

B.Sc. Agriculture

[4-Year, 8- Semester]

CHOICE BASED CREDIT SYSTEM (CBCS)

Effective from Academic Year 2017-2018

**HIMALAYAN GARHWAL UNIVERSITY
POKHRA, PAURI, GARHWAL
UTTARAKHAND**



DEPARTMENT OF AGRICULTURE
HIMALAYAN GARHWAL UNIVERSITY POKHRA, PAURI, GARHWAL, Uttarakhand, India
Course Curriculum for B. Sc. Agriculture, 2017-18 under CBCS Course offered

Course No.	Paper Title	Total Marks	Theory Marks		Credits
			Internal	External	
Semester – I					
Core					
BAGT101	Fundamentals of Soil Science	100	30	70	2
BAGP101	Fundamentals of Soil Science	100	-	100	1
BAGT102	Principles of Crop Production	100	30	70	2
BAGP102	Principles of Crop Production	100	-	100	1
BAGT103	Fundamentals of Horticulture	100	30	70	2
BAGP103	Fundamentals of Horticulture	100	-	100	1
BAGT104	Introductory Plant Pathology	100	30	70	2
BAGP104	Introductory Plant Pathology	100	-	100	1
Ability Enhancement Compulsory Course (AECC)					
BAGT105	Structural and spoken english	100	30	70	1
BAGP105	Structural and spoken english	100	-	100	1
Elective					
Student has to earn 7 credits form the electives. Student can choose any elective from same department or other department of school of Agriculture & Allied Science.					
BAGT106	Elementary, Statistics and Applied Mathematics	100	30	70	1
BAGP106	Elementary, Statistics and Applied Mathematics	100	-	100	1
BAGT107	Elements of Genetics	100	30	70	1
BAGP107	Elements of Genetics	100	-	100	1
BAGT108	Rural Sociology and Educational Psychology	100	30	70	1
BAGP108	Rural Sociology and Educational Psychology	100	-	100	1
BAGP109	Physical Education/Yoga	100	-	100	1
Total Credit to earn in the semester I					
Core	AECC	SEC	Elective	Total	
12	2	-	6	21	

Theory and practical are linked to each other ----

In Theory, One credit = 1 hr

In practical, One credit= 3 hrs

T- Theory

P-Practical

Course No.	Paper Title	Total Marks	Theory Marks		Credits
			Internal	External	
Semester – II					
Core					
BAGT201	Elementary Plant Biochemistry and Chemistry of Plant Products	100	30	70	3
BAGP201	Elementary Plant Biochemistry and Chemistry of Plant Products	100	-	100	1
BAGT202	Elementary Crop Physiology	100	30	70	3
BAGP202	Elementary Crop Physiology	100	-	100	1
BAGT203	Natural Resource Economics and Farm Management Economics	100	30	70	3
BAGP203	Natural Resource Economics and Farm Management Economics	100	-	100	1
Ability Enhancement Compulsory Course (AECC)					
BAGT204	Irrigation and water management	100	30	70	1
BAGP204	Irrigation and water management	100	-	100	1
Elective					
Student has to earn 7 credits form the electives. Student can choose any elective from same department or other department of school of Agriculture & Allied Science.					
BAGT205	Fundamentals of Extension Education and Rural Development	100	30	70	1
BAGP205	Fundamentals of Extension Education and Rural Development	100	-	100	1
BAGT206	Agricultural Meteorology	100	30	70	1
BAGP206	Agricultural Meteorology	100	-	100	1
BAGT207	Introductory Entomology	100	30	70	1
BAGP207	Introductory Entomology	100	-	100	1
Total Credit to earn in the semester II					
Core	AECC	SEC	Elective	Total	
12	2	-	6	20	

Theory and practical are linked to each other.

In Theory, One credit = 1 hr

In practical, One credit= 3 hrs

Course No.	Paper Title	Total Marks	Theory Marks		Credits
			Internal	External	
Semester – III					
Core					
BAGT301	Agriculture marketing, export and cooperation	100	30	70	2
BAGP301	Agriculture marketing, export and cooperation	100	-	100	1
BAGT302	Cereals Millets, and pulses crops (field crops Kharif Crops)	100	30	70	2
BAGP302	Cereals Millets, and pulses crops (field crops Kharif Crops)	100	-	100	1
BAGT303	Vegetable Production	100	30	70	2
BAGP303	Vegetable Production	100	-	100	1
BAGT304	Farm Structures, Power and Machinery (ICAR)	100	30	70	2
BAGP304	Farm Structures, Power and Machinery (ICAR)	100	-	100	1
Ability Enhancement Compulsory Course (AECC)					
BAGT305	Mushroom Culture and Plant Hematology	100	30	70	1
BAGP305	Mushroom Culture and Plant Hematology	100	-	100	1
Elective					
Student has to earn 7 credits form the electives. Student can choose any elective from same department or other department of school of Agriculture & Allied Science.					
BAGT306	Rainfed and Dry land farming and water shed management.	100	30	70	1
BAGP306	Rainfed and Dry land farming and water shed management.	100	-	100	1
BAGT307	Principal of plant breeding	100	30	70	1
BAGP307	Principal of plant breeding	100	-	100	1
BAGT308	Principles of Livestock Production and Management including Poultry.	100	30	70	1
BAGP308	Principles of Livestock Production and Management including Poultry.	100	-	100	1
BAGP309	Practical crop production	100	-	100	1
Total Credit to earn in the semester III					
Core	AECC	SEC	Elective	Total	
12	2	-	6	21	

Theory and practical are linked to each other.

In Theory, One credit = 1 hr

In practical, One credit= 3 hrs

Course No.	Paper Title	Total Marks	Theory Marks		Credits
			Internal	External	
Semester – IV					
Core					
BAGT401	Soil Fertility, Fertilizer and Integrated Nutrient Management	100	30	70	3
BAGP401	Soil Fertility, Fertilizer and Integrated Nutrient Management	100	-	100	1
BAGT402	Oil Seeds Commercial Crops Fields Crops- II Rabi Crops	100	30	70	3
BAGP402	Oil Seeds Commercial Crops Fields Crops- II Rabi Crops	100	-	100	1
BAGT403	Fruit Production Technology of Fruit Crops	100	30	70	3
BAGP403	Fruit Production Technology of Fruit Crops	100	-	100	1
Ability Enhancement Compulsory Course (AECC)					
BAGT404	Economic Entomology	100	30	70	1
BAGP404	Economic Entomology	100	-	100	1
Elective					
Student has to earn 7 credits from the electives. Student can choose any elective from same department or other department of school of Agriculture & Allied Science.					
BAGT405	Soil Survey/Land Planning and Remote Sensing	100	30	70	1
BAGP405	Soil Survey/Land Planning and Remote Sensing	100	-	100	1
BAGT406	Breeding of Field Crops	100	30	70	1
BAGP406	Breeding of Field Crops	100	-	100	1
BAGT407	Health and Diseases of Livestock including Poultry.	100	30	70	1
BAGP407	Health and Diseases of Livestock including Poultry.	100	-	100	1
Total Credit to earn in the semester IV					
Core	AECC	SEC	Elective	Total	
12	2	-	6	20	

Theory and practical are linked to each other.

In Theory, One credit = 1 hr

In practical, One credit= 3 hrs

Course No.	Paper Title	Total Marks	Theory Marks		Credits
			Internal	External	
Semester – V					
Core					
BAGT501	Crop Pests and Integrated Pest Management	100	30	70	3
BAGP501	Crop Pests and Integrated Pest Management	100	-	100	1
BAGT502	Crop Diseases and their Management	100	30	70	3
BAGP502	Crop Diseases and their Management	100	-	100	1
BAGT503	Principles of Milk Processing	100	30	70	3
BAGP503	Principles of Milk Processing	100	-	100	1
Ability Enhancement Compulsory Course (AECC)					
BAGT504	Weed Management	100	30	70	1
BAGP504	Weed Management	100	-	100	1
Elective					
Student has to earn 7 credits from the electives. Student can choose any elective from same department or other department of school of Agriculture & Allied Science.					
BAGT505	Post Harvest Management and Preservation of Fruits and Vegetables	100	30	70	1
BAGP505	Post Harvest Management and Preservation of Fruits and Vegetables	100	-	100	1
BAGT506	Introduction to plant biotechnology	100	30	70	1
BAGP506	Introduction to plant biotechnology	100	-	100	1
Total Credit to earn in the semester V					
Core	AECC	SEC	Elective	Total	
12	2	-	4	18	

Theory and practical are linked to each other.

