

# CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-I, 2010-2011

Sub : Agricultural Chemistry & Soil Science

Course - II

## PHYSICAL CHEMISTRY AND ANALYTICAL TECHNIQUES

Code-J-131

M.M. 100 50 + 50

Theory -

Sl.No.	Topic
	<u>Unit - I</u>
1.	Structure of atom : Atomic orbitals, Molecular orbital theory of chemical bonding, concept of hybridization. (5 Hours)
2.	Radioactivity: Radio isotopes, concept of specific activity, Principles of trace techniques, isotopic dilution and labeling, isotopes in Agriculture. (5 Hours)
	<u>Unit - II</u>
3.	Theory of dilute solutions : Osmosis and Osmotic pressure. (5 Hours)
4.	Catalysis : Types, characteristics & uses. <u>Unit - III</u> (5 Hours)
5.	Colloidal state of matter : classification, characteristics, preparations & uses of colloids. (5 Hours)
6.	Chemical equilibrium : Law of mass action and its application to homogeneous equilibria activity coefficients. (5 Hours)
7.	Concepts of surface tension, viscosity, dipole moment, ionic products, solubility products and common ion effect. <u>Unit - IV</u> (5 Hours)
8.	Theory of indicator, modern concept of acids & bases and salt hydrolysis, pH & Buffers (5 Hours)
9.	Principles and methods of quantitative analysis, volumetric analysis-acid base & redox. <u>Unit - V</u> (5 Hours)
10.	Principles and use of Flame photometry & Spectrophotometry. (5 Hours)

### REFERENCES -

- Bahl, B.S. & Tuli, G.D. Essential of Physical Chemistry, S.Chand & Co., New Delhi.
- Glasstone S.A. 1976 Text Book of Physical Chemistry, Macmillon Ltd., New Delhi.
- Jakson, M.L. 1973 Soil chemical analysis, Printice Hall of India, New Delhi.
- Tandon H.L.S. 1993, Methods of analysis of soils, Plants, Fertilizers and waters, FDCO Books, New Delhi.
- Volgel, A.I. 1979 A Text book of Quantitative inorganic analysis. ELBS: London
- Willard H.H., Merritt Jr. I.L. Dean J.A. Settle, Jr. F.A. 1986 Instrumental method of analysis CBS Publishers, New Delhi-1.

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CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-I, 2010-2011

Sub : Agricultural Chemistry & Soil Science  
Course - III



Course outline

PLANT BIOCHEMISTRY - I

M.M. 100 50+50

Theory -

J-103 2 (014-8603)

Sl.No.

Topic

- | Sl.No. | Topic   |
|--------|---|
|        | <i>Unit - I</i>   |
| 1.     | <b>Carbohydrates</b> : Definition, classification, structure and properties of Glucose, Fructose, sucrose, maltose, lactose, cellulose, Hemicellulose and starch (10 Hours) |
|        | <i>Unit - II</i>  |
| 2.     | <b>Proteins</b> : Sources, classification, structures and general properties. (5 Hours)   |
| 3.     | <b>Amino Acids</b> : Classification, structures and general properties. (5 Hours)   |
|        | <i>Unit - III</i>   |
| 4.     | <b>Lipids</b> : Classification, structures, general properties, fatty acids, classification. (5 Hours)  |
| 5.     | <b>Nucleic Acids</b> : Structure of RNA & DNA their biological importance. (5 Hours)  |
|        | <i>Unit - IV</i>  |
| 6.     | <b>Vitamins</b> Classification, Occurrence, Structure, Physiological function, deficiency symptoms of Vitamin A,D,E,K,C and B complex. (5 Hours)                            |
| 7.     | Biosynthesis of carbohydrates. (5 Hours)  |
|        | <i>Unit - V</i>   |
| 8.     | Biosynthesis of Proteins. (5 Hours)   |
| 9.     | Biosynthesis of Lipids. (5 Hours)   |

REFERENCES -

Cyril Tyler, 1959 Organic and Plant Biochemistry.

Edwin T. Mertz 1973. Elementary Biochemistry.

Singh, N. 1997 Organic and Plant Biochemistry.

West and Todd, Text Book of Biochemistry.

Das & Gupta, Biochemistry.



