SYLLABUS OF B.SC (AG.)HONS.

(SEMESTER SYSTEM)

ALL SUBJECTS

Semester I

Course-

Semester- I **PRINCIPLES OF AGRONOMY** **2+1=3**

1. Definition and scope of Agronomy.
2. Classification of Crops or different basis.
3. General principles of Crop production: Climate, soil, soil preparation, seed and sowing, post sowing-tillage, water management, nutrient management, plant protection measures, harvesting, threshing and storage.
4. Crop sequences and systems with special emphasis on mixed 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.
7. Framing of crops rotations and cropping intensity.
8. Preparation of practical record.

Course-

Semester- I **FUNDAMENTALS OF SOIL SCIENCE** **2+1=3**

1. Soil : Pedological and Edaphological concept and components of soil.
2. Important soil forming minerals and rocks, weathering of rocks and minerals. Soil forming factors and processes.
3. Development of soil profile.
4. Physical properties of soil and their significance.
5. Chemical properties of soil, cation and anion exchange phenomenon and their importance in agriculture.
6. Soil air : Definition, composition and factors affecting the composition of soil air.
7. Soil water : Retention, potential, soil moisture constant, movement of soil water.
8. Soil colloids- Nature, structure, properties, types, chemical composition and their importance.
9. soils reaction - Factors controlling of soil PH and influence of soil reaction on availability of nutrients.
10. soil organic matter – composition and their maintenance in soil, humus formation and its importance in soil fertility management.
11. Biofertilizers : Definition, types and their potential, nitrogen fixing bacteria, symbiotic and non symbiotic nitrogen fixation, nutrient solublizing bacteria, merits of biofertilizers.
12. Important soil types of India with special reference to the U.P. soil.

Practical:

1. Analytical chemistry : Basic concepts, techniques and calculation.
2. Collection and processing of soil sample for analysis of organic carbon, soil pH and electrical conductivity
3. Preparation of HCl extract of soil.
4. Determination of Iron oxide sesquieoxide, Ca, and P in HCl extract of soil.
5. Estimation of $CO3^{=}$ and HCO_3^{-} in irrigation water.
6. Study of soil profile and identification of rocks and minerals.

Course-

Semester- I **2+1=3**

ELEMENTS OF GENETICS

1. Definition, significance and historical development in genetics.
2. Mendel's Law's of heredity .
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,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 droisophila, 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. Preparation of practical record.

Course-

Semester- I **FUNDAMENTALS OF HORTICULTURE** **2+1=3**

1. Introductory knowledge of main branches of horticulture and their importance.
2. Botanical classification of fruits.
3. Climatic fruit zones of Uttar Pradesh and fruits grown therein.
4. Establishment of orchards; Selection of site, systems of planting.
5. Orchard soil management.
6. Systems of irrigation.
7. Principles of pruning and systems of training of fruit plants.
8. Unfruitfulness - its causes and measures to overcome it.
9. Fruit drop - its causes and measures to control it.
10. Rejuvenation of orchards.
11. 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 of seed beds and raising of seedlings.
5. Practice of lifting and packing of nursery plants.
6. Visit to nurseries, gardens and research stations.
7. Preparation of practical record.

Course-

Semester- I **AGRICULTURAL METEOROLOGY** **2+1=3**

1. Different meteorological variables related to agriculture.
2. Rainfall- Hydrological cycle and it's components. Types and forms of precipitation. Storms, occurrence, variation and measurement of rainfall. Rain guage, computation and analysis of data. Plotting of mass curve and rainfall intensity curve.
3. Run-off - Definition, types, factors affecting, estimation and measurement.
4. Atmosphere - Definition and structure, climate and weather, atmospheric pressure, factors affecting and measurement.
5. Elementary idea of insolation, Temperature – kinds, measuring instruments of temperature and evaporation. Factors affecting and measurement of temperature and evaporation.
6. Humidity, definition, kind and importance.
7. Agro Climatic Zones in India.
8. Elementry idea of weather forecasting.

Practical

1. Computation of average rainfall. Plotting Bargraph for rainfall data and Rainfall intensity curve.
2. Measurement of rainfall, Atmospheric pressure, relative humidity and evaporation.
3. Plotting line graphs for illustrating climatic factors such as temperature.
4. Mass Curve.
5. Maintenance of practical record.

Course-

Semester- I **RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY** **2+1=3**

(A) Rural Sociology

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 in social /rural change
6. Socio-economic problems of rural India.

(B) Educational psychology

1. Definition, nature and importance of psychology in the development of human behaviour.
2. Meaning of habit and habit development.
3. Basic Psychological concepts; motivation, Social Interaction, Attitudes, Emotions, prejudices and Social Perception.
4. Personality- definition, development and factors affecting them.

Practical

1. Socio-economic survey of village communities.
2. Developing schedules and questionnaires.
3. Visit and gaining of 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.
6. Preparation of practical record.

Course-

Semester- I **STATISTICS AND APPLIED MATHEMATICS** **2+1=3**

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; 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 complete enumeration and sample survey, types of data, need for sampling, sampling and Non-sampling errors, concept of standard error, concepts of unit and population, sampling unit, sampling frame, problem of incomplete frame, Random sampling, simple Random sampling (srs) with and without replacement (srswr, srswor), estimation of population Mean, Variance and their unbiased estimators.

Basic concepts used in tests of Significance, statistical Hypothesis, null Hypothesis, two types of error, Level of significance, degree of freedom, definition and uses of **z** test and t test in testing significance of difference between two means, F test in testing, equality of two variances. χ^2 test, as test of independence of attributes in 2 x 2 contigency table only.

Scattered diagram, positive and negative correlation, correlation coefficient, range of correlation coefficient, concept of line of best fit.

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

Limits and Differentiation (without differentiation by first principles). Differentiation of algebraic, trigonometrical, 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.

Note - Calculator and statistical tables are allowed in practical exam.

Course-

Semester- I **STRUCTURAL AND SPOKEN ENGLISH** **1+0=1**

ELEMENTS OF ENGLISH GRAMMAR:

(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

Course-

Semester- I **PHYSICAL EDUCATION** **0+1=1**

1. Practical knowledge of field preparation of different games and sports and their maintenance.
2. Knowledge of rules and regulations of games and sports.
3. Practical knowledge of games and sports.

