

Sant Gadge Baba Amravati University, Amravati
 Syllabus Prescribed for (One Years- Two Semesters PG Diploma Programme- NEPv23)
Programme: PG Diploma in Soil Testing
 Scheme for Teaching, Learning, Examination, and Evaluation for
PG Diploma (Soil Testing) Semester-I

Subject	Teaching hours per week	Credits	Theory Exam		Practical Exam		Total	Minimum Passing	
			Internal	External	Internal	External		Internal	External
*Pre-Requisite Course(s) Faculty Specific Core	00	00	15	35			50	6	14
DSC – I.1	04	04	40	60			100	16	24
DSC – II.1	04	04	40	60			100	16	24
DSC – III.1	04	04	40	60			100	16	24
DSE-I.1 Lab-I	04	02			50	50	100	50	
DSE-II.1 Skill-I	08	04			50	50	100	50	
DSE-III.1 Skill-II	04	02			50		50	25	
Total	28	20					600		

Subject	Course Code	Course Title	Hrs/week	Credits
*Pre-Requisite Course(s) Faculty Specific Core	1PGDST 00	Introduction to Soil Science	0	0
DSC – I.1	1PGDST 01	Soil Science-1	4	4
DSC – II.1	1PGDST02	Soil Testing Technique	4	4
DSC – III.1	1PGDST03	General Laboratory Analysis	4	4
DSE-I.1 Lab-I (Based on DSC II.1)	1PGDST 04	Soil Analysis Lab-I	4	2
DSE-II.1 Skill-I	1PGDST 05	Project/ Seminar-1	8	4
DSE-III.1 Skill-II	1PGDST 06	Visit to Soil Testing Lab	4	2

PG Diploma (Soil Testing) Semester II

Subject	Teaching hours per week	Credits	Theory Exam		Practical Exam		Total	Minimum Passing	
			Internal	External	Internal	External		Internal	External
DSC – I.2	04	04	40	60			100	16	24
DSC – II.2	04	04	40	60			100	16	24
DSC – III.2	04	04	40	60			100	16	24
DSE-I.2 Lab-II	04	02			50	50	100	50	
DSE-II.2 Skill-III	08	04			50	50	100	50	
DSE-III.2 Skill-IV	04	02			100		100	50	
Total	28	20					600		

Subject	Course Code	Course Title	Hrs/week	Credits
DSC – I.2	2PGDST01	Soil Science - II	4	4
DSC – II.2	2PGDST 02	Methods of Chemical Analysis	4	4
DSC – III.2	2PGDST03	Spectroscopic and Other Instrumental Techniques	4	4
DSE-I.2 Lab-II (Based on DSC II.2)	2PGDST04	Soil Analysis Lab-II	4	2
DSE-II.2 Skill-III	2PGDST 05	Project/Seminar- II	8	2
DSE-III.2 Skill-IV	2PGDST 06	OJT: On-Job Training: Internship/ Apprenticeship *	4	4

PG Diploma (Soil Testing) Semester I

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
1PGDST 00	Introduction to Soil Science	

Course Objectives :

1. Students should know about the soil and its Characteristics.
2. To make them familiarize with soil.

Course Outcomes: After successful completion of the course, student would be able to

1. Know about the soil and its properties which is basic of agriculture.
2. Importance of Organic manure and chemical fertilizers
3. To get complete information about soil nutrients

Unit-I 8L

Introduction:

Definition of Soil, Concept of Lithosphere, Soil as a natural body, Soil Components: Air, Water, inorganic and organic solids, Formation of Soil, Types of Soils & Basic Concepts.

Unit-II 8L

Properties of Soil:

Introduction to properties of Soil:

A) Physical Properties :-

Soil Separates, Texture, Aggregation and Structure, Temperature, Colour, 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.

c) Biological Properties :-

Soil organic matter, C:N Relation ship, N-Transformation, Soil organisms, Sulphur transformation

Unit- III 8L

Fertility Status of Soils-Fertility status of soils, soil deficiency with respect to macro and micro nutrient components, brief study of micronutrient & macronutrient sources &

Importance, remedial measures to overcome deficiency.

Unit-IV 8L

Soil Profile & Classification-Soil profile, Soil forming factors, soil survey methods, soil survey reports, soil distribution, classification system.

