



**BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE  
(AUTONOMOUS)  
DEPARTMENT OF CIVIL ENGINEERING**

<b>REGULATION</b>	<b>BR23</b>				
<b>III B. TECH II SEMESTER</b>	<b>Course Code: 23CE6T03</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Course Title:</b>	<b>ENVIRONMENTAL ENGINEERING</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Learning Objectives:**

The course will address the following:

1. Outline planning and the design of water supply systems for a community/town/city
2. Provide knowledge of water quality requirement for domestic usage and knowledge on design of water distribution network
3. Selection of valves and fixture in water distribution systems
4. Outline the planning and design of Sewerage System for a community/town/city
5. To impart knowledge on wastewater treatment and disposal

**Course Outcomes:**

Upon successful completion of this course, the students will be able to:

- a. Plan and design the water and distribution networks and sewerage systems
- b. Able to identify the appropriate source of water based on quality and quantity requirements
- c. Select a suitable treatment for raw water treatment as well as sewage treatment
- d. Decide the manner of disposal of wastewater

**SYLLABUS:**

**UNIT-I**

**Introduction:** Importance and Necessity of Protected Water Supply systems. Water borne diseases. Planning of public water supply systems. Per capita demand and factors influencing it, types of water demand and its variations, factors affecting water demand, Design Period, Factors affecting the Design period, estimation of water demand for a town or city, Population Forecasting.

**Sources of Water:** Various surface and subsurface sources considered for water supply and their comparison- Capacity of storage reservoirs, Conveyance of Water from the source to the point of interest: Gravity and Pressure conduits, Types of Pipes and Pipe joints.

**UNIT-II**

**Quality and Analysis of Water:** Physical, Chemical and Biological characteristics of water. Water quality criteria for different uses- Rural, Municipal, Industrial and Agricultural uses. Drinking water quality standards: IS and WHO guidelines.

**Distribution of Water:** Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods – Appurtenances of water distribution system–Laying and testing of pipe lines.

Dr M C S MADAN HOD & BOS, Department of Civil Engineering, BVCITS Batlapalem	Dr G Yesuratnam Professor of Civil Engineering JNTU Kakinada (University Nomine)	Dr A Murali Krishna, Professor, Department of Civil Engineering, IIT Tirupathi.	Dr B Raghuram kadali, Asst Assistant Professor, Department of civil Engineering, NIT Warangal.	Mr P Rajesh Sr Engineer(P)SDVVL Survey &Constructions, Kakinada (Industrial Expert)	Mr Chakradhar Prasad Assistant Professor, Department of civil DNR College of Engineering Technology Bhimavaram. (Alumni Member)



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**UNIT-III**

**Treatment of Water:** Typical treatment flow of a municipal water treatment plant, Unit operations of water treatment: Theory and Design of Sedimentation, Coagulation, flocculation, Filtration, Water conditioning and softening, Disinfection, Removal of color and odors – Removal of Iron and manganese – Fluoridation and De-fluoridation – Ion Exchange - Ultra filtration- Reverse Osmosis.

**UNIT-IV**

**Planning and Design of Sewerage System**

Characteristics and composition of sewage — population equivalent -Sanitary sewage flow estimation — Sewer materials — Hydraulics of flow in sanitary sewers — Sewer design — Storm drainage-Storm runoff estimation — sewer appurtenances — corrosion in sewers — prevention and control — sewage pumping-drainage in buildings-plumbing systems for drainage **Primary Treatment of Sewage**

Objectives — Unit Operations and Processes — Selection of treatment processes — Onsite sanitation — Septic tank- grey water harvesting — Primary treatment — Principles, functions and design of sewage treatment units — screens — grit chamber-primary sedimentation tanks — Construction, Operation and Maintenance aspects.

**UNIT-V**

**Secondary Treatment of Sewage**

Objectives — Selection of Treatment Methods — Principles, Functions, — Activated Sludge Process and Extended aeration systems -Trickling filters– Sequencing Batch Reactor (SBR) — Membrane Bioreactor — UASB — Waste Stabilization Ponds — Other treatment methods -Reclamation and Reuse of sewage — Recent Advances in Sewage Treatment — Construction, Operation and Maintenance aspects.

**Disposal of Sewage**

Standards for– Disposal — Methods — dilution — Mass balance principle — Self-purification of river - Oxygen sag curve — de-oxygenation and re-aeration — Streeter–Phelps model — Land disposal — Sewage farming — sodium hazards — Soil dispersion system.

**TEXT BOOKS**

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – McGraw-Hill Book Company, New Delhi, 1985.
2. Water Supply Engineering. Dr. P.N. Modi, Standard Book House, Delhi.

**REFERENCES**

- 1.Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi,1996.
- 2.Water Supply Engineering. – Dr. B.C. Punima, A.K. Jain and A.K. Jain. Laxmi Publications (P) Ltd., New Delh
- 3.Water Supply and Sanitary Engineering – G.S. Birdie and J.S. Birdie,2010.

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