

# V. B. S. Purvanchal University, Jaunpur

## Syllabus

### M.Sc. Ag. (Agricultural Chemistry)

#### M.Sc.-Agricultural Chemistry, First Year

Sr.	Name of the Papers	Theoretical /Practical/ Viva-voce/Assignment	Maximum Marks	Duration (hours)
1	Physical Chemistry and Modern analytical Techniques	Theoretical	75	3.00
2	Advanced Organic Chemistry and Plant Biochemistry	Theoretical	75	3.00
3	Agriculture Statistics	Theoretical	50	3.00
4	Soil Genesis, Physics, Survey and Classification	Theoretical	75	3.00
5	Practical (Based on I, II & IV Paper)	Practical	100	
Total=375				

#### M.Sc.- Agricultural Chemistry, Final Year

Sr.	Name of the Papers	Theoretical /Practical/ Viva-voce/Assignment	Maximum Marks	Duration (hours)
1	Soil Fertility, Fertilizers and Plant Nutrition	Theoretical	75	3.00
2	Soil Chemistry and Soil Microbiology	Theoretical	75	3.00
	Agro. Chemicals and Soil Pollution	Theoretical	50	3.00
3	<b>Optional-A</b> Agricultural Biochemistry	Theoretical	75	3.00
	or <b>Optional-B</b> Management of Waste Land and other Problematic Soil			
	or <b>Optional-C</b> Environmental Chemistry and Soil Science.			
	or <b>Optional-D</b> Dissertation	Dissertation		
4	Practical (Based on V, VI & VIII Paper)	Practical	100	
5	Practical (Based on Paper VIII) or Viva Voce (Based on Thesis)	Practical	50	
Total=425				

➤ The Question papers are divided into three sections : **(M.M.-75)**

**Section A** : Ten very short answer questions, based on entire course. Each question must be answered in about 50 words. (10 x 1.5= 15 Marks)

**Section B** : Five short answer questions. Each question must be answered in about 200 words. (5 x 8= 40 Marks)

**Section C** : This section will have Five long answer questions. The candidates will have to answer two questions. Each question must be answered in about 500 words.

(2 x 10= 20 Marks)

➤ The Question papers are divided into three sections : **(M.M.-50)**

**Section A** : Ten very short answer questions, based on entire course. Each question must be answered in about 50 words. (10 x 1= 10 Marks)

**Section B** : Five short answer questions. Each question must be answered in about 200 words. (5 x 5= 25 Marks)

**Section C** : This section will have five long answer questions. The candidates will have to answer two questions. Each question must be answered in about 500 words.

(2 x 7.5= 15 Marks)

**Note:-** Dissertation based on a research project investigation shall be compulsory. The allocation of the candidates to the qualified supervision would be made by the head of department of M.Sc. Ag. (Agricultural Chemistry). The topic of the dissertation should be related to the area of specialization which a candidate would offer. Each student will submit to his guide an outline of the project work. He intends to take which offer discussion and approval of the supervisor will be taken in the beginning of the session. Three typed and printed copies through the Principal of the college the date decided by Registrar of the University and these copies of dissertation should be accomplished with the declaration by the student that it is his own work and it has not been submitted previously it should also contain certificate from the supervisor concerned. The dissertation will be examined by the supervisor and by an external examiner appointed by the university. Each of them shall award marks out of 75 and average of the two will be the marks obtained by the candidate in the dissertation. The viva-voce examination will be conducted by the board of examiners appointed by the university. The viva-voce examination shall be comprehensive and shall be based on dissertation offered by the candidate.

## **M.Sc. Agricultural Chemistry-First Year**

### **Paper-I**

#### **Physical Chemistry and Modern Analytical Techniques**

M.M. : 75

Duration:- 3.00 hours

Principles of analytical chemistry:

Ionic equilibria, Ionic product, Common ion effect, coloured ions, solubility product, Surface Chemistry, Adsorption phenomenon, Colloids and emulsion. Theory of dilute solution. Osmosis and osmotic pressure, Hydrogen ion activity and its determination.

Chemical analysis of soil, plants, manures and fertilizers. Quality of irrigational water. Determination of toxic substances in milk and milk product.

Principles of colorimetry, flame Photometry, atomic absorption emission spectrophotometry, conductimetry, gravimetry, titrimetry and chromatographic techniques.