Unit-V 8L

Conservation and Management

Drainage, Soil erosion, types of Irrigation, Land use Classification, Plant & Animal waste, Municipal & Industrial by products & their impact, nutrient loading, tillage system, wetlands.

Books Recommended :

1. Soils and soil fertility, Troch, F.R. And Thompson, L.M. Oxford Press.
2. Fundamentals of soil science, foth, H.D. Wiley Books.
3. Soil Science and Management, Plaster, Edward J., Delmar Publishers.
4. Principles of Soil Chemistry (2Wed.) Marcel Dekker Inc., New York.
5. Handbook of Agricultural Sciences, S.S.Singh, P.Gupta, A.k.Gupta, Kalyani Publication

PG Diploma (Soil Testing) Semester I

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
1PGDST 01	Soil science- I	60 hrs (4 hrs/week)

Course Objectives :

- 1 Students should know about the soil and its properties .
- 2 To make them familiarize with agricultural basics.

Course Outcomes: After successful completion of the course, student would be able to

- 1 Know about the soil and its properties which is basic of agriculture.
- 2 Importance of Organic manure and chemical fertilizers
- 3 To get complete information about soil nutrients

Unit- I- 10L

Soil as a natural body, pedagogical and edaphological concepts of soil. Nebular hypothesis

Soil genesis: soil forming rocks and minerals- Classification, Weathering, Soil forming processes and factors of soil formation; Soil Profile, components of soil.

Unit- II- 10L

Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, Soil temperature; source, amount and flow of heat in soil; effect on plant growth, **Chemical properties of soil**-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;

Soil biological properties-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;

Unit- III 10L

Introduction and importance of organic manures, properties, and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management.

Unit- IV 10L

Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers.

Unit- V 10L

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.

Books Recommended:

1. Soil and soil Fertility, Troch, F.R. And Thompson, L.M. Oxford Press.
2. Fundamentals of soil science, foth, H.D. Wiley Books.
3. Soil Science and Management, Plaster, Edward J., Delmar Publishers.
4. Principles of Soil Chemistry (2Wed.) Marcel Dekker Inc., New York.
5. Handbook of Agricultural Sciences, S.S.Singh, P.Gupta, A.k.Gupta, Kalyani Publication.
6. ISSS. 2009. Fundamentals of Soil Science. 2nd Ed. Indian Society of Soil Science, New Delhi-110 012. pp. 728.
7. Das D. K. 2011. Introductory Soil Science, 3rd revised and Enlarged Ed, Kalyani Publisher, Ludhiana. pp. 645.
8. Text Book of Soil Science. Nirankari Lal Singh. Aman Publication, Meerut.
9. Organic farming for sustainable agriculture. Dahama , A. K.AgrobotanicaBinaker.
- 10.Text Book of Soil Science., Mehara , R. K.ICAR, New Delhi.
11. Fundamentals of Soil Science, Patil, V. D. and Mali C. V. Aman Publication, Meerut.
12. T.B. of Soil Science by P.D. Vishwas & Mukherjee.
13. Nature and Properties of Soil by Tisdle& Nelson.

PG Diploma (Soil Testing) Semester I

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
1PGDST02	Soil Testing Techniques	60 hrs (4 hrs/week)

Course Objectives :

- 1 Students should know about the soil testing and its importance .
- 2 To understand about soil sampling and its processing.
- 3 To get knowledge about chemical handling and laboratory saftey

Course Outcomes: After successful completion of the course, student would be able to

- 1 Carry out soil sampling and how to processes it
- 2 Adopt Laboratory Safety guidelines
- 3 To expertise in chemical handling during analysis
- 4 To learn about Soil testing lab establishment and how to recommend fertilizer as per soil testing report

Unit – I :

10L

Importance of Soil Testing and Analysis

Importance of soil testing in agriculture for successful crop production, some basic principles of analytical chemistry and working principles of instruments used for soil testing, importance of plant nutrients, Based on soil testing results, balanced fertilizer application for successful crop production

Unit – II :

10L

Sample Collection and Processing

Purpose of Soil testing and analysis, selection of field, Method of Soil Sample collection
Methods of soil sample processing, precautions during soil collection & processing, Preservation labeling and Storage of soil samples, various types of boys used for collection.