CH. CHARAN SINGH UNIVERSITY, MEERUT  
M.Sc. (Ag.) Sem. -I, 2010-2011  
Sub : Agricultural Chemistry & Soil Science  
Course - IV

SOIL GENESIS, CLASSIFICATION AND SURVEY

Course outline

M.M. 100 50+50

Theory -

Code - J-1033

Sl.No.	Topic
1.	<u>Unit - I</u> Soil : Meaning & definition components of soil, soil-plant relationship. (5 Hours)
2.	Weathering : Mechanical Forces of weathering, chemical process of weathering, factors affecting weathering, weathering in action (Genesis of parent materials), Weathering and soil profile development. (5 Hours)
3.	<u>Unit - II</u> Soil-Building process : The General Nature of the pedogenic process, general fundamental pedogenic process and conditions. Specific fundamental pedogenic process. (10 Hours)
4.	Initial Material of the Solum : Influence of Rock Types on soil properties, sedimentary rocks (Glacial, Till unconsolidated coastal plain sediments, strongly weathered sediments, Lime stone and dolomite, sandstones, shales), Light-coloured siliceous crystalline Rocks (Firanites, Schist), Dark-coloured Ferromagnesian (Basic) Rocks, Volcanic ash, Nonuniformity and Discontinuities in Parent material. (5 Hours)
5.	<u>Unit - III</u> Factors influencing soil formation : Climate (Particularly temperature and Precipitation) Living organism (especially the native vegetation), Nature of Parent material (Structure, chemical and mineralogical composition), Topography of area, Parent material Time Factor, slope and development concept of individual soils. (5 Hours)
6.	<u>Unit - IV</u> Soil classification - New comprehensive system. (5 Hours)
7.	Soil survey, its utilization and land capability classification. (5 Hours)
8.	<u>Unit - V</u> Elementary idea of remote sensing techniques and geographic information system(GIS) for resource inventorization. (5 Hours)
9.	Land use planning : Concept of bench mark soil survey for agro technology- transfer in soils. (5 Hours)

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**CH. CHARAN SINGH UNIVERSITY, MEERUT**  
 M.Sc. (Ag.) Sem.-I, 2010-2011  
 Sub : Agricultural Chemistry & Soil Science  
 Practical - I

Based on Papers II, III & IV

Course outline

J-1034

M.M. 200

Theory -

Sl.No.

Topic

- | Sl.No. | Topic   |           |
|--------|---|-----------|
| 1      | Preparation of standard acid- alkali solutions.   | (9 Hours) |
| 2      | Determination of calcium and magnesium by EDTA titration method.                              | (6 Hours) |
| 3      | Determination of surface tension and viscosity of solutions.                                  | (6 Hours) |
| 4      | Determination of reducing and non-reducing sugars, crude proteins and crude fat.              | (9 Hours) |
| 5      | Determination of fat constant : R.M.- value, P- value, Iodine value and saponification value. | (9 Hours) |
| 6      | Identification of soil formings rocks and minerals.   | (6 Hours) |
| 7      | Study of soil profile.  | (5 Hours) |

**REFERENCES -**

- Jackson, M.L. 1973, Soil chemical Analysis. Prentice Hall of India. New Delhi.
- Tandon, H.L.S. 1993. Methods of Analysis of Soils, Plants, Fertilizers and Waters, FDCO, Books, New Delhi.
- Singh, D. Chhonkar, P.K. and Pandey, R.N. 1999, Soil Plant Water Analysis - A methods manual, Indian Agril. Res. Inst., New Delhi & ICAR.
- Vogel. A.I. 1979. A Text Book of Quantitative inorganic Analysis. E.L.B.S., London.
- Piper, C.S. 1966, Soil and Plant Analysis, Hans Publishers, Bombay.
- Black, C.A. (ed) 1965, Methods of Soil Analysis, Am. Soc. Agron., Madison, USA.
- Chopra, S.L. and Kanwar, J.S. 1976, Analytical Agricultural Chemistry, Kalyani Publishers, Ludhiana.
- USDA handbook No. 60, Diagnosis and improvement of saline and alkali soils, Oxford & IBH Publ. Co., Calcutta.
- Upadhayay, R.M. and Sharma, N.L. 2001, Mannual of Soil, Plant, Water and Fertilizer Analysis, Kalyani Pub., New Delhi.
- Singh, D., Chhonkar, P.K. and Pandey R.N. Soil Plant Water analysis A methods manual.



CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-II, 2010-2011

Sub : Agricultural Chemistry & Soil Science

Course - VI

Course outline

SOIL PHYSICS

M.M. 100

Theory -

J-231

50 + 50

Sl.No.

Topic

1. **The Soil as a Disperse System** : <sup>Unit - I</sup> Soil Texture, Textural classes, Characteristics of Dispersed phase size of particle, chemical and mineralogical nature of particles, shape of clay particles, surface behaviour of clay particles. (5 Hours)
2. **Dynamic properties of soils** : <sup>Unit - II</sup> Soil consistency, consistency of Moist and wet soils consistency of Dry soil, soil plasticity, Dynamic properties of soils involved in Tillage - The physics of flow Action, Viscosity & welling properties of soil colloids. (5 Hours)
4. **Soil Structure - Classification and Genesis** : Definition, classification, Genesis of soil structure, cation effects, clay particle interaction, iron and Aluminium colloids, organic matter effects. <sup>Unit - III</sup> (5 Hours)
5. **Soil Aeration** : <sup>Unit - III</sup> Pore Types involved in aeration, composition of soil air, Gaseous Exchange - The Renewal of soil air, mass flow, diffusion. (5 Hours)
6. **The Thermal Regime of soils** : Source and amount of Heat, Radiation, Thermal properties of soils, Heat capacity, Thermal conductivity and Diffusivity, Variation in soil temperature. <sup>Unit - IV</sup> (5 Hours)
7. **Soil water Retention** : Water content, water close to particle surface, energy state of water in soil, pF. (5 Hours)
8. **Soil water movement** : Classification of soil water, General Flow principal, flow equations, saturated flow problems, unsaturated flow problems flow in stratified soil system <sup>Unit - V</sup> (5 Hours)
9. **Field Moisture Regime** : Water Balance, water movement, infiltration, flow equation drainage, water in soil profile, field capacity, wilting coefficient, hygroscopic coefficient & moisture equivalent evaporation. (5 Hours)
10. **Soil water - Plant Relationship** : Internal water Relations of Plants, Plant Response to leaf - water Deficits, Transpiration from plant leaves, Transport through the plant, water movement to plant roots, Relation of plant growth to soil water, soil atmosphere, plant continuum (SAP) (5 Hours)



CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-II, 2010-2011

Sub : Agricultural Chemistry & Soil Science

Course - VII

Course outline

J-232

SOIL FERTILITY

M.M. 100

Theory -

Sl.No.

Topic

- Unit - I*
1. Plant Growth and the factors affecting it, Growth expressions. 5 Hours
  2. Plant nutrients, criteria, classification, forms of nutrients absorbed by plants, deficiency symptoms in plants, Role of nutrients in plants. 5 Hours

*Unit - II*

  3. Source of nutrients, Dynamics of nutrient availability, multiple deficiency, nutrient interaction, nutrient toxicity, indicator plants, critical limits of nutrients. 5 Hours
  4. **Nutrient uptake** : Nutrient supply to plant root, mass flow, diffusion, Root interception. 5 Hours

*Unit - III*

  5. Ion absorption by plants, Root Morphology, plant cell and membrane, active and passive ion transport, ion uptake mechanism. 5 Hours
  6. **Nitrogen** - Role of nitrogen in plants, mineralization and immobilization, Nitrification and denitrification, Nitrogen management in the soil, loss of nitrogen. 5 Hours

*Unit - IV*

  7. **Phosphorus** - Role of phosphorus plants, source and amounts of P in soils factors affecting phosphorus availability, Nitrogen in process P uptake. 5 Hours
  8. **Potassium**: Role of potassium in plants, forms of potassium in the soil, fixation of potassium in the soil, factor affecting potassium in the soil. 5 Hours

*Unit - V*

  9. **Evaluation of soil fertility** : Nutrient deficiency symptoms of plants, Hidden Hunger, soil and plant analysis, Integrated nutrient management. 5 Hours
  10. **Fertility management of cultivable soils** : Types of soil fertility, losses of plant nutrients from the soil, factors affecting soil fertility and Maintenance of soil fertility. 5 Hours

REFERENCES -

Tisdale, L. Samuel and Nelson L. Werner 1956. Soil fertility and fertilizers, New York, London.

