

**B.SC. AGRICULTURE (4 YEARS COURSES)
SEMESTER WISE DETAILED LAYOUT OF COURSES**

Semester – I						
S.NO.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Elementary Statistics	1+1	35	15	25	75
2.	Agriculture Meteorology	1+1	35	15	25	75
3.	Computer Application	1+1	35	15	25	75
4.	Str. & Spoken English	1+1	35	15	25	75
5.	Elementary Agri/Elementary/Biology/Elementary Mathematics (Only one depending on subjects in 10+2)	2+1	35	15	25	75
6.	Principles of Agronomy	2+1	35	15	25	75
7.	Rural Sociology & Educational Psychology	2+1	35	15	25	75
Total		10+7 = 17	245	105	175	525

**B.SC. AGRICULTURE (4 YEARS COURSES)
SEMESTER WISE DETAILED LAYOUT OF COURSES**

Semester – II						
S.NO.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Fundamentals of Soil Science	2+1	35	15	25	75
2.	Fundamentals of Horticulture	2+1	35	15	25	75
3.	Elementary Plant Biochemistry	2+1	35	15	25	75
4.	Weed Management	1+1	35	15	25	75
5.	Element of Genetics	2+1	35	15	25	75

6.	Introductory Entomology	2+1	35	15	25	75
7.	Introductory Plant Pathology	2+1	35	15	25	75
8.	Microbiology	1+1	35	15	25	75
Total		14+8 = 22	280	120	200	600

Semester – III						
S.NO.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Vegetable Production	2+1	35	15	25	75
2.	Irrigation Water Management	2+1	35	15	25	75
3.	Principles of Plant Breeding & Breeding of Field Crops	3+1	35	15	25	75
4.	Soil Fertility and Nutrient Management	2+1	35	15	25	75
5.	Agri. Marketing and International Trade	2+1	35	15	25	75
6.	Field Crops I (Kharif)	2+1	35	15	25	75
7.	Crop Diseases and their Management	2+1	35	15	25	75
Total		15+7 = 22	245	105	175	525

Semester – IV						
S.NO.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Economic Entomology	2+1	35	15	25	75
2.	Introduction to Plant Biotechnology	1+1	35	15	25	75
3.	Field Crops II (Rabi)	2+1	35	15	25	75
4.	Agriculture Co-operation, Finance and Busi. Mgt.	2+1	35	15	25	75
5.	Insect Pest and their Management	2+1	35	15	25	75
6.	Fruit and Plantation Crops	2+1	35	15	25	75
7.	Livestock Production	2+1	35	15	25	75
8.	Rainfed Agriculture	1+1	35	15	25	75
Total		14+8 = 22	280	120	200	600

Semester – V						
S.NO.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Poultry Management	2+1	35	15	25	75
2.	Mushroom Cultivation	1+1	35	15	25	75
3.	Elementary Crop Physiology	2+1	35	15	25	75
4.	Farm Machinery and Power	2+1	35	15	25	75
5.	Farm Mgt. and Natural Resource Economics	2+1	35	15	25	75
6.	Fundamentals of Extension Education and Rural Development	2+1	35	15	25	75
7.	Post Harvest Mgt. & Processing of Fruits and Vegetables	2+1	35	15	25	75
8.	Practical Crops Production – I	0+2	0	0	75	75
Total		13+9 = 22	245	105	250	600

Semester – VI						
S.NO.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Farming System and Sustainable Agriculture	2+1	35	15	25	75
2.	Conservation and Management of soil and water resources	1+1	35	15	25	75
3.	Oramental Horticulture	2+1	35	15	25	75
4.	Environmental Science	2+1	35	15	25	75
5.	Silviculture and Agro Forestry	2+1	35	15	25	75
6.	Seed Production and Processing Technology	2+1	35	15	25	75
7.	Practical Crops Production – II	0+2	0	0	75	75
Total		12+8 = 20	210	90	225	515

Semester – VII						
S.NO.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	General Economics	2+0	35	15	-	50
2.	Breeding and Improvement of Farm Animals	1+1	35	15	25	75
3.	Principles of Animal Nutrition	2+1	35	15	25	75
4.	Element of Food Technology	2+1	35	15	25	75
5.	Human Food and Nutrition	2+1	35	15	25	75
6.	Soil Taxonomy, Survey and remote sensing	2+1	35	15	25	75
7.	Production Technology of Medicinal and Agromatic Plants	0+2	35	15	25	75
Total		14+6 = 20	245	105	150	500