Instrumental methods of analysis of soil, water and plants.

## **M.Sc. Agricultural Chemistry-First Year**

### **Paper-II**

#### **Advanced organic Chemistry and plant Biochemistry**

M.M. : 75

Duration:- 3.00 hours

#### **Theory**

Classification of organic compounds. Nomenclature and their general properties. Chemistry of functional groups. Characteristics of chemical bonds and covalent.

Chemistry of aromatic compounds (Benzene and Phenol and heterocyclic compounds (purines and pyrimidines). Organic reactions. Substitution, elimination and addition.

Biochemical organization of cell. Chemistry of biological compounds: Carbohydrates, Lipids, Proteins, Amino acids, Nucleic acids, Enzymes. Vitamins, Pigments, Monocyclic terpenoids and alkaloids.

Metabolism of energy yielding compounds i.e. carbohydrates, Lipids, proteins and amino acids, Electron transport Chain and oxidative phosphorylation. Metabolic regulation. Biosynthesis of carbohydrates. Protein and lipids.

**M.Sc. Agricultural Chemistry-First Year**

**Paper-III**

**Agriculture Statistics**

M.M. : 50

Duration:- 3.00 hours

**Theory**

As prescribed for all the candidates of M.Sc. Ag in other disciplines of faculty.

**M.Sc. Agricultural Chemistry-First Year**

**Paper-IV**

**Soil genesis, physics, survey and classification**

M.M. : 75

Duration:- 3.00 hours

**Theory**

Soil – Meaning and scope, soil as a natural body and medium for plant growth, pedology and edaphology: basic concepts.

Rocks and minerals their classification, composition, characteristics, weathering of rock and mineral. Parent materials, classification and properties. Soil forming factors and processes of soil formation, soil profile, diagnostic horizons.

Soil Texture, soil structure, Soil density and porosity, Soil water. Soil moisture retention. Characteristics and energetic concept of soil water in relation to its availability to plants, water movement in soil, water constants, management and measurements of soil water, soil temperature, soil air and soil colour.

Soil classification-new comprehensive system of soil classification (7<sup>th</sup> approximation) soil orders and sub-orders. Soil survey, classifications and mapping, Land capability classification, Latest trend in soil survey, Aerial photography and remote sensing application, Soil taxonomy. Major soil groups of India, their Characteristics, distribution and fertility status, Soils of Utter Prades.

Soil testing-object, methods and interpretations of results.

## **M.Sc. Agricultural Chemistry-First Year**

### **Paper-V**

#### **Practical Examination**

M. M: 100

Practical Based on Paper I, II and IV

1. Preparation of standard solutions for volumetric analysis.
2. Plant analysis: ashing wet and dry. Total nitrogen by kjedhal method. Colorimetric determination of phosphorus. Detemination of Potassium. Calcium and Magnisium by Flame photometer.
3. Detemination of pH
4. Detemination of reducing and non-recucing sugars in molasses, cane sugar, fruit juice, sugar cane and Gur.
5. Estimation of crude fat, crude fibre, crude and true protein, nitrogen free extract, organic carbon, moisture and minerals matter in plant and feeding stuff samples.
6. Gravimetric determination of sulphate and Iron.
7. Determination of R.M.Value, P. Value, K. Value, Saponification value. Iodine value and acid value of oils and fat.
8. Analysis of DDT, Gammexane and Bordeaux misture.

## **M.Sc. Agricultural Chemistry-Final Year**

### **Paper-V**

#### **Soil Chemistry and Soil Microbiology.**

**M. Marks: 75**

#### **Theory**

Chemical composition of the soil. Soil colloids characteristics and identification of clay minerals. Ion exchange-ionic activity and ionic equilibra in soil. Fixation and release of nutrient ions in soil. Soil reaction and buffering capacity of soil.

Elementary ideas about the use of radiotracer techniques to soils and plants.

**Problematic soil and their management:-**Acid soils and its reclamation, salt affected soils and its reclamation, soils requiring unusual management. Chemistry of submerged soils. Redox potential and nutrients availability, organic soils, clay soils. Waste land and its management.

### **Soil organic matter**

Its nature and constitution, Decomposition of organic matter, Formation of clayhumus complexed, influence of organic matter in soil atmosphere.