Kanwar, J.S. 1976. Soil Fertility - Theory and Practices ICAR, New Delhi.

Forth H.D. and Ellies, B.C. 1997. Soil fertility, CRC Press, New York,

Prasad, R. and Power, J.F. 1997 Soil Fertility Management for sustainable

Agriculture.

*Prasad - C*



CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-II, 2010-2011

Sub : Agricultural Chemistry & Soil Science

Course - VIII

Course outline

SOILS OF INDIA

M.M. 100

50 + 50

Theory -

J-233

Sl.No.

Topic

*Unit - I*

1. **Indo- Genetic Soil** : Morphology, Genesis , Chemical composition and classification. (5 Hours)

2. **Desert Soil** : Morphology, Genesis, Chemical composition and classification. (5 Hours)

*Unit - II*

3. **Black soils** : Morphology, Genesis, Chemical composition and classification. (5 Hours)

4. **Red and Laterite soils** : Morphology, Genesis, Chemical composition and classification. (5 Hours)

*Unit - III*

5. **Salt affected soils** : Morphology, Genesis, Chemical composition and classification. (5 Hours)

6. **High Altitude soils** : Morphology, Genesis, Chemical composition and classification. (5 Hours)

7. **Tarai soils** : Morphology, Genesis, Chemical composition and classification.

SOIL TECHNOLOGY:

*Unit - IV*

(15 Hours)

(i) Land evaluation.

(ii) Soil and water conservation. *Unit - V*

(iii) Water quality and soil productivity.

(iv) Land use and management practices in acid zone.

(v) Land and water management in semi-arid rainfed areas.

REFERENCES :

Review of soil research in India Part -I and Part - II 1982.



CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-II, 2010-2011

Sub : Agricultural Chemistry & Soil Science

Practical - II

J-234

Course outline

BASED ON PAPERS, VI, VII & VIII M.M. 200

Sl.No.

Topic

- ✓ 1. Soil Sampling. ( 9 Hours)
2. Determination of particle size distribution by hydrometer and international pipette method. ( 9 Hours)
- ✓ 3. Determination of bulk-density, particle density, porosity and pore size distribution. ( 9 Hours)
4. Determination of soil moisture. ( 6 Hours)
- ✓ 5. Determination of E.C. and pH of soil. ( 6 Hours)
- ✓ 6. Determination of calcium carbonate in soil. ( 6 Hours)

Field trip and visit to Agricultural Research Stations.

REFERENCES -


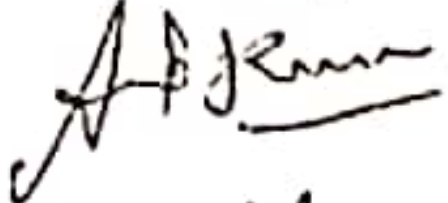
- Jackson, M.L. 1973, Soil chemical Analysis. Prentice Hall of India. New Delhi.
- Tandon, H.L.S. 1993. Methods of Analysis of Soils, Plants, Fertilizers and Waters, FDCO, Books, New Delhi.
- Singh, D. Chhonkar, P.K. and Pandey, R.N. 1999, Soil Plant Water Analysis - A methods manual, Indian Agril. Res. Inst., New Delhi & ICAR.
- Vogel. A.I. 1979. A Text Book of Quantitative inorganic Analysis. E.L.B.S., London.
- Piper, C.S. 1966, Soil and Plant Analysis, Hans Publishers, Bombay.
- Black, C.A. (ed) 1965, Methods of Soil Analysis, Am. Soc. Agron., Madison, USA.
- Chopra, S.L. and Kanwar, J.S. 1976, Analytical Agricultural Chemistry, Kalyani Publishers, Ludhiana.
- USDA handbook No. 60, Diagnosis and improvement of saline and alkali soils, Oxford & IBH Publ. Co., Calcutta.
- Upadhayay, R.M. and Sharma, N.L. 2001, Mannual of Soil, Plant, Water and Fertilizer Analysis, Kalyani Pub., New Delhi.
- Singh, D., Chhonkar, P.K. and Pandey R.N. Soil Plant Water analysis A methods manual.



