DR. BHIMRAO AMBEDKAR UNIVERSITY, AGRA

Syllabus

M.Sc. (Ag.) Soil Science and Agricultural Chemistry

(Semester wise)

2019-20

By

Department of Soil Science and Agricultural Chemistry

Raja Balwant Singh College, Bichpuri, Agra,

U.P. India – 283105

Department of Soil Science and Agricultural Chemistry
M.Sc. (Ag.) Semester wise course Distribution

1st Semester			
Course Code	**Course title**	**Credit Hrs.**	Total
SSAC 501	Soil mineralogy genesis, classifications survey	3(2+1	11
SSAC 502	Soil Chemistry	3(2+1)	
SSAC 503	Analytical techniques & instrumental methods	2(0+2)	
*SSAC 511	Fertilizer technology	4(3+1)	
AST 501	Experimental Designs	3(2+1)	
2nd Semester			
SSAC 504	Soil Physics	3(2+1)	12
SSAC 505	Soil Fertility and Fertilizer use	4(3+1)	
SSAC 506	Soil Biology and Biochemistry	3(2+1)	
*SSAC 512	Soil fertility and integrated nutrient management	4(3+1)	
AST 503	Computer Application in Agricultural	2(1+1)	
3rd Semester			
SSAC 507	Soil water and Air pollution	3(2+1)	09
SSAC 508	Soil erosion and conservation	3(2+1)	
SSAC 509	Remote sensing & GIS technique for soil and crop studies	3(2+1)	
*SSAC 513	Land Degradation and Restoration	4(3+1)	
4th Semester			
SSAC 510	Management of problem soils and waters	3(2+1)	24
SSAC 516	Seminar	1	
SSAC 517	Master Thesis/ Special Paper	20	
*SSAC 514	Chemistry of Problems Soils and Their Management	4(3+1)	
*SSAC 515	Watershed and Wasteland Management	4(3+1)	56

*Special papers in lieu of thesis

M.Sc. (Ag.) Semester wise course Distribution

Ist Semester		**Evaluation Marks**				
Code No.	**Course title**	**Credit Hrs.**	**Mid Term (Internal)**	**Practical (External)**	**End term/Final (External)**	**Total**
SSAC 501	Soil mineralogy genesis, classifications survey	3(2+1	20	30	50	100
SSAC 502	Soil Chemistry	3(2+1)	20	30	50	100
SSAC 503	Analytical techniques & instrumental methods	2(0+2)				100
*SSAC511	Fertilizer technology	4(3+1)	20	30	50	100
AST 501	Experimental Designs	3(2+1)	20	30	50	100
	Total Credit	**11**				
2nd Semester		**Evaluation Marks**				
SSAC 504	Soil Physics	3(2+1)	20	30	50	100
SSAC 505	Soil Fertility and Fertilizer use	4(3+1)	20	30	50	100
SSAC 506	Soil Biology and Biochemistry	3(2+1)	20	30	50	100
*SSAC 512	Soil fertility and integrated nutrient management	4(3+1)	20	30	50	100
AST 503	Computer Application in Agricultural	2(1+1)	20	30	50	100
	Total Credit	**12**				
3rd Semester		**Evaluation Marks**				
SSAC 507	Soil water and Air pollution	3(2+1)	20	30	50	100
SSAC 508	Soil erosion and conservation	3(2+1)	20	30	50	100
SSAC 509	Remote sensing & GIS technique for soil and crop studies	3(2+1)	20	30	50	100

*SSAC 513	Land Degradation and Restoration	4(3+1)	20	30	50	100
	Total Credit	**09**				
4th Semester		**Evaluation Marks**				
SSAC 510	Management of problem soils and waters	3(2+1)	20	30	50	100
SSAC 516	Seminar	1(0+1)				100
SSAC 517	Master Thesis / special Paper	20	Satisfactory/ Unsatisfactory			
*SSAC 514	Chemistry of Problems Soils and Their Management	4(3+1)	20	30	50	100
*SSAC 515	Watershed and Wasteland Management	4(3+1)	20	30	50	100
	Total Credit	**56**				

*Special papers in lieu of thesis

SOIL SCIENCE & AGRICULTURAL CHEMISTRY
COURSE CONTENTS

Soil Mineralogy, Genesis, Classification and Survey

SSAC 501 **Crs. 3(2+1)**

Objective

To acquaint students with basic structure of alumina-silicate minerals and genesis of clay minerals; soil genesis in terms of factors and processes of soil formation, and to enable students conduct soil survey and interpret soil survey reports in terms of land use planning.