In Theory, One credit = 1 hr

In practical, One credit= 3 hrs

Course No.	Paper Title	Total Marks	Theory Marks		Credits
			Internal	External	
Semester – VI					
Core					
BAGT601	Farming System and Sustainable Agriculture	100	30	70	2
BAGT602	Ornamental Horticulture	100	30	70	2
BAGP602	Ornamental Horticulture	100	-	100	1
BAGT603	Agricultural Finance, Business management and trade	100	30	70	2
BAGP603	Agricultural Finance, Business management and trade	100	-	100	1
BAGT604	Post Harvest Engineering	100	-	100	2
BAGP604	Post Harvest Engineering	100	30	70	1
Ability Enhancement Compulsory Course (AECC)					
BAGT605	Dairy Products Technology	100	30	70	1
BAGP605	Dairy Products Technology	100	-	100	1
Elective					
Student has to earn 7 credits form the electives. Student can choose any elective from same department or other department of school of Agriculture & Allied Science.					
BAGT606	Principles of Seed Technology	100	30	70	1
BAGP606	Principles of Seed Technology	100	-	100	1
BAGT607	Elementary Microbiology	100	30	70	1
BAGP607	Elementary Microbiology	100	-	100	1
BAGT608	Communication, Diffusion of Agricultural innovation	100	30	70	1
BAGP608	Communication, Diffusion of Agricultural innovation	100	-	100	1
Total Credit to earn in the semester VI					
Core	AECC	SEC	Elective	Total	
12	2	-	4	19	

Theory and practical are linked to each other.

In Theory, One credit = 1 hr

In practical, One credit= 3 hrs

Course No.	Paper Title	Total Marks	Theory Marks		Credits
			Internal	External	
Semester – VII					
Core					
BAGT601	Management of Problem soils and Wasteland	100	30	70	3
BAGP601	Management of Problem soils and Wasteland	100	-	100	1
BAGT602	Environmental Science and Agro. Ecology	100	30	70	3
BAGP602	Environmental Science and Agro. Ecology	100	-	100	1
BAGT603	Silviculture and Agroforestry	100	-	100	3
BAGP603	Silviculture and Agroforestry	100	30	70	1
Ability Enhancement Compulsory Course (AECC)					
BAGT604	Computer Applications	100	30	70	1
BAGP604	Computer Applications	100	-	100	1
Elective					
Student has to earn 7 credits form the electives. Student can choose any elective from same department or other department of school of Agriculture & Allied Science.					
BAGT605	Production Technology of Medicinal Aromatic and Spices Crops	100	30	70	1
BAGP605	Production Technology of Medicinal Aromatic and Spices Crops	100	-	100	1
BAGT606	Dairy Chemistry and Animal Nutrition	100	30	70	1
BAGP606	Dairy Chemistry and Animal Nutrition	100	-	100	1
Total Credit to earn in the semester VII					
Core	AECC	SEC	Elective	Total	
12	2	-	4	18	

Theory and practical are linked to each other.

In Theory, One credit = 1 hr

In practical, One credit= 3 hrs

Semester - I
BAG101 :- FUNDAMENTALS OF SOIL SCIENCE

1. Definition of Soil, Components of Soil and their role in agriculture.
2. Soil forming rocks and minerals, Development, of Soil profile, Soil formation, factors affecting soil formation, soil forming processes.
3. Soil reaction and its measurements and significance.
4. Chemistry of clay minerals with special reference to Kaorinite, Montmorillonite and illite.
5. Physical properties of soil and their significance.
6. Chemical properties of soil, cation and anion exchange phenomenon and their importance in agriculture.
7. Soil organic matter, humus formation and its importance in soil fertility, management and maintenance of organic matter in soils.
8. Soil of U.P., classification, distribution, characteristics.
9. Elementary idea of soils of India, occurrence, characteristics, physico-chemical properties of chernozems, podzol and laterite soil.
10. Basic idea of comprehensive system (7th approximation) of soil classification.
11. Occurrence, distribution and functions of Soil Microorganisms. Biological Nitrogen Fixation (Symbiotic and Non symbiotic), Nitrification, Microbial decomposition of organ Matter in soil,
12. Classification and use of Insecticide, Fungicides and herbicides e.g. BHC, DDT, Malathion, 2,4-D.

Practical:

1. Preparation of HCL extract of Soil
2. Determination of FeO, R₂O₃, Ca and P in HCl extract
3. Determination of soil O.M.
4. Estimation of Cl, CO₃, HCO₃ in soil extract
5. Determination of total nitrogen in soil.

BAG102 :- PRINCIPLES OF CROP PRODUCTION

1. Definition and scope of Agronomy.
2. Classification of Crops on Different basis.

3. General principles of Crop production: Climate, soil, preparation, seed and sowing, post sowing-tillage, water management, nutrition, plant protection measures, harvesting, threshing and storage.
4. Crop sequences and system with emphasis on mixed cropping and inter cropping.
5. Nutritional management of crops including application of manures, fertilizers and bio-fertilizers.

Practical

1. Study of weather and weather forecasting.
2. Identification of crops, manures and fertilizers.
3. Framing of crop rotations and preparation of cropping schemes for varying agro-climatic conditions.
4. Preparation of seed bed based on important inter-cropping systems.
5. Calculation of fertilizer requirement, fertilizer mixtures and unit values.
6. Methods of fertilizer application.

BAG103 :- FUNDAMENTALS OF HORTICULTURE

Introductory knowledge of main branches of horticulture and their importance; Botanical classification of fruits; climatic fruit zones of Uttar Pradesh and fruits grown therein; Establishment of orchards; Selection of site, systems of planting; Orchard soil management; Systems of irrigation; Principles of pruning and systems of training of fruit plants; Unfruitfulness, its causes and measures to overcome it; fruit drop, its causes and measures to control it; rejuvenation of orchards, Brief studies of Polyembryony, Parthenocarpy and incompatibility.

Practical

1. Identification of garden tools and plants;
2. Preparation of orchard layouts for different climatic zone of U.P.;
3. Practice of propagation of major fruit plants;
4. Preparation and seed beds and raising of seedlings;
5. Practice of lifting and packing of nursery plants;
6. Visit to nurseries, gardens and research stations.

BAG104 :- INTRODUCTORY PLANT PATHOLOGY

Definition and importance of plant pathology.

Causes of plant diseases.

Classification of plant diseases according to cause and occurrence.

Plant Pathogens:

(a) Fungi

Economic importance and general characteristics.

Morphology of different vegetative structures (thallus, mycelium, haustoria etc.)

Reproduction

Different types of spores.

Levels of parasitism

Nomenclature

Classification of fungi with special reference to genera listed under following item

Life histories of Pythium, Albugo, Erysiphe, Ustilago, Claviceps and Puccinia.

Diagnostic characters of the following genera. Phytophthora, Peronospora,

Sclerospora, Ustilago, Sphacelotheca, Tolyposporium, Melampsora, Alternaria, Cerospora, Fusarium, Helminthosporium Pyricularia, Rhizoctonia, Colletotrichum.

(b) Bacteria:

Brief history of bacteria as plant pathogens.

Morphology and Cell structure.

Vegetative reproduction.

Brief outline of classification of plant pathogenic bacteria.

A brief account of mycoplasma.

(c) Viruses Nature and properties.

Transmission of plant virus

(d) Phanerogamic parasites: Cuscuta, Loranthus, Orobanche and Striga.

Practical

Temporary slide preparation of representative genera of disease causing fungi for morphological studies

Simple staining of bacteria from milk and curd

Preparation of PDA

Practical record

Viva voce

BAG105 :- STRUCTURAL AND SPOKEN ENGLISH

(A) ELEMENTS OF ENGLISH GRAMMER: A REVISION

1. Study and use of Articles: Pronouns and Prepositions.
2. Tenses in English

(B) SENTENCE STRUCTURE

1. Sentence formation
2. Some common varieties of sentence structure (including errors).

(C) READING COMPREHENSION

Six specified lessons from the following text book:

Name : Glimpses of English Prose.
Author : Dr. O.P. Dixit
Publisher : Sahitya Niketan, Kanpur

(D) WRITTEN COMMUNICATION

1. Letter and application writing
2. Report writing.

(E) VOCABULARY

1. Synonyms and antonyms
2. One word substitution
3. Affixes, prefixes and suffixes

PRACTICALS

1. Speech mechanism-speech event, production of speech, speech organs.
2. Phonetic sounds and symbols-pure vowels, diphthongs and constants.
3. Stress and intonation-word-accent (syllable, consonant clusters), compound words, word accent in Indian English v/s R.P., rules for accentual patterns.
4. Accent in connected speech-rhythm, weak forms, intonation etc.
5. Listening comprehension
6. Reading comprehension.

