J.S. University, Shikohabad (U.P.)

M.Sc. (Ag.) (Prev. and Final Year)
Agronomy

Note- Any three papers may be taken in one year provided that Paper III (Ag. Statistics) is taken in the previous examination, and Paper VI or Thesis is taken in the Final Examination . Research work for Thesis may be begin in Previous year.

PAPER	Title of Paper	MAX. MARKS / MIN. MARKS
PAPER-I	Crop Production and Fertilizer Management	100/36
PAPER-II	Soil & Water Conservation and Weed Management	100/36
PAPER-III	Agricultural Statistics	50/18
PAPER-IV	Crop physiology and soil & water management	100/36
PAPER-V	Commercial and forage crops and seed production technology	100/36
PAPER-VI	Crop Production, Forestry And Agrostology OR Thesis	100/36

Paper I- Crop Production and Fertilizer Management

Theory **(100 marks)**

(A) Crop production **(60 marks)**

Unit I

General Agronomy: Concepts, history, scope and development of agronomy and its relation to other sciences, importance of crops and their classification, role of agronomist in Indian agriculture. Recent agronomic trends and problems in different countries and their impact on crop production Agronomic research set up in India.

Principle of Agronomy: Principles of economic production, principles underlying crop rotation, cropping scheme, cropping scheme, cropping pattern and cropping system, mixed

cropping, multiple cropping, relay cropping for humid, subhumid, semi arid and arid regions and other problematic areas of the country with special reference to Uttar Pradesh.

Climatology: Concepts of Agro-meteorology, weather forecasting, role of various climatic parameters in crop production, crop adaptation, Agro-climatic regions and efficient crop zones.

Unit II

Cereals And Millets: Wheat, Paddy, Barley, Maize, Pearl Millet and Great Millet.
Grain Legumes : Chick pea, Pigeon pea, Field pea, Lentil, Soybean, Green gram, Black gram and Rajmah.

Unit III

Oilseeds : Groundnut, Linseed, Rapeseed and Mustard, Sunflower, Til.
Fibre Crops : Cotton and jute

Study of above crops in relation to origin production and distribution, classification description and varietal improvement of crops. Adaptability, climate , soil , water and cultural requirements , developments and nutrition of crop plants based on agronomic investigations, quality, its components and factors affecting it. Handling and processing of produce. Industrial uses, crop protection measures. Recent advances in agronomic research.

(B) Fertilizer managements 40 marks

Unit IV

General principles of Plant Nutrition: Elements essential for plants, animal and human beings, classification, form of availability and loss of plant nutrients from soil. Nitrogen, phosphorus and potassium in soils- chemistry, forns availability and their problems.
Classification of N,P& K: Fertilizer form, choice mixed fertilizers, principles and methods of fertilizers application and their management under different soil, climate and crop and cropping system. Fertilizer use and its management in problematic conditions viz Dryland regions, Salt affected and acid soils

Unit V

Soil organic matter and organic manures including green manuring in relation to crop production. Diagnostic techniques for soil and crop fertility evaluation.

Fertilizer management for efficient: Factors affecting fertilizer response, crop response to fertilizers, Economics of fertilizer use, Fertilizer use efficiency in relation to water management

Recent advances in fertilizer use research: Integrated nutrient supply system, simple, complex and mixed fertilizers, use of slow release fertilizer and nitrification inhibitors, Bio fertilizers, fertilizer schedule based on targeted yield concept; fertilizer use under constraint conditions and economics of fertilizer use.

Practical

1. Land utilisation, crop distribution and statistics of important crops mentioned in theory. Presentation of data through bar diagrammes and histograms and cost of production studies of crops included in theory.
2. Preparation of crop rotations and cropping schemes for different agro-climatic zones of Uttar-Pradesh, under the varying farming conditions.
3. Crop competition studies – mainly germination, crop stand and dry matter accumulation.
4. Compulsory tour -visits of important research organisations and Agricultural Universities of the country.
5. Maintenance of practical record and presentation of work at the time of annual examination.
6. Practical study of different methods of manures and fertilizers application (to be done as field experiment).
7. Micro technique for analysing, NPK in soils, plants and fertilizers.
8. Estimation of organic carbon in soils.