Theory

UNIT-I

Fundamentals of crystallography, space lattice, coordination theory, isomorphism and polymerphism.

UNIT-II

Classification, structure, chemical composition and properties of thy minerals; genesis and transformation of crystalline and non-crystalline clay minerals; identification techniques; amorphous soil constituents and other non-crystalline silicate minerals and their identification; clay minerals in Indian soils.

UNIT-III

Concepts and definitions of soil, sod profile; Formation and weathering of rocks and mineral, weathering sequences of minerals. Factors of soil formation, soil forming proozsses.

UNIT-IV

Concept of soil individual; soil classification systems - historical developments and modem systems of soil classification with special emphasis on soil taxonomy; application of soil taxonomy.

UNIT-V

Soil survey and its types; soil survey techniques - conventional and modern; soil series — characterization and procedure for establishing soil series; benchmark soils and soil correlations; soil survey interpretations; soil mapping.

UNIT-VI

Landform soil relationship; major soil groups of India and UP.; land capability and irrigability classification; land evaluation and land use type (LOT)–concept and application; approaches for managing soils and landscapes in the framework of agro-ecosystem.

Practical

- Identification and quantification of minerals in soil fractions
- Morphological properties of soil profile in different landforrns
- Classification of soils using soil taxonomy
- Calculation of weathering indices and its application in soil formation
- Grouping soils using available data base in terms of soil quality
- Aerial photo and satellite data interpretation for soil and land use
- Cartographic techniques
- Land use planning exercises using conventional and RS tools

SOIL CHEMISTRY

SSAC 502 **Crs. 3(2+1)**

Objective

To introduce the classical concepts of soil chemistry and to familiarize students with modern developments in chemistry of soils in relation to using soils as a medium for plant growth.

UNIT-I

Chemical (elemental) composition of the earth's crust and soils.

UNIT-II

Elements of equilibrium thermodynamics, chemical equilibria, electrochemistry and chemical kinetics.

UNIT III

Soil colloids: inorganic and organic colloids - origin of charge, concept of point of zero-charge (PZC) and its dependence on variable-charge soil components, surface charge characteristics of soils; diffuse double layer theories of soil colloids, zeta potential, stability, coagulation/flocculation and peptization of soil colloids; electrometric properties of soil colloids; sorption properties of soil colloids; clay-organic interactions.

UNIT-IV

Ion exchange processes in soil; cation exchange- theories based on law of mass action (Kerr-Vanselow, Gapon equations, hysteresis, Jenny's concept), adsorption isotherms, donnan-membrane equilibrium concept, ionic activity measurement, thermodynamics, anion and ligand exchange - inner- sphere and outer-sphere surface complex formation, fixation of oxyanions, hysteresis in sorption-desorption of oxy-anions and anions, shift of PZC on ligand exchange, AEC, CEC; experimental methods to

study ion exchange phenomena and practical implications in plant nutrition.

UNIT-V

Potassium, phosphate and ammonium fixation in soils covering specific and non-specific sorption; precipitation-dissolution equilibria; step and constant-rate K; management aspects.

UNIT-VI

Chemistry of acid soils; active and potential acidity; lime potential chemistry of acid soils; sub-soil acidity.

UNIT-VII

Chemistry of salt-affected soils and amendments; soil pH, EC, ESP, SAR and important relations; soil management and amendments.

UNIT-VIII

Chemistry and electrochemistry of submerged soils.

Practical

- Determination of CEC and Eb of soils
- Analysis of equilibrium soil solution for pH, EC, Eb by the use of Eh-pH meter and conductivity meter
- Determination of point of zero-charge and associated surface charge characteristics by the serial potentiometric titration method
- Potentiometric and conduct metric titration of soil humic and fulvic acids
- (E/E6) ratio of soil humic and fulvic acids by visible spectrophotometric studies and the A (4/F4) values at two pH values
- Adsorption-desorption of phosphate/sulphate by soil using simple adsorption isotherm • Construction of adsorption envelope of soils by using phosphate/fluoride/sulphate and ascertaining the mechanism of the ligand exchange process involved

- Determination of titratable acidity of an acid soil by RaC12-TEA method
- Determination of lime requirement of an acid soil by buffer method
- Determination of gypsum requirement of an alkali soil

Analytical Techniques and Instrumental Methods in Soil and Plant Analysis

SSAC 503 **Crs. 2(0+2)**

Objective

To familiarize the students with commonly used instruments, their working, preparations of common analytical reagents for qualitative and quantitative analysis of both soil as well as plant samples.

