Certificate course in soil and water analysis

Under Ordinance 181

Paper-I Soil Analysis

Chapter: 1 Soil Chemistry **15 Hours**

Importance of soil, What is soil, Soil formation , Composition of soil, Soil profile, Types of soil, Acid-Base and Ion exchange reactions in soil, Micro and Macro plant nutrients.

Ref.1 Pages- 435-449

Chapter: 2 Soil Analysis 25 **Hours**

Soil fertility and productivity, Soil moisture measurement, Determination of soil pH and total nitrogen, Determination of total phosphorus, sulfur, manganese and iron, Determination of silica, lime and liming materials in soil, Determination of Salts in soil, Determination of sodium and potassium in soil by flame photometry, Determination of calcium and magnesium in soil, Mechanical analysis of soil

Ref. 1 Pages- 502-524

Chapter: 3 Soil Pollution **10 Hours**

Sources of soil pollution: Industrial waste, Urban waste, Radioactive pollutants, Agricultural practices, Metallic pollutants, Biological agents , Mining activities, Municipal garbage and soil sediments, Detrimental effect of soil pollution, Love Canal episode.

Ref.1 Pages- 450-465

Chapter: 4 Control of Soil Pollution **15 Hours**

Introduction, Control of soil pollution, Effective measures to prevent soil pollution, Biofertilizers, Natural pesticide and neem, Utilization of waste products, Ecological farming system, Integrated plant nutrient management, Integrated pest management, Bioremediation-Microbial clean up approach, Bioremediation of contaminated soil and toxic compounds,

Mycoremediation, Phytoremediation Biodegradability of organic matter, Cellulosic waste and lignin.

Ref.1 Pages- 486-501

Chapter: 5 Soil Erosion and Conservation 10 Hours

Introduction, Soil erosion, Methods of quantifying soil losses, Factors controlling soil erosion risk, Soil conservation

Ref.8 Pages- 10-26

Chapter: 6 Collection of Sample 15 Hours

Introduction, Types of soil samples for analysis, Disturbed and bulk soil samples, Handling and processing of the bulk soil sample, Storage of soil sample, Undisturbed or core soil samples, Handling and processing of the undisturbed soil samples, Laboratory analysis.

Ref.7 Pages- 1-7

References:

1. Environmental Chemistry 6th by H. Kaur page 435-449. (Chapter 1st)

2. Environmental Chemistry 7th by A. K. De page 71-77. (Chapter 1st)

3. Environmental Chemistry 6th by H. Kaur page 502-524. (Chapter 2nd)

4. Environmental Chemistry 6th by H. Kaur page 450-465. (Chapter 3rd)

5. Environmental Chemistry 6th by H. Kaur page 486-501. (Chapter 4th)

6. Analysis of Soil Physical Properties by S. K. Mujumdar and R. A. Singh page 1-7(Chapter 6th)

7. Soil, Plant, Water and Fertilizer Analysis by P. K. Gupta page 1-7. (Chapter 6th)

8. Ref.8 Soil Management problems and solution by Michael A. Fullen and John A. Catt Pages-

10-26. (Chapter 5th)

Paper-II Water Analysis

Chapter: 1 Hydrosphere **15 Hours**

Water resources: The hydrologic cycle, Physical Chemistry of sea water, Complexation in natural water and waste water, Aquatic biochemical process

Ref.1 Pages- 53-70

Chapter: 2 Water Quality Parameter **25 Hours**

Temperature, Colour, Teste and Odour, Turbidity, Foam and Froth, Conductivity, Dissolve Solid, P^H, Oxidation-Reduction Potential, Alkalinity, Acidity, Dissolve Oxygen, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Ammonia, Nitrate, Phosphate, Sulphate, Sulfide, Chloride, Silica, Hardness, Calcium, Magnesium, Sodium, Potassium, Iron, Heavy Metals, Detergents, Pesticides

Ref. 1 Pages-228-258

Ref.2 Pages-1-23

Chapter: 3 Sampling Methods **10 Hours**

Selection of sampling sites, sampling procedure, Preservation, handling of sample

Ref.2 Pages-23-34

Chapter: 4 Water Pollution **15 Hours**

Water Pollutants, Eutrophication, drinking water supplies and trace element in water

Ref.3 Pages- 197-216

Chapter: 5 Water Standards **10 Hours**

Drinking water standards: World health organization highest desirable limit and maximum permissible limit, Tolerance limit for industrial influents ISI standards for disposal of water Ref.4 Pages- 115-121

References:

1. Environmental Chemistry 7th by A. K. De page 53-70. (Chapter 1st)

2. Chemical and Biochemical methods for water pollution studies by R. K. Trivedi and P. K. Goel page 1-34. (Chapter 3rd)

3. Environmental Chemistry 7th by A. K. De page 197-216. (Chapter 4th)

4. Fundamentals of air and water pollution by P. C. Mishra page 115-121. (Chapter 5th)

Practical Course

Total 120 Hours

Part-I Analysis of soil and sediments 60 Hours

1. Visit to farmers fields for collection of soil samples. (Sampling techniques)
2. Preparation of various chemical reagents required for soil testing.
3. Processing of soil sampling for analysis
4. Determination of moisture content of soil by conventional oven method.
5. Determination of P^H of soil sample using P^H meter
6. Determination of electrical conductivity of soil sample using electrical conductivity meter
7. Determination of chloride content of soil sample.
8. Total alkalinity, soluble carbonates and bicarbonates determination from soil sample
9. Determination of available phosphorous from soil sample
10. Determination of total phosphorous in soil sample
11. Estimation of total organic matter in the soil
12. Determination of exchangeable ammonia in soil sample
13. Determination of nitrate in soil sample
14. Determination of exchangeable calcium and magnesium from soil sample
15. Determination of sodium and potassium from soil sample

Part-II Physico-chemical analysis of water (Any 15) 60 Hours

1. Sampling techniques (sample collection from site)
2. Determination of P^H of water sample using P^H meter
3. Determination of conductivity of water sample using conductometer
4. Determination of total dissolved solid present in water sample
5. Determination of alkalinity carbonates and bicarbonates present in water sample
6. Determination the acidity of water sample
7. Determination of CO_2 present in water sample
8. Determination of dissolved oxygen
9. Determination of Biochemical Oxygen Demand (BOD)
10. Determination of Chemical Oxygen Demand (COD)
11. Determination of ammonia
12. Determination of nitrates and nitrite
13. Determination of inorganic phosphorous
14. Determination of total phosphorous
15. Determination of sulfates
16. Determination of chlorides
17. Determination of calcium
18. Determination of magnesium
19. Determination of hardness of water

References

1. Chemical and Biochemical methods for water pollution studies by R. K. Trivedi and P. K. Goel.
2. Principles in quantitative analysis of water, fertilizers, plants and soils by Dr. U. S. Sree Ramula.

3. Soil properties, testing, measurement and evaluation by Cheng Liu and Jack B. Evett.