

**Module 1**

**Chapter 1 : Water Supply and Quality of Water**

**1-1 to 1- 20**

**1.1 Water supply :** Water supply systems, water resources, types of intake structures, distribution systems of water and distribution layouts.

**1.2 Quality of water :** Introduction to pure water: potable, wholesome, palatable, distilled, polluted and contaminated water, drinking water standards and characteristics of water, water borne diseases.

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**Module 2**

**Chapter 2 : Water Treatment**

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**2.2 Coagulation and flocculation :** Principle of coagulation, flocculation, Clari flocculator, coagulants aids.

**2.3 Filtration :** rapid sand filters, operation, cleaning and back-washing, Entire design of rapid gravity filter with under drainage system. Pressure filter : Construction and operation

**2.4 Disinfection :** Different methods of disinfection, chlorination and chemistry of chlorination, chlorine demand, free and combined chlorine, various forms of chlorine, types of chlorination. Numerical to calculate quantity of required chlorine doses.

**2.5 Advanced and Miscellaneous Treatments :** Water softening by lime soda process and by base exchange method, Reverse Osmosis, Activated carbon, Membrane filtration, Removal of Iron and Manganese.

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**Module 3**

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<b>Chapter 3 : Building Water Supply, Drainage and</b>	
<b>Rainwater Harvesting</b>	<b>3-1 to 3-30</b>

**3.1 Building water supply :** Water demands, Per capita Supply, Service connection from main, Water meter.

**3.2 Building drainage :** basic principles, traps-types, location and function, Systems of Plumbing, anti siphonic and vent pipes.

**3.3 Rainwater harvesting :** Need for rainwater harvesting, Annual potential, Roof-top rain water harvesting. Numerical on annual rainwater harvesting potential.

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**Module 4**

**Chapter 4 : Domestic Sewage and Sewerage System**

**4-1 to 4-54**

**4.1 Sewage :** Introduction to domestic sewage, and storm water, System of sanitation, Physical and chemical characteristics, decomposition of sewage, BOD, COD, numerical on BOD. MPCB norms for disposal of sewage effluent.

**4.2 Sewerage system :** Systems of sewerage and their layouts: Separate, Combined and partially combined system, merits and demerits, self-cleaning velocity and non-scouring velocity, Sewer- Shape, hydraulic design of sewers, Laying and testing of sewers, manhole-location, necessity, types and drop manhole, ventilation.

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**5.2 Introduction to Biological Treatment** : Aerated lagoons, Oxidation ponds, oxidation ditches.

Self-purification of natural waterbodies : Oxygen economy, Disposal of treated effluent. Disposal of Raw and treated sewage on land and water, DO sag curve.

**5.3 Rural and Low-cost sanitation** : Septic Tank and Soak Pit –Operation, suitability and Design.

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**Module 6**

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