**BAG106 :- ELEMENTARY STATISTICS AND APPLIED
MATHEMATICS STATISTICS**

Definition, Aims, Characteristics and Limitations of statistics, Classification and Tabulation of data.

Definition, advantages and disadvantages of Arithmetic Mean, Median, Mode; Geometric Mean, Harmonic Mean and Weighted Mean as measures of central tendency; and Range, Quartile Deviation, Mean Deviation, Variance, Standard Deviation and Coefficient of variation as measures of dispersion.

Definition of probability, Additive and Multiplicative Laws of probability and simple problems based on them. Definition, merits and demerits of Non-random sampling

and Random Sampling. Concept of Standard Error. Basic concepts used in tests of Significance like Null Hypothesis, Degrees of freedom and Level of significance. Definition and uses of z and t-tests in testing significance of difference between two means; F-test in testing equality of two variances and (χ^2 = test as a test of independence of attributes in 2×2 contingency table only.

Basic principles of Experimental Design. Description and Analysis of Completely Randomized Design (C.R.D.), Randomized Block Design (R.B.D.) and Latin Square Design (L.S.D.)

MATHEMATICS

Binomial Theorem for positive integral index only. Uses of Natural and common Logarithms. Exponential Series. Limits and Differentiation (Without differentiation by first principles). Differentiation of algebraic, trigonometrically, logarithmic and exponential functions only, Logarithmic differentiation. Differentiation of products, quotients, function of functions, implicit and explicit functions.

Practical

Based on

1. Measures of Central Tendency
2. Measures of Dispersion
3. Tests of Significance
4. Analysis of CRD, RBD and LSD

BAG107 :- ELEMENTS OF GENETICS

1. Definition, significance and historical development in genetics.
2. Mendel's Law's of heredity and exceptions to the laws.
3. Chromosomal theory of inheritance, meiosis and mitosis.
4. Linkage and crossing over - types, mechanism and significance,
5. Nucleic acid as genetic material - structure, replication, genetic code, transcription and translation.
6. Mutation - spontaneous and induced.
7. Chromosomal changes - molecular, structural and numerical.
8. Multiple factor inheritance and multiple alleles, blood groups in man and body coat colour in rabbits.

9. Sex chromosomes and its determination in man and drosophila, sex linked characters.
10. Cytoplasmic inheritance - plasma and nuclear, gene interaction.

Practical

1. Preparation of temporary cytological slides (mitosis and meiosis)
2. Genetical problems on mono and dihybrid ratios with their modifications.
3. Chi-square test and goodness of fit of Mendelian modified ratios.
4. Practical record
5. Viva-voce

BAG108 :- RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY

1. Definition and scope of rural sociology.
2. Basic concept of society, community and groups
3. Characteristics and Differences of rural and urban communities
4. Basic rural institutions and their role in Agriculture development.
5. Definition and types of rural leadership and their role.
6. Definition, nature and importance of psychology in the development of human behavior.
7. Meaning of habit and habit development.
8. Basic Psychological concepts; motivation, Social Interaction, Attitudes, Emotions, Prejudices and Social Perception.
9. Personality- definition and development.

Practical

1. Socio-economic survey of village communities.
2. Developing schedules and questionnaires.
3. Practical knowledge about the working of basic rural institutions.
4. Identification of important value systems in the rural setting as a means of social control.
5. Identification of rural personality traits that affect the development of personality in rural situation.

SEMESTER - II

BAG201 : ELEMENTARY PLANT BIOCHEMISTRY AND CHEMISTRY OF PLANT PRODUCTS

Scope of biochemistry.

Carbohydrates - Definition, Classification,
Chemistry and Structural formula of the following:-

Monosaccharides - D Glucose, D. fructose, D.

Galactose Oligosaccharides - Sucrose, Maltose, Lactose.

Polysaccharides - Starch, Cellulose, Inulin.

Proteins - definition, classification, composition, important functions Primary and secondary Structure of protein, Biological significance of proteins.

Amino acids - Classification, properties of Amino acids structure of the following amino acids- Glycine, Tryptophan, Aspartic acid, serine, Lysine, Histidine, Methionine, protein; Essential and non-essential amino acids, Nutritional significance of amino acids.

Lipids- Definition, classification, properties and structural formula of the following saturated fatty acids (Butyric acid, caproic acid, palmitic acid, stearic acid) and unsaturated fatty acid (oleic acid, Linolenic acid, erucic acid).

Enzyme - Occurrence, nomenclature, classification, mechanism of action, general properties and factors effecting the rate of enzyme action, co-enzyme-A.

Vitamins - Classification, biochemical functions and structural formula of vitamin A, thiamine, riboflavin, Vit. B₁₂ Ascorbic acid, vitamin D.

Phytohormones - Occurrence, structure and functions of important plant growth substances viz. Auxins, gibberellins, cytokinins and Abscisic acid.

Alkaloids - Occurrence, classification, uses general properties and Biological significance of alkaloids. Structural formula of Cocine Nicotine and Papaverine.

Nucleic acid - structural formula of Pyrimidines and Purines, Nucleosides and Nucleotides Watson and crick model of DNA.

Practical

Qualitative test of important sugars, proteins and alkaloids.

Estimation of starch in plants.

Estimation of reducing and non reducing sugars in cane juice and jaggery.

Separation and identification of amino acid by paper chromatography.

Iodometric titration.

Estimation of Diastase enzyme in plants.

Estimation of Ca by EDTA method.

BAG202 : ELEMENTARY CROP PHYSIOLOGY

- 1- Role of plant physiology in agriculture.
- 2- Cell structure and function.
- 3- Physico-chemical phenomenon-diffusion, osmosis and imbibitions.
- 4- Essential nutrient elements, their role, deficiency symptoms, mineral salt, absorption.
- 5- Photosynthesis - light and dark reactions. Significance of C₃, C₄ and CAM Pathway.
- 6- Mechanism of respiration, transpiration
- 7- Fat metabolism, synthesis of fatty acids, glycerol and their condensation.
- 8- Assimilation of nitrogen in plants.
- 9- Plant growth substances, photoperiodism and vernalization.

Practical

- 1- Experiments on diffusion, osmosis and imbibitions.
- 2- Determination of transpiration rate by photometers.
- 3- Extraction of photosynthetic pigments, separation of chlorophyll "a" and "b" and carotenoides.
- 4- Experiments on factors affecting rate of photosynthesis (CO₂, light and temperature).
- 5- Determination of photosynthetic and respiration rates through portable CO₂ gas analyzer.

BAG203 : NATURAL RESOURCE ECONOMICS AND FARM MANAGEMENT ECONOMICS

A. Natural Resource Economics

Definition, subject matter and scope of economics.

Micro Economics and Macro Economics within both static and dynamic framework.

Definition, subject matter and significance of agricultural economics.

Primitive and scientific Agriculture. Characteristics and Indian agriculture; major problems including causes of low productivity.

Economic Development, role of agriculture Technological change in agriculture and various inter-relationships.

Task of an economic system, role of economic theory in agriculture.

Production:

Basic production problems production function, productivity curves; relationships thereof, intensity of resource use, law of diminishing returns, output-elasticity, homogeneity in production functions.

Consumption:

Theory of demand, demand curves, consumption function, Elasticity, Utility Analysis, Indifference Curve, Consumer's surplus.

B. Natural Resources

Meaning, Geographical situations, Topography and crops (Agro zones), Temperature and plant growth, Land and land use, cultivable waste land crop rotations, cropping scheme and cropping intensity. Forest- Classification, causes of deforestation. Functions of forests. Forestry programmes of the Indian Government Water Irrigation sources, progress, Misuse of irrigation water. Application of economic laws to irrigation, growth and utilization of irrigation potential, Command Area-meaning and Functions of water Managements. Management of irrigation water. Ongoing projects including watershed management programme. Utilized groundwater resources.

C. Farm Management Economics

Definition and scope of farm economics and management

Farm Management and production economics. Agricultural Economics and industrial Economics-Similarities and differences.

