	**Assignment 3**	**Assignment 4**	**Assignment 5**

Google Class Code Details: 3k4awtk

Class Name: WSE II Year CIVIL

PLAN OF ASSESSMENT TEST –DISTRIBUTION OF MARKS:

TEST	CO- MARK WISE DISTRIBUTION						BLOOM'S LEVEL MARK WISE DISTRIBUTION					
AT-1	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
AT-2	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6
MODEL	CO1	CO2	CO3	CO4	CO5	CO6	BTL1	BTL2	BTL3	BTL4	BTL5	BTL6

Prepared By

Verified By
(HOD/CIVIL)

Approved By
(PRINCIPAL)