

PGDFLP21: fundamentals of plumbing systems – Syllabus

Course Objectives

The course introduces students to the principles of plumbing engineering and building water supply, sanitary drainage, storm water management, and sustainable plumbing practices. It provides the knowledge required for planning, designing, operating, and maintaining plumbing systems in residential, commercial, institutional, industrial, and high-rise buildings in accordance with the National Building Code (NBC), CPHEEO Manuals, and relevant Indian Standards.

Course Modules

Module 1: Introduction to Plumbing Engineering

- Evolution and scope of plumbing engineering
- Components of plumbing systems
- Plumbing terminology
- Role of plumbing in healthy buildings
- Plumbing codes and standards

Module 2: Water Supply Systems

- Sources of water
- Water quality requirements
- Water demand estimation
- Domestic water supply systems
- Cold and hot water distribution

Module 3: Plumbing Materials and Fixtures

- Pipe materials (GI, Copper, CPVC, UPVC, HDPE, PPR, DI, Stainless Steel)
- Pipe joints and fittings
- Valves
- Plumbing fixtures and accessories
- Selection criteria

Module 4: Internal Water Distribution

- Building water supply layouts

- Direct and indirect systems
- Overhead and underground storage tanks
- Pumps and hydro-pneumatic systems
- Pressure zoning in high-rise buildings

Module 5: Sanitary Plumbing Systems

- Principles of sanitation
- Soil, waste and vent systems
- One-pipe and two-pipe systems
- Traps, vents and interceptors
- Building drainage layouts

Module 6: Storm Water Drainage and Rainwater Harvesting

- Surface drainage systems
- Roof drainage
- Rainwater pipes and gutters
- Rainwater harvesting techniques
- Sustainable storm water management

Module 7: Plumbing Design Principles

- Fixture unit concept
- Water demand calculations
- Pipe sizing principles
- Hydraulic considerations
- Preparation of plumbing layouts

Module 8: Plumbing in Special Buildings

- High-rise buildings
- Hospitals
- Hotels
- Commercial complexes and malls
- Industrial buildings

- Green building plumbing concepts

Module 9: Installation, Testing and Maintenance

- Plumbing installation practices
- Inspection procedures
- Leak testing
- Commissioning
- Preventive maintenance
- Common plumbing defects and troubleshooting

Module 10: Codes, Standards and Emerging Technologies

- NBC 2016 (Part 9: Plumbing Services)
- CPHEEO Manuals
- Relevant BIS standards
- Uniform Illustrated Plumbing Code (UIPC-I)
- Water-efficient plumbing systems
- Smart plumbing, IoT-based water management and BIM applications in plumbing design.

Recommended Textbooks

1. S. C. Rangwala, *Water Supply and Sanitary Engineering*, Charotar Publishing House.
2. B. C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, *Water Supply Engineering*, Laxmi Publications.
3. G. S. Williams, *Plumbing, Sanitation and Domestic Engineering* (Volumes I–IV), McGraw-Hill.
4. A. F. E. Wise & J. A. Swaffield, *Water, Sanitary and Waste Services for Buildings*, Routledge.
5. Deolalikar, *Plumbing Engineering*, Tata McGraw-Hill.

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.

- **Uniform Illustrated Plumbing Code – India (UIPC-I).**
- **Relevant Bureau of Indian Standards (BIS) codes for plumbing systems and water supply.**