Management decisions and cultivators' holdings. Economic Principles their role in farm management. Application of economic Principles/Laws.

Law of Diminishing, Returns/Principle of variable Proportions laws of return, scale properties, Law of Equi-marginal Returns, Law of such situation, opportunity cost/opportunity Returns, Law of comparative advantage.

Production Function, productivity curves, least cost combination of inputs, Principle of combining Enterprises Determination of Optimum output.

Cost concepts and Principles, Cost Relationship and curves.

Time Comparison (Compounding and discounting of costs). Allocation of Over-head and command costs.

Profit Maximization.

Measures of farm profit.

Farm Records and Accounts.

Methods of valuation and depreciation of assets.

Types of farming: Diversified, General farm, subsistence or Marginal farming, specialized farms, Mixed farming, Ranching and Dry farming.

Systems of farming Cooperative farming, peasant farming, state farming, collective farming, capitalistic farming.

Tools of Farm Management: Farm Budgeting (Complete and partial budgeting) and farm planning, Linear Programming (Graphical method).

Definition of Institute and University: Types of uncertainty in agriculture (Price uncertainty, yield uncertainty, innovation uncertainty Social and legal frame as a source of uncertainty). Diversification (complementary and supplementary relationships) as a mechanism to minimize uncertainty), crop and cattle insurance, pump set insurance Arguments for and against.

Practical:

- Socio-economic survey and collection of data, classification and tabulation with special reference to natural resources of a village.
- Study of a farm holding (resources, enterprises, costs, profit and complete farm economy) of the allotted farmer by cost-accounting method.
- Preparation of an alternative farm plan for the farmer.
- Submission of Report.

BAG204 : IRRIGATION AND WATER MANAGEMENT

- Importance of water in crop production.
- Soil Moisture constants.
- Estimation of Potential Evapo-transpiration and consumptive use.
- Water requirement of crops and factors affecting it.
- Approaches of irrigation scheduling.
- Systems and methods of irrigation – drip, sprinkler and mist Irrigation.
- Quantity and quality of irrigation.
- Measurement of irrigation water.
- Elementary idea of drainage on farms.

Practical

- Measurement of irrigation water.
- Determination of soil moisture content and quality of water.
- Calculation on consumptive use of water.
- Numerical exercises on drainage and irrigation requirement.
- Calculation of irrigation water use efficiency

Visit to irrigation and drainage projects.

**BAG205 : FUNDAMENTALS OF EXTENSION EDUCATION
AND RURAL DEVELOPMENT****1. Extension Education:**

- Meaning, definition, objectives, Principles, Scope, Philosophy and its distinguishing features.
- Extension Teaching and Learning: Teaching, Teaching Elements, steps in Teaching, Learning, Learning Situation, Basic Principles of Teaching and Learning.

Early Extension Efforts in India.

Comparative study of Extension Service in India and USA.

2. **Community Development:**

Meaning, Definition and objectives of community development.

Organizational set up and Activities of Community development at State, District, Block and Village level.

Extension and Rural Development Programmes: Including T and V system, National Demonstration, IRDP, Jawahar Rojgar Yozana.

3. **Extension Programme Planning, Monitoring and Evaluation:**

Meaning, Principles and Procedure of Programme Planning.

Definition: purpose, types, criteria and steps involved in monitoring and evaluation.

Practical

Practice in Conducting Survey

Practice in preparing schedule and Questionnaire for studying the organizational set up of community development.

Contact with the farmers and educating them in new technology of Agriculture.

Development programme for a village and a Block.

Preparation of an outline and practice on evaluation of a programme.

Classification, Tabulation and diagrammatic representation of data.

Writing study Reports.

BAG206 : AGRICULTURAL METEOROLOGY

Different meteorological variables related to agriculture.

Rainfall- Hydrologic cycle and its components. Types and forms of precipitation. Storms, occurrence, variation and measurement of rainfall. Rain gauges, Computation and analyses of data. Plotting of mass curve and rainfall, intensity curve.

Run-off- Definition, types, factors affecting, estimation and measurement of run-off.

Atmosphere - Definition and structure, climate and weather, atmospheric pressure, factors affecting, measurement.

Elementary idea of Insolation, Temperature, kinds and measuring instruments. evaporation, factors affecting, measurement

Humidity, definition, Wind Vane, Anemo-Meter.

Indian Agro Climatic Zones

Elementary idea of weather forecasting.

Practical

1. Computation of average rainfall.
2. Mass Curve
3. Plotting Barograph for rainfall data.
4. Rainfall intensity curve.
5. Measurement of rainfall by Rain Gauge.
6. Measurement of Atmospheric Pressure.
7. Plotting line graphs for illustrating climatic factor such as temperature.
8. Measurement of Relative Humidity.
9. Study of wind vane and Anemometer.

Measurement of Evaporation by USDA evaporation pan.

BAG207 : INTRODUCTORY ENTOMOLOGY

General introduction to Phylum-Arthropoda, its various classes and their distinguishing characters.

Insect Morphology : Body wall-structure, composition and functions; Body divisions- Head (Structure and its appendages; structure, functions and modifications of antennae; Mouthparts-Biting and chewing, piercing and sucking, sponging, siphoning, chewing, and lapping); Thorax-its structure and appendages, modifications and functions of legs and wings, wing coupling apparatus and wing venation; Abdomen-its segments and appendages.

Anatomy: Digestive, Excretory, Reproductive, circulatory, respiratory and nervous systems of grass hopper.

Post-embryonic development including ecdysis, instars, types of larvae and pupae.

Different types of metamorphosis.

Taxonomy: Insect Classification up to the level of families of agricultural importance of following orders:

Orthoptera	:	Acrididae;
Isoptera	:	Termitidae;
Hemiptera	:	Coreidae, Pyrrhocoreidae, Lophopidae, Aleurodidae, Jassidae, Aphidae, Coccidae.
Coleoptera	:	Dermestidae, Coccinellidae, Bruchidae Chrysomelidae; Curculionidae, Tenebrionidae, Scarabaeidae;
Lepidoptera	:	Gelechiidae, Pyralidae, Noctuidae, Cymbidae, Papilionidae

		and Arctiidae.
Hymenoptera	:	Tenthredinidae and Apidae
Diptera	:	Trypetidae

Practical

Dissection of Grasshopper for the study of digestive, reproductive and nervous system.
 Study and Temporary mounting of external parts of grasshopper.
 Identification and comments upon the various Arthropods
 Collection and preservation of insects. Viva-voce and practical records.

SEMESTER- III

BAG301 : AGRICULTURE MARKETING, EXPORT AND COOPERATION

A. Agricultural Marketing:

Market, Meaning, scope and classification of markets. Definition of agricultural marketing, demand, supply and price.
 Marketable surplus, marketed surplus. Integrated marketing.
 General theory of markets and marketing.
 Demand for agricultural products.
 Production and market supply.
 Price Determination and price analysis under different market structures.
 Marketing Functions and services.
 Marketing costs margins and efficiency.
 Defects of Present system of marketing of agricultural produce. Steps taken by the Indian Government and possibilities of improvements.
 Fixation of agricultural Prices.
 Marketing Institutions: Regulated and cooperative markets.
 Market Research.

B. Export.

The concept of export as a district business activity in agricultural sector of the Indian economy, its importance and role in economic development.
 Policies of export of food grains and agricultural commodities pursued by the Indian Government.
 Import vs. export value of cereals and other agricultural commodities.
 Agencies engaged in exporting agricultural goods.

C. Cooperation

Meaning and Concept of Cooperation, principles of Cooperation (Equality, universality, distributive, justice, democracy, unity, honorary services voluntarism). Place of thrift in cooperation, economic planning and cooperation.
 History and Progress of cooperative movement in India.
 Structure and organization of agricultural cooperation in India.
 National cooperative federations, courses of slow growth of agricultural cooperatives, suggestions for rapid development. National Bank for Agriculture and Rural development (1982).
 Cooperative farming: Meaning thereof, New classification cooperative farming, cooperative joint farming, cooperative collective farming. Advantages thereof.
 Reasons for apathy of farmers in adopting cooperative joint farming.

Practical

- Survey of a market (mandi) both primary and secondary (at least one each).
- Case studies of marketing of a minor and a major commodity with respect to marketing channels costs margin and price spread over.
- Study of a (i) cooperative marketing society (ii) a warehouse functioning market (iii) a regulated market and (iv) a cold storages.
- Submission of a report on the above four aspects.