Theory/Practical

UNIT-I

Preparation of solutions for standard curves, analytical reagents, qualitative reagents, indicators and standard solutions for acid-base, oxidation- reduction and complexometric titration; soil, water and plant sampling techniques, their processing and handling.

UNIT-II

Principles of visible, ultraviolet and infrared spectrophotometery, atomic absorption, flame-photometry, inductively coupled plasma spectrometry; chromatographic techniques, mass spectrometry and X-ray defractrometery; identification of minerals by X-ray by different methods.

UNIT-III

In Analysis of soil and plant samples for N, P, K, Ca, Mg., S, Zn, Cu, Fe, Mn, B and Mo, analysis of plant materials by digesting plant materials by wet and dry ashing and soil by wet digestion methods.

Fertilizer Technology

***SSAC 511** **4(3+1)**

Objective :

To impart knowledge about how different fertilizers are manufactured using different kinds of raw materials and handling of fertilizers and manures.

Unit – 1

Fertilizers – production, consumption and future projections with regard to nutrient use in the country and respective states, fertilizer control order.

Unit – 2

Manufacturing processes for different fertilizers using various raw materials, characteristics and nutrient contents.

Unit – 3

Recent development in secondary and micronutrient fertilizers and their quality control as per fertilizer control order.

Unit – 4

New and emerging issues in fertilizer technology – production and use of slow and controlled release fertilizers, super granules fertilizers and fertilizers for specific crops/situations.

Practical :

1. Qualitative tests for different fertilizers.
2. Estimation of NPK in inorganic fertilizer and organic manures.
3. Estimation of sulphur in fertilizer and manures.
4. Estimation of micro nutrients in organic manures.
5. Visit of fertilizer industries.

SSAC 504 Soil Physics Crs. (2+1)

Objective

To impart basic knowledge about soil physical properties and processes in relation to plant growth.

Theory

UNIT-I

Scope of soil physics and its relation with other branches of soil science; soil as a three phase system.

UNIT-II

Soil texture, textural classes, mechanical analysis, specific surface.

UNIT-III

Soil consistence; dispersion and workability of soils; soil compaction and consolidation; soil strength; swelling and shrinkage - basic concepts.

UNIT-IV

Soil structure - genesis, types, characterization and management soil structure; soil aggregation, aggregate stability; soil tilth, characteristics of good soil tilth; soil crusting - mechanism, factors affecting and evaluation; soil conditioners; puddling, its effect on soil physical properties: clod formation.

UNIT-V

Soil water, content and potential, soil water retention, soil-water constants, measurement of soil water content, energy state of soil water, soil water potential, soil-moisture characteristic curve; hysteresis, measurement of soil-moisture potential.

UNIT-VI

Water flow in saturated and unsaturated soils, Poiseuille's law, Darcy's law; hydraulic conductivity, permeability and fluidity, hydraulic

diffusivity; measurement of hydraulic conductivity in saturated and unsaturated soils.

UNIT-VII

Infiltration; internal drainage and redistribution; evaporation; hydrologic cycle, field water balance; soil-plant-atmosphere continuum.

UNIT-IX

Composition of soil air, renewal of soil air - convective flow and diffusion measurement of soil aeration, aeration requirement for plant growth, soil air management.

UNIT-X

Modes of energy transfer in soils; energy balance; thermal properties of soil; measurement of soil temperature; soil temperature in relation to plant growth; soil temperature management.

Practical

- Mechanical analysis by pipette and international methods
- Measurement of Atterberg limits
- Aggregate analysis - dry and wet
- Measurement of soil-water content by different methods
- Measurement of soil-water potential by using tensiometer and gypsum blocks
- Determination of soil-moisture characteristics curve and computation of pore-size distribution
- Determination of hydraulic conductivity under saturated and saturated conditions
- Determination of infiltration rate of soil
- Determination of aeration porosity and oxygen diffusion rate
- Soil temperature measurements by different methods
- Estimation of water balance components in bare and cropped fields

Soil fertility and fertilizer use

SSAC 505 **Crs. 4(3+1)**

Objective

To impart knowledge about soil fertility and its control, and to understand the role of fertilizers and manures in supplying nutrients to plants so as to achieve high fertilizer use efficiency,

Theory

UNIT-I

Soil fertility and soil productivity; nutrient sources fertilizers and manures; essential plant nutrients - functions and deficiency symptoms.

