B.Tech. Civil Engineering Regulations 2021

CED 2104 WATER AND WASTEWATER L T P C SDG: 6 ENGINEERING 3 0 2 4

COURSE OBJECTIVES:

The objectives of the course are to impart knowledge on

COB1: The population forecasting, water sources, intake structures, water quality and its treatment

COB2: The advanced water treatment methods, water storage facilities and distribution network

COB3: The sewerage systems, estimation of wastewater flows & storm runoff, wastewater characterization and its primary treatment

COB4: The secondary treatment of wastewater

COB5: The methods for wastewater disposal & sludge handling.

MODULE I WATER TREATMENT

9

Design Period - Population forecasting - Types of water demand -Sources of water - Intakes - Characteristics of water - Standards for drinking water - Principle, function and design of water treatment units - sedimentation, coagulation & flocculation, Filtration — theory & principle of disinfection methods.

MODULE II ADVANCED WATER TREATMENT, 9 STORAGE & DISTRIBUTION

Water softening – Iron, Manganese and Phosphorus removal, Defluoridation – Desalination - Membrane filtration - Water storage facilities – Distribution networks & analysis.

MODULE III PRIMARY TREATMENT OF 9 WASTEWATER

Sewerage systems - Sewage flow estimation - Storm runoff estimation - Sewer materials - Hydraulics of flow in sewer - Sewer appurtenances - Characteristics of sewage - Unit operations and processes - Primary treatment - Principles, functions and design of sewage treatment units - Screens - Grit chamber.

MODULE IV SECONDARY TREATMENT OF 9 WASTEWATER

Introduction to Aerobic and Anaerobic treatment process - Functions and design of Activated sludge process and trickling filter – Principles and functions of Membrane Bioreactor, Sequential batch reactor, Waste stabilisation pond, UASB reactor - Onsite sanitation - septic tanks

MODULE V WASTEWATER DISPOSAL & SLUDGE 9 TREATMENT

Standards for disposal into water bodies – Self-purification of river - Oxygen sag curve – Sewage farming and methods - Sludge thickening & Digestion – Biogas recovery – Sludge conditioning and Dewatering – Sludge drying bed.

PRACTICALS

List of experiments

- 1. Determination of pH and Turbidity
- 2. Determination of Dissolved oxygen
- 3. Determination of Solids (Total, Suspended and Dissolved solids)
- 4. Determination of Conductivity
- 5. Determination of Sodium, Potassium and Calcium
- 6. Determination of Biochemical Oxygen Demand (BOD)
- 7. Determination of Chemical Oxygen Demand (COD)
- 8. Determination of Hardness
- 9. Determination of Chlorides and Residual Chlorine
- 10. Determination of Optimum Coagulant Dosage by Jar Test
- 11. Determination of Alkalinity
- 12. Determination of Nitrate
- 13. Determination of Phosphate
- 14. Heavy metals determination using AAS (Demo)

L - 45; P - 30; Total Hours - 75

TEXT BOOKS:

- 1. GargSK, "Water Supply Engineering", Khanna Publications, 27th Edition, 2015
- 2. Mackenzie L. Davis, Ph.D., P.E., BCEE. Water and Wastewater Engineering: Design Principles and Practice, Second Edition (McGraw-Hill Education: New York, 2020.
- 3. Metcalf and Eddy, "Wastewater Engineering Treatment, Disposal and Reuse", Tata McGraw Hill, 2007.
- Modi.P.N., "Sewage Treatment and Disposal and Wastewater Engineering", Standard Book House, New Delhi, 2008

REFERENCES:

- 1. APHA., "Standard methods for the examination of Water and Waste Water", American Public Health Association, United States, 2013.
- Bureau of Indian Standards, "Indian Standard Drinking water Specification- IS10500: 2012, New Delhi.
- 3. Water and Wastewater analysis Manual, Central Pollution Control Board, New Delhi, 2011.

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1: forecast population, estimate quantity of water demand, characterize water quality and design treatment units

CO2: describe advanced treatments for water, water storage facilities and analyze distribution network

CO3: explain the sewerage systems, estimate wastewater flows & storm runoff, characterize quality of wastewater and design the primary wastewater treatment units

CO4:describe the secondary treatment of wastewater

CO5: describe the methods for wastewater disposal & sludge handling.

Board of Studies (BoS):

Academic Council:

16th BoS of Civil held on 05.01.2022.

18th Academic Council held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	-	-	М	-	-	L	Н	L	M	M	-	М	L	-	Н
CO2	-	-	L	-	-	-	Н	L	M	M	-	М	L	-	Н
CO3	-	-	М	-	-	L	Н	L	M	M	-	М	L	-	Н
CO4	-	-	М	-	-	-	Н	L	M	M	-	М	L	i	Н
CO5	-	-	L	-	-	М	Н	Ĺ	M	M	-	М	Ĺ	-	Н

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG No.6: Clean Water and Sanitation

The understanding of water and wastewater treatment leads to the development of sustainable technologies for treatment and management of water and wastewater.