BAG302 : CEREALS MILLETS, AND PULSES CROPS (Field Crops Kharif Crops)

Importance, origin, distribution climate varieties soil practices, manuring and irrigation, plant protection, harvesting and processing of the following crops, under different agroclimatic conditions of U.P.

- A. Cereal Crops : Paddy, Maize
- B. Millet Crops : Sorghum,
- C. Oil seed : Groundnut, Til, castor
- D. Pulses Crops : Pigeon Pea, Urdbean, Moongbean, Soybean, Cowpea.
- E. Fibre Crops : Cotton, Jute, Sun hemp
- F. Green Manure crops : Sun hemp and Dhencha
- G. Fodder Crops : Sorghum, Pearl millet, Maize, Napier, Sudan grass, cluster, bean, cowpea
- H. Cash crops : Sugarcane, Tobacco

Practical

- Identification of crop-seeds, plants associated weeds.
- Practical knowledge of operations from sowing to harvesting of kharif crops included in theory course.
- Judging of maturity and estimation of yields.
- Study of crop production techniques at different farms.
- Calculation of seed and fertilizer requirement of crops.
- Preparation of seed beds of important crops.
- Visit to farms of University and Institutes.

BAG303 : VEGETABLE PRODUCTION

Importance and scope of vegetable production in India; Classification of vegetables. Types of vegetable gardens; Cultivation and seed production of major vegetable like Potato, Brinjal, chillies, tomato, Cauliflower, Cabbage, Onion, Bottle, gourd, Musk melon, watermelon, Okra, Radish, Carrot and Pea.

Practical

Nursery raising of vegetable crops.

Production of seeds in vegetable available at the time of course.

Cost of cultivation studies in Potato, Tomato, Cauliflower and Okra.

Production oriented training in cultivation of vegetable crops.

BAG304 : FARM STRUCTURES, POWER AND MACHINERY

Farm structures farm site, food storage structure Breeding materials farm house, dairy building poultry housing.

Elementary knowledge about the engineering terminology and calculations on piston displacement compression ratio, hip and Licenses of engines construction and working of four stroke and two stroke cycleic engines, common engine troubles causes and their remedies.

Classification of tractors elementary knowledge about following main components of tractor and their functions steering clutches, transmission different and final drive brakes, bolt, pulley PTO, shift and hydraulic lift methods of starting and stopping of tractors. General care and maintenance.

Study of simple parts operation and installation of an electric meter (Induction type, eniyl, calculation of HP units consumed Role of switches fuses and starter,

Study of construction working principles troubles and adjustments of the following machines.

Disclough dischonow land development and soil conservation machines, seed drill planter reaper mower threshers combine spresyes and dusters calculation of area covered power requirement and efficiency of above machines.

Practical:

Preparation of layout for farm houses dairy barn and poultry housing.

Study of construction of four stroke and two stroke cycle engines operating and running of diesel engines.

Study of tractors systems tractor driving practice.

Study of disc plough land development machinery study of seed drill plants and its calibration, study of thresher and combine.

Visits to places of engineering interest.

Identification of different work shop tools and machines and their used.

BAG305 : MUSHROOM CULTURE AND PLANT HEMATOLOGY

Morphology of edible mushrooms and their classification. spawn and its preparation. Methods of Cultivation of different types of edible mushrooms. Mushroom diseases and etc. Mushroom recipes.

Practical :

- (I) Practical record
- (AI) Viva voce

BAG306 : RAINFED AND DRY LAND FARMING AND WATER SHED MANAGEMENT

1. Definition, Characteristics and extent of rainfed/dry land farming areas in the country and the state of U.P.
2. Problems in dry land agriculture.
3. Moisture conservation practices and use of antitranspirants in dryland farming.
4. Watershed management concept, Principles and practices.
5. Selection of suitable crops, crop rotations and crop mixtures for various categories of rainfed areas.

Practical

1. Preparation of crop rotations and cropping schemes for rainfed farming and dry land agriculture.
2. Determination of Soil Moisture contents.
3. Studies on moisture depletion pattern and rainfed farming.
4. Study of practical application of antitranspirants.
5. Visit to Dry Farming research stations.

Maintenance of practical record.

BAG307 : PRINCIPLES OF PLANT BREEDING

Plant Breeding-history, objectives and scope.

Mode of reproduction in crop plants in relation to breeding techniques.

Plant variation kind and causes.

Genetic consequences of self and cross pollinated crops.

Plant Introduction and exploration.

Breeding self pollinated crops, population's improvement, Mass selection, recurrent selection. Breeding cross pollinated crops mass selection, pedigree, bulk and back cross methods.

Male sterility and its importance.

Breeding of asexually propagated crops, Clonal selection and apomixes.

Polyploidy and mutation breeding.

Practical

Technique of emasculation and artificial pollination in important crops.

Skeleton of different breeding procedures.

Practical record.

Viva-voce.

BAG308 : Principles of Live Stock Production and Management including Poultry

General:

Importance of livestock in Agriculture. Relationship of plants with animal husbandry. Dairying under specialized and mixed farming. Livestock and milk Production statistics, milk distribution.

Dairy cattle and Buffalos management:

Breeds, Breeding methods and systems, care and management of milk cows and after calving; Raising of calves, management of heifers and bulls maintenance of livestock records milking methods and principles. Clean milk production. Pasture management. Housing for dairy animals.

Pig Management

Importance, important Breeds, raising piglets up to age of slaughter. General aspects of breeding care of sow and boar.

Sheep and Goat Management:

Importance, important breeds, raising to kids and lambs, breeding, feeding of goats and sheep.

Poultry production:

Importance, important breeds, General aspects management of raising broilers and layers, feeding of different class of birds, Grading of eggs and preservation.

Practical

Study of external body parts, study of phenotypic and physiological different between cow and buffaloes, zebu, vs. taurus, estimation of body weight measurements, marking for identification castration, dehorning, Estimation of judging cost of milk production, problems on computation of ration mixing of feeds, casting and throwing, Grooming, Preparing scheme of round the year for green forage recording temperature, pulse and respiration of animals.

BAG309 : PRACTICAL CROP PRODUCTION

In this course, team of about 10 students will be given a sizable plot of land (100 sq.m. minimum) for a full year. The team will manager crop production enterprise from a to z including maintenance of account and preparation of balance sheet. No paid labors will be supplied and other inputs will be supplied on loan and their cost will be deducted from the receipt of the enterprise. The net profit will be distributed among the students. To cope with natural calamities a revolving fund will be raised by deducting 10% amount from net profit every year. The evaluation of students will be done on the basis of actual working units, share in profit, oral examination and maintenance of accounts and records.

SEMESTER – IV

BAG401 : SOIL FERTILITY, FERTILIZER AND INTEGRATED NUTRIENT MANAGEMENT

Soil fertility concept, soil productivity, factors influencing soil fertility, maintenance of soil productivity.

Essential plant nutrients, Criteria of essentiality; functions, deficiency Symptoms, Critical levels of deficiency and toxicity.

Mechanism of uptake and transport of minerals salts in plants.

Sail fertility evaluation, soil and plant analysis, tissue tests.

Mineralization and immobilization of N and fixation and availability of P and K in soil.

Fertilizers - definition, classification, characteristics, reactions of fertillzer in soil, Important fertilizer elements- Nitrogen, phosphorus, potassium, sulphur, zinc, Mixed and complex fertilizers Manufacture of urea, ammonium sulphate, superphosphate and marinate of potash. Organic sources of nutrients, digested sludge, manure, compost and green manures.

Elementary idea of biofertilizers and vermin compost.

Integrated nutrient management (INM) concept, Elementary idea of INM models, integrated nutrient management and soil health.

Practical

Analysis of N, P and K in fertilizers.

2- Determination of availability of NPK and S in soil.

3- Elementary idea of determination of micronutrients in soil.

4- Plant Tissue tests.

5- Determination of Organic Matter in soil.

BAG402 : OIL SEEDS COMMERCIALS CROPS

FIELD CROPS II RABI CROPS (ICAR)

Importance, origin, distribution, climate, varieties improved, agronomic practices managing and irrigation, plant protection, harvesting and processing of the following crops under various agroclimatic conditions of U.P.

