

EVPC2002 WATER SUPPLY ENGINEERING (3-0-0)

Course Objectives:

The course in Water Supply Engineering aims to provide students with a comprehensive understanding of water resource management and distribution systems. It seeks to develop advanced knowledge of water demand estimation, intake structures, treatment technologies, and distribution network design. Students will explore critical concepts including water quality, treatment processes, hydraulic systems, and economic considerations. The objective is to equip students with theoretical and practical skills in analyzing water supply challenges, understanding complex treatment methodologies, and applying sophisticated techniques for sustainable water resource management in urban and rural contexts.

Module I

Introduction: General outline of water supply; Water availability and uses; Temporal and spatial distribution; Key issues and concerns; Features and elements of a water distribution systems.

Water Demand: Concept of water demand; Estimation of water demand; Factors affecting demand; Components of demand; Demand fluctuations; Demand forecasting; Population forecasting methods

Water Intake: Intake of water; Types of intake; Intake Structures; Conveyance and intake conduits; Free flow and Pressure flow systems; Pumps and their capacity estimation; Economic diameter of water supply pipes

Module II

Treatment Philosophy: Storage structures, Reservoir designing, Storage Capacity of Distribution Reservoirs; Mass curve concepts; Design considerations for hourly, daily, weekly and seasonal regulation

Water Quality and Treatment: Water quality assurance; Water quality standards; Philosophy of treatment; Unit operations and unit processes; sedimentation, sedimentation; Conventional Water Treatment: Coagulation and flocculation; Clariflocculation; Filtration: Slow and rapid gravity filter, multi-media filters and pressure filters

Module III

Water Treatment: Disinfection and Advanced Treatment: Disinfection through chlorination and other methods; Advanced methods of water treatment; Advanced oxidation processes; Removal of iron and manganese, hardness, fluorides, colour, taste and odour, dissolved metals and gases

Water Distribution Networks: Water Distribution; Hydraulics of pipe network design; Layouts of Distribution Network; Pipe network analysis; Hardy Cross method.

Module IV

Water Losses and Control: Water-losses in water supply systems; Advanced Water Distribution Design Approaches: Sectorization of distribution networks; Automation in distribution systems; Concept of Smart Water Supply System for India cities; Apparent and real losses; water loss detection methods; water losses reduction strategies, Automation in Water Supply: Automation in water supply

Water Economics and Pricing: Economics of water supply systems; Calculation of investments and operational costs; Cost optimization; Approaches of water metering; Water

pricing for sustainability; Pricing water in context to Indian cities; Issues and approaches; Existing water pricing models; Case studies

Text and Reference Books:

1. Environmental Engineering (Volume I & II) by S. K. Garg-Khanna Publishers
2. Environmental Engineering (Volume I & II) by B. C. Punmia-Khanna Publishers
3. Environmental Engineering by H. S. Peavy, D.R. Rowe and G. Tchobanoglous, MGH.

Course Outcomes:

1. To explore the sources of water, general requirement for water supply and characterize water.
2. To study the principles of water treatment and design treatment units.
3. To provide insight to smart water supply systems including automation, leakage detection
4. To understand the financial sustainability of water supply systems and sustainable water pricing models