



QUESTION BANK

Year / Semester: III B.Tech VI Semester

Regulation: R23

Subject and Code: ENVIRONMENTAL ENGINEERING (23CIV362T)

Course Objectives:

The objectives of this course are to make the student to:

1. Understand the sources, demand estimation, and quality parameters of water.
2. Apply water treatment processes for purification and supply.
3. Analyze storage, distribution, and operation of water supply systems.
4. Design sewerage systems, stormwater drainage, and plumbing networks.
5. Evaluate sewage treatment, sludge management, and water reuse methods.

UNIT- I

WATER SUPPLY

Estimation of Surface and Subsurface Water Resources - Predicting Demand for Water- Impurities of Water and Their Significance - Physical, Chemical and Bacteriological Analysis - Waterborne Diseases - Standards for Potable Water. Intake of Water: Pumping and Gravity Schemes- Water Safety Plans (WHO recommended) – important in smart water management.

UNIT- II

WATER TREATMENT

Objectives - Unit Operations and Processes - Principles, Functions, and Design of Water Treatment Plant Units, Aerators of Flash Mixers, Coagulation and Flocculation – Clariflocculator-Plate and Tube Settlers - PulsatorClarifier - Sand Filters - Disinfection - Softening, Removal of Iron and Manganese - Defluoridation- Softening - Desalination Process - Residue Management - Construction, Operation and Maintenance Aspects.

UNIT- III

WATER STORAGE AND DISTRIBUTION

Storage and Balancing Reservoirs - Types, Location and Capacity. Distribution System: Layout, Hydraulics of Pipe Lines, Pipe Fittings, Valves Including Check and Pressure Reducing Valves, Meters, Analysis of Distribution Systems, Leak Detection, Maintenance of Distribution Systems, Pumping Stations and Their Operations - House Service Connections.

UNIT- IV

PLANNING AND DESIGN OF THE SEWERAGE SYSTEM

Characteristics and Composition of Sewage - Population Equivalent - Sanitary Sewage Flow Estimation - Sewer Materials - Hydraulics of Flow inSanitary Sewers - Sewer Design - Storm Drainage-Storm Runoff Estimation - Sewer Appurtenances - Corrosion inSewers - Prevention and Control – Sewage Pumping-Drainage inBuildings - Plumbing Systems for Drainage-Stormwater Harvesting & Urban Flood Mitigation principles.

UNIT- V

SEWAGETREATMENT AND DISPOSAL

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended Aeration Systems - Trickling Filters - Sequencing Batch Reactor(SBR) - UASB - Waste Stabilization Ponds - Other Treatment Methods - Reclamation and Reuse of Sewage - Recent Advances in Sewage Treatment - Construction, Operation and Maintenance Aspects. - Discharge Standards-Sludge Treatment -Disposal of Sludge.



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Max Marks: **10**

S.No.	CO	Questions	BT
UNIT- I WATER SUPPLY			
1	1	a) Define surface water resources and subsurface water resources. b) What are the main impurities present in water? c) What are waterborne diseases? d) What are the standards for potable water? e) What is a water safety plan?	L4
2	1	Explain the estimation of surface and subsurface water resources?	L4
3	1	Discuss the methods used for predicting water demand in urban areas?	L3
4	1	Explain different types of impurities present in water and their significance?	L5
5	1	Describe physical, chemical, and bacteriological analysis of water?	L4
6	1	Explain various waterborne diseases and their prevention methods?	L3
7	1	Discuss the standards for potable water recommended by the World Health Organization?	L5
8	1	Explain the intake structures used in water supply systems?	L4
9	1	Describe pumping schemes used in water supply?	L3
10	1	Explain gravity water supply schemes and their advantages?	L3
11	1	Discuss the components of a water supply system?	L3



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S.No.	CO	Questions	BT
UNIT- II WATER TREATMENT			
1	2	a. What are unit operations and unit processes in water treatment? b. Define coagulation and flocculation ? c. What is sedimentation? d. What is filtration in water treatment? e. What is disinfection?	L4
2	2	Explain the objectives of water treatment ?	L3
3	2	Describe the principles and functions of water treatment plants ?	L4
4	2	Explain the working of flash mixers in water treatment ?	L3
5	2	Discuss coagulation and flocculation processes in detail ?	L5
6	2	Explain the design and working of plate and tube settlers ?	L4
7	2	Describe the working principle of Clari flocculators ?	L3
8	2	Explain pulsator clarifiers and their advantages ?	L5
9	2	Discuss sand filtration methods used in water treatment plants ?	L4
10	2	Explain disinfection methods used in water purification ?	L3
11	2	Describe the softening process used in water treatment ?	L4



