

Syllabus of Certificate Course in Soil and Water Analysis

Unit-I: - Soil Analysis

Topic – I [3 Hours]

Definition of Soil, Concept of Lithosphere, Soil as a natural body, Soil Components: Air, Water, inorganic and organic solids.

Topic –II [2 Hours]

Formation of Soil, Types & Basic Concepts of Soils. Soil Profile & Classification.

Topic –III [6 Hours]

Physical and Chemical Properties :-

Soil Separates, Texture, Aggregation and Structure, Temperature, Colour, Properties of Soil Mixture, Pore Space, Bulk Density, Particle Density, Aeration and Drainage, Compaction, Surface area, Soil water relationships. Morphology of Colloids, Chemistry of Clays, Ionic Exchange, Acidity, Alkalinity, pH, Salinity, Reactions in Liming and Acidification.

Biological Properties of soil :-

Soil Organic Matter, C: N Relationships, N-Transformation, Soil Organisms, Sulfur Transformation. Importance of Soil Testing and Analysis

Topic-IV [4 Hours]

Sample Collection and Processing Purpose of Soil testing and analysis, selection of field, Method of Soil Sample collection Methods of soil sample processing, precautions during soil collection & processing. Preservation labelling and storage of soil samples. Preparation of Soil analysis and test report.

Unit-II: - Water Analysis

Topic-I [3 Hours]

Introduction: Water and its Quality Parameters- Chemistry of water -Water resources- Hydrological cycle-Water quality parameters and drinking standard-Physical, Chemical quality of drinking water-Biological quality of drinking water.

Topic –II [5 Hours]

Water Analysis-Water composition analysis - Hardness testing-pH-Salinity-Turbidity-TDS -Conductivity testing-Minerals-BOD, COD, DO, Coli forms-Culture identification-MPN test-Microscopy: principles and practices-Staining methods. Water borne pathogen: Types and Detection-Portability of water.



Topic –III

[3 Hours]

Water treatment -Treatment of water: Flowchart of water treatment plant, Treatment methods (Theory and Design) Physico-chemical treatments: Sedimentation, Coagulation-flocculation, Settling tanks, Disinfection systems: Chemicals- Chlorination and other disinfection methods, Reverse osmosis technologies.

Topic –IV

[4 Hours]

Practical Analytical Methods - Introduction to analytical laboratory - Safety, Equipment's and techniques used in laboratory, Determination of hardness, pH, turbidity, conductivity, DO, BOD and COD, Analysis of metals and ions, Microbiological analysis.

Unit-III: - Practical and Field work

PRACTICALS

[15 Hours]

1. Determination of pH of soil and classification as acidic or basic soils.
2. Determination of electrical conductance of soil and hence total soluble salt contents.
3. Determination of Calcium Carbonate (CaCO₃) content of soils.
4. Determination of Gypsum requirement of alkaline soils.
5. Determination of available Phosphorous from soils by Colorimetric method.
6. Determination of Potassium from soil by flame photometer.
7. Determination of Sodium from soil by flame photometer
8. Determination of Calcium from soil by flame photometer.
9. Determination of Nitrate from soil.
10. Determination of pH of water samples.
11. Determination of COD of water samples.
12. Determination of BOD of water samples.
13. Determination of TDS of water samples.
14. Determination of turbidity of water samples

Field work and preparation of field report.

References:-

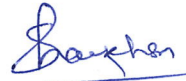
1. Hydrology - Principles, analysis and Design - H. M Ragunath, New age International Publications.
2. Standard Methods for the examination of water and waste water-APHA (Americal Public Health Association), AWWA (American Water Works Association), WEF (Water Environmental Federation)



3. Low cost waste water treatment technologies- R. K. Trivedy and Siddharth Kaul
4. Pollution and Bioremediation- PC. Trivedi
5. An Introduction to Environmental pollution- B. K. Sharma and H. Kaur



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