- Unit – III 10L
Laboratory Safety Guidelines and Rules, Regulations Pertaining to the Chemical Hygiene Plan, Chemical and Non-Chemical Hazards, Chemical Management Types of chemicals - Corrosives, Flammables, Oxidisers, Water Reactives, Pyrophorics, Toxics Peroxide forming chemicals, Basic laboratory safety practices - Chemical Inventory and MSDSs/SDSs Chemical Procurement, Chemical labeling, Special chemical hazards, Antidots, Treatment of Specific Poison, First aid techniques,
- Unit – IV 10L
Chemical Handling and Processing Transporting Chemicals - Chemical Storage and Compatibility - Flammable Chemicals, Handling of Solvents, Corrosive Chemicals - Highly Reactive and Explosive Chemicals, Chemical Waste Disposal, Waste minimization, Chemical waste of particular concern, Solid waste and recycling, Biological/radioactive waste, Mixed waste. Laboratory Equipment and Facilities- Emergency shower and eyewashes, Personal apparel, Gloves, Respirators, Hearing protectors, Fire safety equipment, Laboratory signs, Laboratory ventilation, Other facilities.
- Unit – V 10L
Establishing Soil testing Lab- Laboratory Layout, built up area, Laboratory requirement, working pattern, budget requirement, trained manpower, various funding scheme and agencies.
Soil test report and fertilizer recommendation- Preparation of soil analysis and test report, recommendation of fertilizer as per the report, Preparation of soil test summaries and fertility maps.

Books Recommended-

1. Soil and soil Fertility, Troch, F.R. And Thompson, L.M. Oxford Press.
2. Fundamentals of soil science, foth, H.D. Wiley Books.
3. Soil Science and Management, Plaster, Edward J., Delmar Publishers.
4. Principles of Soil Chemistry (2Wed.) Marcel Dekker Inc., New York.
5. Handbook of Agricultural Sciences, S.S.Singh, P.Gupta, A.k.Gupta, Kalyani Publication.
6. ISSS. 2009. Fundamentals of Soil Science. 2nd Ed. Indian Society of Soil Science, New Delhi- 110 012. pp. 728.
7. Das D. K. 2011. Introductory Soil Science, 3rd revised and Enlarged Ed, Kalyani Publisher, Ludhiana. pp. 645.
8. Text Book of Soil Science. Nirankari Lal Singh. Aman Publication, Meerut.
9. Organic farming for sustainable agriculture. Dahama , A. K. Agrobotanica Binaker.
10. Text Book of Soil Science., Mehara , R. K. ICAR, New Delhi.
11. Fundamentals of Soil Science, Patil, V. D. and Mali C. V. Aman Publication, Meerut.
12. T.B. of Soil Science by P.D. Vishwas & Mukherjee.
13. Nature and Properties of Soil by Tisdle & Nelson.
14. Guidelines for Chemical Laboratory Safety by American Chemical Society

PG Diploma (Soil Testing) Semester I

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
1PGDST03	General laboratory Analysis	60 hrs (4 hrs/week)

Course Objectives :

- 1 Students should know basics of analysis and estimations .
- 2 To understand about extraction techniques.
- 3 To get knowledge about calibration of equipments

Course Outcomes: After successful completion of the course, student would be able to

- 1 Know about Titration techniques
- 2 Know about Gravimetric estimation and volumetric analysis
- 3 To expertise in handling and calibration of equipments

Unit- I

10L

Acid- Base titrations - Types of acid base titrations, pH variation during acid base titration, acid base indicators, Modern theory of acid base indicators. Choice of indicators for different acid base titrations.

Unit-II

10L

Gravimetric Analysis - Principles, Various steps involved in gravimetric analysis with reference to estimation of Barium as Barium sulphate. Co-precipitation post-precipitation. Role of Organic precipitant in gravimetric analysis, Criteria for choice of solvent, Some important organic precipitant. Electrogravimetry.

Unit- III

10L

Solvent Extraction- Principle of solvent extraction, classification of extractions, Technique of extraction, Different solvents used in extraction, Application of solvent extraction techniques in industries and laboratories.

Unit – IV

10L

Calibration and Handling of Different Equipment's– pH- meter, Potentiometer, Colorimeter, Conductometer, Spectrophotometer, Introduction to Electrodes and their handling and care.

Unit – V

10L

Laboratory techniques-Heating Methods, Stirring- Magnetic Stirrer and Mechanical Stirrer, Centrifugation, Filtration- Gravity Filtration, Vacuum Filtration, Calibration of Pipette, Burette, Volumetric Flask, Weighing by Chemical Balance, One pan Balance, Electronic balance.

