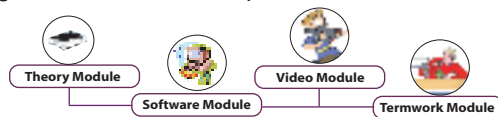


# Environmental Engineering



System Requirement:- IBM-PC Compatible with Window-OS, 128 MB RAM/Multimedia Kit

## Theory module

**Features :** Theory, Figures, Photographs, Animations with controller, Highlighter tool, Note creation facility, Systematic page navigation, Printing facility, Access to numerical modules, Access to Videos at appropriate locations.

## List of Topics

### A. Water Supply Engineering



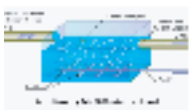
**Introduction:-** General Importance of environmental engineering, Need for protected water supply-water borne diseases, Need for disposal of waste.

**Estimation of Demand of Water:-** Water requirement for Domestic, Public & Industrial needs, Fire demands, Losses and wastage, Rate of demand, Factors affecting rate of demand, Minimum requirement as IS 1172, Variation in rate of demand, Design period for water supply scheme, Forecasting population, Methods of forecasting, Problems, Estimation of total quantity of water for a town.

**Sources of Water:-** Classification of sources: Surface and Sub-surface, Adequacy of source, Intakes-Canal intake, Reservoir intake, River intake, Lake Intake, Factors governing location and Construction of intakes.



**Quality of Water:-** Meaning of potable water, Impurities present in water and its classification, Need for analysis of water. Test on water, Physical tests for colour, taste and odour and turbidity. Chemical test for total solids, hardness, chlorides, dissolved gases, pH, Nitrogen & its compound, Bacteriological tests, E-coli index MPN.



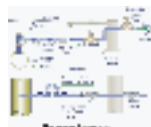
**Treatment of Water:-** **Aeration:** Object of aeration, Methods of aeration, Fountain. **Sedimentation:** Objects of sedimentation, Plain sedimentation, Sedimentation with coagulation, Principles of coagulation, Types of coagulants, Choice of coagulants, Process of coagulation. Sedimentation tanks, Types, Construction, Working and Design aspects. Study of clarifloculator. **Filtration:** Objects of filtration, Theory of filtration,

Filter media, Depth and grading of sand bed, Classification of filters-Slow sand filters & Rapid sand filters, Construction, Working and Design aspects. **Disinfecting:** Objects of disinfecting, Methods of disinfection and chlorinating, Different forms of chlorinating, Point of chlorination, Residual chlorine and orthotolidine test. Flow diagram of water treatment plants, Components of a water treatment plan.

**Conveyance of Water:-** Schematic arrangement of water supply scheme, Jack well, Pump house, Pumps, Rising main. Different types of pipes used for conveyance of water, Choice of pipe material, Joints in cast iron & concrete pipes, Laying of pipes, Testing of pipe lines, Pressure test and leakage test. **Valves:** Sluice valve, Air-relief valve, Pressure relief valve, Their functions, Uses and location on a pipeline.

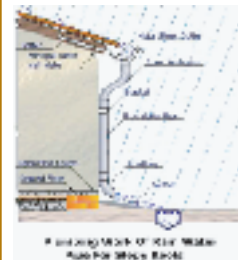
**Distribution of Water:-** **Methods of distribution:** Gravity, pumping and combined system,

**Service reservoirs:** Purpose and types. **Layouts for distribution system:** Dead end, Grid iron, Circular and Radial system, Their suitability, Merits and Demerits.



**Water Supply Arrangements in Building:-** Water main, Service pipe, Distribution pipe. Connection from water main to building. Study of water supply layout arrangement for building with reference to cock, valves, Junctions and tap connections, Selection of appropriate diameters and class of pipes.

## B. Sanitary Engineering



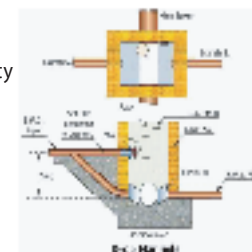
**Introduction:-** Necessity of building sanitation, **Terms:** Sewage, Sludge, Refuse, Garbage, Rubbish, Storm water sanitary sewage, Domestic sewage.

**Building Sanitation:-** **Terms:** Water pipe, Rain water pipe, Antisiphonage pipe, Waste pipe, Drains. Building sanitary fittings -Water closet, Flushing cistern, Wash basin, Sinks, Urinals, Traps-Nahni trap, Gully trap. **Systems of plumbing:** Single stack system, One pipe system, Two pipe system, Choice of system. Principles governing design of building drainage, Layout plan for building sanitary fittings (drainage plan) minimum size of drains and their slopes, Inspection and Junction chambers, Their necessity, Location, Size and shape, Maintenance of sanitary units.

**Solid Waste and its Disposal:-** Dry refuse- Common constituents of dry refuse, Collection & methods of dry refuse.

**Conservancy System / Rural Sanitation:-** Removal of night soil, Disposal of excreta, Bore hole Latrine, Aqua privy.

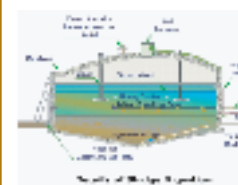
**Types of Sewerage Systems:-** **Systems of Sewerage:** Separate systems, Combined system, Partially separate system, Comparison and their suitability. **Types of sewers:** Shapes and materials used, Their suitability and selection. **Design of sewers:** Quantity of sewage, Self cleaning velocity, Gradient of sewers, Size of sewers, Use of tables in design of sewers. Laying of sewers, Testing of sewers, Maintenance of sewers.



**Sewer Appurtenances:-** Man hole- Component parts, Location, Spacing and construction. Drop man holes, Sewer inlets-streets inlets. Flushing tanks.

**Analysis of Sewage:-** Characteristics of sewage, B.O.D. and its significance, Strength of sewage, Aerobic and process.

**Sewage Treatment:-** Objects of sewage treatment, General layout, Flow diagrams of sewage treatment plant for a small town including primary & secondary treatment. Introduction and function of grit chamber, Skimming tank, Sedimentation tank, Sludge digestion tank and trickling filters. Activated sludge process, Flow diagram & working, Disposal of sewage-Sludge and its disposal. Principles of septic tank, its digestion & working in respect of small colony / residential building. Use of standard tables for design of septic tank, Soak pit. Gobar gas plant, Miscellaneous methods-Oxidation pond, Oxidation ditch.



**Industrial Waste:-** Types of industrial waste-Hazardous & Non hazardous waste, Major characteristics of waste from the following industries-Textile, Sugar, Leather, Dairy, Food, paper & pulp. General idea regarding disposal of waste from above industries.

**Air Pollution:-** Introduction, Causes of air pollution, Noise pollution, Introduction to global warming, Acid rain.

