MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN

Department of Civil Engineering

Name of the Subject	Water Supply Engineering	Name of the handling Faculty	Mr. R.B. Rakesh
Subject Code	EN8491	Year / Sem	III/V
Acad Year	2021-2022	Batch	2019-2023

Course Objective

• To equip the students with the principles and design of water treatment units and distribution system.

Course Outcome

• Explain the structure of drinking water supply systems, including water transport, treatment and distribution

• Describe the various unit operations and processes in water treatment

• Design the various functional units in water treatment

• Explain water quality criteria and standards, and their relation to public health

• Design and evaluate water supply project alternatives on basis of chosen criteria.

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
	UNIT I SOURCES OF WATER						
1	Public water supply system – Planning, Objectives,	T1	1	NPTEL	L2	CO1	PO1,PO3
2	Design period, Population forecasting; Water demand	T1	2	PPT	L3	CO1	PO1,PO3
3	Sources of water and their characteristics	T1	1	PPT	L2	CO1	PO1,PO3
4	Surface and Groundwater – Impounding Reservoir	T1	1	PPT	L2	CO2	PO1,PO3
5	Development and selection of source – Source Water quality	T1,T2	2	BB,PPT	L2	CO1	PO1,PO3
6	Characterization – Significance –Drinking Water quality standards. refraction.	T1,T2	2	PPT	L2	CO1	PO1,PO3
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any							**Quiz**
Evaluation method - MCQ							
	UNIT II CONVEYANCE FROM THE SOURCE						
7	Water supply – intake structures – Functions	T1	2	NPTEL	L2	CO2	PO1,PO3-PO4
8	Pipes and conduits for water	T2	1	PPT	L2	CO2	PO1,PO3
9	Pipe materials – Hydraulics of flow in pipes	T2	1	PPT	L2	CO2	PO1,PO3-PO4
10	Transmission main design	T1	1	PPT	L2	CO2	PO1,PO3-PO4
11	Laying, jointing and testing of pipes – appurtenances	T1,T2	2	BB,PPT	L3	CO2	PO1,PO3-PO4
12	Types and capacity of pumps	T1,T2	1	BB,PPT	L2	CO2	PO1,PO3-PO4
13	Selection of pumps and pipe materials.	T1,T2	1	BB	L2	CO2	PO1,PO3-PO4

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any **Assignment on types of intake strucutres**							
Evaluation method - Paper Based							
UNIT III WATER TREATMENT							
14	**Objectives – Unit operations and processes**	**T1**	**1**	**PPT**	**L2**	**CO3**	**PO1,PO3**
15	**Principles, functions, and design of water treatment plant units**	**T2**	**2**	**PPT**	**L3**	**CO3**	**PO1,PO3-PO5**
16	**aerators of flash mixers, Coagulation and flocculation**	**T2**	**2**	**PPT**	**L3**	**CO3**	**PO1,PO3-PO5**
17	**Clarifloccuator-Plate and tube settlers**	**T2**	**1**	**PPT**	**L3**	**CO3**	**PO1,PO3-PO5**
18	**Pulsator clarifier - sand filters**	**T1,T2**	**1**	**BB,PPT**	**L3**	**CO3**	**PO1,PO3-PO5**
19	**Disinfection - Residue Management**	**T1**	**1**	**BB,PPT**	**L3**	**CO3**	**PO1,PO3-PO4**
20	**Construction, Operation and Maintenance aspects.**	**T2**	**1**	**BB,PPT**	**L3**	**CO3**	**PO1,PO3,PO9**
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any **Tutorial**							
Evaluation method - Paper Based							
UNIT IV ADVANCED WATER TREATMENT							
21	**Water softening – Desalination- R.O. Plant**	**T1**	**1**	**BB,PPT**	**L3**	**CO4**	**PO1,PO3-PO5**
22	**demineralization – Adsorption**	**T1**	**1**	**PPT**	**L3**	**CO4**	**PO1,PO3-PO4**
23	**Ion exchange– Membrane Systems**	**T1**	**1**	**PPT**	**L3**	**CO4**	**PO1,PO3-PO5**
24	**RO Reject Management**	**T2**	**1**	**BB,PPT**	**L3**	**CO4**	**PO1,PO3-PO4**
25	**Iron and Manganese removal - Defluoridation -**	**T1,T2**	**2**	**BB,PPT**	**L3**	**CO4**	**PO1,PO3-PO5**
26	**Construction and Operation & Maintenance aspects**	**T2**	**1**	**BB,PPT**	**L3**	**CO4**	**PO1,PO3,PO9**
27	**Recent advances - MBR process**	**T2**	**2**	**BB,PPT**	**L3**	**CO4**	**PO1,PO3-PO5**
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any **Quiz**							
Evaluation method - MCQ							
UNIT V WATER DISTRIBUTION AND SUPPLY							
28	**Requirements of water distribution**	**T1**	**1**	**PPT**	**L2**	**CO5**	**PO1,PO3**
29	**Components – Selection of pipe material**	**T1**	**1**	**PPT**	**L2**	**CO5**	**PO1,PO3**
30	**Service reservoirs– Functions**	**T1**	**1**	**PPT**	**L2**	**CO5**	**PO1,PO3**
31	**Network design – Economics – Analysis of distribution networks -**	**T1**	**2**	**PPT**	**L3**	**CO5**	**PO1,PO3-PO4**
32	**Computer applications- Appurtenances – Leak detection**	**T2**	**1**	**BB,PPT**	**L2**	**CO5**	**PO1,PO3**
33	**Principles of design of water supply in buildings – House service connection**	**T1,T2**	**2**	**BB,PPT**	**L3**	**CO5**	**PO1,PO3**
34	**Fixtures and fittings, systems of plumbing and types of plumbing.**	**T1,T2**	**1**	**BB,PPT**	**L2**	**CO5**	**PO1,PO3-PO5**
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any **Case Study**							
Evaluation method - Report submission							
Content Beyond the Syllabus Planned							
1	Study on different types of impounding structures used for water storage in india						
Text Books							