Semester – VIII						
	Rural Agriculture Work Experience	0+20	0	0	525	525
Total		0+20	0	0	525	525

Grand Total Credits

Theory **10+14+15+14+13+12+14+0** **= 92**

Practical **7+8+7+8+9+8+6+20** **= 73**

Total **= 165**

B.SC. AGRICULTURE SEMESTER – I

PAPER – I (ELEMENTARY STATISTICS)

Introduction to statistics, arithmetic mean, median, mode and partition values range, interquartile range, quartile deviation, mean deviation, variances, standard deviation, coefficient of variation, moments, skewness, Kurtosis and its measure; Definition of probability. Simple problems based on probability theory; Definition of correlation; Scatter diagram; Karl Pearson's coefficient of correlation; Linear regression equations; introduction to test of significance, one sample and two sample test for mean.

Practicals

Based on Graphical Representation of Data, measure of dispersion raw & central tendency, partition values, measure of dispersion raw & central moments, measure of skewness & kurtosis, correlation and regression analysis, application of one sample t-test and Fisher's 2 sample t-test.

B.SC. AGRICULTURE SEMESTER – I

PAPER – II (AGRICULTURE METEOROLOGY)

Earth atmosphere its composition, extent and structure; Atmospheric weather variables: Atmospheric pressure, its variation with height; Daily and seasonal variation of wind speed and direction. Cyclones and anticyclones, air masses and fronts; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave and thermal radiation, net radiation, albedo, atmospheric temperature – temperature inversion, daily and seasonal variation of temperature balance of earth; atmospheric humidity; concept of saturation, vapour process of condensation, formation of dew, fog, mist, frost, snow rain and hail: precipitation cloud formation and movement.

Agriculture and weather relations: Modification of crop microclimate, use of weather data for irrigation scheduling, pesticides sprays, fertilizer application, climatic normals for crop production.

Practicals

Agro-meteorological observatory-its site selection, installation and exposure of instruments, weather data recording. Measurement of total solar radiation, short wave and long wave radiation, albedo and sunshine duration, maximum and minimum air temperatures, soil temperature, dew point temperature. Determination of vapor pressure, relative humidity, atmospheric pressure, wind speed and wind direction. Measurement of rain, open pan evaporation and evapo-transpiration. Processing, tabulation and presentation of weather data.

B.SC. AGRICULTURE SEMESTER – I

PAPER – III (COMPUTER APPLICATION)

Introduction to personal computer, peripherals, operating systems (Dos & Windows) and high-level language- Interaction with software pack-ages (Lotus, Foxpro, Statistical, packages) and its execution for the following applications: Solution of simultaneous equations, plotting of graph and diagrams. Simple agricultural statistics computations. Database file; creation and Query.

Practicals

Demonstration of working of computer system, MS-DOS, MS Windows commands and utilities, writing sample software for agricultural problems, Basic programmes.

B.SC. AGRICULTURE SEMESTER – I

PAPER – IV (STRUCTURAL AND SPOKEN ENGLISH)

Structural patterns of communicative grammar; modern usages; functional language disorder and common structural errors in part of speech-noun, pronoun, verb, adjective, adverb, preposition, conjunction; articles; word-formation and vocabulary building-affixes, prefixes, suffixes, synonyms, antonyms, substitutions and foreign words; prepositions; phrases idioms; gerunds; participles; infinitives; time and tense; modal verbs, conditional parities; synthesis; transformation controlled writing; paragraph writing; study of modern technical prose; listening and reading skills; comprehension; phonetic and scientific systems of spoken English – speech mechanism; symbols and sounds; stress and intonation.

Practicals

Speech mechanism speech event, production of speech; speech organs; abonetic sounds and symbols-pure vowels; diphthongs; consonants (voiceless/voiced, accented/ unaccented, aspirated/unaspirate); stress and intonation word accent (syllable, consonant clusters), stress shift, compound words, word accent in Indian English Vs R sonant clusters); stress shift, compound words; word accent in Indian English VS RP; rules for accentual patterns, accent in connected speech rhythm; weak forms; intonation- falling tone; rising tone; rising falling tone; listening comprehension; skill sear training.