Paper II-Soil & Water Conservation and weed management

(100 marks)

(A) Soil and Water Conservation **(60 marks)**

Unit I

Definition and importance of soil and water conservation, types and process of soil erosion, factors affecting soil erosion. Control method of wind and water erosion,
Various agronomical and mechanical method of erosion control, Gully formation and its control and ravine reclamation

Unit II

Forestry, its objectives and benefits, social forestry programme& and their problems, research needs of social forestry. land use capability classification in relation to soil and water conservation.

Unit III

Dry farming research in India including All India Coordinated research Projects, Important lines Agronomical Research and result of practical utility and importance.

Anti – transparents and light reflectants, water harvesting and its re-cycling concepts, techniques and practices.

(B) Weed Management (40 marks)

Unit IV

Scope and principles of weed control, common Indian Weeds, their characteristics, multiplication and distribution.
Specific weed problem in cropped and uncropped area, special weed problems of India, integrated weed management.
Crop weed competition and allelophathic effects of weeds, losses caused by weeds, Economic aspects of weed flora.

Unit V

Methods of weed study in the field, principle and methods of weed control, cultural, chemical and biological, their merits and demerits.
Weedicides and their applications, persistence residual sprayings, Bioassay tests.

Practical

1. Soil moisture determination, calculation of consumptive use of water.
2. Practical study and methods of calculating amount of runoff, erosion, drainage coefficient, capacity of drains, and size of bunds.
3. Interpretating land use capability maps.
4. Identification of weeds and preparation of herbarium.
5. Study of crop weed association in Kharif and Rabi season succession of weeds.
6. Preparation of herbicidal solutions and use of chemical weed killers in the field. Assessment of weed mortality and effects of weedicidal sprays in crop fields. Bioassay test for4 determination of herbicidal residual.
7. Study of characteristics of weeds and their mode of propagation.
8. Visits to important research stations and demonstration farms.

Paper III-AGRICULTURAL STATISTICS (50Marks)

(A) Common course (30 Marks)

Unit I

Classification and tabulation of data diagrammatic and graphical representation of data. Various measures of central tendency and dispersion, concept of standard error, test of significance based on z ,t and f test.

Unit II

x^2 test for testing the significance of goodness of fit and independence of attributes and its various uses in finding the heterogeneity and linkage in genetics and quantity of several variances.

Analysis of variance, Principles of experiments of designs, planning and analysis of simple experiments, completely randomised design, randomised block design and latin square design. Missing plot technique in randomised blocks and latin square designs (one plot missing), concept of probability.

Unit III

Linear regression and correlation, rank correlation, partial correlation and regression (upto 3 variables only)
Basis ideas in sampling, probability sampling, purposive sampling. Statistics of area and yield of crops. Sample surveys and crop cutting experiments.

(B) Specific course **(20 Marks)**

Unit IV

Factorial experiment, Randomised block split plot and strip plot designs. Concept of confounding total and partial designs.

Unit V

Analysis of co-variance progeny row trials and compact family block design.

Paper IV-Crop Physiology and Soil and Water Management

(100 marks)

(A) Crop Physiology **(60 marks)**

Unit I

Physiological Phenomena: Osmosis, diffusion, inhibition and hysteresis. Photorespiration in relation to crop yield, measurement of photorespiration. Photorespiration and true respiration Metabolism of Photorespiration. Energetic relation to Agronomy and other agricultural sciences. Drought and frost resistance physiology.
Crop response to drought and frost, Mechanism of drought and frost injury and resistance, effective drought and frost control Salt resistance physiology.

Unit II

Soil water and plant relationship: Factors affecting water absorption. Availability of nutrients, absorption. Availability of nutrients, absorption mechanisms, and factors affecting nutrient availability. Inverse yield nitrogen law concept and limitation.
Photoperiodism and Vemalization: Their role in crop production, Lysenko's theory of phasic development, theoretical concepts involved in growth and development, various growth measurements. Source and sink ratio. Mitscherlich's yield equation, its interpretation and applicability.

Unit III

Crop yield and ecological optimum: Effect of adverse climate factors on growth and yield of crops, plan regulators, their nature and mode of action and role in crop production.

(B) Soil and Water Management (40 marks)

Unit IV

Water potential in plant and soil, water movement in soils, soil moisture stress and plant growth, consumptive use of water, methods of determining irrigation and water requirements, when and how much to irrigate, crop management for improved water use efficiency. Soil moisture conservation, excess soil water and plant growth.
Concept and Practices of Tillage: Mulches, different kinds effectiveness and economics, effect of tillage on soil in relation to plant growth Minimum tillage.