UNIT-II

Soil and fertilizer nitrogen-sources, forms, immobilization and mineralization, nitrification, denitrification; biological nitrogen fixation types, mechanism, microorganisms and factors affecting; nitrogenous fertilizers and their fate in soils; management of fertilizer nitrogen in lowland and upland conditions for high fertility use efficiency.

UNIT-III

Soil and fertilizer phosphorus, forms, immobilization, mineralization, reactions in acid and alkali soils; factors affecting phosphorus availability in soils; phosphatic fertilizers - behavior in soils and management under field conditions.

UNIT-IV

Potassium - forms, equilibrium in soils and its agricultural significance; mechanism of potassium fixation; management of potassium fertilizers under field conditions.

UNIT-V

Sulphur - source, forms, fertilizers and their behavior in soils; calcium and magnesium factors affecting their availability in soils; management of sulphur, calcium and magnesium fertilizers.

UNIT-VI

Micronutrients critical limits in soils and plants; factors affecting their availability and correction of their deficiencies in plants; role of chelates in nutrient availability.

UNIT-VII

Common soil test methods for fertilizer recommendations; quantity intensity relationships; soil test crop response correlations and response functions.

UNIT-VIII

Fertilizer use efficiency; blanket fertilizer recommendations — usefulness and limitations; site-specific nutrient management; plant need based nutrient management; integrated nutrient management.

UNIT-IX

Soil fertility evaluation - biological methods, soil, plant and tissue tests; soil quality in relation to sustainable agriculture.

Practical

- Principles of colorimetry
- Flame-photometry and atomic absorption spectroscopy
- Chemical analysis of soil for total and available nutrients
- Analysis of plants for essential elements
- Determination of soil pH, Ece, organic carbon
- Determination of total NPK and S in plant

Soil Biology and Biochemistry

SSAC 506 **Crs. 3 (2+1)**

Objective

To teach students the basics of soil biology and biochemistry, including biogeochemical cycles, plant growth promoting rhizobacteria, microbial interactions in soil and other soil activities.

Theory

UNIT-I

Soil biota soil microbial ecology, types of organisms in different soils; soil microbial biomass; microbial interactions; un-culturable soil biota.

UNIT II

Microbiology and biochemistry of root-soil interface; phyllosphere; soil enzymes, origin, activities and importance: soil characteristics influencing growth and activity of microflora.

UNIT-III

Microbial transformations of nitrogen, phosphorus, sulphur, iron and manganme in soil: biochemical composition and biodegradation of soil organic natter and crop residues. basic principles of humus formation.

UNIT-IV

Biodegradation of pesticides, organic wastes and their use for production of biogas and manures; biotic factors in soil development; microbial toxins in the soil.

UNIT –V

Preparation of farmyard manure, animal manures, rural and urban composts and vermicompost.

UNIT-VI

Bio-fertilizers Definition, classification, specifications, method of production and role in crop production.

Practical

- Determination of soil microbial population
- Soil microbial biomass
- Elemental composition, fractionation of organic matter and functional groups
- Decomposition of organic matter in soil
- Soil enzymes
- Measurement of important soil microbial processes such as ammonification, nitrification, N_2 fixation, S oxidation, P solubilization and mineralization of other micro nutrients
- Study of rhizosphere effect

Soil fertility and Integrated nutrient management

SSAC 512 **4(3+1)**

Theory

Unit – 1

Soil fertility and productivity – factors affecting; features of good soil management, problems of supply and availability of nutrients; relation between nutrient supply and crop growth.

Unit – 2

Criteria of essentiality of nutrients; essential plant nutrients – their functions, nutrient deficiency symptoms; transformation and dynamics of major plant nutrients.

Unit – 3

Farmyard manure, compost, green manure, vermicompost, bio-fertilizers and other organic concentrates, their composition, availability and crop responses; recycling of organic wastes and residue management.

Unit – 4

Commercial fertilizers; composition, relative fertilizer value and cost; crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades; agronomic, chemical and physiological methods of increasing fertilizer use efficiency, nutrient interaction.

Unit – 5

Time and method of manure and fertilizers application, foliar application and its concept; relative performance of organic and inorganic manure's economics of fertilizer use; integrated nutrient management; use of vermicompost wastes in crops.