B.SC. AGRICULTURE SEMESTER – I

PAPER – V (ANY ONE UNIT OF THE FOLLOWING)

UNIT I – ELEMENTARY AGRICULTURE

Indian agriculture-scope and resources; crop plants-their significance as source of food, feed, fuel and raw material for various industries. Crop seasons and classification of crops according to seasons. Soils-their formation, classification, physical and chemical properties and manures and fertilizers-essential plant nutrients, uptake of N,P & K by important crops, methods of manure & fertilizer application, composition of bulky organic manures, concentrated organic manures, green manures and various types of inorganic fertilizers, Irrigation and drainage-importance of water, quality of irrigation water; sources methods and measurement of irrigation water, disadvantages of excessive soil moisture necessity and methods of drainage. Cultivation of important crops in the state such as wheat, rice, cotton, sorghum, maize, groundnut, rape seed & mustard, chickpea, pigeonpea, tobacco, berseem, potato and sugarcane. Acquaintance with horticultural crops such as cabbage, cauliflower, onion, garlic, cucurbits, root crops, peas, tomato, brinjal, banana, apple, mango, litchi, citrus, guava. Introductory economics-Factors of production, exchange, different types of markets; pricing, bank and credits, law of diminishing returns, elementary rural sociology, place of agriculture in five year plans, statistics relating to agricultural production. Study of main breeds of animals such as cows, buffaloes, goats, sheep and poultry. Elementary physiology and anatomy of cow and buffaloes. Characteristics of milchcattles. Care of animal, poultry management, principles of nutrition, common medicines. Types of iron and steel used in agricultural implements; different types of plough, mechanical devices, their management and cost. Water lifting devices, tillage, different methods of ploughing. Power transmission through belts, pulleys, gears, chaff, cutter, cane crusher. Necessity for drainage, damage to soil due to excess moisture, land development, prevention and formation of acidic and alkaline soils.

Practicals

Identification of important crops, crop seeds, fertilizers and agricultural chemicals, crop weeds, farm implements and acquaintance with irrigation resource and instruments. Acquaintance with vegetable and horticulture crops and their management, study of main cattle breeds and their management and also visit to Livestock Centers and Laboratories. Practical Knowledge of seed bed preparation and other recent agronomic practices of main crops, visit to agricultural museum and meteorological observatory Estimation of yields and cultivation cost of main field and horticultural crop, study of different type of markets and banks including their visits.

B.SC. AGRICULTURE SEMESTER – I

PAPER – V (ANY ONE UNIT OF THE FOLLOWING)

UNIT II – ELEMENTARY BIOLOGY

Introduction to the living world, diversity of life, characteristics of life, system of classification, binomial nomenclature, main groups of animals from protozoa to mammals. Diversity of plants, classification, brief study of algae, fungi, bryophytes, pteridophytes. Gymnosperms and angiosperms, morphology of root, stem leaf, inflorescence, flower, germination, systematics and ecology. Structure of Cell, cell division, heredity and genetics, origin of life and evolution. Histology and physiology of rabbit. Economic importance.

Practicals

Important characters of algae, fungi, bryophytes and gymnosperms. Morphology of flowering plants and its parts i.e. root, stem and leaf modification. Internal morphology (anatomy) of root, stem and leaf of both dicots and monocots. Families: Cruciferae, Leguminosae, Compositae and Gramineae. Field trip. Study of specimens and slides from protozoa to mammals. Cell-Cell division and tissues. Histology and skeletal system of rabbit.

B.SC. AGRICULTURE SEMESTER – I

PAPER – V (ANY ONE UNIT OF THE FOLLOWING)

UNIT III – ELEMENTARY MATHEMATICS

Co-ordinates: distance between two points, coordinates of a point of division of straight line joining two points, area of triangle and quadrilateral, equation of straight line, change of axes, circle, parabolas and ellipse. Simple problems based on them.

Functions: Limit continuity, differentiation, equations of tangent and normal, maxima and minima. Methods of integration including integration by parts. Define integrals, application of definite Integrals in finding areas under curves.