- A. Cereal Crops : Wheat, Barley, Oat
- B. Oilseed Crops : Rapeseed and mustard Linseed, Sunflower
- C. Pulse crops : Chickpea, field pea, Lentil, Rajmash
- D. Fodder Crops : Oat, Berseem Lucerne
- E. Cash Crops : Potato, Mentha

Practical

Practical study of all field crops.

BAG403 : FRUIT PRODUCTION TECHNOLOGY OF FRUIT CROPS

Importance, scope and present position of fruit crops in India, Practices involved in the production of fruits : Mango, Guava, Kagzi lime, Banana, Grape, Litchi, Papaya, Loquat, Aonla, Ber, Jack Fruit, Apple and Peach;

Practical

Identification of fruits; Orchard layout and planting; Practice of different propagation methods with special reference to fruits; Practice of training and pruning of fruit plants; Plant protection practices; visit to orchards, nurseries and research centers of fruits.

BAG404 : ECONOMIC ENTOMOLOGY

1. Economic importance of insects, nature and extent of damage, life history and

management of the major insect pests of following crops as mentioned against them:

Paddy	<i>Leptocorisa varicornis</i> , <i>Hieroglyphus</i> Spp., <i>Nilaparvata lugens</i> , <i>Nephotetix</i> , spp., <i>Mythimna separata</i> .
Jowar Maize	<i>Chilo partellus</i> , <i>Atherigona variosocata</i> , <i>Scirpophaga</i> , <i>Excerptalis</i> , <i>Chiloinfuscatelles</i> ,
Sugarcane	<i>Pyrilla prepusilla</i> .
Cotton	<i>Pectinophora gossypiella</i> , <i>Earias</i> Spp., <i>Sylepta derogata</i> , <i>Dysdercus</i> Spp., <i>Bemisia tabaci</i> , <i>Amrasca bigutulla</i> .
Oilseeds	<i>Lipaphis erysimi</i> , <i>Athalia proxima</i> <i>Bagrada Cruciferarun</i> , <i>Dasyneura lini</i> .
Pulses	<i>Helicoverpa armigera</i> <i>Agrotis</i> Spp., <i>Etiella zinckenella</i> , <i>Melanagromyza obtusa</i> , <i>Phytomyza atricornis</i> .
Pests of Fruit crops	<i>Drosicha mangiferae</i> , <i>papilio Democlius</i> , <i>Diaphorina citri</i> <i>Phyllocnistis citrella</i> , <i>Eriosoma lanigerum</i> .
Pest of Vegetable crops	<i>Leucinodes orbonalis</i> , <i>Epilachna viqintioctopunctata</i> . <i>Dacus cucurbitae</i> , <i>Plutella xylostella</i> .
Pests of Stored Grains	<i>Sitophilus oryzae</i> , <i>Trogoderma granarium</i> , <i>Sitotroga cerealella</i> , <i>Callosobruchus chinensis</i>
Polyphagous pests	<i>O dontotermesobesus</i> , <i>Holotrichia consanguinea</i> , <i>Spilosoma obliqua</i> , <i>Spodoptera litura</i> , <i>Amshcta</i> Spp.

2. Elementary knowledge of apiculture.

Practical

Collection, mounting and preservation of insect pests of crops stages.

Field and laboratory acquaintance with insect pests, the various stages and damaged materials.

Technical knowledge of honey production.

Practical records and Viva-voce.

BAG405 : SOIL SURVEY/LAND PLANNING AND REMOTE SENSING

Physical properties of soil and their determination.

Definition and importance of soil conservation in agriculture. History of soil conservation in India.

Soil survey, definition Land use capability classification.

Soil erosion, definition types, mechanics and causes of erosion. Factors affecting soil erosion. Agronomical practices for soil and water conservation. Engineering practices for erosion control such as bunding, terracing, temporary and permanent structures for Gully control. Grassed waterways. Water harvesting.

Wind erosion mechanics, control, sand dune fixation, shifting cultivation.

Survey, measurement of distance direction and elevation.

Remote Sensing – definition, objectives and uses.

Practical

Familiarization with chain survey equipments.

Exercises on chain survey.

Familiarization with prismatic compass (P.C.)

Calculation of included angles.

Study and adjustment of Dumpy level (D.L.)

Differential leveling by D.L.

Calculation of Reduced level.

Construction and design of bunds with calculation of earth work.

Calculation of infiltration rate and bulk density

Visit to soil conservation research centre for soil erosion and its control.

BAG406 : BREEDING OF FIELD CROPS

Origin, distribution and objectives.

Breeding problems, systematic description and economic importance.

Breeding methods adopted and achievements with reference to following crops:

- (a) Cereals : Wheat, rice and maize
- (b) Millets : Sorghum and pearl millet
- (c) Pulses : Gram, Pea and Arhar
- (d) Oil-seeds : mustard, groundnut and sunflower
- (e) Others : cotton and potato

Practical

1. Identification of important varieties of above mentioned crops.
2. Systematic description and artificial hybridization in above mentioned crops.
3. Significant research advances made in above mentioned crops.
4. Practical record

Viva-voce.

BAG407 : Health and Diseases of Livestock including poultry

Diseases:

Signs of illness, control measures of diseases, classification of diseases. Modes of

transmission, prevention and treatment of diseases of bovine (HS, RP, BO, Anthrax, Brucellosis, Johne's, Mastitis, Milk fever, FMD), Sheep and goats (enterotoxaemia, coccidiosis, ascariasis), pigs (Swine fever, Hog cholera) and poultry (Ranikhet, fowl pox, CRD, Marex, Gumbaro). Vaccination programme for cattle and poultry.

Practical

Diagnosis of Pregnancy, sign of heat, recording temperature, pulse and respiration rates, segregation and quarantine identification of equipments used in treatment.

Cleaning and sanitation of sheds / byres, debeaking, grading of eggs incubator waterer and feeder.

Demonstration of semen collection and uses of artificial insemination in livestock.

Vaccination schedule for livestock and poultry.

SEMESTER – V

BAG501 : CROP PESTS AND INTEGRATED PEST MANAGEMENT

1. Basic principles of pest outbreaks and their economic status.
2. Methods of insect control; including mechanical, physical, cultural, biological, legal and chemical control use of insecticides, repellents, antifeedants, attractants, chemosterilants, pheromones and insect growth regulators.
3. Basic concept of integrated pest management.
4. Elementary knowledge of plant protection equipments.
5. General account of non-insect pests with particular reference to rodents. Nematodes, mites and mollusks.
6. Pesticidal pollution and hazards, and their management.
7. Insect vectors transmitting plant diseases.

Practical

1. Collection and preservation of established predators and parasites.
2. Field and laboratory acquaintance with non-insect pests and their damaged materials.
3. Dilution and application of insecticides.
4. Handling of plant protection equipments.
5. Practical record and viva- voce.

BAG502 : CROP DISEASES AND THEIR MANAGEMENT

- General Symptoms of plant diseases.
Methods of plant disease management.
Preliminary knowledge of different groups of fungicides.
Study of the symptoms, etiology, mode of perpetuation and management of the following diseases:
- Early and late blight of potato.
 - White rust of crucifers.
 - Green ear disease of bajra.
 - Loose smut, Karnal bunt and rusts of wheat.
 - Covered smut of barley.
 - Grain smut of Jowar
 - (vii) Bajra smut
 - (viii) Rust of linseed
 - (ix) Leaf spot or Tikka disease of groundnut
 - (x) Wilt of arhar
 - (xi) Stripe disease of barley
 - (xii) Red rot of sugarcane
 - (xiii) Blast of rice.
 - (xiv) Citrus canker
 - (xv) Khaira disease of paddy and Black tip of mango.
 - (xvi) Tobacco mosaic
 - (xviii) Yellow vein mosaic of bhindi
 - (xix) Bean common mosaic
 - (xxi) Little leaf of brinjal

Practical

- (i) Diagnosis of important diseases by studying symptoms.
- (ii) Microscopic examination of diseased parts.
- (iii) Preparation of Bordeaux mixture.
- (iv) Practical record
- (v) Viva voce.

BAG503 : PRINCIPLES OF MILK PROCESSING

1. Milk and its secretion, composition of colostrum and milk of different species like cow, buffalo, sheep and goat. Physical properties of colostrum, cow and buffalo milk. Factors affecting the quantity and quality of milk. Clean milk production, microorganism of milk and their functions. Agencies engaged in handling and transportation of milk pricing of milk.