Practical :

1. Determination of soil pH, ECe, organic C, total N available NPK and S in soil.
2. Determination of total N, P, K and S in plants.
3. Numerical problem on fertilizers requirement and fertilizer mixture.
4. Analysis of soil extent and irrigation water for their soluble cations and anions and interpretation of result.

Soil, Water and Air Pollution

SSAC 507 **Crs. 3 (2+1)**

Objective

To make the students aware of the problems of soil, water and air pollution associated with use of soils for crop production.

Theory

UNIT-I

Soil, water and air pollution problems associated with agriculture, nature and extent.

UNIT-II

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.

UNIT-III

Sewage and industrial effluents, their composition and effect on soil properties/health, and plant growth and human beings; soil as sink for waste disposal.

UNIT-IV

Pesticides their classification, behavior in soil and effect on soil micro-organisms.

UNIT-V

Toxic elements their sources, behavior in soils, effect on nutrients availability, effect on plant and human health.

UNIT-VI

Pollution of water resources due to leaching of nutrients and pesticides from soil emission of green house gases carbon dioxide, methane and nitrous oxide.

UNIT-VII

Remediation / amelioralion of contaminated soil and water, remote sensing applications in monitoring and management of soil and water pollution.

Practical

- Sampling of sewage waters, sewage sludge, solid/liquid industrial wastes, polluted soils and plants
- Estimation of dissolved and suspended solids, chemical oxygen demand (COD), biological oxygen demand (BOD), nitrate and ammoniacal nitrogen and phosphorus, heavy metal content in effluents

- Heavy metals and pesticides in Contaminated soils and plants
- Management of contaminants in soil and plants to safeguard food safety
- Air sampling and determination of particulate matter and oxides of sulphur
- Visit to various industrial sites to study the impact of pollutants on soil and plants.

Soil Erosion and Conservation

SSAC 508 **Crs. 3(2+1)**

Objective

To enable students to understand various types of soil erosion and measures to be taken for controlling soil erosion to conserve soil and water.

Theory

UNIT-I

History, distribution, identification and description of soil erosion problems in India.

UNIT-II

Forms of soil erosion; effects of soil erosion and factors affecting soil erosion; types and mechanisms of water erosion; raindrops and soil erosion; rainfall erosivity - estimation as Elm) index and kinetic energy; factors affecting water erosion; empirical and quantitative estimation of water erosion; methods of measurement and prediction of runoff; soil losses in relation to soil properties and precipitation.

UNIT-III

Wind erosion- types, mechanism and factors affecting wind erosion; extent of problem in the country.

UNIT-IV

Principles of erosion control; erosion control measures agronomical and engineering; erosion control structures, their design and layout.

UNIT-V

Soil conservation planning; land capability classification; soil conservation in special problem areas such as hilly, arid and semi-arid regions, waterlogged and wet lands.

UNIT-VI

Watershed management - concept, objectives and approach; water harvesting and recycling; flood control in watershed management; socio-economic aspects of watershed management; case studies in respect to monitoring and evaluation of watersheds; use of remote sensing in assessment and planning of watersheds.

Practical

- Determination of different soil erodibility indices, percolation ratio. raindrop erodibility index
- Computation of kinetic energy of falling rain drops
- Computation of rainfall erosivity index ($EI3_0$) using rain gauge data
- Visits to a watersheds

Remote Sensing and GIS Techniques for Soil, Water and Crop Studies

SSAC 509 **Crs. 3(2+1)**

Objective

To impart knowledge about the basic concepts of remote sensing, aerial photographs and imageries, and their interpretation; application of remote sensing in general and with special reference to soil, plants and

yield forecasting; to impart knowledge about geo-statistical techniques with special reference to krigging and GIS and applications in agriculture.

Theory

UNIT-I

Introduction and history of remote sensing; sources, propagation of radiations in atmosphere: interactions with matter.

UNIT-II

Sensor systems – camera, microwave radiometers and scanners; fundamentals of aerial photographs and image processing and interpretations.

UNIT-III

Application of remote sensing techniques - landuse soil surveys, crop stress and yield forecasting, prioritization in watershed and drought management, wasteland identification and management.

UNIT-IV

Significance and sources of the spatial and temporal variability in soils; variability in relation to size of sampling; classical and geo-statistical techniques of evolution of soil variability.

UNIT-V

Introduction to GIS and its application for spatial and non-spatial soil and land attributes.

