

## **23SC804 SOIL POLLUTION CONTROL & ECO RESTORATION TECHNIQUES** **(5-0-0-5)**

To enable the students to get a thorough knowledge about the ecorestorartion techniques

### **COURSE OUTCOME (COS)**

From this course, student will be familiarized with the various concepts related to theoretical knowledge on different aspects of soil fertility and fertilizer use like essential nutrient elements, chemistry and transformation of nutrient elements and their management.

The students are expected to gain knowledge on nature, sources, extent of soil, water and air pollution; their effects on soil nutrients availability, plant and human health and their remediation/amelioration.

The students are expected to gain theoretical knowledge on analytical techniques and instrumental methods used soil and plant analysis.

To get an overview of the principle, instrumentation and different methods of soil and water analysis.

### **MODE OF TRANSACTION**

Lecture cum discussion, demonstration, group presentations, seminars, debates, assignments, brain storming sessions, peer group discussion, ICT based teaching and learning

### **SYLLABUS**

#### **Unit: I Soil fertility and fertilizer use:**

Factors affecting soil fertility; nutrient sources: fertilizers and manures; essential plant nutrients, functions and deficiency symptoms. Criteria of essentiality of elements in plant nutrition. Chemistry and transformation of nutrient elements including micronutrients in soil and their role in plant nutrition-their sources, forms, retention behaviour and movement; correction of micronutrient deficiencies in plants. Principles of fertilizer application and residual effects of fertilizers and organic manures.

#### **Unit: II Soil Pollution:**

Water and air pollution problems associated with agriculture, nature and extent. Nature and sources of pollutants: agricultural, industrial, urban wastes, fertilizers and pesticides, acid rains, oil spills etc.; air, water and soil pollutants - their CPC standards and effect on plants, animals and human beings. Sewage and industrial effluents, their composition and effect on soil properties/health, and plant growth and human beings; soil as sink for waste disposal. Pesticides – their classification, behaviour in soil and effect on soil microorganisms. Toxic elements – their sources, behaviour in soils, effect on nutrients availability, effect on plant and human health. Pollution of water resources due to leaching of nutrients and pesticides from soil.

### **Unit: III Analytical techniques and instrumental methods in soil and plant analysis:**

Volumetric analysis-principles of acid-base titration, neutralization indicators; redox titration-permanganometry, dichrometry, iodometry, use of redox indicators; precipitation titration, argentometric titration, use of adsorption indicators; complexometric titration, metal ion indicators, concept of masking and demasking reactions. Principles of conductometry and potentiometric titrations. Principles of colorimetry, flame photometry, and atomic absorption spectrophotometry. Radiotracer technique and its methodology

### **Unit: IV Sampling Methods & Preservation of Samples:**

Water Analysis: physico-chemical & biological parameters of water and wastewater: (a)determination of pH, dissolved solids and suspended solids, dissolved oxygen, COD, BOD, hardness, chlorides, Oil & grease, nitrite, nitrate, total nitrogen, phosphates, sulfates, alkalinity/acidity, nitrogen, phosphorus, and potassium. (b) determination of heavy metals by spectrophotometric method. (c) determination of pesticide residues in environmental samples.

### **Unit: V Soil Analysis:**

Standard methods of soil sampling and types of equipment, determination of soil types and texture, pH, hydraulic conductivity, soil moisture, nitrogen, potassium, phosphorus, and organic matter.

### **Unit VI Remediation techniques:**

Causes of soil pollution, effects of pesticides on soil components, residual effects, and pollution. Synthetic fertilizers and their effects on soil, industrial effluents and their interaction with soil components, remediation technologies. Bioremediation techniques, Phytoremediation, Remediation/amelioration of contaminated soil and water

## **EVALUATION AND GRADING**

<b>Internal (Weightage = 50%)</b>		<b>External (Weightage = 50%)</b>	<b>Total</b>
<i>Components</i>	<i>Weightage</i>	Examination = 100 Marks	Internal+ External = 100
Midterm Exam	30%		
Assignments / seminar / class test	20%		

## **REFERENCES**

1. S. K Garg, 2021. Environmental Engineering Sewage Waste Disposal and Air Pollution Engineering, Vol.2, Khanna Publishers.
2. Met Calf and Eddy, 1991. Waste Water Engineering, Tata Mc Graw Hill
3. Waste Water treatment for Pollution Control, Aceivala, Tata McGraw Hill
4. Waste Water treatment Plan design. 1997. A manual of practice, Water Pollution Control Federation
5. Chereminsinoff, N.P. 1996. Biotechnology for waste and wastewater treatment,

William Andrew Publishing, New York

6. Bhatia, S.C. 2007. Solid and hazardous waste management. Atlantic Publishers and distributors.

**ACTIVITIES/ CONTENT WITH DIRECT BEARING ON EMPLOYABILITY/  
ENTREPRENEURSHIP/ SKILL DEVELOPMENT (based on NAAC Criteria):**

The learner will get a clear understanding of the concepts and ideas regarding the technical and theoretically relevant area which is explored in the course. This course will equip the learner to build a career as a researcher and academician in Chemical/Environmental Sciences.