

PGDFLP21: Water Supply and sanitation systems – Syllabus

Course Objectives

This course provides a comprehensive understanding of water supply and sanitation systems used in residential, commercial, institutional, industrial, and high-rise buildings. It emphasizes planning, design, operation, maintenance, and sustainable management of water supply, drainage, sewerage, and wastewater systems in accordance with the National Building Code (NBC 2016), CPHEEO Manuals, and relevant Indian Standards.

Course Modules

Module 1: Introduction to Water Supply and Sanitation

- Importance of water supply and sanitation in the built environment
- Components of water supply and sanitation systems
- Water cycle and urban water management
- Plumbing codes, standards and regulations
- NBC and CPHEEO guidelines

Module 2: Water Sources and Demand Assessment

- Surface and groundwater sources
- Water quality standards
- Water demand estimation
- Per capita consumption
- Water conservation strategies

Module 3: Water Treatment and Storage

- Water treatment processes
- Storage reservoirs
- Underground and overhead water tanks
- Pumping systems
- Distribution reservoirs

Module 4: Water Distribution Systems

- Direct and indirect water supply systems

- Pipe network planning
- Pipe materials and fittings
- Valves and accessories
- Hydro-pneumatic and pressure boosting systems

Module 5: Building Water Supply Systems

- Cold and hot water supply systems
- Internal plumbing layouts
- Fixture unit concept
- Pipe sizing
- High-rise water supply systems

Module 6: Sanitation and Building Drainage

- Principles of sanitation
- Soil, waste and vent systems
- Building drainage
- Traps, vents and interceptors
- House drainage systems

Module 7: Sewerage and Wastewater Management

- Sewer systems
- Sewage collection and conveyance
- Wastewater characteristics
- Sewage treatment processes
- Septic tanks and decentralized wastewater treatment systems

Module 8: Storm Water Drainage and Rainwater Harvesting

- Surface and roof drainage
- Storm water drainage design
- Rainwater harvesting systems
- Groundwater recharge
- Urban flood management

Module 9: Sustainable Water Management

- **Water-efficient plumbing fixtures**
- **Greywater recycling**
- **Recycled water reuse**
- **Green building water systems**
- **Smart water metering, IoT and BIM applications**

Module 10: Operation, Maintenance and Safety

- **Inspection and testing of water supply and sanitation systems**
- **Leak detection and preventive maintenance**
- **Water quality monitoring**
- **Occupational health and safety**
- **Case studies of building water supply and sanitation systems**

Recommended Textbooks

1. **B. C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, *Water Supply Engineering*, Laxmi Publications.**
2. **S. K. Garg, *Water Supply Engineering*, Khanna Publishers.**
3. **S. C. Rangwala, *Water Supply and Sanitary Engineering*, Charotar Publishing House.**
4. **E. W. Steel & Terence J. McGhee, *Water Supply and Sewerage*, McGraw-Hill.**
5. **A. F. E. Wise & J. A. Swaffield, *Water, Sanitary and Waste Services for Buildings*, Routledge.**

Reference Codes and Manuals

- **National Building Code of India (NBC 2016) – Part 9: Plumbing Services.**
- **CPHEEO Manual on Water Supply and Treatment.**
- **CPHEEO Manual on Sewerage and Sewage Treatment Systems.**
- **IS 1172 – Code of Basic Requirements for Water Supply, Drainage and Sanitation.**
- **Relevant Bureau of Indian Standards (BIS) specifications for plumbing materials, fittings, storage tanks and water supply systems. The CPHEEO manuals remain the**

principal technical references for municipal water supply and sewerage design in India, while NBC Part 9 governs building-scale plumbing systems.