Semester II

Course-

Semester- II **NATURAL RESOURCES AND FARM MANAGEMENT** **2+1=3**

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

General and economic study of land and land use pattern, water and forest.

C. Farm Management Economics

1. Definition and scope of farm economics and management
2. Farm Management and production economics. Agricultural Economics and industrial Economics - Similarities and differences.
3. Management decisions and cultivators' holdings. Economic Principles their role in farm management. Application of economic Principles/Laws.
4. 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.
5. Production Function, productivity curves, least cost combination of inputs, Principle of combining Enterprises Determination of Optimum output.
6. Cost concepts and Principles, Cost Relationship and curves.
7. Time Comparison (Compounding and discounting of costs). Allocation of Over-head and command costs.
8. Profit Maximization.
9. Measures of form profit.
10. Farm Records and Accounts.
11. Methods of valuation and depreciation of assets.
12. Types of farming: Diversified, General farm, subsistence or Marginal farming, specialized farms, Mixed farming, Ranching and Dry farming.
13. Systems of farming Cooperative farming, peasant farming, state farming, collective farming, capitalistic farming.
14. Tools of Farm Management: Farm Budgeting (Complete and partial budgeting) and farm planning, Linear Programming (Graphical method).
15. 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:

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

Course-

Semester II ELEMENTARY PLANT BIOCHEMISTRY 2+1=3

1. Biochemistry- Introduction, scope and importance in agriculture.
2. Carbohydrates - Definition, Classification, Chemistry and Structural formula of the following saccharides :-

i. Glucose,	ii. fructose,	iii. Galactose
iv. Mannose	v. Sucrose	vi. Lactose.
vii. Maltose	viii. Starch	ix. Cellulose.

3. **Proteins :** Definition, Classification, Composition, Properties, Primary and secondary Structure and its important functions.
4. **Ammo acids:** Definition Classification, important properties and their nutritional significance
5. **Lipids:** Definition, Classification, important common saturated and unsaturated fatty acids found in fats and oils and structural formula of the following fatty acids:
   (I) Saturated fatty acids – Butyric , caproic, palmitic and stearic acid.
   (II) Unsaturated fatty acids – oleic, linolenic, erucic acid.
6. **Enzyme:** Definition , nomenclature and function and factors affecting of enzyme activity.
7. **Vitamins:** Definition Classification and their sources, biochemical functions and structural formula of vitamin A, D, E, K, Thiamine, Riboflavin and Nicotinic acid.
8. General idea about the nucleic acid.
9. **Alkaloids**: Definition, classification, general properties and their biological significance, Structural formula of Conine, Nicotine and Piperine.

Practical

1. Qualitative test of important sugars, proteins in plants.
2. Estimation of reducing and non reducing in sugar cane juice and jaggery.
3. Quantitative determination of protein in pulses and fats and oils in oil seeds.
4. Estimation of Ca as Cao and $CaCO_3$ in plant HCl extract.

Course-

Semester- II IRRIGATION AND WATER MANAGEMENT 2+1=3

1. Importance of water in crop production.
2. Soil Moisture constants.
3. Estimation of potential evapo-transpiration and consumptive use
4. Water requirement of crops and factors affecting it.
5. Approaches of irrigation scheduling.
6. Systems and methods of irrigation – drip, sprinkler and mist Irrigation.
7. Quantity and quality of irrigation.
8. Measurement of irrigation water.
9. Elementary idea of drainage on farms.

Practical

1. Measurement of irrigation water.
2. Determination of soil moisture contents.
3. Calculation on consumptive use of water.
4. Numerical exercises on drainage and irrigation requirement.
5. Calculation of irrigation water use efficiency.
6. Visit to irrigation and drainage projects.
7. Preparation of practical record.

Course-

Semester- II **EXTENSION EDUCATION AND RURAL DEVELOPMENT** **2+1=3**

1. Extension Education:

a. Meaning, Definition, Objectives, Principles, Scope, Philosophy and its distinguishing features.

b. Extension Teaching and Learning: Teaching, Teaching Elements, steps in Teaching and Learning, Learning Situation, Basic Principles of Teaching and Learning.

c. Early Extension Efforts in India.

d. Comparative study of Extension Service in India and USA.

2. Community Development:

a. Meaning, Definition and objectives of community development.

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

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

3. Extension Programme Planning, Monitoring and Evaluation:

a. Meaning, Principles and Procedure of Programme Planning.

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

c. Role of extension agent in programme planning

Practical

1. Practice in Conducting Survey
2. Practice in preparing schedule and Questionnaire for studying the organizational set up of community development.
3. Contact with the farmers and educating them in new technology of Agriculture.
4. Preparation of an outline and practice on evaluation of a programme.
5. Classification, Tabulation and diagrammatic representation of data.
6. Writing study Reports.
7. Preparation of practical record.

Course-

Semester- II **ELEMENTARY CROP PHYSIOLOGY** **2+1=3**

1. Role of plant physiology in agriculture.
2. Cell structure and function.
3. Plant tissues.
4. Physio-chemical phenomenon-diffusion, osmosis and imbibition.
5. Essential nutrient elements, their role, deficiency symptoms, mineral salt, absorption.
6. Photosynthesis - light and dark reactions.
7. Mechanism of respiration, transpiration
8. Ecological adaptation of plants.
9. Plant growth substances, photoperiodism and vernalization.

Practical

1. Experiments on diffusion, osmosis and imbibition.
2. Experiments on factors affecting rate of photosynthesis (CO_2, light and temperature).
3. Preparation of practical record.

Course-

Semester- II **ELEMENTARY MICROBIOLOGY** **2+1=3**

1. Definition, scope and importance of microbiology.
2. Characteristics of Prokaryotic and Eukaryotic.
3. The type and classification of microorganism with particular references to bacteria, fungi and virus.
4. General structure of bacteria and fungi.
5. Shape, size, locomotion, reproduction, growth, nutrition and morphology of bacteria and fungi.
6. Factors affecting of growth of microorganism.
7. Koch's postulates.
8. Microbiological laboratory techniques – microscopy, sterilization, isolation, identification and enumeration.
9. Simple and Gram's staining techniques of bacteria.
10. Characteristics of Gram's positive and negative bacteria.
11. General structure of bacteriophage and replication.

