

Open Elective: Plumbing Engineering

Section I

Unit I

1. Introduction to Plumbing Engineering 4 hours
Definition – Plumbing Engineering/Public Health Engineering, Indian plumbing industry, Roles of Plumber, Plumbing Contractor, Plumbing Consultant, Plumbing terminology, Principles of plumbing, head and pressure, plumbing hydraulics and pneumatics, Effect of frictional loss in pipes, Properties of water, Norms for water qualities (CPCB), alternate water sources, benefits, hazards and precautions (GPCS-I).

2. Introduction to Codes and Standards 4 hours

Introduction to UPC-I and ITM, other codes applicable in plumbing, Approvals, Authority Having Jurisdiction, General regulations, Testing and labelling, alternative materials, workmanship and minimum standards, Prohibited fittings and practices, Local laws related to plumbing, Architectural and structural coordination, Plumbing shafts, Sunken toilet floors, Ledge walls.

Unit II

3. Plumbing fixtures and fittings 4 hours

Plumbing Fixtures, Water conserving fixtures, Rating system for Water Efficient Products (WEP-I), Water closets, Bidets, Urinals, Flushing devices, Lavatory and bath units, Kitchen sinks, Water coolers/purifiers, Drinking water fountain, Clothes washers, Mop sinks, Dish washers, Receptors, Overflows, Strainers, Prohibited fixtures, Floor slopes, Minimum spacing, Standard heights.

4. Water Supply 4 hours

Types of water supply pipes, fittings and joints, Galvanized iron, Copper, Stainless steel, HDPE, MDPE, Rigid PVC, CPVC, PPR, Composite pipes (PE-AL-PE), PEX, Joints, jointing methods and materials, tools etc, Pipe protection, Velocity, pressure and temperature limitations, Water Supply Fixture Units (WSFU), sizing, testing, valves and regulators, backflow prevention, Commissioning, Water tanks.

Unit III

5. Traps and Interceptors 4 hours

Traps – purpose, Fixture traps and floor traps, types of traps, prohibited traps, trap arm, developed length, trap seal, trap seal protection, venting of traps, trap primers, Building traps, Clarifiers, Grease interceptors, sizing, oil and sand interceptors.

6. Vents 4 hours

Vent requirement, Trap seal protection, Parts of vent system, Materials, Sizing, Vent connections, Flood rim level, Island sink venting, Venting of interceptors, Water curtain and hydraulic jump, Termination of vent stacks, Stack venting, Yoke vent, Wet venting.

Section II

Unit IV

7. Sanitary Systems 3 hours
Fixtures, Appliance and Appurtenance, Classification of fixtures, Soil and waste Vs black and gray water, Soil fixtures, bathroom fixtures, Accessories, Indirect waste connections, Food handling establishments, Fixtures below invert levels.
8. Building Drains 6 hours
Introduction, Four systems of plumbing – one pipe and two pipe systems, Air admittance valves and Sovents; Comparison of systems, Vent pipe, Siphonic action, Protection of trap seals, Anti-siphon and vent pipes, Loop, Circuits, Types of building drainage pipes, fittings and jointing methods, Clean-outs, Drainage Fixture Units (DFU), Sizing, Testing, Case Study.

Unit V

9. Rain (Storm) Water Drainage 3 hours
Introduction, Measurement of rainfall, Rainfall intensity, Primary and secondary drains, Conductors and leaders, Runoff coefficient, Primary and tributary catchment areas, Piping system, Sizing of gutters, channels and pipes, Traps required, Rainwater harvesting, Design, Components of RWH, Surface and sub-surface storage and recharge systems, sub-soil drains.
10. Solar Hot Water 3 hours
Introduction to USEC-I, Open and closed loop system, Capacity, Sizing, Space requirements for solar systems, Flat plate collectors, Evacuated Tubes, Hot water tanks, Hot water distribution, Safety, Water and energy conservation.

Unit VI

11. Building Sewers 3 hours
Drainage fixture units, Change in direction of flow, Hydraulic jump, Sudsing stack, Cleanouts, Pipe grading, Pipes and fittings suitable for building sewers, RCC, PVC, Nu-Drain, Stoneware etc., Sizing, Testing, Types of traps, gully, chambers and manholes, materials, venting, sizing, testing. Sumps, Pumps, Sewage disposal, Septic tanks.
12. Plumbing in High-rise Buildings 6 hours
Definition of high-rise, Multiple storage tanks, Plumbing shafts, Break pressure tank, Water supply, Hydro-pneumatic system, Pressure Reducing Valves, Building drainage system, Rainwater system, Sizing, Testing, Case Study. Introduction to centralized hot water supply, System types, Principles of design, Pressure conditions, Insulation, Return Circulation, Sizing, Testing.