

**UNIT I**

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Elementary knowledge of soil taxonomy classification and soils of India.

**UNIT II**

Soil Profile, components of soil; Soil physical properties: soil texture - Methods of particle size analysis, structure, density and porosity, soil colour, consistence and plasticity. Soil water retention, movement and availability; soil air, composition; source, amount and flow of heat in soil; soil temperature and plant growth

**UNIT III**

Soil reaction - pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; Soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge ion exchange, cation exchange capacity, base saturation. History of soil fertility and plant nutrition. criteria of essentiality, role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

**UNIT IV**

Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects. Problematic soils and its management. Wasteland management.

**Practical(s):**

1. Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry.
2. Study of soil sampling tools, collection of representative soil sample, its processing and storage.
3. Study of soil profile in field. Study of soil forming rocks and minerals.
4. Determination of particle density and bulk density of soil and computation of porosity.
5. Determination of soil moisture content and maximum water holding capacity and computation of moisture constants.

6. Determination of soil texture by feel and international pipette method.
7. Studies of capillary rise phenomenon of water in soil column and water movement in soil.
8. Study of soil map.
9. Determination of soil colour.
10. Demonstration of heat transfer in soil.
11. Determination of soil pH and electrical conductivity.
12. Determination of cation exchange capacity of soil.
13. Estimation of organic matter content of soil.