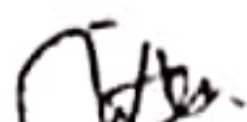
Ch. Charan Singh Univ., Meerut

A meeting of Board of Studies in Ag Statistics was held on 12-07-2010 at 11.30 A.M. in the Committee Room, Administrative Block, Ch. Charan Singh Univ., Meerut. Syllabus for M.Sc.(Ag)-I Sem & II Sem of the subject - Ag Statistics was prepared. This syllabus will be implemented from the session 2010-11 and onwards.

The following members were present in the B.O.S. meeting -

1. Dr. A. K. Sharma, Dept. of Ag-Stats, A.S. College, Lakhoti, BSR 
2. Dr. Anil Kumar, Senior Scientist, IASRI, Pusa, New Delhi 
3. Prof. B. Ramesh, Dean Faculty of Agriculture, C.C.S. Univ., Meerut

Encl: A copy of the Syllabus enclosed herewith.





CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-III, 2010-2011

Sub : Agricultural Chemistry & Soil Science  
Course - IX

Course outline

PLANT BIOCHEMISTRY - II

M.M. 100

Theory -

J-3031 (034-8601)

50+50

Sl.No.

Topic

- | Sl.No. | Topic  | Hours    |
|--------|--|----------|
|        | <i>Unit - I</i>  |          |
| 1.     | General Chemical composition of plant.   | 5 Hours. |
| 2.     | <b>Plant Pigments</b> : Types & structure of Carotenoids and Anthocyanins.   | 5 Hours. |
|        | <i>Unit - II</i>   |          |
| 3.     | Plant hormones their source, importance and structures.  | 5 Hours  |
| 4.     | <b>Organic compounds used against plant pests</b> : Structure and uses.  | 5 Hours  |
|        | <i>Unit - III</i>  |          |
| 5.     | <b>Alkaloids</b> : Source, importance and their structure.   | 5 Hours  |
| 6.     | <b>Sterols</b> : Their source, structure and importance.   | 5 Hours  |
|        | <i>Unit - IV</i>   |          |
| 7.     | <b>Antibiotics</b> : Their source, structures and uses.  | 5 Hours  |
| 8.     | <b>Essential Oils</b> : Occurance and structure.   | 7 Hours  |
|        | <i>Unit - V</i>  |          |
| 9.     | Enzyme : Nomenclature, classification and general characteristics<br>mechanism of enzyme action and factor affecting it. | 10 Hours |

REFERENCES -

Cyril Tyler, 1959, Organic Chemistry for student of Agriculture and allied subjects, London.

Edwin T. Mertz 1973 Elementary Biochemistry.

West, E.S., Todd, W.R., Howard, S. and John. T. 1961 Biochemistry, New  
New Delhi

Singh, N. 1997 Organic and Plant Biochemistry. Aman Publishing House,  
Meerut



CH. CHARAN SINGH UNIVERSITY, MEERUT  
M.Sc. (Ag.) Sem.-III, 2010-2011  
Sub : Agricultural Chemistry & Soil Science  
Course -X

Course outline

SOIL CHEMISTRY

M.M. 100

Theory -

J-3032

50+50

Sl.No.

Topic

- | Sl.No. | Topic   | Hours   |
|--------|---|---------|
| 1.     | Chemical composition of soil, concept of chemical equilibria in soil, acid base equilibria, oxidation reduction equilibria. <i>Unit - I</i>   | 5 Hours |
| 2.     | Buffering of soils, Buffer capacity of soils and related phases, importance of buffering. <i>Unit - II</i>  | 5 Hours |
| 3.     | Soil Reaction : Source of hydrogen ions, colloidal control of soil reaction, major changes in soil pH, Minor Fluctuation in soil pH.  | 5 Hours |
| 4.     | Cation ex-change phenomena and its importance, Development of charge, cation ex-change capacity (CEC), Power of replacement, concept of electrical double layer, effect of valence and salt concentration on electrical double layer, implications regarding plant nutrients. | 5 Hours |
| 5.     | Anion exchange phenomena, adsorption and exchange of anions, salt effects on phosphate sorption, exchange between solid phases, factors influencing affecting the anion exchange phenomena. <i>Unit - III</i>   | 5 Hours |
| 6.     | Water logged soils.   | 5 Hours |
| 7.     | Salt affected soils. <i>Unit - IV</i>   | 5 Hours |
| 8.     | Acid soils.   | 5 Hours |
| 9.     | N and K Fixation and solubilization of inorganic P. <i>Unit - V</i>   | 5 Hours |
| 10.    | Importance and use of radio isotops in Agriculture.   | 5 Hours |

REFERENCES -

- Bear, E. Firman 1964. Chemistry of the soil, London.  
Buckman, O. Harry and Braddy, N. 1961. The Nature and Properties of soils.  
Boul, S.W., Hole, F.D. and Mc CRACKEN, R.J. 1980 Soil Agenesis and classification, New Delhi.  
Van Olphen, H 1977 Introduction to clay colloid chemistry, New York.



CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem. -III, 2010-2011

Sub : Agricultural Chemistry & Soil Science  
Course - XI

Course outline : SOIL CHEMICALS AND BALANCE FERTILIZATION FOR AGRICULTURAL SUSTAINABILITY

M.M. 100

Theory -

J- 303 3

50+50

Sl.No.

Topic

1. Pesticides : Background, Kinds and behavior of Pesticides. (5 Hours)  
*Unit - I*
2. Organic Wastes : Use for crop production, Soils as Organic waste. (5 Hours)  
*Unit - II*
3. Integrated nutrients : Meaning and use of Macro and micro nutrients for crop production. (5 Hours)
4. Bio- fertilizer : Name and use of bio- fertilizer , advantage and disadvantage of bio-fertilizers with and without chemical fertilizers for crop production. (5 Hours)  
*Unit - III*
5. Organic manures : Name of Organic manures and use of organic manures for sustainable crop production and soil health. (5 Hours)
6. Fertilizers consumption : Past and present, change in product patterns, Regional disparities , Inter – season variations, Soil Fertility status . (5 Hours)  
*Unit - IV*
7. Nutrient use efficiency : A general prevailing trend and nutrients removals and balances. (5 Hours)
8. Site – specific nutrient management in agriculture crop system in Uttar Pradesh. (5 Hours)  
*Unit - V*
9. Water quality and Soil productivity : Quality of ground waters, Effect of saline water irrigation on soil properties , Effect of saline water irrigation on crop growth , management practices to use saline water for irrigation. (5 Hours)

REFERENCES :

NWZ India 56, Project leaders , Dr. S.K. Sharma, Dr. A.K. Shukla, Dr. V.K. Singh, Modipuram, Meerut , U.P

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CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) III Sem., 2010-2011

Sub : Agricultural Chemistry & Soil Science  
Course - XII

Course outline

SOIL BIOLOGY - I

M.M. 50

Theory -

J-3034

50 + 50

Sl.No.	Topic	
	<i>Unit - I</i>	
1.	Micro-organisms of the soil and ecology of Micro-organisms in soil.	5 hours
2.	Beneficial activities of soil organisms.	5 hours
	<i>Unit - II</i>	
3.	Microbiology of cellulose, Hemicellulose, Lignins & Strach.	5 hours
4.	Nitrogen Cycle : Mineralization, and immobilization, Nitrification, Denitrification and nitrogen fixation.	5 hours
	<i>Unit - III</i>	
5.	Sulphur Transformation : Mineralization and immobilization, inorganic sulphur oxidation, reduction of inorganic sulphur.	5 hours
6.	Phosphorus Transformation : Mineralization and immobilization of organic phosphorus.	5 hours
	<i>Unit - IV</i>	
7.	Transformation of iron & manganese.	5 hours
8.	Soil enzymes, their classification and enzymes activity in soil.	5 hours
	<i>Unit - V</i>	
9.	The carbon cycle : Organic matter Decomposition, carbon nitrogen ration, significance of carbon nitrogen ratio, factors affecting organic matter and nitrogen.	5 hours
10.	Condition affecting the growth of soil, bacteria, injurious effect of soil organism on higher plants, effect of agricultural practice on soil organisms.	5 hours

REFERENCES -

Alezeander, on, 1977. Introduction of soil microbiology, New York.

Burgs, A. and Raw, F. 1967. Soil Biology, New York.

Mc Laren, A.D. and Peter, G.H. 1967 Soil Bio-Chemistry, New York.