### **Soil organisms**

Classification, growth and nutrition, their role in organic matter decomposition, nutrient transformations (N, P, K, S, Zn, Mn and Cu), Biological nitrogen fixation, Role of microorganisms in soil fertility, concept of rhizosphere and phyllosphere. Association and antagonistic activities of micro-organisms in soil.

## **M.Sc. Agricultural Chemistry-Final Year**

### **Paper-VI**

### **Soil Fertility, Fertilizers and plant Nutrition**

**M. Marks: 75**

#### **Theory**

Essentiality of nutrients, Essential and beneficial. Plant nutrients their chemical behaviour, role, deficiency and productivity. Factors affecting Soil fertility, Soil fertility evaluation and methods of assessing nutrient requirement of crops. Role of isotopes in soil fertility.

Principles of fertilizers application. Fertilizer elements; Nitrogenous, phosphate and potassic fertilizers, their chemistry, manufacture and use. Fixation of nitrogenous, phosphatic and potassic fertilizers in soil.

Technology and use of complex fertilizers, Liquid fertilizer. Fertilizer-pesticide mixtures. Biofertilizers, Evaluation of relative efficiency of fertilizers.

Economics and methods of fertilizer application.

Secondary nutrients and micronutrients in soil. Factors affecting their availability.

Organic manures-composition, methods of preparation and their responsiveness to different crops.

**M.Sc. Agricultural Chemistry-Final Year**

**Paper-VII**

**Agro Chemicals and soil pollution.**

**M. Marks: 75**

**Theory**

**Pesticides:** Mode of action and effect on soil.

Insecticides; Genetal chemistry of commonly used synthetic insecticides, DDT, BHC, Malathion, monocrotophos. Carbaryl, Carbofuron, Insecticides of botanical origin pyrethroides, rotenoids, Nicotine phorate.

Nematocides: Bordeaux mixture, calomel, captan, copper fungicides, danomet, dinocap.

Herbicides: 2, 4 D, Dalapon, diuron atrazine, IPC, EPCT, DMTT, Dinoseb and Acrollin.

Rodenticides: Barium carbonate, Zinc phosphide, Thallium sulphate, warfain and Alphanaphthyl, Tiourea.

Soil Pollution: Chemical pollution of soils, Behaviour of pesticides in soils, compatibility of agrochemicals with biofertilizers, Heavy metal toxicity and soil pollution, Prevention and elimination of inorganic chemicals contamination. Organic wastes; use and disposal in soils. Recycling of organic wastes.

**M.Sc. Agricultural Chemistry-Final Year**

**Paper-VIII- (Special Paper)**

**M.M:75**

A. Agricultural Biochemistry

or

B. Management of Waste Land and other Problematic Soil

or

C. Environmental Chemistry and Soil Science.

or

D- Dissertation

**A. Agricultural Biochemistry**

Composition of animal body and its food. Importance of carbohydrates. Proteins and fats, mineral matter and vitamis in animal nutrition. The process of digestion and absorption in animal body

Metabolism of carbohydrates, proteins and lipids in animal body with special reference to ruminants. Biochemistry of milk constituents viz. lactose, proteins lipids minerals matter and vitamins of milk.

Preservation of milk, use of preservatives and their detection. Adulteration of milk and ghee. Use of various adulterants and their detection.

Preparation, composition and properties of milk products viz. Butter cream, ghee, evaporated milk and milk powder.

Enzyme their occurrence and properties, mode of enzymatic action.

### **C. Environmental Chemistry and Soil Science.**

Concept and scope of environmental chemistry; segments of environment-Atmosphere, hydrosphere, lithosphere.

**Environmental pollution:-** with particular reference to pollution of rural environment.

Environmental pollutants, their use, source of pollution, environmental health rise, ecological effects and environmental levels, gaseous and particulates, metals and metallic compounds. Pesticides and plant nutrients, Toxic chemicals in environment.

Impact of toxic chemicals on enzymes, biochemical effects of As, Cd, Cr, Pb, Hg, Co, Nitrogen oxides, sulphur oxides, ozone, PAN, Cyanide pesticides, green house effect.

Soil pollution, biocides, solid waste pollution, solid wastes and their disposal, Solid waste treatments. Utilization and recycling of waste and other refuse. Composition of refuse, water wastes.