



“Dissemination of Education for Knowledge, Science and Culture”
-ShikshanmaharshiDr.BapujiSalunkhe



Shri Swami Vivekanand Shikshan Sanstha's

RAJE RAMRAO MAHAVIDYALAYA, JATH

Dist- Sangli (Maharashtra) 416 404

UGC Recognition under 2F & 12 (B) UGC Act 1956

(Affiliated to Shivaji University, Kolhapur)

NAAC Reaccredited : “B” (Third Cycle)

Office : (0234) 246251, Email : rajeramrao@gmail.com, Website : www.rcollege.org

P. G. DEPARTMENT OF CHEMISTRY

Certificate Course

Soil & Water Analysis

2021-22

Aims and Objectives

During the certificate course of 'Soil, Water Analysis and Management' a candidate is trained on professional skill, professional knowledge and Employability skill related to job role. In addition to this a candidate is entrusted to undertake project work, extracurricular activities and on job training to build up confidence. The skill gaps in Soil, Water Analysis are

1. The agricultural and domestic sector is largely dependent on the results of laboratory tests used to support accurate analysis affect to improve crop yield and health.
2. The test results therefore should be reliable, accurate and reproducible. Generation of such quality results involves a step wise process of scrupulous planning, perfect execution. Due to the inadequate practical and basic knowledge, accurate analysis of soil and water is quite difficult leading to tremendous loss in the crop yields and water quality.
3. The Laboratory Technology is an associated with agricultural and domestic profession and is a vital tool in the analysis and study of the various parameter for proper treatment of soil and water. In the rapidly growing area of scientific knowledge and skills, laboratory testing science is an imperative area of study leading to generation of skilled Laboratory Technician.
4. Lack of skill based knowledge in soil and water analysis and management is the key reason for inadequate ability to handle complaints.
5. The excessive use of fertilizers and irrigation resulted in the salting of soil in this south western Maharashtra, Sangli region due to improper counselling of farmers.
6. The excessive amount of iron, fluorides, nitrates, TDS in the water contain not observed due inappropriate lab testing and management, resulted in the ill effects.

Learning Outcomes

Undergraduate students upon graduation with a Bachelor degree in Sciences:

1. Theory & measurement of soil water content, movement, storage & plant availability.
2. How to manage and measure salinity and sodicity in irrigated agricultural systems.
3. How to solve quantitative problems in soil water management, specifically how to conduct simple calculations of water content, porosity, density and hydraulic conductivity. Analyse and interpret data on infiltration, available water, and storage of water.
4. How to work effectively in small groups in the lab and in the field.

5. The primary causes and consequences of a wide range of soil degradation problems, including soil acidity and alkalinity, erosion, salinity and sodicity, and nutrient loss.
6. The impact of soil management on soil organic matter, soil structural stability, water quality and other important soil properties.
7. Where soil conservation and management fit into the broader context of the South Australian Natural Resource Management Act.
8. Develop an ability to collect and evaluate data in practical classes.
9. Develop writing skills through essay and report writing.
10. Learn how to provide and respond to “peer-review” feedback on a draft essay.

1. Duration of course: Six Month
2. Eligibility to course: Students studying in B.Sc.
3. Admission: On the basis of merit
4. Maximum No. of students: 25
5. Admitted students -

Evaluation System:

All the students will be continuously evaluated by,

a. Attendance	10M
b. Assignments	20 M
c. Class tests	20 M
d. One final examination (Two papers)	100 M
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	150 M

Practical Course

a. Final examination	
i. Soil Analysis	20 M
ii Water Analysis	20 M
iii. Oral	05 M
iv. Laboratory Journal	05 M
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	50 M

Nature of Theory question paper

1. Q-1 Multiple choice question and compulsory, containing 10 questions. (10 marks)

2. From Q-2 Long answer type any four questions to be solved (40 marks)

Grades: A grade= above 75, B grade = above 60, C grade = above 50

Certification: A certificate will be issued on successful completion of the course.

Paper- I [Total periods: 15]

Soil Analysis

Unit – I Introduction and formation of soil

5L

Definition of Soil, Concept of Lithosphere, Soil as a natural body, Soil Components: Air, Water, inorganic and organic solids, Formation of Soil, Factors of Soil Formation: Parent Material, Organic, Climatic, And Topographic.

Unit – II Properties of soil

5L

- A) Physical Properties:- Soil Separates, Texture, Aggregation and Structure, Temperature, Color, Properties of Soil Mixture, Pore Space, Bulk Density, Particle Density, Aeration and Drainage, Compaction, Surface area, Soil water relationships.
- B) Chemical Properties:- Morphology of Colloids, Chemistry of Clays, Ionic Exchange, Acidity, Alkalinity, pH, Salinity, Reactions in Liming and Acidification.