Different types of Glassware's their use in laboratory, Other-lab maintenance.

Books Recommended –

1. Analytical chemistry- Problems and Solution- S. M. Khopkar, New Age International Publication.
2. Quantitative Analysis, Day & Underwood:
3. Practical Physical Chemistry, Findley
4. A Text book of Quantitative inorganic Chemistry, A. I. Vogel ELBS, London.
5. Analytical chemistry Strouts Galfillal
6. Physicochemical Analysis Y. Lyalikov
7. Chemical Analysis Vol IS. Wilson & P. Jones
8. Advance Analytical Chemistry, Meites and Thomas (Mc Graw Hill)
9. Instrumental Methods of Analysis, H.H. Willard, L.L. Merritt and J.A. Dean (Van Nostrand).

10. Instrumental Methods of Chemical Analysis R. D. Brown (Mc Graw Hill)

11. Laboratory Manual of Organic Chemistry by R. K. Bansal

PG Diploma (Soil Testing) Semester I

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
1PGDST 04 Lab- 1	Based on Soil Analysis	60 hrs (4 hrs/week)

1. Introduction to different laboratory glassware's their calibration and apparatus, equipments used in soil testing laboratory.
2. Preparation of Solutions of different normality and molarities in the lab.
3. To carry out standardization of different solutions by using primary standard.
4. Study of soil sampling tools, collection of representative soil sample, its processing and storage.
5. Determination of soil density, moisture content and porosity.
6. Determination of soil texture by feel and Bouyoucos Methods
7. Determination of Ph& E.C. of soil
8. Determination of CaCO_3 from soil
9. Determination of Organic carbon content from soil
10. Determination of cation exchange capacity of soil.
11. Determination of available NPK from soil
12. Determination of DTPA extractable micronutrient (Fe, Mn, Zn and Cu) from soil
13. Determination of Total Nutrient from plant
14. Preparation of soil test report, Interpretation of result and fertilizer recommendation.
15. Preparation of Soil Health Card.

PG Diploma (Soil Testing) Semester I

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
1PGDST 05 Lab-II	Project/Seminar- I	120 hrs (8 hrs/week)

Every student has to submit seminar report and deliver seminar with Power point Presentation

Seminar Course Outcome : After completion of the seminar, the students would be able to :

1. Impart skill in preparing detailed seminar report.
2. Communicate effectively by making an oral presentations.
3. Searching for new topic for the preparation of script

Project Course Outcome : After completion of the seminar, the students would be able to :

1. Demonstrate a sound technical knowledge of their Project topic.
2. Design/develop the solution to a problem.
3. Undertake problem identification, formulation, objectives and solution
- 4.

Subject Code- 1PGDST 06 Internship/Work experience/Field Work

Students are required to undertake mandatory Internship/Work experience/Field Work (during Vacation of Sem-I) for duration of 60 Hrs.

PG Diploma (Soil Testing) Semester II

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
2PGDST01	Soil Science-II	60 hrs (4 hrs/week)

Unit- I 10L

Soil degradation- Concepts, types, factors, and processes. Soil quality and soil health- definition and concepts, soil quality indicators. Characteristics of healthy soils.
Distribution and extent of waste land and problematic soil in India and Maharashtra.
Categorization of problem soil based on properties.

Unit-II

10L

Saline soil, alkali soil, saline- alkali soil, degraded alkali soil, coastal saline soil – Definition, formation, characteristics, effect on plant growth, reclamation, and management. Acid and acid sulphate soil - Definition, formation, characteristics, effect on plant growth, reclamation, and management.
Calcareous soil-Definition, formation, characteristics, effect on plant growth, reclamation, and management.
Eroded Soil and compacted soils- Definition, formation, characteristics, effect on plant growth, reclamation, and management.

Unit- III 10L

Polluted soils-Definition, sources, and their remediation
Water pollution-Definition, sources, and their remediation

Unit- IV 10L

Quality of Irrigation water-and its suitability for irrigation
Utilization of saline and sewage water in agriculture.