Reddy, M.V. 1995 Soil Organisms and litter Decomposition in the Tropics, New

Delhi



# CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-III, 2010-2011

Sub : Agricultural Chemistry & Soil Science  
Practical - III

J-305

Course outline

BASED ON PAPERS IX, X, XI & XII

M.M. 200

Sl.No.	Topic	
1.	Determination of total and available macro and micronutrients in soils and formulation for fertilizer recommendations based on soil test.	6 Hours
2.	Characterization of acid, saline and sodic soils.	6 Hours
3.	Determination of lime requirement of acid soils.	6 Hours
4.	Determination of gypsum requirement of sodic soils.	6 Hours
5.	Determination of crude and true protein, in plant sample.	3 Hours
6.	Determination of calcium magnesium and sulphate in soil sample.	6 Hours
7.	Determination of chlorides, carbonates and bicarbonate in water sample.	6 Hours
8.	Acid value of oils.	3 Hours
9.	Quantitative analysis of formal dehyde.	5 Hours
10.	Determination of alkalinity burgundy mixtures D.D.T. and B.H.C.	3 Hours

## REFERENCES -

Tondon. H.L.S. 1993. Methods of Analysis of Soils, Plants, Fertilizers and Waters, FDCO, Books, New Delhi.

Vogel, A.I. 1979. A text book of Quantitative inorganic analysis. ELBS, London.

Piper, C.S. 1966, Soil and Plant Analysis, Hans Publishers, Bombay.

Black, C.C. (ed) 1965, Methods of Soil Analysis, Am. Soc. Agron., Madison, USA.

Chapman, H.D. and Pratt. P.F. 1961. Methods of analysis for soils, plants and water. Univ. of California, U.S.A.

Chopra, S.L. and Kanwar, J.S. 1976, Analytical Agricultural Chemistry. Kalyani Publishers, Ludhiana.

Upadhyay, R.M. and Sharma, N.L. 2001. Manual of Soil, Plant Water and Fertilizer Analysis Pub., New Delhi.

Singh, D., Chhonkar, P.K. Pandey R.N. Soil Plant Water analysis A methods manual.



CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem. -IV, 2010-2011

Sub : Agricultural Chemistry & Soil Science

Course - XIII

Course outline

SOIL MINERALOGY M.M. 100

Theory -

F-431

J-4031

Sl.No.

Topic

Unit - I

1. Soil forming rocks : Classification, chemical composition formation and diagnostic features of soil forming rocks. (5 Hours)

2. Soil forming minerals : Classification, structure and identification of soil and clay minerals. (5 Hours)

3. Minerals in soils : Silicon, <sup>Feldspar</sup> Field spars, Sulphur bearing and carbonates. (5 Hours)

4. Classification of soil particles , mechanical analysis and physical nature of the soil separates. (5 Hours)

5. (a) Silicate minerals : Micas, vermiculite. (5 Hours)  
(b) Montmorillonite, chlorite.

6. Oxide Minerals : Aluminium oxide, iron oxide and Titanium oxide, allophanes. (5 Hours)

7. Alternation of clay minerals of the Parent material, formation of soil profiles and soil properties. (5 Hours)

8. Relationship between mineral soils and plant growth. watermovement, Difusion, Dispersion and Flocculation. Mineralogical organization of silicate clays and mineral colloids other than silicates. (5 Hours)

9. Supply and availability of plant nutrients in mineral soils : The essential element, essential element from air and water, essential elements from the soil, Transfer of plant nutrients to available forms, nutritional importance of soil pH, Forms of elements used by plants. (5 Hours)

10. Mineralogical and Chemical composition of the soil separates and soil textural classes. (5 Hours)

REFERENCES -

Bear, E. Firman 1964. Chemistry of the soil London.

Braddy, N 2005. The Nature and Properties of soils.



CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem. -IV, 2010-2011

Sub : Agricultural Chemistry & Soil Science  
Course - XIV

Course outline

FERTILIZERS & MANURES

M.M. 100

Theory -

~~F-432~~ J-1032 50-150

Sl.No.