Practical

1. Study of microscope and microscopic techniques.
2. Simple and Gram's staining of bacteria.
3. Preparation of nutrient broth, Czapek-Dox and Richard's media.
4. Enumeration and measurement of bacteria and fungi.
5. Practical record.

Course-

Semester- II **INTRODUCTORY ENTOMOLOGY** **2+1=3**

1. 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.
2. Anatomy: Digestive, Excretory, Reproductive, Circulatory, Respiratory and Nervous systems of grasshopper.
3. Sense organs: Structure and functions of ocelli, compound eye, tympanum and Johnston's organ.
4. Post-embryonic development including ecdysis, instars, types of larvae and pupae. Different types of metamorphosis.
5. General introduction to Phylum Arthropoda, its various classes and their distinguishing characters with particular reference to class Insecta.
6. Taxonomy: Insect classification upto the level of families of agricultural importance of following orders:

i)	Orthoptera	:	Acrididae.
ii)	Isoptera	:	Termitidae.
iii)	Hemiptera	:	Coreidae, Pyrrhocoridae, Lophopidae, Aleurodidae, Jassidae, Aphidae, Coccidae, Lacciferidae.
iv)	Coleoptera	:	Dermestidae, Coccinellidae, Bruchidae, Chrysomelidae, Curculionidae, Tenebrionidae, Scarabaeidae.
v)	Lepidoptera	:	Gelechiidae, Pyralidae, Noctuidae, Cymbidae, Papilionidae, Arctiidae and Bombycidae.
vi)	Hymenoptera	:	Tenthredinidae and Apidae.
vii)	Diptera	:	Trypetidae (=Tephritidae), Cecidomyidae and Agromyzidae.

Practical:

1. Dissection of grasshopper for the study of digestive, reproductive and nervous system.
2. Study and temporary mounting of external parts of grasshopper.
3. Identification and comments upon the various arthropods.
4. Collection and preservation of insects.
5. Practical record.

Course-

Semester- II **COMPUTER AND ITS APPLICATION IN AGRICULTURE** **2+1=3**

Introduction to computer. A brief history of computing. Data Processing and information. Characteristics of the computer, function, capability and limitations, strength and weakness of computers.
Generation of computers, First, Second, Third, Fourth and Fifth generation computer with their features only.
Types of computer, Digital, Analog and Hybrid computers.
Classification of computers on size and capabilities of Micro-, Mini-, Mainframe and Super computer.
Anatomy and components of computer, computer organisation CPU, ALU, Input and output devices, peripheral devices, storage units hard disk, compact disk, various types of memories, RAM, ROM, PROM and EPROM.
Number systems, Decimal, Binary, Octal, Hexadecimal, Character codes, ASCH, EBCDIC, BCD.
Types of softwares, System softwares and Application softwares. Introduction to DOS, (disk Operating System), Fundamentals of DOS commands, Internal commands, external command, files and directory, Editor.
Elementary Idea of BASIC (Computer Language).

Practical

Practice of Application software Ms Word, Excel, Simple programming exercise in BASIC for elementary statistics.

Semester III

Course-

Semester III **FIELD CROPS I** **2+1=3**

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, Bajra.
C. Oil seed crops : Groundnut, Til, castor.
D. Pulses Crops : Pigeon Pea, Urdbean, Moongbean, Soybean, Cowpea.
E. Fibre Crops : Cotton, Jute, Sunnhemp.
F. Green Manure crops : Sun hemp and Dhaincha.
G. Fodder Crops : Chari, Napier, Sudan grass, Cluster bean, cowpea.

Practical

1. Identification of crop-seeds, crops associated weeds.
2. Practical knowledge of operations from sowing to harvesting of kharif crops included in theory course.
3. Judging of maturity and estimation of yields.
4. Study of crop production techniques at different farms.
5. Calculation of seed and fertilizer requirement of crops.
6. Preparation of seed beds of important crops.
7. Visit to farms of Universities and Institutes.
8. Preparation of practical record.

Course-

Semester- III **PRINCIPLES OF PLANT BREEDING** **2+1=3**

1. Plant Breeding - history, objectives and scope.
2. Mode of reproduction in crop plants in relation to breeding techniques.
3. Plant variation kind and causes.
4. Genetic consequences of self and cross pollinated crops.
5. Plant Introduction and exploration.
6. Breeding self pollinated crops, population's improvement, Mass selection, recurrent selection. Breeding cross pollinated crops mass selection, pedigree, bulk and back cross methods.
7. Male sterility and its importance.
8. Breeding of asexually propagated crops, Clonal selection and apomixes.
9. Polyploidy and mutation breeding.

Practical

1. Technique of emasculation and artificial pollination in important crops.
2. Practical record.
3. Preparation of practical record.

Course-

Semester- III VEGETABLE CROPS PRODUCTION 2+1=3

1. Importance and scope of vegetable production.
2. Classification of vegetables.
3. Types of vegetable gardens.
4. Cultivation and seed production of major vegetables like Potato, Brinjal, chillies, tomato, Cauliflower, Cabbage, knol khol, Onion, gourds, Musk melon, Watermelon, Okra, Radish, Carrot and Pea.

Practical

1. Nursery raising of vegetable crops.
2. Production of seeds in vegetable available at the time of course.
3. Cost of cultivation studies in Potato, Tomato, Cauliflower and Okra.
4. Production oriented training in cultivation of vegetable crops.
5. Layout of kitchen garden.
6. Preparation of practical record.

Course-

Semester- III **PRINCIPLES AND METHODS OF SOIL AND WATER CONSERVATION** **2+1=3**

1. Definition, importance and history of soil conservation in agriculture.
2. Physical properties of soil and their determination.
3. Definition of Soil survey and land use capability classification.
4. Measurement of distance, direction and elevation of survey.
5. Definition, types, mechanism and causes of erosion. Factors affecting soil erosion. Agronomical practices for soil and water conservation. Engineering practices such as bunding, terracing, temporary and permanent structures for gully control. Grassed waterways, water harvesting, shifting cultivation.
6. Definition, objectives and uses of Remote Sensing.