1	Punmia, B.C.,Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi, 2014.
2	Garg, S.K. Environmental Engineering, Vol.IKhanna Publishers, New Delhi, 2010.
3	Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2010.

Reference Books

1	Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
2	Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.4. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004

Website / URL References

1	https://nptel.ac.in/courses/105/105/105105201/

Blooms Level

Level 1 (L1) : Remembering Level 2 (L2) : Understanding Level 3 (L3) : Applying	Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing Level 5 (L5) : Evaluating Level 6 (L6) : Creating		Higher Order Thinking	Projects / Mini Projects

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	SOURCES OF WATER	0	5	1	0	0	0	6	0	6
Unit 2	CONVEYANCE FROM THE SOURCE	0	6	1	0	0	0	7	0	7
Unit 3	WATER TREATMENT	0	1	6	0	0	0	7	0	7
Unit 4	ADVANCED WATER TREATMENT	0	3	0	0	0	0	3	0	3
Unit 5	WATER DISTRIBUTION AND SUPPLY	0	5	2	0	0	0	7	0	7
Total		0	20	10	0	0	0	30	0	30
Total Percentage		0	66.66667	33.33333	0	0	0	100	0	100

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2		2										2	2
CO2	3		2	2									2	2
CO3	3		3	3	3				2				2	2
CO4	3		2	3	3				2				2	2
CO5	3		3	3	3								2	2
Avg	2.8		2.4	2.75	3				2				2	2

Justification for CO-PO mapping

CO1	PO1: Design of public water supply and impounding structures, Design and analysis of population forcasting, PO3:Demostration engineering tools and sovling problems based on population forecasting method
CO2	PO1,PO3-PO4- Modern techniques like intake structures, pipes for water supply and conveyance of water
CO3	PO1,PO3-PO5 - Design and Analysis of unit treatment process and design knowledge in water treatment plants, PO9 - Advanced Knowledge in Construction, Operation and Maintenance aspects.
CO4	PO1,PO3-PO5: Design and Analysis of water softening methods PO9- understanding of impact of engineering solutions on the advanced water treatment
CO5	PO1,PO3-PO4: Design of water supplies in building, PO5- Modern techniques in plumbing for water coveyance and Demostration engineering tools and sovling problems based on network analysis and distribution of water

3	High level	2	Moderate level	1	Low level

Name & Sign of Faculty Incharge : Rakesh R B

Name & Sign of Subject Expert :

Head of the Department :

Format No :231