Practical

- Familiarization with different remote sensing equipments and data products
- Interpretation of aerial photographs and satellite data for miming of land resources
- Analysis of variability of different soil properties with classical and geo-statistical techniques
- Creation of data files in a database programme

- Use of GIS for soil spatial simulation and analysis
- To enable the students to conduct soil survey and interpret sod survey reports in terms of land use planning

Land Degradation and Restoration

***SSAC 513** **4(3+1)**

Objective :

To impart knowledge related to various factors and processes of land degradation and their restoration techniques.

Unit – 1

Type, factors and processes of soil/land degradation and its impact on soil productivity, including soil fauna, biodegradation and environment.

Unit – 2

Land restoration and conservation techniques erosion control, reclamation of salt affected soils, mine land reclamation, afforestation, organic products.

Unit – 3

Extent, diagnosis and mapping of land degradation by conventional and modern RS-GIS tools, monitoring land degradation by fast assessment, modern tools, land use policy, incentives and participatory approach for reversing land degradation; global issues for twenty first century.

Practical :

1. Isolation and identification of soil fauna
2. Estimation of EC, pH, Organic Carbon, Exchangeable calcium, magnesium, potassium and sodium.

Management of Problem Soils and Waters

SSAC 510 **Crs. 3(2+1)**

Objective

To educate students about basic concepts of problem soils and brackish water, and their management. Attention will be on management of problem soils and safe use of brackish water in relation to crop production.

Theory

UNIT-I

Area and distribution of problem sodic acidic, saline and sodic soils; origin of problematic soils, and factors responsible.

UNIT-II

Morphological features of saline, sodic and saline-sodic soils; characterization of salt-affected soils - soluble salts, ESP, pH; physical, chemical and microbiological properties.

UNIT-III

Management of salt-affected soils; salt tolerance of crops - mechanism and ratings; monitoring of soil salinity in the field; management principles for sandy, clayey, red lateritic and dry land soils.

UNIT-IV

Acid soils - nature of soil acidity, sources of soil acidity; effect on plant growth, lime requirement of acid soils; management of acid soils; biological sickness of soils and its management.

UNIT-V

Quality of irrigation water; management of brackish water for irrigation; characterization of brackish waters; relationship in water use and quality.

UNIT-VI

Agronomic practices in relation to problematic soils; cropping pattern for utilizing poor quality ground waters.

Practical

- Characterization of acid, acid sulfate, salt-affected and calcareous soils
- Determination of cations (Na^+, K^+, Ca^{++} and Mg^{++}) in ground water and soil samples
- Determination of anions (Cl, SO_4^-, CO_3 and HCO_3) in ground waters and soil samples
- Lime and gypsum requirements of acid and sodic soils

Chemistry of Problems Soil and Their Management

***SSAC 514** **4(3+1)**

Theory

Unit – 1

Acid and salt affected soils–their origin, distribution, classification, reclamation and management practices.

Unit – 2

Waterlogged Soils – their classification, changes in soil pH, electrical conductivity

Unit – 3

Redox potential and transformation of important plant nutrients during waterlogging,

Unit – 4

Management of waterlogged soils for crop irrigation water and use/of brackish water for crop production.

Practical :

1. Determination of gypsum requirement of sodic soils.

2. Preparation of saturation extract of soil and its analysis for cations and anions.
3. Analysis of irrigation waters for their quality appraisal.
4. Determination of hydraulic conductivity, bulk density, particle density and porosity of soils.

Watershed and Wasteland Management

***SSAC 515** **4(3+1)**

Theory

Unit – 1

Watershed management: Concept, need, principles and components of watershed management.

Unit – 2

Integrated watershed management: Factors affecting watershed management : Runoff and soil loss management in a watershed; Socio-economic concept of watershed – peoples participation in watershed management.

Unit – 3

Application of Remoted Sensing, GIS and Isotope Technology in survey and problem identification for planning and management watershed. Policy approaches and management plan.

Unit – 4

Problems of watershed management. Wasteland management : Definition, concept and types of degraded and wasteland. Distribution and extent of watershed in Uttar Pradesh and India.

Unit – 5

Factors responsible for land degradation; Characteristic of different types of degraded and wasteland : Problems of degraded land in

Uttar Pradesh. Appropriate techniques for management of different types of degraded and wasteland.

Practical :

1. Preparation of master plan for watershed.
2. Participatory Rural Appraisal (PRA) techniques in watershed.
3. Watershed monitoring and evaluation.
4. Estimation of runoff and soil loss in a watershed area.
5. A case study of watershed. Visit to model watershed.