

Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad (Autonomous)
Department of Chemistry
Career Oriented Course
Syllabus Soil and Water Analysis

GENERAL OBJECTIVES OF THE COURSE:

1. To educate and prepare graduate students from rural and urban area who will get employment on large scale in academic institutes, R & D and Quality control laboratories of Indian chemical/pharmaceutical industries as well as multinational and forensic Laboratories.
2. To provide students with broad theoretical and applied background in all specialization of Chemistry with emphasis on qualitative and quantitative technique.
3. To provide broad common frame work of syllabus to expose our young graduates to the recent and applied knowledge of interdisciplinary branches of chemistry involving applied organic, inorganic, physical, analytical, industrial, pharmaceutical, polymer, nano science & technology.
4. To conduct lesser written tests and to encourage on non-written tests.
5. To focus on encouraging students to conduct various academic activities like midterm tests, online tests, open book tests, tutorial, surprise test.

Learning outcomes:

1. A graduate in Chemistry has in-depth and detailed functional knowledge of the fundamental theoretical concepts and experimental methods of chemistry.
2. The graduate has expert knowledge of a well-defined area of chemistry. The graduate has specific skills in planning and conducting advanced chemical experiments and applying structural-chemical techniques. Skilled in examining specific phenomena theoretically and/or experimentally, the graduate is able to contribute to the generation of new scientific insights or to the innovation of new applications of chemistry.

As per U.G.C. guidelines,

The Certificate course will be of 20 credits. Each credit will have 15 hours of workload out of which 8 credits should necessarily be assigned to field work/Project work/training.

Certificate Course: - Soil and Water Analysis

Semester	Title	Total Number of lectures/ practical's	Credits
I	Theory	90 hrs	6
	Practical Course	15 hrs	1
	Project	15 hrs	1
	Field work	30 hrs	2
II	Theory	90 hrs	6
	Practical Course	15 hrs	1
	Project	15 hrs	1
	Field work	30 hrs	2
Total hrs		300 hrs	
Total Credits			20
Total Marks		300 Marks	

Syllabus

Paper I – Study of Water

Unit I –

1. Introduction to analytical chemistry -Role of analytical chemistry ,Techniques of weighing, Volumetric analysis, Glassware cleaning and calibration, Gravimetric techniques, Selecting and handling the reagents , Safety in laboratory, Errors, Types of errors and definitions. (15)

2. Instrumental Techniques- A.A.S. principle, Instrumentation and application, paper Chromatography, TLC, Gas, ion exchange, HPLC principle, classification and techniques, Flame photometry. (15)

Unit II –

1. a. Hydrosphere- Water resources, physical chemistry of sea water, composition, microorganism and nitrogen cycle. (10)

b. Chemistry of water- color, odor, turbidity, total salt content, total suspended Water. (05)

2. a. Water Microbiology- Quality of drinking water, Quality of irrigation water, COD, BOD, TOC E-coli and total bacteria. (10)

b. Sewage analysis (05)

Unit III –

1. a .Water pollution- Definition of water pollution, types of water pollutants Sources of water Pollutants, trace element in water, water quality parameters And standards, sampling And preservation. (15)

b. monitoring techniques of methodology-pH, specific conductivity, total Hardness. (05)

2. Purification of water- Treatment of domestic and industrial water, General Instrumentation, in water analysis. (10)

Unit I -

1. a. The structure of earth, Elemental composition of earth crust, Definition of soil. (05)
b. Nature and classification of soil, Minerals, properties of minerals, important soil forming minerals, productivity of soil, soil as eco system. (10)
2. Soil chemistry- Concept of nutrients, Micro and macro nutrients and it's relation to Plant health and productivity. (15)

Unit II-

1. Chemical properties of soil- Soil reaction, soil pH, buffering capacity of soil, ion exchange, CEC (Cation Exchange Capacity of Soil), Base saturation, soil colloids. (10)
2. Soil moisture- Maximum water holding capacity, field capacity, wetting point, available Water capacity, pH, soil water movement under saturated and unsaturated Condition. (10)
3. Problematic soils- Types of problematic soils, Classification, Management of problematic soils and reclamation of problematic soils, saline soils-Alkaline soils, acid soils and water logged Soils. (10)

Unit III -

1. Soil fertility- Soil texture, soil structure, Bulk density, Porosity, Soil air and soil temperature, Fertilizers use, classification of manures and fertilizers, Role of fertilizers in crop production, Estimation of nitrogen by Kjeldahls method (10)
2. Nitrogen cycle in soil- Study of nitrogen fixation, symbiotic and non-symbiotic, blue green, algae and actenomycets, Role of these microorganisms in soil. (10)
3. Soil erosion- Definition, Types, Control of erosion, Soil conservation practices, Soil pollution, causes and remedies. (10)

Practical/ Work experience/Field Work/Projects /training

- 1. Collection of water samples (Field work) (10)**
- 2. Collection of soil samples from fields and study of soil sampling tools.
(Field work) (20)**
- 3. Determination of total hardness of water (03)**
- 4. Determination of alkalinity of water (03)**
- 5. Determination of salinity of water (03)**
- 6. Determination of pH of water (03)**
- 7. Determination of conductivity of water (03)**
- 8. Determination of TDS in water (03)**
- 9. Determination of COD of water (03)**
- 10. Determination of BOD of water (06)**
- 11. Determination of total plate count in soil (03)**
- 12. Determination of moisture content in soil (03)**
- 13. Determination of maximum water holding capacity of soil (06)**
- 14. Determination of pH of soil (03)**
- 15. Determination of conductivity of soil (03)**
- 16. Determination of chloride contents in soil (03)**
- 17. Determination of sulphate contents in soil (06)**
- 18. Estimation of nitrogen by Kjeldahl's method (06)**
- 19. Project work (30)**

**Coordinator
Soil and Water Analysis**