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S.No.	CO	Questions	BT
UNIT- III WATER STORAGE AND DISTRIBUTION			
1	3	a. What are balancing reservoirs? b. What are the different types of water storage reservoirs? c. What is a distribution system in water supply? d. What are pipe fittings used in water distribution? e. What is leak detection in water supply systems?	L4
2	3	Explain the purpose of storage reservoirs in water supply systems ?	L3
3	3	Discuss the types, location, and capacity of storage reservoirs ?	L4
4	3	Explain different layouts of water distribution systems ?	L3
5	3	Discuss the hydraulics of pipe flow in distribution systems ?	L5
6	3	Explain different types of valves used in water distribution ?	L4
7	3	Describe the working of check valves and pressure reducing valves ?	L3
8	3	Explain different types of water meters used in distribution systems ?	L5
9	3	Discuss the analysis of water distribution systems ?	L4
10	3	Explain methods of leak detection in distribution pipelines ?	L3
11	3	Discuss maintenance of water distribution systems ?	L3



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S.No.	CO	Questions	BT
UNIT- IV PLANNING AND DESIGN OF THE SEWERAGE SYSTEM			
1	4	a. What is sewage? b. Define population equivalent ? c. What is storm runoff? d. What are sewer appurtenances? e. What is stormwater harvesting?	L4
2	4	Explain the characteristics and composition of sewage ?	L3
3	4	Discuss the concept of population equivalent in sewage systems ?	L4
4	4	Explain sanitary sewage flow estimation methods ?	L3
5	4	Discuss different materials used for sewer construction ?	L5
6	4	Explain hydraulics of flow in sanitary sewers ?	L4
7	4	Describe the design of sewer systems ?	L3
8	4	Explain storm drainage systems used in urban areas ?	L5
9	4	Discuss storm runoff estimation methods ?	L4
10	4	Explain sewer appurtenances used in sewer systems ?	L3
11	4	Discuss corrosion in sewers and its prevention methods ?	L3



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S.No.	CO	Questions	BT
UNIT- V SEWAGETREATMENT AND DISPOSAL			
1	5	<ol style="list-style-type: none">1. What is sewage treatment?2. What is activated sludge process?3. What is a trickling filter?4. What is a sequencing batch reactor (SBR)?5. What is sludge disposal?	L4
2	5	Explain the objectives of sewage treatment ?	L3
3	5	Discuss different methods used for sewage treatment ?	L4
4	5	Explain the activated sludge process and its advantages ?	L3
5	5	Describe extended aeration systems used in wastewater treatment ?	L5
6	5	Explain the working of trickling filters ?	L4
7	5	Discuss the sequencing batch reactor (SBR) process ?	L3
8	5	Explain the working of UASB reactors in sewage treatment ?	L5
9	5	Describe waste stabilization ponds and their advantages ?	L4
10	5	Explain other advanced sewage treatment methods ?	L3
11	5	Discuss reclamation and reuse of sewage ?	L3



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COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:		POs related to COs
CO1	Explain water sources, quality standards, and waterborne diseases.	PO1, PO2, PO3
CO2	Design unit processes of water treatment plants.	PO1, PO2, PO3
CO3	Analyze water distribution networks and pumping stations.	PO1,PO2,PO3,PO4
CO4	Design sewerage systems, including stormwater and sanitary sewers.	PO1,PO2
CO5	Assess sewage treatment methods and advanced wastewater management techniques	PO1,PO2,PO3,PO4

TEXT BOOKS:

- 1.Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014.
- 2.Environmental Engineering, I and II by BC Punmia, Std. Publications.

REFERENCEBOOKS:

- 1.Environmental Engineering, I and II by SK Garg, Khanna Publications.
- 2.Environmental Pollution and Control Engineering CS Rao, Wiley Publications
- 3.Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
- 4.Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
- 5.Water and Waste Water Technology by Mark J Hammar and Mark J. HammarJr.Wiley, 2007.

Online Learning Resources:

<https://nptel.ac.in/courses/103107084>

CO-MAPPING

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO-1	3	2	2	1	-	3	3	1	-	1	-	2	3	3
CO-2	3	3	3	2	2	2	2	1	-	-	-	1	3	3
CO-3	3	3	3	2	2	2	3	1	-	-	-	1	3	3
CO-4	3	3	3	2	2	2	3	1	-	-	-	1	3	3
CO-5	2	2	2	1	3	3	3	1	-	1	1	2	2	2