Practical

1. Familiarization with chain survey equipments and its survey.
2. Familiarization to prizmatic compass (P.C.) and calculation of included angles. Calculation of included angles.
3. Study and adjustment of Dumpy level (D.L.).
4. Construction and design of bunds with calculation of earth work.
5. Calculation of infiltration rate and bulk density
6. Visit to soil conservational research centres.
7. Preparation of practical record.

Course-

Semester- III **FARM POWER AND MACHINERY** **2+1=3**

1. Farm structures farm site, food grain storage structure, Building materials for farm house, dairy building and poultry housing.
2. Elementary knowledge about the engineering terminology and calculations on piston displacement, compression ratio, HP and efficiencies of engines. Construction and working of four stroke and two stroke cycle I.C. engines, common engine troubles, causes and their remedies.
3. Classification of tractors, Elementary knowledge about main components of tractor and their functions such as steering, clutches, transmission gears, differential and final drive, brakes, belt, pulley PTO, shaft and hydraulic lift. Methods of starting and stopping of tractors. General care and maintenance.
4. Study of simple parts, operation and installation of an electric motor (Induction type only), calculation of HP units consumed. Role of switches, fuses and starter.
5. Study of construction, working principles, troubles and adjustments of the following machines: M.B. Plough, Disc plough, Disc harrow, cultivator, secondary tillage equipments, seed drill and planter, reaper and mower, threshers, combine, sprayers and dusters. Calculation of area covered, power requirement and efficiency of above machines. Calibration of seed drill.

Practical:

1. Preparation of layout for farm houses, dairy barn and poultry housing.
2. Study of construction of four stroke and two stroke cycle I.C. engines operating and running of diesel engines.
3. Study of tractor's transmission systems and tractor driving practice.
4. Study of M.B. Plough.
5. Study of Disc Plough.
6. Study of seed drill and planter and its calibration.
7. Study of power thresher.
8. Visit to places of engineering interest.
9. Identification of different work shop tools, farm machines and engine parts.
10. Preparation of practical record.

Course-

Semester- III **AGRICULTURAL MARKETING AND COOPERATION** **2+1=3**

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 and 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.

Course-

Semester- III **INTRODUCTORY PLANT PATHOLOGY** **2+1=3**

1. Definition and importance of plant pathology.
2. Causes of plant diseases.
3. Classification of plant diseases according to cause and occurrence.
4. Plant Pathogens:

(a) Fungi

(i) Economic importance and general characteristics.
(ii) Morphology of different vegetative structures (thallus, mycelium, haustoria, etc.)
(iii) Reproduction.
(iv) Different types of spores.
(v) Levels of parasitism.
(vi) Nomenclature.
(vii) Classification of fungi with special reference to genera listed under following item:-

- Life histories of Pythium, Albugo. Erysiphe, Ustilago, Claviceps and Puccinia.
- Diagnositic characters of the following genera: *Phytophthora, Peronospora, Sclerospora, Ustilago, Sphacelotheca, Tolyposporium,Melampsora, Alternaria,Cercospora, Fusarium, Helminthosporium, Pyricularia, Rhizoctonia* and *Colletotrichum*.

(b) Bacteria:

(i) Brief history of bacteria as plant pathogens.
(ii) Morphology and Cell structure.
(iii) Vegetative reproduction.
(iv) Classification of plant pathogenic bacteria.
(v) A brief account of mycoplasma.

(c) Viruses

(i) Brief history.
(ii) Nature and properties.
(iii) Transmission of plant virus.

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

Practical

1. Temporary slide preparation of representative genera of disease causing fungi for morphological studies.
2. Simple staining of bacteria from.
3. Preparation of PDA and nutrient agar.
4. Preparation of practical record.

Semester IV

Course- I

Semester- IV **FIELD CROPS II** **2+1=3**

Importance, origin, distribution, climate, improved varieties, agronomic practices manuring and irrigation, plant protection, harvesting and processing of the following crops under various agro-climatic 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, Rajmah.
D. Fodder Crops : Oat, Berseem Lucerne
E. Cash Crops : Potato, Mentha, sugarcane and tobacco.

Practical

1. Identification of crop seeds, crops associated weeds.
2. Practical knowledge of operations from sowing to harvesting of crops included in theory course.
3. Judging the maturity and estimation of yields.
4. Calculation of seed and fertilizer requirement of crops.
5. Preparation of seed bed of important crops.
6. Visit to farms of universities and institutions.
7. Preparation of practical record.

Course- II

Semester- IV **BREEDING OF FIELD CROPS** **2+1=3**

1. Origin, distribution and objectives.
2. Breeding problems, systematic description and economic importance.
3. 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 of above mentioned crops.
3. Significant research advances made in above mentioned crops.
4. Preparation of practical record.

Course-

Semester- IV **FRUITS AND PLANTATION CROPS PRODUCTION** **2+1=3**

1. Importance, scope and present position of fruit and plantation corps in India,
2. Practices involved in the production of fruits: Mango, Guava, Kagzi lime, Banana, Grape, Litchi, Papaya, Loquat, Aonla, Ber, Jack Fruit, Apple and Peach.
3. Production techniques of plantation crops: Coconut, Cashew nut, Tea Coffee and coca.

Practical

1. Identification of fruits and plantation crops.
2. Orchard layout and planting.
3. Practice of different propagation methods with special reference to fruits.
4. Practice of training and pruning of fruit plants.
5. Plant protection practices.
6. Visit to orchards, nurseries and research centres of fruits and plantation crops.
7. Preparation of practical record.

Course-

Semester- IV **PRINCIPLES AND METHODS OF INSECT PEST MANAGEMENT** **2+1=3**

1. Pest, its definition, classification and reasons of pest outbreak.
2. Methods of insect control including mechanical, physical, cultural, biological, legal, genetic, ecological and chemical.
3. Insecticides: Classification and detailed study of important insecticides of plant and animal origin and synthetic chemicals.
4. Novel insecticides including Insect Growth Regulators and pheromone. Repellents, antifeedants, attractants, chemo-sterilants.
5. Preliminary knowledge of hazards related to pesticide use, MRL, ADI, Mammalian Safety Ratio.
6. Basic concept of Integrated Pest Management, decision making levels, survey and surveillance and sampling methods.
7. Elementary knowledge of plant protection equipments and pesticide application techniques.
8. Plant protection organizations at the state, national and international level.