Topic

1. <sup>Unit - I</sup> **Classification and Chemistry of Fertilizers** : Nitrogenous fertilizers, Phosphatic fertilizers, potassic fertilizers, complex fertilizers & mixed fertilizers. 5 hours
2. <sup>Unit - II</sup> **Secondary Nutrient fertilizers**, source, recent development and importance in agricultural sustainability. 5 hours
3. <sup>Unit - III</sup> **Micronutrient fertilizers**, source, recent development, material containing micronutrients, amount of micronutrient that can be applied to crops. 5 hours
4. **Principles of manures and fertilizers** : Time of manuring : Manures and fertilizers application - (a) Solid form :- Broadcasting, placement, localised placement, pellet application. Liquid form : starter solution, foliar application. direct application to the soil, application through irrigation, selecting the proper time, tips to get best efficiency of applied fertilizer, calculation of amount of fertilizer. 5 hours
5. **Quality control in fertilizers.** 5 hours
6. <sup>Unit - IV</sup> **Manures Compost** : Essential requirement of composting, Beneficial action of composting on soil, vermi compost farm yard manure : constituent of FYM, factor influencing the composition of manure, method of preparation of FYM, Green crops Benefits of green manuring, limitation of green manuring, Biofertilizers, use and importance of biofertilizer. 5 hours
7. **Fertilizers as related to soil, water and environmental pollution.** 5 hours
8. <sup>Unit - V</sup> **Macro and Micronutrient availability in organic manures, economic value of organic manures.** 5 hours
9. **Vermicomposting** : Economic implication of vermi composting, material for vermicompost. 10 hours

**REFERENCES -**

- Tisdale, L. Samuel and Nelson L. Werner 1956. Soil fertility and fertilizers, New York, London.
- Kanwar, J.S. 1976 Soil fertility. Theory and practices ICAR, New Delhi.
- Das, P.C. 1993 Manures and Fertilizers, Kalyani (Pub.), New Delhi.
- Backman, O Harry and Brady.N. 1961 The Nature and Properties of Soils.
- Gupta, P.K. 2000 Hand Book of soil, Fertilizer and Manure, Bikaner.

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CH. CHARAN SINGH UNIVERSITY, MEERUT

M.Sc. (Ag.) Sem.-IV, 2010-2011

Sub : Agricultural Chemistry & Soil Science  
Course - XVI

Course outline SOIL BIOLOGY AND BIOCHEMISTRY - II M.M. 100

Theory - ~~J-4133~~ J-4034 (0448604)

Sl.No.	Topic
1.	<sup>0</sup> Rhizabium : Cross- inoculation, survey and scrology, ecological studies, carriers for legume inoculants, physiology and genetics, future projection. <i>Unit - I</i> (5 Hours)
2.	Non-symbiotic nitrogen fixation : Photosynthetic nitrogen fixers, heterotrophic nitrogen fixers, Associative symbiosis, Biochemistry of nitrogen fixation, genetic regulation of N-fixation, crop response to microbial fertilizers (Blue grun algae, azotobacter, azospirillum, future projection. <i>Unit - II</i> (5 Hours)
3.	Azolla as a organic nitrogen fertilizer for medium and lowland rice : Azolla survival, N contribution, insect damage of azolla, application in fields (maintenance of azolla nurseries, field eculation and effect of rice yield), comparative efficiency of azolla and other organic manures, availability of azolla N and P. <i>Unit - III</i> (5 Hours)
4.	Biochemistry of soil organic matter : Turnover of carbon and nitrogen in soils, composition of organic matter, decomposition of organic matter and factor affecting it, effect of decomposition of organic matter on the release of nutrients, role of organic matter in soil colour, organo-metallic interaction, toxin production. <i>Unit - III</i> (5 Hours)
5.	Microbial recycling of organic matter : Bio transformation of organic matter in soil, effect on soil properties, nutrient availability, effect on crop yields, crop residues as mulches, control of root pathogens. <i>Unit - III</i> (5 Hours)
6.	Organic manures : Decomposition of organic manure in soil, decomposition of organic residues and change in soil microbial population, effect on physical properties of soils, nutrient availability, effect of organic manures in maintenance of soil organic matter. <i>Unit - III</i> (5 Hours)
7.	Green manuring and soil properties, control of plant parasitic nematotes and fungi by organic manures, organic manures and crop yield. <i>Unit - III</i> (5 Hours)
8.	Bio fertilizers : Rhizobia as biofertilizers (Pelleting, combined inoculations, effect of organic manuring, humic substances and rhizobium inoculants), azotobacter as inoculants, phosphate- dissolving micro organisms as Bio-fertilizer, microbial inoculants in composting. <i>Unit - IV</i>

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