

ENVIRONMENTAL ENGINEERING, PUBLIC HEALTH ENGINEERING
AND
WATER TECHNOLOGY & HEALTH SCIENCES

Total Marks: 100 Marks

Unit 1:-Materials of Construction, Construction Technology & Concrete Technology:

20marks

Materials of Construction - Stones - Classification of rocks, qualities of good building stone, quarrying of stones, Bricks - Manufacturing process, types, tests, Timber - Classification, defects, preservation, seasoning, market forms of timber, Cement - Composition, types, tests, uses, Paints, varnish & distemper - Ingredients, types, Ferrous, Non-Ferrous and Alloy – Properties and Uses

Construction Technology - Types of foundation & suitability, SBC of soil, Technical terms in Brick & stone masonry, Types of damp proofing materials, types of Doors & windows, fixtures for doors & windows, Lintel & arches, Scaffolding, shoring & under pinning, Technical terms in stair, types of stairs, Types of roof, Plastering & pointing, types of floors, Ventilation.

Concrete Technology - Ingredients of concrete, Admixture, W/C ratio, Grade of concrete & steel, Curing, Special concrete, High strength concrete & steel for Pre stressing, Post tensioning, Pre tensioning.

Unit -2: Surveying & Hydraulics

-20marks

Chain surveying- Types of survey, principles of survey, ranging, offsets, instruments for setting perpendiculars, errors in chain surveying.

Compass survey – Bearing, meridian, system of bearing, prismatic & surveyor compass, dip, declination, local attraction, open & closed traverse.

Leveling - Terms in leveling, Bench mark, Types of leveling, L/S, C/S, contouring computation of area, volumes, minor instruments.

Theodolite surveying – measurement of horizontal & vertical angles, deflection angle, latitude, departure, Bowditch's & Transit rule.

Trigonometric leveling – height & distance for different cases.

Tacheometry – Definition, stadia, system of Tacheometry.

Curves- Types, elements of curve, designation, setting out curves – Chord Produced and Rankin's Method

Modern survey instruments - GIS, GPS, remote sensing, Total Station – Fundamentals, Working Principles, Advantages and Disadvantages

Fundamentals – properties of fluids, total pressure, centre of pressure for circular, rectangular & triangular vertical plates.

Flow of fluids – Types of flow, Bernoulli's equation, continuity equation.

Flow through orifices, Notches and Weirs – Orifice - Types of orifice, Vena contracta, Hydraulic co-efficient & their relationships, Notches – Types of Notches, discharge over rectangle triangular & trapezoidal notches, Mouth Piece – Types, Weirs – Types of Weirs, discharge over rectangular and cippolitte weir

Flow through channels – Types, Chezy's & manning's formula, Most economical section.

Flow through pipes – Types of Major & minor losses, water hammer, surge tanks.

Unit – 3: Water Supply Engineering & Environmental Chemistry:**-20marks**

Hydrologic cycle and its components.

Sources of water: Surface Sources - Lakes, Streams, Rivers. Impounded Reservoirs. Underground Sources - Infiltration Galleries, Infiltration Wells and Springs.

Intake and Conveyance of water: Types of intakes, Conveyance of Water - Open Channels and Pipes, Pipe corrosion and remedial measures

Quality of Water: Impurities of water - organic and inorganic classification and examination of water. Physical - temperature, colour, turbidity, taste and odour. Chemical - pH Value, Total Solids, Hardness, Chlorides, Iron and Manganese, Fluoride and Dissolved Oxygen.

Treatment of Water: working and operation of the following units - plain sedimentation, sedimentation with coagulation, flocculation, filtration-Slow sand filters, Rapid sand filters and pressure.

Distribution System: General Requirements, Systems of Distribution - Gravity System, Combined System, Direct Pumping. Methods of Supply - Intermittent and Continuous. Distribution Systems. Storage - Underground, Ground Level And Overhead Service Reservoirs – Necessity and Accessories.

Appurtenances in Distribution System: Use of Sluice Valves, Check Valves, Air Valves, Scour Valves, Zero Velocity Valves, Fire Hydrants, Water Meter.

Introduction: chemistry fundamentals, methods of sampling gravimetric & volumetric analysis, calorimetric methods of water analysis.

Chemical equivalents: atomic structure, types of chemical bonds, equivalent weight, normal solution, normality, molarities, lecheteliers principle, common ion effect.

Colorimetric analysis: lamberts & beers law, photoelectric colorimeters, spectrophotometers, colour comparison tubes, calibration & use, flame photometers.

Absorption and adsorption: difference between absorption & adsorption, importance of adsorption in environmental engineering, use of activated carbon as an adsorbent.

Organic chemistry: BOD & COD, significance of DO, TOD & TOC.