Practical:

1. Collection and preservation of established predators and parasitoids.
2. Dilution and application of insecticides, study of label, leaflet and colour code associated with insecticide containers.
3. Handling of plant protection equipments.
4. Practical record.

Course-

Semester- IV **2+1=3**

LIVESTOCK PRODUCTION AND MANAGEMENT (INCLUDING POULTRY)

General:-Importance of farm's livestock and poultry in agriculture and Indian economy. Relationships of plants with animal husbandry. Farm's livestock biodiversity (important Species & Breeds) in India and their physical characteristics. Livestock farming systems in India. Management skills- animals, land, labour and business.

Cattle and buffalo production:- Reproduction and breeding management :- Aims and objectives, male and female reproductive system, reproduction under hormonal control and development of sperm & ova. Infertility problems-causes and their possible solution. Methods and systems of livestock reproduction & breeding. Care and management of down calvers, milch cows, calves & heifers and stud bulls. Maintenance of different livestock records. Housing requirement for dairy animals.

Sheep, Goat, Pig and Poultry Production:- General aspects of reproduction, breeding, feeding and care & management in brief.

Practical :-

1. Judging of dairy cattle and buffalo.
2. Demonstration of A.I. technique.
3. Demonstration of external body parts.
4. Demonstration of castration, dehorning and farms animal's marking for identification.
5. Use of common appliances in controlling farms animals.
6. Estimation and calculation of cost of production.
7. Estimation of weight and age of livestock.
8. Preparation of practical record.

Course-

Semester- IV **2+1=3**

HEALTH AND DISEASE MANAGEMENT OF LIVESTOCK (Including Poultry)

Meaning of health and disease, classification of diseases. Pathogenesis and immune system. The antigens, antibiotics, antiseptics, disinfectants, and their role in disease control. The principles of spread and control of infectious diseases, knowledge of various technical terms are used when discussing infectious diseases.

Elementary knowledge of prevention and control of following common diseases of livestock and poultry :-

Bovine anthrax, black quarter, hemorrhagic septicaemia, Brucellosis, mastitis, foot and mouth disease, Johne's disease and disease of new born calf, worm infestation, milk fever and some other metabolic disorder. Enterotoxaemia in sheep and goat. swine fever and hog cholera in pig. Ranikhet, avian pox, Marek's disease, Gambaro disease, chronic respiratory disease, infectious coryza and fowl cholera in poultry.

Practical:-

1. Recording of body temperature, respiration rate and pulse rate.
2. Specimen collection of blood, faeces, urine, pus, milk and body tissues for diagnostic laboratory use.
3. Common diagnostic qualitative tests- Mastitis, Benedict's test.
4. Useful disinfectant of livestock and poultry farms.
5. Identification of common medicines in used.

Course-

Semester- IV **SILVICLTURE AND AGRO –SOCIAL FORESTRY** **2+1=3**

(A) Silviculture:

1. Definition and scope of silviculture and forestry, its scope and classification.
2. Role of forests - geographic, productive and bio-aesthetical.
3. Elementary idea of forest types.
4. Regeneration of forests.
   (a) Natural seed production, seed dispersal, germination and seedling establishment.
   (b) Artificial Afforestation, reforestation and their objectives. Choice of tree species, nursery techniques.

(B) Agro-forestry and Social Forestry

1. Definition, concept and need of agro- and Social Forestry.
2. Classification of agro-forestry and Social Forestry systems.
3. Prominent agro- and Social forestry system prevailing in Uttar Pradesh.
4. Limitations of agro- and Social forestry. Choice of tree species for agro- and Social forestry for fuel, fodder and timber requirement.
5. Cultivation and shelter 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.
5. Preparation of practical record.

Semester V

Course-

Semester- V **WEEDS AND WEED MANAGEMENT** **2+1=3**

(A) Definition, classification and general characteristics of weeds, Advantages and disadvantages of weeds.
(B) Principles and methods of weed control.
(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. Sedges grass, Kans, Baisuri, Satyanasi, Parthenium, *Phalaris minor*, Hirankhuri and Pyaji.

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.
4. Preparation of practical record.

Course-

Semester- V INTRODUCTORY PLANT BIOTECHNOLOGY 2+1= 3

1. Definition scope and importance of plant biotechnology.
2. Outlines of basic steps involved in plant biotechnology / genetic engineering such as:
   (a) Isolation of plant DNA and vector DNA
   (b) Restriction of DNA by endonucleases.
   (c) Electrophoresis of restricted DNA fragments.
3. Cloning vectors for recombinant DNA such as-
   (a) Ti-plasmid vector for higher plants.
   (b) Plant viruses such as cauliflower mosaic virus (CaMV), tobacco mosaic virus (TMV) and gemineae virus as vectors.
4. Applications of plant genetic engineering in crop improvement.
5. Plant tissue culture:
   (a) Culture media used in plant tissue culture.
   (b) Somaclonal and gametoclonal variation in plants.
   (c) Micro - propagation of plants.
   (d) Application of plant tissue culture in crop improvement.

Practical

1. Elementary knowledge of instruments used in Plant Biotechnology.
2. Media Preparation for Tissue culture, Ovary culture, Anther culture, Ovule culture.
3. Isolation of DNA.
4. Preparation of practical record.

Course-

Semester- V **PRODUCTION TECHNOLOGY OF SPICES, MEDICINAL AND AROMIATIC PLANTS** **2+1=3**

1. Importance and scope of medicinal, aromatic plants and spices.
2. Cultivation of Mentha, Citronella, Khus, Ocimum, Rauvolifia and Dioscoria.
3. Cultivation of Turmeric, Zinger, Coriander, Cumin and Saunf in the North Indian conditions.

Practical

1. Identification of medicinal and aromatic plants.
2. Calculation of 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 crops.