Unit- V 10L

Remote sensing and GIS in diagnosis and management of problem soils.
Multipurpose tree species and bioremediation of soils.
Land capability classification and land suitability classification

Books Recommended-

1. Soil and soil Fertility, Troch, F.R. And Thompson, L.M. Oxford Press.
2. Fundamentals of soil science, foth, H.D. Wiley Books.
3. Soil Science and Management, Plaster, Edward J., Delmar Publishers.
4. Principles of Soil Chemistry (2Wed.) Marcel Dekker Inc., New York.
5. Handbook of Agricultural Sciences, S.S.Singh, P.Gupta, A.k.Gupta, Kalyani Publication.
6. ISSS. 2009. Fundamentals of Soil Science. 2nd Ed. Indian Society of Soil Science, New Delhi- 110 012. pp. 728.
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11. Fundamentals of Soil Science, Patil, V. D. and Mali C. V. Aman Publication, Meerut.
12. T.B. of Soil Science by P.D. Vishwas & Mukherjee.
13. Nature and Properties of Soil by Tisdle& Nelson.

PG Diploma (Soil Testing) Semester II

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
2PGDST 02	Methods of Chemical Analysis	60 hrs (4 hrs/week)

Unit- I

10L

Volumetric Analysis - titrant, titrate, end point, equivalence point, indicator. Requirement of volumetric analysis, definition of standard solution, primary standard substance, requirement of primary standard substance. Terms to express concentrations namely- molarity, molality, normality, preparations of solutions of different normality and molarity. mole fraction and percentage.

Unit- II

10L

Redox titrations - General principles involved in redox titration, redox reaction, redox potential, oxidant, reductant, oxidation number. Brief idea about use of KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$ as oxidants in acidic medium in redox titrations. Use of I_2 , in iodometry and iodimetry. External and internal indicators. Use of starch as an indicator. Iodometric estimation of Cu (II)

Unit- III

10L

Complexometric Titrations -Principle of complexometric titrations, Different types of indicators used in complexometric titrations, typical EDTA titrations, Advantages of complexometric titrations, study of different types of estimations by complexometric titrations.

Unit- IV

10L

Chromatography- Principle of chromatography, Different types of chromatographic techniques in detail, Historical development, Introduction to different types of chromatographic methods, Separation characteristic. Study of some chromatographic separations.

Unit- V

10L

Analytical data and Statistical Analysis- Errors in Chemical Analysis, Classification of errors, Determining the accuracy of methods, Improving the accuracy of analysis, Criteria of rejection of result Q- Test, Presentation of data, Confidence limit, Standard "t" Test, Problems, Problems for practice.

Books Recommended –

1. Analytical chemistry- Problems and Solution- S. M. Khopkar, New Age International Publication.
2. Quantitative Analysis, Day & Underwood:
3. Practical Physical Chemistry, Findley
4. A Text book of Quantitative inorganic Chemistry, A. I. Vogel ELBS, London.
5. Analytical chemistry StroutsGalfillal
6. Physicochemical Analysis Y. Lyalikov
7. Chemical Analysis Vol I S. Wilson & P. Jones
8. Advance Analytical Chemistry, Meites and Thomas (Mc Graw Hill)
9. Instrumental Methods of Analysis, H.H. Willard ,L.L. Merritt and J.A. Dean (Van Nostrand).

10. Instrumental Methods of Chemical Analysis R. D. Brown (Mc Graw Hill)
11. Laboratory Manual of Organic Chemistry by R. K. Bansal
12. Basic Concepts of Analytical Chemistry by S.M. Kopkar
13. Instrumental Method of Chemical Analysis by Gurdeep Raj
14. Analytical Chemistry by H. Kaur

PG Diploma (Soil Testing) Semester II

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
2PGDST03	Spectroscopic and other Instrumental Techniques	60 hrs (4 hrs/week)

Unit – I 10L

Ultraviolet- Visible Spectrophotometry- Introduction, Theory, Principle, Source of radiation, wavelength range, Instrumentation, Different types of transitions, Functioning of spectrophotometer, Comparison between colorimeter and spectrophotometer, Wavelength of maximum absorption, Factors affecting wavelength of maximum absorption, Bathochromic shift, Hypsochromic shift, Hypochromic shift, Hyperchromic shift, Study of some UV- Visible spectra.

Unit – II 10L

Atomic Absorption Spectrophotometry- Introduction, Theory, Principle, Instrumentation, Applications, Spectral Interference in AAS, Advantages of AAS over AES, Handling, and care of AAS and carrying out actual analysis.