Unit – III Classification, distribution and fertility status of soil

5L

Classification of soil, Characteristics and World Distribution of Soils, Soil Erosion: Concept, Causes and Controlling Factors. Degradation and Conservation of Soils.

REFERNCES

1. Backman, H.O and Brady, N.C.(1960.)The Nature and Properties of Soils, McMillan, NewYork.
2. Bennet, Hugh H.: Soil Conservation, McGraw Hill, New York .
3. Foth H.D. and Turk, L.M.(9172) Fundamentals of Soil science, John Wiley, New York.
4. Mc. Bride, M.B.(1999)Environmental Chemistry of Soils, Oxford University Press, New York.
5. GovindaRajan, S.V. and GopalaRao, H.G.(9178) Studies on Soils of India Vikas, New Delhi.
6. Raychoudhuri, S.P.(1958) Soils of India, ICAR, New Delhi.
7. Russell, Sir Edward J.:(1961) Soil Conditions and Plant Growth, Wiley, New York.

Paper- II [Total periods: 15]

Water Analysis

Unit – I

A) Earth's Natural Resources.

6 L

1. Hydrosphere
2. Introduction to Water cycle in Nature
3. Methods of Water sampling
4. Structure of Water molecule

B) Sources of Water

1. Rain, River, Ocean, Ground water
2. Origin of water
3. Forms of water – Solid, Liquid and Gas water.

Unit – II Types of water

4L

1. Hard and soft water
2. Fresh and Dense water
3. Ground water
4. Potable water & Portability of water
5. Saline water

Unit – III

A) Characteristics of Water

5L

1. Flowing, pouring and spilling
2. Storing and carrying
3. Evaporating and condensing
4. Boiling and freezing
5. Seeping and Rising
6. Alkalinity, Hardness, Total Solids, Transparency, Silica content.

B) Measurement of water quality

1. Chemical Methods
2. Physical Methods

REFERENCES:

1. The Chemical Analysis of Water, Hunt D.T.E., Royal Society of Chemistry, ISBN: 9780851867977
2. Water Analysis, Fresenius, Wilhelm, Quentin, Karl E., Schneider, Wilhelm, Springer, ISBN 978-3-642- 72610-1.
3. Chemistry and Water, AhujaSatinder, Elsevier Science Publishing Co Inc, ISBN: 9780128093306.
4. Standard Analytical Procedures for Water Analysis, Hydrology Project, Government of India and Netherland, 1999.
5. Drinking Water Chemistry, Hauser Barbara, Taylor & Francis Ltd, ISBN: 9781138475311.

Practicals Course (Any 12)

1. Field Visit and Sampling of Soil Analysis.
2. Determination of water holding Capacity of Soil.
3. Determination of Moisture Content of Soil.
4. Determination of pH of Soil.
5. Determination of Electrical Conductivity of Soil.
6. Preparation of Calcium Carbonate.
7. Field Visit and Sampling of Water Analysis.
8. Determination of Electrical Conductivity of water
9. Preparation of Reagents and Solutions.
10. Determination of pH of water.
11. Determination of Alkalinity of water.
12. Determination of Hardness of water.
13. Determination of percentage of Carbonate of water.
14. Determination of Suspended Solids of water.
15. Determination of TDS in water.
16. Determination of DO

REFERENCES:

1. Soil Analysis Handbook of Reference Methods, CRC Press; first edition, 20 December 1999.
2. Soil Testing and Analysis, Oxford Book Company, ISBN: 9789380179575, 9789380179575.
3. Fundamentals of Soil Science 2nd Edition by Tolunur S., CBS PUBLICATION, October 2017.
4. Principles and Methods of Soil Analysis, Edgar Richards, Franklin Classics, 2018.
5. Soil sampling and methods of analysis, M.R. Carter, CRC Press, 1993.
6. Water Analysis, Wanklyn James Alfred, Biblio Life, ISBN: 9781103755882.
7. Handbook Of Water Analysis 3rd Edition by Nollet, Taylor and Francis, ISBN:9781439889640, 2013.
8. The Chemical Analysis of Water, Hunt D.T.E., Royal Society of Chemistry, ISBN: 9780851867977.
9. Water Analysis, Fresenius, Wilhelm, Quentin, Karl E., Schneider, Wilhelm, Springer, ISBN 978-3-642- 72610-1.
10. PRACTICAL MANUAL OF WATER ANALYSIS, Priyanka Singh, ISBN-10: 9789384502294.