Course

Semester- V **DAIRY CHEMISTRY AND ANIMAL NUTRITION** **2+1=3**

Dairy Chemistry:- The milk and its synthesis in mammary glands. Chemical composition of milk of different species and colostrum. Details composition and physio-chemical properties of cow and buffalo's milk. Factors affecting quantity and chemical composition of milk. Chemistry of milk constituents viz. lactose, fat, protein, enzymes and vitamins. Preservatives and adulterants of milk. Chemical changes occurring during storage of milk. Synthetic milk. **Animal Nutrition**:- The composition and comparison of plants and animal body. Ruminant's digestive system. Water, carbohydrates, protein, lipid, mineral and vitamins in animal nutrition. Feed additives. Classification of common feeds and fodders. Feed quality and animal output relationships. Evaluation of energy and protein value of feed. Processing methods of animal feed stuffs. Various feed processing methods for improving nutritive value of inferior quality roughages. Harmful natural constituents and toxic substances in animal feeds. Conservation of fodders. Scientific livestock feeding practices.

Practical:-

1. Sampling of milk and its analysis for its composition & acidity.
2. Detection of preservatives and adulterants in milk.
3. Demonstration of proximate analysis of feed and fodders sample.
4. Ration formulation and mixing for different class of livestock and poultry.
5. Identification of common feed stuffs.
6. Demonstration of "urea-minerals-molasses-block" preparation.

Course-

Semester- V **SOIL FERTILITY AND NUTRIENT MANAGEMENT** **2+1=3**

1. Soil fertility: Definition concept, and factors influencing soil fertility.
2. Essential plant nutrient Criteria of essentiality, forms of nutrients in soil, functions, deficiency Symptoms, Critical levels of deficiency and toxicity.
3. Mechanism of nutrient transport to plants and factors influencing nutrient availability to plants.
4. Mineralization and immobilization of Nitrogen, fixation and availability of N, P and K.
5. Soil fertility evaluation, soil and plant analysis, tissue tests.
6. Soil testing: Soil test in crop response and correlation, fertilizer recommendation based on soil test.
7. Fertilizers - definition, classification, characteristics, reactions of fertilizer in soil and fertilizers use efficiency.
8. Organic manures: Preparation, properties and use in crop production, nutrient enriched compost, vermi-compost and green manure.
9. Integrated nutrient management – problems and prospects.
10. Concepts of INM and management of soil productivity.

Practical

1. Analysis of N. P. and K in fertilizers.
2. Determination of available of NPK and S in soil.
3. Elementary idea of determination of micronutrients in soil.

Course -

Semester- V **ECONOMIC ENTOMOLOGY** **2+1=3**

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	*Scripophaga incertulus*, *Leptocorisa varicornis*, *Hieroglyphus* spp, *Nilaparvata lugens*, *Nephotettix* spp, *Mythimna separata*.
Jowar/Maize	*Chilo partellus*, *Atherigona varia soccata.*
Sugarcane	*Tryporyza nivella*, *Emmalocera depresella*, *Pyrilla perpusilla*, *Aleurolobus barodensis*.
Cotton	*Pectinophora gossypiella*, *Earias* spp, *Sylepta derogata*, *Dysdercus* spp, *Bemisia tabaci*, *Amrasca biguttula biguttula*.
Oilseeds	*Lipaphis erysimi*, *Athalia lugens proxima*, *Bagrada cruciferarum*, *Dasyneura lini.*
Pulses	*Helicoverpa armigera*, *Agrotis* spp, *Etiella zinckenella*, *Melanagromyza obtusa*, *Lampides boeticus, Phytomyza atricornis.*
Pests of fruit crops	*Drosicha mangiferae*, *Idioscopus* spp, *Papilio demolius*, *Diaphorina citri*, *Phyllocnistis citrella*, *Otheris* spp, *Virachola Isocrates*, *Eriosoma lanigerum*, *Quadraspidiotus perniciosus*, *Bactrocera diversa*, *Carpomyia vesuviana*, *Icerya* spp., *Pentalonia nigronervosa*, *Odoiporus longcollis*, *Cosmopolites sordidus*.
Pests of vegetable crops	*Leucinodes orbonalis*, *Epilachna vigintioctopunctata*, *Raphidopalpa foveicollis*, *Bactrocera cucurbitae*, *Plutella xyllostella*, *Pthorimea operculella, Hellula undalis.*
Pests of stored grain	*Sitotroga cerealella, Cadra* (=*Ephestia*) *cautella, Corcyra cephalonica, Sitophilus oryzae*, *Oryzephilus surinamensis, Trogoderma granarium*, *Tribolium castaneum*, *Callosobruchus chinensis.*
Polyphagous pests	*Odontotermes obesus*, *Schistocerca gregaria*, *Holotrichia* spp, *Spilarctia obliqua*, *Spodoptera litura*, *Amsacta* spp.

3. Elementary knowledge of Apiculture, Sericulture and Lac culture.

Practical

1. Collection, mounting and preservation of insect pests of different crops at different stages.
2. Field and laboratory acquaintance with insect pests, various life stages and damaged material.
3. Technical knowledge of honey, silk and lac production.
4. Field application of insecticidal formulations.
5. Practical record.

Course-

Semester- V CROP DISEASES AND THEIR MANAGEMENT 2 + 1= 3

1. General Symptoms of plant diseases.
2. Methods of plant disease management.
3. Preliminary knowledge of different groups of fungicides.
4. Study of the symptoms, etiology, mode of perpetuation and management of the following diseases:
   (a) Early and late blight of potato.
   (b) White rust of crucifers.
   (c) Green ear disease of bajra.
   (d) Powdery mildew, Loose smut, Karnal bunt and rusts of wheat.
   (e) Covered smut of barley.
   (f) Grain smut of Jowar
   (g) Bajra smut
   (h) Rust of linseed
   (i) Tikka disease of groundnut
   (j) Wilt of arhar
   (k) Stripe disease of barley
   (l) Red rot of sugarcane
   (m) Blast of rice.
   (n) Citrus canker
   (o) Khaira disease of paddy and Black tip of mango.
   (p) Tobacco mosaic
   (q) Yellow vein mosaic of bhindi
   (r) Bean common mosaic
   (s) Little leaf of brinjal

Practical

1. Diagnosis of important diseases by studying symptoms.
2. Microscopic examination of diseased parts.
3. Preparation of Bordeaux mixture.
4. Identification of some important fungicides.
5. Practical record.