Unit – III 10L

Atomic Emission Spectrophotometry- Flame Photometer- Introduction, Theory, Principle of emission spectroscopy, Source of excitations, Instrumentation, Analysis by Emission spectroscopy, Principle of Flame photometer, Interference, Applications, Handling, and care of Flame Photometer and carrying out actual analysis.

Unit – IV 10L

pH- metry- Introduction, Theory, and principle of pH- metry and conductometry, Applications of pH- metry and conductometry, Instrumentation, Calibration of pH- meter and conductometer, measuring of pH and conductance, Electrodes use in pH- meter their handling and care, Study of different pH-metric titration and conductometric titrations

Unit – V 10L

Conductometry - Introduction, Theory, and principle of conductometry, Applications of conductometry, Instrumentation, Calibration of conductometer, measuring of conductance, Electrodes use in conductometer their handling and care, Study of different conductometric titrations.

Books recommended-

1. Basic concepts of Analytical Chemistry by S. M. Khopkar
2. Instrumental method of chemical analysis by Gurdeep Raj
3. Advance Analytical Chemistry, Meites and Thomas (Mc Graw Hill)
4. Spectroscopy of Organic compounds by P.S. Kalsi
5. Elementary Organic Spectroscopy by Y.R. Sharma
6. Quantitative Analysis, Day & Underwood
7. Practical Physical Chemistry, Findley
8. Vogel A Text book of Quantitative inorganic Chemistry, ELBS, London.
9. Physicochemical Analysis, StroutsGalfillal Y. Lyalikov
10. Environmental chemistry, Sharma & Kaur, Krishna publishers.
11. Environmental chemistry, A. K. De, Wiley Eastern.
12. Environmental Pollution Analysis, S. M. Khopkar, Wiley Eastern.
13. Environmental Toxicology, Ed. J. Rose, Gordon and Breach Science Publication.

PG Diploma (Soil Testing) Semester II

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
2PGDST04- Lab- II	Soil Analysis Lab-II	60 hrs (4 hrs/week)

1. Preparation of soil saturation extract and Determination of soil pH and electrical conductivity from soil saturation extract.
2. Determination of pH & EC of saturation extract of soil
3. Determination of gypsum requirement of problem soil.
4. Estimation of Chloride content of Soil
5. Determination of Exchangeable Ca & Mg in Soil (EDTA-method)
6. Determination of Exchangeable sodium and potassium from soil and from irrigation water.
7. Determination of lime requirement from acid soil
8. Determination of anions (CO₃, HCO₃, Cl, SO₄) from irrigation water and computation of RSC and SAR.
9. Quality of irrigation water and its suitability.
10. Determination of BOD and COD from water.
11. Determination of dissolved oxygen in water.
12. Identification of adulteration in fertilizer.
13. Use of Various soil testing kits and working of mobile soil testing van.
14. Visit to District soil testing laboratory.

PG Diploma (Soil Testing) Semester II

Code of the Course/ Subject	Title of the Course/Subject	(Total Number of Periods)
2PGDST 05 - Lab-2	Project/Seminar- II	120 hrs (8 hrs/week)

Every student has to submit seminar report and deliver seminar with Power point Presentation

Seminar Course Outcome : After completion of the seminar, the students would be able to :

4. Impart skill in preparing detailed seminar report.
5. Communicate effectively by making an oral presentations.
6. Searching for new topic for the preparation of script

Project Course Outcome : After completion of the seminar, the students would be able to :

5. Demonstrate a sound technical knowledge of their Project topic.
6. Design/develop the solution to a problem.
7. Undertake problem identification, formulation, objectives and solution.

Project work: A project work in the 1st & 2nd semester has been included in the curriculum to enable the students to get familiar with the practices and procedures being followed in the Soil testing Laboratories.

A project report should be submitted in three copies.

The students would develop their project individually and get the topic approved by the head/director/principal of the college. For the purpose of approval, they have to submit their project titles and proposals with the name of internal guides to the head/principal of the college within 45 days of the commencement of the semester.

The students have to report to the guide for at least three times during the project lifespan with the progress report duly signed by the internal guide. Moreover, they have to submit the progress reports with the final project report at the time of external examination.

The external examiners appointed by the University shall award the marks on the basis of the Presentation, Demonstration, Viva-Voce, and on the basis of Project Report.

Subject Code- 2PGDST 06 Internship/Work experience/Field Work

Students are required to undertake mandatory Internship/Work experience/Field Work

(During Vacation of Sem-I/Sem-II) for a duration of 60 Hrs.