

# **Certificate Course in Water and Soil Analysis**



**SADAKATHULLAH APPA COLLEGE (AUTONOMOUS)**

**Rahmath Nagar, Tirunelveli - 627 011**

**Certificate in Water and Soil**

**Analysis**

**About the Course**

The Course is designed to develop the knowledge on analyzing of soil and water. It helps to enhance the analytical skills in laboratory atmosphere.

**Instructional Design**

This Course is of twelve months duration which includes Theory classes and Practical sessions, Assignment and Project Work.

**Eligibility**

All students who have passed Higher Secondary are eligible to enroll for the course.

**Scope of the course**

The Course provides enriching and rewarding career for the students. It opens up opportunities in analytical research and as technical laboratory personnel. The Certificate helps to secure jobs and also establish their own laboratory.

**DEPARTMENT OF CHEMISTRY**  
**Certificate Course in Water and Soil Analysis**

<b>PAPER-I</b>	<b>SOIL ANALYSIS-I</b>	<b>18NCHC11</b>	
<b>Total Hrs: 45</b>	<b>Hrs/ Week : 2</b>	<b>Hrs/ Unit : 9</b>	<b>Credits: 3</b>

**UNIT-I:**

Definition of soil-Major components of soil – Origin of earth- theories- Nebular hypothesis, Tectonic plate theory, Continental drift theory – Age of earth – Soil forming rocks-Classification-Igneous, metamorphic and Sedimentary rocks-characteristics and formation.

**UNIT-II:**

Composition of earth's crusts – Soil forming minerals – occurrence – classification – primary, secondary minerals – clay minerals – structure , weathering of rocks and minerals – Physical, chemical weathering and biological weathering.

**UNIT- III:**

Soil formation – soil forming factors – Active factors – climate , precipitation, temperature and vegetation – Passive factors – parent material, topography, Age of soil – Main soil groups of Tamil Nadu- Red soil , Black soil , Alluvial Soil, Saline and Alkaline soils- Soil survey-types and uses.

**UNIT -IV:**

Soil forming process – Eluviations and Illuviations, Accumulation of organic matter – Soil profile – Organic horizons (O), A, B, C, R – Specific pedogenic processes – Calcification, decalcification, salinisation, alkalization, podsolization and laterisation.

**UNIT -V: Soil Sampling and testing**

Soil testing – concept, objectives and basis- soil sampling, tools, collection processing, dispatch of soil samples-Determination of pH ,Electrical conductivity, bulk density, specific gravity, Moisture content, water holding capacity and Cation exchange capacity.

**Reference books:**

1. Analytical Agricultural Chemistry – S.L.Chopra and J.S. Kanwar, Kalyani Publishers, Fourth Edn., 1991
2. Text book of soil Science – Second Edn. T.D. Biswas and S.K. Mukherjee Tata McGraw – Hill 1994
3. Environmental Science and biotechnology – A G Murugesan and C Rajakumari MJP Publishers.

<b>PAPER-II</b>	<b>WATER ANALYSIS-I</b>	<b>18NCHC12</b>
<b>Total Hrs: 45</b>	<b>Hrs/Week : 2</b>	<b>Hrs/ Unit : 9</b>
		<b>Credits: 3</b>

### **UNIT-I: Properties of Water**

Introduction Molecular – structure of water – properties of water – physical properties- chemical properties – Anomalous properties of water- hydrogen bonding , Types of water, Freezing and Ice structure phase Diagram of Water, density, Taste, Compressibility, Viscosity ,Electrical Conductivity , Thermal-Conductivity, Specific and latent heat, Refractive index , Radioactivity, pH.

### **UNIT-II: Sources of Water**

Water resources of the planet – Hydrosphere – Components and Composition – Importance of hydrosphere - hydrological cycle – Origin of Oceans and Characteristic features of the primitive oceans – Mode of formation of ground water – process of formation of elements – Ground water – Features of surface water (ocean, sea, lakes and rivers)- features of ground water.

### **UNIT-III: Features of sea water& estuarine water**

Physical chemistry of sea water- chemical parameters and chemical composition of sea water- Geochemical balance – dissolved materials and their residence time in sea water – sea water model – chemical composition of Estuarine water – comparison of river water and sea water – Comparison of ground water and rain water in terms of chemical composition – characteristics of snow and ice , water vapour and vaporization.

### **UNIT-IV: Water quality parameters**

Important parameters measuring the quality of water – Parameters and standards – domestic water and surface water - sampling – preservations – sample collection – Water Quality standards for drinking water by WHO and ICMR –water quality standard for effluents (WHO &NEQSE).

### **UNIT-V: Water analysis-I**

Determination of colour , turbidity, Electrical conductivity, pH, Alkalinity, Acidity, Total hardness, Total solids, Total dissolved solids and Total suspended solids.

### **Reference books:**

1. Analytical Agricultural Chemistry- S.L.Chopra and J.S. Kanwar, Kalyani Publishers, Fourth Edn., 1991
2. Text book of soil Science – Second Edn. T.D. Biswas and S.K. Mukherjee Tata McGraw – Hill 1994
3. Environmental Science and biotechnology – A G Murugesan and C Rajakumari MJP Publishers.
4. Environmental chemistry – A. K. De, 4<sup>th</sup> edition , New Age International Publishers
5. Environmental chemistry with green chemistry – Asim K Das, Books and Allied PVT Limited.
6. All About water- N.W. Gokhale, CBS Publishers& distributors, First edition , 2009.
7. Environmental Chemistry by V.P.Kudesia, First edition, 2000.
8. A Textbook of Environmental Chemistry and Pollution Control S.S.Dara, S.Chand &Company Ltd, New Delhi, Fourth Edition,2001.

<b>PAPER-III</b>	<b>Practical in Water and Soil Analysis-I</b>	<b>18NCHCP1</b>
<b>Total Hrs: 30</b>		<b>Credits: 2</b>

**i) Water Analysis Practical**

1. Determination of pH, EC, and TDS
2. Determination of Total solids, Total dissolved solids and Total suspended solids.
3. Determination of Total acidity, Phenolphthalein acidity, Methyl Orange acidity.
4. Determination of Total alkalinity and phenolphthalein alkalinity.
5. Determination of Total hardness
6. Determination of Dissolved Oxygen.

**ii) Soil Analysis Practical:**

1. Determination of pH, EC
2. Determination of Bulk Density, Pore Space & Particle Density
3. Determination of Specific gravity
4. Determination of Moisture content
5. Determination of alkalinity
6. Determination of Organic carbon



**Sadakathullah Appa College (Autonomous)**

**Rahmath Nagar, Tirunelveli -627 011.**

**Certificate Course in Water and Soil Analysis**

**Offered by Department of Chemistry**

**Upon completion of the course students will be able to:**

- Learn knowledge about Soil and Water quality parameters.
- Analyze the Water quality parameters and Soil parameters.
- Provide enriching and rewarding career for the students.
- Open up opportunities in Analytical Research and become technical laboratory personnel.
- Secure jobs and also establish their own laboratory.