Semester VI

Course-

Semester- VI **FARMING SYSTEMS AND SUSTAINBLE AGRICULTURE** **2+1=3**

1. Farming systems - Definition, types and methods of farming.
2. Definition, scope and advantage 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.

Practical

1. Prepare important rotations for sustainable agriculture.
2. Fertilizer and irrigation management for sustainable agriculture.
3. Preparation of different models of farming systems.
4. Preparation of cropping scheme under different Agro-climatic conditions of U.P
5. Preparation of practical record.

Course-

Semester VI **PRINCIPLES OF SEED TECHNOLOGY** **2+1=3**

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, maize, sorghum and bajra.
   (ii) Pulses - chickpea, pigeon pea, field pea, and lentil
   (iii) Oil Seeds - rape seed, mustard, groundnut, sesamum, and soyabean.
   (iv) Commercial crops - sugarcane and jute.
5. Factors affecting seed longevity and quality.
6. Causes of seed deterioration with reference to genetic and storage.
7. Seed testing- 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. Analysis of purity, moisture and germination of seed samples and communication of results.
4. Viability and vigour test.
5. Practical record.

Course-

Semester VI **ORNAMENTAL HORTICULTURE AND LAND SCAPE GARDENING** **2+1=3**

1. Importance and scope of ornamental horticulture in India.
2. Cultivation of annuals.
3. Commercial cultivation of rose, canna, *Chrysanthemum*, marigold and *Gladiolus*.
4. Making and maintenance of Lawn.
5. Making and maintenance of Hedge and edging.
6. Elementary knowledge of common shrubs, climbers and trees and their various uses.
7. Indoor gardening.
8. Styles of gardens with special reference to Mughal and Japanese gardens.
9. Flower arrangement and techniques to prolong vase life of flowers.

Practical:

1. Identification of ornamental plants.
2. Preparation of herbaceous and shrubbery borders.
3. Practice of making garlands.
4. Bouquet and arrangements in vases.
5. Propagation of Ornamental plants.
6. Practice of potting and re-potting of plants.
7. Visit to ornamental gardens and research station.

Course-

Semester VI AGRICULTURAL FINANCE AND BUSINESS MANAGEMENT 2+1=3

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, 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 well as 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 account(s).
   Knowledge of business environment for operation of bank account cheques, bank draft etc.

Practical

1. Factors governing use of capital and identification of credit needs, Time value of money.
2. Compounding and discounting, Tools of financial management, Balance sheet, Income statement and cash flow analysis.

3. Estimations of credit needs and determining unit costs, preparations and analysis of loan proposals, rules of repayment of loans.
4. Study of financial Institutions:- PACS, DCCB, Apex Banks, RRBS, CBS, NABARD.
5. Preparation of practical record.

Course -

Semester VI **MILK PROCESSING** **2+1=3**

Milk - composition and properties of their constituents. Market milk definition, standards of different milks in India, nutritive value of milk and their role in human nutrition, milk and public health, clean and safe milk production. Buying, collection, transportation and storage methods of milk. Basis of milk price determination. Bacteriology and deterioration of milk. Quality assurance procedures. Processing of milk for filtration, clarification, bactofugation, standardization, homogenization, cream separation-centrifugation. Various methods of milk preservation viz.- heating & cooling treatments and other alternative methods. Membrane filtration process of milk. Basic principles of cleaning & sanitization of dairy equipment and packaging of liquid milk.

PRACTICAL:-

1. Sampling of milk from field for laboratory analysis.
2. Analysis of milk for total solids, solid not fat, fat, Ash, specific gravity and acidity.
3. Assessment of quality of milk by various plate forms tests.
4. Quantitative estimation of bacteria in raw milk by Direct Microscopic Count.
5. Dairy arithmetical calculation.
6. Preparation of practical record.

Course -

Semester VI POST HARVEST AGRICULTURAL ENGINEERING 2+1=3

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 food grains and seeds.
5. Bio-methanation 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.
6. Preparation of practical record.

Course-

Semester- VI **ELEMENTARY NEMATOLOGY AND MUSHROOM CULTIVATION** **2+1=3**

(a) Mushrooms:

1. Introduction, history and economic importance of mushroom.
2. Morphology of edible mushrooms and their classification.
3. Spawn and its preparation.
4. Methods of Cultivation of different types of edible mushrooms (button, oyster, straw, shiitake and black ear mushrooms).
5. Mushroom diseases and pests.
6. Mushroom recipes.

(b) Plant Nematodes:

1. General characters of plant parasitic nematodes.
2. Reproduction and classification.
3. Symptoms of nematode infection.
4. Methods of nematode control.

Practical

1. Production of spawn.
2. Cultivation of White button mushroom.
3. Cultivation of Paddy straw mushroom.
4. Cultivation of Oyster mushroom.
5. Isolation of nematodes from plant.
6. Preparation of practical record.

SEMESTER VII

Course-

Semester- VII **RAINFED AGRICULTURE AND WATER SHED MANAGEMENT** **2+1=3**

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

Practical

1. Preparation of crop rotations and cropping schemes for rainfed farming and dryland agriculture.
2. Determination of Soil Moisture constants.
3. Studies on moisture depletion pattern and rainfed farming.
4. Study of practical application of anti-transpirants.
5. Visit to Dry farming research stations.
6. Preparation of practical record.

Course -

Semester- VII **ENVIRONMENTAL SCIENCE AND AGRO-ECOLOGY** **2+1=3**

1. Ecology - definition, division and significance.
2. Environment - Environmental management and control of pollution. Environmental factors affecting plant growth as abiotic and biotic interaction.
3. Ecosystem - Major ecosystems, energy and its flow in ecosystems, biochemical cycles and nutrient cycles.
4. Plant community – classification, composition, and study of plant community structure.
5. Plant adaptation - ecological classification of plants and their morphological anatomical and physiological adaptations to adverse environments as hydrophytes, xerophytes, mesophytes, epiphytes and holophytes.
6. Ecological problems of major crops - cereals, millets, pulse and oilseeds.

Practical

1. To record temperature, relative humidity and light intensity values of the atmosphere.
2. To study the community by quadrat method by determining plant structure of different crops.
3. To study the guttation of the given area by a phylogenetic method, biological spectrum method.
4. To record abiotic components – pH, temperature, light intensity, turbidity in pond ecosystem.