2. Processing the milk. Filtration, Clarification, Bactofugation, pasteurization, ultra high temperature treatment, homogenization, sterilization, cooling and chilling of milk. Membrane filtration and reverse osmosis processes. Common adulterants and preservatives used in milk and their detection.

Practical

1. Sampling of milk.
2. Determination of specific gravity by lactometer and Westphal balance. Fat test by Gerber's method, total solid and SNF percentage by Richmond's scale and formula.
3. Assessment of quality of milk by simple tests like C.O.B., Alcohol test, and Sediment test.
4. Determination of acidity of milk.
5. Calculations on Standardization and adulteration of milk.
6. Detection of common milk adulterants

BAG504 : WEED MANAGEMENT

- (A) Definition, classification and general characteristics of weeds, Losses caused by weeds.
- (B) Principles and methods of solving weed problem.
- (C) Weed control schedules for important field crops of U.P.
- (D) Integrated weed management system and its importance.
- (E) Control of Abnoxious weeds viz. Sedge grass, Kane, Baisuri and Satyanasi.

Practical

1. Identification and preservation of important weeds of locality.
2. Calculation on quantities of herbicides, weed control efficiency and weed index.
3. Calculation of cost involved in different weed control schedules.

BAG506 : POST HARVEST MANAGEMENT AND PRESERVATION OF FRUITS AND VEGETABLES

Importance and scope of post harvest management of fruits and vegetables post, harvest deterioration of fruits and vegetables Techniques of prolonging the self life of fruits and vegetables; handling grading and packing of fruits and vegetables.

Fruits Preservation

Causes of Spoilage of Fruits and Vegetable Principles and methods of fruits and vegetables preservation canning of pea; Dehydration of fruits and vegetables; tomato products; jam, jelly and squash; preserve of Aonla and Bael; pickles of mango citrus, chilies and mixed vegetables.

Practical

Practical knowledge of harvesting, handling, grading, precooling, waxing and use of chemicals to prolong the post harvest life of fruits and vegetables. Visit to storage centres carrying improved practices of post harvest handling.

Bottling of green peas; dehydration of seasonal fruits and vegetables, preparation of apple jam, guava and karonda jellies; preparation of lime and orange squashes, Aonla and Bael preserve. Tomato juice and ketchup.

BAG506 : INTRODUCTION TO PLANT BIOTECHNOLOGY

Definition scope and importance of plant biotechnology.

Outlines of basic steps involved in plant biotechnology/ genetic engineering such as; Isolation of plant DNA and vector DNA

Restriction of DNA by endonucleases.

Electrophoresis of restricted DNA fragments.

3. Cloning vectors for recombinant DNA such as-

(3.a) Ti-plasmid vector for higher plants.

(3.b) Plant viruses such as cauliflower mosaic virus (Ca MV), tobacco mosaic virus (TMV) and gemineae virus as vectors.

4. Applications of plant genetic engineering in crop improvement.

5. Plant tissue culture;

Culture media used in plant tissue culture.

Somaclonal and gametoclonal variation in plants.

Micro - propagation of plants.

Application of plant tissue culture in crop improvement.

Practical

- 1- Requirement for plant tissue culture laboratory.
- 2- Media components and preparations.
- 3- Sterilization techniques and inoculation of various explants.
- 4- Micro propagation of important crops Anther, Embryo and Endosperm culture.
- 5- Demonstration of Isolation of DNA and gel – electrophoresis techniques.

SEMESTER – VI

BAG601 : FARMING SYSTEM AND SUSTAINABLE AGRICULTURE

1. Farming systems – Definition, types and methods of farming.
2. Definition, scope and advantages of sustainable agriculture.
3. Modern agriculture in relation to sustainable agriculture.
4. Sustainable agriculture in relation to tillage fertilizers, irrigation, weed management and plant protection measures.
5. Important cropping systems for sustainable agriculture.

BAG602 : ORNAMENTAL HORTICULTURE

Importance and scope of ornamental horticulture in India. Cultivation of annuals and canna. Commercial cultivation of rose, chrysanthemum, marigold and gladiolus; Making and maintenance of Lawn; Making and maintenance of Hedge and edging; Elementary knowledge of common shrubs, climbers and trees and their various uses. Indoor gardening; Styles of gardens with special reference to Mughal and Japanese gardens: Flower arrangement and techniques to prolong vase life of flowers.

Practical:

Identification of ornamental plants: Preparation of herbaceous border; Practice of making garlands, Bouquet and arrangements in vases; Propagation of Ornamental plants: Practice of potting and repotting of plants. Visit to ornamental gardens and research station.

**BAG603 : AGRICULTURAL FINANCE, BUSINESS
MANAGEMENT AND TRADE**

A. Agricultural Finance

1. Credit, Meaning, Importance and credit control.
2. Definition, need for finance in agriculture, characteristics of good agricultural finance (credit)
3. Decision on the use of credit, Principles of farm credit (Equity or Increasing Risk, Added Cost and Added Return, Cost of Credit and no loss no profit goal of farming and opportunity cost Principle).
4. Types of loans and classification of agricultural credit.
5. Qualifications of a borrower, Analysis and three R's and credit (Return, Repayment Capacity and Risk-bearing Capacity). Analysis of three C's of Credit (character, capacity and capital).
6. Types of Loan, according to liquidity, budgeted loan, loan amortization, Even payment method, Decreasing method.
7. Crop index reflecting use and farm finance.
8. Role and Rural Credit Institutions (Recommendations of the Banking Commission Integrated Scheme of Rural Finance (Credit), Institutional Agencies, Taccan,
9. Sources of agricultural finance (Commercial banks, RRB, Lead Bank, Lead Bank, NABARD, Cooperative Credit (PACs, Land Development Banks, National Cooperative Federation, Farmers Service Cooperatives).

B. Business Management

1. Meaning of management, functions of management, role of managers and scope of management in agricultural business. Role and objectives in management references.
2. Decision making by individuals as also by groups.
3. Functional areas of management and their relationship with agriculture production, finance, marketing and human resources as coordination thereof.
4. Importance and nature of planning, useful generalization of planning forecasting technique with the help of a planning model, components of strategic management. Budgeting in A basic planning technique. Time management, a technique for planning use of manager's own time.
5. Leadership in Management, Types and Leadership for production, planning and control activities (inventory control quality control, cost control) and financial management, financial forecasting and planning acquisition of funds.
6. Acquaintance of book-keeping and cash accounts(s).
7. Knowledge of business environment for operation of bank account cheques, bank draft etc.

BAG604 : POST HARVEST ENGINEERING

1. Importance and advantages of processing of agricultural produce.
2. Study of process and equipments involved in cleaning drying, storage of farm produce. Rice milling, Pulse-milling, wheat milling, oilseed milling, soybean processing, cane- crushing, Chaff cutting and animal feed grinding.

3. Utilization of agricultural by products such as rice husk and straws, rice bran and Arhar Stalk.
4. Processing and Preservation of foods and seeds.
5. Biomethanation of agricultural and municipal wastes.
6. Green house technology / low cost green houses / utility of green houses.

Practical

1. Determination of moisture content of grains.
2. Sieve analysis of ground materials.
3. Study of construction, operation, care and maintenance of different processing equipments.
4. Study of Biogas plants.
5. Visits of places related to processing of farm produce.

BAG605 : DAIRY PRODUCTS TECHNOLOGY

1. Definition, composition and method of manufacture of cream, butter, dahi, khoya, Chhenna, Ice cream, condensed milk, milk powder, cheddar and cottage cheese, common adulterants of Ghee and khoa and their detection, Cleaning and sanitization of dairy equipments.
2. Basic principles of refrigeration and cold storage of milk products, Principles of cooling and heating. Heat transfer equipments.
3. Nutritive value of milk and milk products.

Practical

1. Demonstration of cream separation.
2. Demonstration of preparation of butter, Ghee, Khoa, Chhenna, Ice Cream and dahi.
3. Calculation on Ice cream mix.
4. Calculation on standardization and Neutralization of cream, over run of butter and ice cream.
5. Comparative study of cost of different milk products.

BAG606 : PRINCIPLES OF SEED TECHNOLOGY

1. History and importance of seed technology.
2. Classes of seeds.
3. Characteristics of quality seeds and its importance.
4. General technique of seed production in important agricultural crops.
 - (i) Cereals - wheat, rice, barley
 - (ii) Pulses - maize, sorghum and bajra
 - (iii) Pulses - chickpea, pigeon pea, field pea, urdbean, mungbean and lentil
 - (iv) Oil Seeds -rap seed, mustard, groundnut, sesamum, Castor, sunflower and soybean
 - (v) Commercial crops – sugarcane, jute and coconut,
5. Factors affecting seed longevity and quality.
6. Causes of seed deterioration with reference to genetic and storage.
7. Seed resting- importance, procedures, purity, viability and germination
8. Certification procedure for important field crops.