Unit V

Features of good soil management, tilth and other factors affecting soil fertility and soil productivity, essentials of plant growth, soil productivity in relation of physical and chemical characteristics of soil. Management of sandy, loamy and clayey soils under different climatic conditions. Development of acid, saline and sodic soils, their reclamation and management, quality of irrigation water.

Practical

1. Pot and field behaviour of crop plants for growth, yield and quality.
2. Demonstration of certain physiological phenomena osmosis diffusion and imbibitions.
3. Measurement of growth, RGR, NAR, AGR, LAR, LAD.
4. Methods of breaking dormancy.
5. Handling and spraying of various plant regulators.
6. Determinations of carbohydrates and fats in plant tissues.

7. Determination of soil moisture, measurement of water discharge, study of different methods of irrigation in fields efficiency, consumptive use of water.
8. Measurement of EC, Saturation percentage, pH, determination of permeability, Ca and Mg determinations. (Determinations of CO_3, Cl and SO_4)
9. Working out reclamation procedures for saline and sodic soils.
10. Use of implements for land preparation.
11. Maintenance of practical records.

Paper V - Commercial and forage crops and seed production technology

(100 marks)

(A) Commercial and Forage Crops **(60 marks)**

Unit I

Intensive study of the following with respect to origin, history, production and distribution, classification, description and varietal improvement of crops. Adaptability, climate, soil water and cultural requirements, development and nutrition of crop plants based on agronomic investigations, quality, its components and factors affecting it. Handling and processing of produce, Industrial uses, crop protection practices.
Commercial Crops: Sugarcane, potato and tobacco.

Unit II

Forage Crops: Berseem, Lucerne, Jowar, Oat.

Unit III

Aromatic and Medicinal Crops: Mentha, Palmarosa, Lemon grass, Citronella.

(B) Seed Production Technology **(40 marks)**

Unit IV

Seed, seed industry in India, development of seed programme, foundation and certified seed.
Production of following crops:
Cereals : Wheat, Sorghum, Pearl millet and Maize
Pulses : Gram and Redgram
Oilseeds : Rape seed and Mustard, Sunflower
Forage : Berseem, Lucerne and Oats.
Commercial : Potato

Unit V

Seed processing, storage and marketing, seed drying, seed cleaning and upgrading, seed treatment, seed packing and handling, seed storage and seed marketing.
Seed testing, seed sampling, sending sample for seed testing laboratories, purity, germination viability and moisture tests.
Seed certification and seed legislation, seed certification- Introduction and history, aims and objectives, procedure of certification, seed certification standards, seed legislation and seed law.
Seed production economics.
Factors affecting seed quality in growing, processing and marketing.

Practical

1. All included in Crop Production, Paper I.
2. Seed sampling and testing sample for purity, germination and moisture, real value and working out seed rates of different crops.
3. Visits to various seed production plots and identifying.
4. Practical training of seed processing on seed processing plant.
5. Seed treatment by different methods.
6. Visit of some well equipped seed testing lab.

Either Paper VI - Crop Production, Forestry and Agrostology

(100 marks)

(A) Crop Production **(60 marks)**

Unit I

Plantation crops:

1. Tea
2. Coffee (Coffee comephora spp.)
3. Rubber
4. Coconut
5. Cocoa

Unit II

Medicinal plants:

1. Basil
2. Satavar
3. Ashwagandha
4. Kalmegh
5. Dioscorea
6. Periwinkle
7. Aloe vera

Unit III

Spices:

1. Coriander (Dhania)
2. Lahsun (Garlic)
3. Turmeric (Haldi)
4. Black pepper (Kali Mirch)
5. Cardamom (Illayachi)

(B) Agrostology and Forestry **(40 marks)**

Unit IV

Grassland of India, principles of grassland ecology, economic aspects of grasslands, grasses from stand point of improving soil fertility, grasses suitable for soil Conservation work, importance, classification and advantages of pasture, establishment of pastures, regulated grazing and their improvement and renovation.

Unit V

Scope and limitation of farm forestry, selection of specific, planting and after care, under seeding of areas under farm forestry, problems of seed germinations, Bird damage due to farm forestry, Appraisal of economics of forestry, soil and water conservation value of farm forestry

Practical

1. Based on theory
2. Agronomical Studies of these Crops and their Cost of production.

OR

Thesis