Course-

Semester- VII **MANAGEMENT OF WASTE LAND AND PROBLEMATIC SOIL** **2+1=3**

Management of Problematic 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 problematic soil.
2. Determination of specific gravity, bulk density, pore space, soil texture.
3. Visit to Areas of problematic soil.

Course-

Semester- VII **POST HARVEST MANAGEMENT AND PRESERVATION OF FRUITS AND VEGETABLES** **1+2=3**

1. Importance and scope of post harvest management of fruits and vegetables.
2. Post harvest deterioration of fruits and vegetables.
3. Techniques of prolonging the life of fruits and vegetables.
4. Handling, grading and packing of fruits and vegetables.
5. Causes of Spoilage of Fruits and Vegetables.
6. Principles and methods of fruits and vegetables preservation.
7. Canning of pea.
8. Dehydration of fruits and vegetables.
9. Tomato products - jam, jelly and squash.
10. Preservation of Aonla and Bael.
11. Pickles of mango, citrus, chillies and mixed vegetables.

Practical

1. Practical knowledge of harvesting, handling, grading, pre-cooling, waxing and use of chemicals to prolong the post harvest life of fruits and vegetables.
2. Visit to storage and centres carrying improved practices of post harvest handling.
3. Bottling of green pea.
4. Dehydration of seasonal fruits and vegetables.
5. Preparation of Apple jam, Guava and Karonda jellies, preparation of Lime and Orange squashes, Aonla and Beal preserve, tomato Juice and ketchup.

Course-

Semester- VII COMMUNICATION AND EXTENSION SYSTEM 2+1=3

1. COMMUNICATION

(a) 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.

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

2. ADOPTION AND DIFFUSION OF AGRICULTURAL INNOVATION

(a) Meaning and definition of innovation, diffusion, adoption, diffusion effect and rate of adoption, Factors affecting adoption, Difference between diffusion and communication.

Innovation decision process, categories of adopters, characteristics of innovations.

3. EXTENSION SYSTEM IN INDIA

(a) First line extension system – ICAR and its role in technology transfer.

(b) Technology Transfer – Meaning and concept.

(c) Brief knowledge about KVK, NATP, NAIP, ATMA AND Agri-clinic.

(d) Other extension service providers and their role (including Public and Private Sectors).

Practical

1. Preparation, procurement and handling of audio-visual aids.
2- Acquaintance with new generation aids like cell phone, Lap top & Digital Camera.
3. Organizing group discussion, campaign, seminar, exhibition and demonstration.
4. Practices in writing news letter, circular letter, radio and television scripts on different farm practices.
5. Identification of adopter categories among farmers.
6. Collection of data regarding rate of adoption for the adoption of different farm practices in different years.
7. Preparation of practical record.

Course-

Semester VII **2+1=3**

NON-INSECT PESTS, PESTS OF FARM ANIMALS AND PLANT DISEASE VECTORS

General account of non-insect pests: Mammals, Birds, Reptiles and Molluscs and their management.

Classification, morphology, distribution, nature of damage and management of important mites under families : Tetranychidae, Tarsonemidae, Tenuipalpidae and Eriophyidae.

Economic importance of rodents and their classification. Common rodents found in India. Habits, behaviour and rodent management.

Insect vectors transmitting plant diseases: Classification and diseases transmitted by important insect vectors. Process of disease transmission.

Management of insect vectors.

Important insect and mite pests of farm animals. Classification, distribution, life history, pathogenesis and management of : Bird lice, sucking lice, blackfly, horsefly, stablefly, tsetse fly, myiasis flies, bot fly, louse fly, red chicken mite, chigger mite, mange and scab mite, scaly leg mites of poultry, fowl tick and cattle tick.

Practical:

1. Identification of different specimens of rodents and other mammals, molluscs, mites and damaged materials.
2. Identification and description of damaged material associated with nematodes and mites, and plant disease vectors.
3. Identification and description of different types of rodent traps and rodenticides.
4. Identification and description of different specimens of pests of farm animals and diseased condition.
5. Practical record.

Course-

Semester VII **DAIRY PRODUCTS TECHNOLOGY** **2+1=3**

Definition, composition, nutritive value, legal standards and methods of manufacturing of **special milk**- sterilized milk, homogenized milk, flavored milk & drink, fermented milk-Acidophilus milk, yoghurt, standardized milk, reconstituted milk, recombined milk and toned milk. **Indigenous milk products**- paneer, chhana, ghee, khoa, dahi.
Other milk products- cream, butter, ice-cream, condensed milk, milk powder, cheese, dairy by products.

Practical:

1. Demonstration of centrifugal cream separation.
2. Demonstration of preparation of flavored milk, paneer, chhana, ghee, khoa, dahi and ice-cream in laboratory.
3. Dairy arithmetic related to milk products.
4. Assessment of cost of preparation of different milk products.
5. Visit of a milk processing plants.
6. Preparation of practical record.

SEMESTER VIII

RURAL AGRICULTURAL WORK EXPERIENCE (RAWE)

Sl. No.	Department	Credit Hours	Title of the course
1.	AGRONOMY	0 + 1 = 1	1. **Rural Awareness Work Experience (RAWE):** Focussed on student's problem solving ability and acquisition of skills for entrepreneurship and self employment. 2. **Voluntary Educational Tour Programme** Students under the supervision of Head of the Institution.
2.	GENETICS AND PLANT BREEDING	0 + 1 = 1	
3.	HORTICULTURE	0 + 1 = 1	
4.	SOIL SCIENCE AND AGRICULTURAL CHEMISTRY	0 + 1 = 1	
5.	AGRICULTURAL ECONOMICS	0 + 1 = 1	
6.	SOIL AND WATER CONSERVATION	0 + 1 = 1	
7.	AGRICULTURAL ENGINEERING	0 + 1 = 1	
8.	ENTOMOLOGY	0 + 1 = 1	
9.	PLANT PATHOLOGY	0 + 1 = 1	
10.	ANIMNAL HUSBANDRY AND DAIRYING	0 + 1 = 1	
11.	AGRICULTURAL EXTENSION	0 + 1 = 1	
12.	AGRICULTURAL STATISTICS	0 + 1 = 1	