Practical

1. Maintenance of seed purity in the field.
2. Field inspection procedure in important crops.
3. Demonstration of seed processing of important crops.
4. Viability and vigour test
5. Analysis of purity, moisture and germination of seed samples and communication of results.

BAG607 : ELEMENTARY MICROBIOLOGY

Definition, scope and importance of microbiology.

A brief survey of microorganism:

Prokaryotes and Eukaryotes.

Types of microorganisms: fungi, bacteria and viruses.

Size relationships.

Simple staining and gram staining techniques of bacteria.

Characteristics of gram positive and gram negative bacteria.

Classification of bacteria (only important groups)

An elementary idea of general characteristics, classification and reproduction of fungi and bacteria.

General structure of bacteriophage and replication.

Sterilization and disinfection.

Practical

Study of different parts of light compound microscope and their functions.

Gram staining of bacteria.

Preparation of nutrient broth, Czapek's and Richard's media.

Identification of fungi and bacteria.

Practical record

Viva voce

BAG608 : COMMUNICATION, DIFFUSION OF AGRICULTURAL INNOVATIONS

Meaning and definition of communication. Communication process, elements and models of communication process. Types of communication. Key communicator, Audio visual aids, their use and effectiveness.

Extension teaching methods – classification, merits and demerits, factors affecting selection and use of extension teaching methods. Mass Media in Extension.

Meaning and definition of innovation, diffusion, adoption, diffusion effect and rate of adoption, stages of adoption, Factors affecting adoption, Elements of diffusion Difference between diffusion and communication. Innovation decision process, categories of adopters, characteristics of innovations.

Practical

1. Preparation, procurement and handling of aids.
2. Organizing group discussion, campaign, seminar, exhibition and demonstration.
3. Practices in writing news letter, circular letter, radio and television scripts on different farm practices.
4. Identification of farmers and categories them into different adopters categories.
5. Collection of Information from farmers regarding different characteristics of innovations.
6. Collection of data regarding rate of adoption for the adoption of different farm practices in different years.

SEMESTER – VII

BAG601 : MANAGEMENT OF PROBLEM SOILS AND WASTE LAND

Management of Problem soil

1. Saline and sodic soils - Occurrence classification, formation, diagnosis, characteristics and management.
2. Acid Soils- occurrence, formation, diagnosis, characteristics and management.
3. Waterlogged soils- occurrence, characteristics and management.
4. Eroded soils: Occurrence characteristics and management.

Management of Wasteland

5. Definition, classification, distribution and extent of wastelands in India with particular reference to U.P. and their Management.
6. Factors responsible for land degradation and characteristics of different types of wastelands.
7. Soil Management in Arid and Semiarid areas and Sand dune Stabilization.

Practical

1. Determination of pH, EC, gypsum requirement, lime requirement in problem soil.
2. Determination of specific gravity, bulk density, pore space, soil texture.
3. Visit to Area of problem soil.
4. Analysis of irrigation water.

BAG602 : ENVIRONMENTAL SCIENCE and AGRO ECOLOGY

Ecology - definition, division and significance.

The Environment - environmental management and control of pollution, affecting plant growth abiotic and biotic interactions.

Ecosystem major ecosystems, energy and its flow in ecosystem biochemical cycles and nutrient cycles.

Plant community - classification composition, and study of plant community structure.

Plant adoption - ecological classification of plants and their morphological anatomical and physiological adaptations to adverse environments hydrophytes, xerophytes, mesophytes, epiphytes and halophytes

Ecological problems of major crops-cereals, millets, pulse and oilseeds

Practical

To record temperature, relative humidity and light intensity value of the atmosphere. To study the community by quadrat method by determining plant structure different species crops.

To study the vegetation of the given area by a phytosociological method biological spectrum method.

To determine the biomass producers in the given area.

To record abiotic components- pH, temperature, light intensity, turbidity in pond ecosystem.

BAG603 : SILVICULTURE AND AGRO FORESTRY

(A) Silviculture:

1. Definition and scope of silviculture, Forestry, its scope and classification.
2. Role of forests - geographic, productive and bioaesthetical.
3. Elementary idea of forest types.
4. Regeneration of forests.

(4.a) Natural seed production, seed dispersal, germination and seedling establishment.

(4.b) Artificial Afforestation, reforestation and their objectives. Choice of tree species, nursery techniques.

(B) Agroforestry and Social forestry

1. Definition, concept and need of agro forestry and Social forestry
2. Classification of agro forestry and Social forestry systems.
3. Prominent agro forestry and Social forestry systems prevailing in Uttar Pradesh.
4. Limitations of agro forestry and Social forestry, choice of tree species for agro forestry and Social forestry for fuel, fodder and timber requirement.
5. Shelter belt and wind breaks trees.
6. Cultivation of teak, sal and poplar trees.

Practical

1. Afforestation, techniques of problematic sites viz. ravines, saline-alkali soils, waterlogged areas, arid areas, hilly areas; roadside and canal bank plantation.
2. Nursery techniques - Numerical problems.
3. Numerical problems on planting and cost of earthwork estimation.

4. Identification of forest tree species.

BAG604 : COMPUTER APPLICATIONS

Introduction to Computer. A brief history of computing. Data Processing and Information. Use, Definition, Anatomy, Components, Classification of Computers, Capabilities and limitation of a computer, Number systems. Decimal, Binary, octal, hexadecimal. Character codes- ASCII, EBCDIC, BCD. Computer organization- CPU, Input-output devices, various types of memories. Introduction to DOS (Disk Operating System), Fundamentals of DOS Commands, Internal, External, Editor, Files and Directory, Elementary Idea of BASIC (Computer Language).

Practical

Simple Programming Exercises in BASIC

BAG605 : PRODUCTION TECHNOLOGY OF MEDICINAL AROMATIC, SPICES AND PLANTATIONS CROPS

1. Importance and scope of medicinal, aromatic and spices crops.
2. Cultivation of mentha, citronella, Khus, Ocimum, Rauvolfia and Dioscoria.
3. Cultivation of turmeric, Zinger, Coriander, Zira and Saunf in the North Indian Condition.
4. Cultivation of plantations crops-coconut, cashew nut, tea and coffee.

Practical

1. Identification of medicinal, aromatic plants and spices crops.
2. Calculation of the cost of cultivation of mentha, citronella, Rauvolfia and Dioscorea.
3. Practical, Identification and demonstration of spices in the course.
4. Visit to commercial growing places and research stations of the medicinal, aromatic and spices corps.

BAG606 : DAIRY CHEMISTRY AND ANIMAL NUTRITION

Unit-1 The milk and colostrums, secretion of milk, chemical composition and physio-chemical properties of milk and colostrums, chemical changes occurring during storage of milk. Preservation of milk. Adulteration of milk and its detection.

- Unit - II** Chemistry of milk constituents viz. lactose, fat protein, enzymes and vitamins.
- Unit - III** Classification of Feeding stuffs, composition of Animal body and feeds, Functions of food constituents, the digestion and absorption of food constituents in ruminants.
- Unit-VI** The metabolism of fat, carbohydrate and protein.
- Unit - V** Role of minerals, hormones, vitamins and Antibiotics in animal body feeding with special reference to deficiency diseases.

Practical

1. Sampling of milk
2. Analysis of milk for TS, SNF, Fat, Total ash, Calcium and Phosphorus.
3. Determination of lactose in milk and proteins.
4. Analysis of feeds for total ash, Ca, P₂ O₅ and Proteins.
5. Demonstration of estimation of Ether Extract and crude fiber in feeds.

Semester- VIII

RURAL AWARENESS WORK EXPERIENCE

It is often complained that the agricultural graduates lack professional competence and cut a shy figure in facing farmers. Keeping this in view the rural agricultural work experience (RAWE) is included in the programme, where students will be exposed to rural (Village) environment for strengthening practical training -group of students will be associated to farmers, agro-industrial units and agricultural research station for this purpose for a period of 3-4 months. They will be constantly supervised and evaluated by the faculty and a detailed report of the survey and works of the students for the period is to be submitted by him.