Colloidal chemistry: meaning & size, types of colloids- lyophilic colloids & lyophobic colloids, properties of colloids,

Bio chemistry: meaning of enzymes and their importance, effect of temperature on aerobic & anaerobic bio chemical processes, effects of ph on biochemical reactions.

Surface Chemistry: definition & application of osmosis and dialysis.

Unit – 4: Sanitary Engineering & Industrial Waste Water Treatment:**-20marks**

Introduction: Definition of sullage, sewage, sewerage, sewer, refuge, garbage. Aims and objectives of sewerage work, systems of refuge disposal and water carriage system.

Quantity of sewage: Domestic and industrial sewage, volume of domestic sewage, variability of flow, limiting velocities-Self cleansing and Maximum velocities of sewer.

Characteristics and analysis of sewage: Strength of Sewage, Sampling of Sewage to analyze for Physical, Chemical and Biological Parameters, Decomposition of sewage, Analysis of Sewage

Sewerage systems: Types of Sewerage System and their Suitability - Separate, Combined and Partially Separate Systems, Types of Sewers - Stoneware, Cast Iron, Cement Concrete, AC Pipes, Pre-Cast Sewers, PVC sewer (SWR grade), and laying of sewers

Surface and storm water drainage: Determination of Storm Water Flow, Run-Off Co-Efficient, Time of Concentration, Empirical Formulae for Run-Off, Surface Drains - Requirements, Shapes, Laying and Construction.

Sewer appurtenances: Location, Function and Construction of Manholes, Drop Manholes, Inlets Catch Basin, Traps, Flushing Tanks, Regulators.

Sewage treatment: Preliminary Treatment - Screens Skimming Tanks and Grit Chambers, Sedimentation and Septic Tanks

Secondary Treatment - Trickling Filters Activated Sludge Process, Oxidation Ponds, Oxidation Ditches, Aerobic Lagoons, Anaerobic Lagoons, Rotary Biological Disc.

Tertiary treatment – Activated sand filter and chlorination.

Sewage Disposal - Dilution, Self purification of streams, factors affecting self purification. Disposal in Sea water, Disposal on Lands, . Recycle of wastewater

Sludge treatment & Disposal - Sludge digestion tank, Sludge drying bed.

Sanitation in buildings and sanitary fittings - Importance and Requirement of Building Drainage, Sanitary Fittings- Water Closets, Flushing Cisterns, Urinals, Inspection Chambers, Traps, Anti-syphonage.

Pollutants – Classification & Sources, Characteristics of Industrial Wastewater, Characterization of waste from – Pulp & Paper mill, Pharmaceutical, Distilleries, food processing, dairy, tannery, sugar industries.

Industrial Wastewater Minimization – Volume reduction, strength reduction, Equalization, Proportioning & Neutralization. Treatment & Disposal methods of Industrial Wastewater.

Unit – 5: Air pollution monitoring and control and Environmental Sanitation: -20marks

Introduction: Air pollution, importance & composition of atmosphere, sources and classification of air pollutants.

Meteorology and air pollution: Meteorological factors influencing air pollution

Factor affecting human health: Health effects, effect of specific pollutant on human, effect of specific pollutant on animals

Effect of air pollutant on plants: Structure of normal leaf, air pollutants affecting plants, forms of damage to leaves & injury to plants, effect of specific air pollutants on plants

Economic effect of air pollution: Material damage and economical loss due to air pollution,

Control of air pollution: objectives of using control equipments settling chambers, cyclone, bag filters, electrostatic precipitator, scrubber, factors affecting choice of equipment.

smoke pollution:-sources and effects of smoke

Introduction: Definition of health and sanitation.

Communicable diseases: Definitions- epidemic, endemic, epizootic, channel of infection, Vehicle of infection, Incubation period,

Disease communicated by intestinal discharge. Typhoid fever , Hook worm disease

Disease communicated by nose and throat discharges.

Disease of animals transmitted to the human beings-Anthrax, Rabies and Brucellosis,

General method of control of communicable diseases.

Food sanitation: Importance of food sanitation, Agencies through which food may cause suffering or death. Food borne diseases; Food poisoning. Streptococcus intoxication and botulinous intoxication, Storage & protection of food in restaurant, Milk borne diseases, Essentials of milk sanitation. Health and habits of dairy workman, dairy barn, milk house, pasteurization of milk

Excreta disposal in unsewered areas: Importance, & requirements of sanitary latrine, Pit privy, Bore hole privy, Aqua privy, Concrete vault privy.

Institutional sanitation: Importance of school sanitation, School health programme, Selection site for School building, furnishing for school

Occupational hazards: Occupational hazards from various sources, General methods for protection of workers from occupational hazards, Threshold limit value , Disease caused due to inhalation of dust & their control, Disease caused due to industrial poisons, Light, heat, compressed air as occupational hazard