Determinants: Matrices, matrix addition and matrix multiplication, transpose of matrix, solution of linear equation using crammers rule.

B.SC. AGRICULTURE SEMESTER – I

PAPER – VI (PRINCIPLES OF AGRONOMY)

Agronomy as a science and its scope, plant growth and development, environmental effects on growth, ideal plant type, tillage, seed quality, sowing, crop density and spatial arrangement, crop nutrition, organic manures and fertilizers, irrigation and drainage, weed management, distribution of crops, cropping systems, selection of crops and varieties for multiple cropping, crop yield contributing characters; Organic farming-concept, practice and scope in India. Crop production in dry lands, salt affected, acidic, flood affected, waterlogged and eroded areas.

Practicals

Sowing techniques different crops, effect of seeding depth on germination and seeding vigor, weeds and weed control experiments, top dressing of nitrogen, layouts design and statistical techniques used in field experimentation, yield contributing characters and yield estimation, germination and viability test, forage crops and important experiments at LRC, numerical exercises on requirement of fertilizer, plant population and herbicides, tillage implements, morphological description of major crops, irrigation water measurement by parshal flume and calculation of time required to irrigate unit area, preparation techniques of charts and diagram and preparation of cropping scheme for a given farm.

B.SC. AGRICULTURE SEMESTER – I

PAPER – VII (RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY)

Concepts, methods, tools, characteristics of rural society and people; rural – urban continuum and differences, Rural social structure: interaction, processes, institutions groups, Rural social stratification: status, roles, class, castes etc. panchayati Raj and Block Development Organizations as rural peoples participative agencies for planned development, Specific, programs for rural area upliftment/ employment: JRY, IAT, EAS, MWS, IRDP, GKY, DWCRA, TRYSEM, DPAP, DDP, NSAP, Land reforms, etc. Council for Advancement of peoples Action and Rural Technology (CAPART). National Fund for Rural Development (NFRD), NGOs/Voluntary Sector. Conceptual/Clarifications on educational psychology, Psychology of individual differences; MA & IQ; the gifted, Slow Learner and Socially disadvantaged child. Learning and motivation, mental hygiene and adjustment, guidance and counseling.

Practicals

Socio economic survey and its tools, study of rural social institutions, Panchayati Raj institutes (any one at any tier of Panchayat Raj system), and measurement of IQ.

B.SC. AGRICULTURE SEMESTER – II

PAPER – I (FUNDAMENTALS OF SOIL SCIENCE)

Soil as a natural body and medium for plant growth; soil compounds and soil plants relationship; soil forming rocks and minerals; weathering and processes of soil formation; physical properties of soils – texture, structure, density and porosity, soil colour, consistence and plasticity, soil reaction pH and its measurement, soil acidity and alkalinity, buffering, effect of pH on nutrient availability, soil colloids – inorganic and organic; silicate clays: constitution and properties; humic substances nature and properties; ion exchange, cation exchange capacity, base saturation; soil organic matter: composition, properties and influence on soil properties, transformation of organic and inorganic constituents of soil; biological nitrogen fixation; recycling of organic wastes in soils – Urban and industrial wastes. Soil water retention, dynamics and availability; soil air composition and dynamics; source, amount and flow of heat in soils; soil temperature and plant growth; soil survey and classification, soils of India; soil pollution – behavior of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practicals

Study of soil as a natural body. Use of soil sampling tools, collection, processing and storage of soil samples. Study of soil forming rocks, mineral's density and porosity. Study of soil texture by feel methods. Study off soil structure, colour and soil map. Capillary rise phenomenon of water in soil column and water movement in soil. Soil reaction measurement by indicators and glass electrode pH meter. Determination of electrical charges on soil colloids and its nutrient retention capacity. Estimation of organic matter content and buffering capacity of soil. Microscopic examination of soil microbes.

B.SC. AGRICULTURE SEMESTER – II

PAPER – II (FUNDAMENTALS OF HORTICULTURE)

Horticulture: its definition and branches; importance and scope; horticultural and botanical classification; climate, soil and distribution of fruit crops; propagation and nursery raising; principles of orchard establishment and management; flower bud differentiation and pollination; causes of unfruitfulness, pollinizers and pollinators; environmental and soil factors affecting vegetable production, kitchen gardening; garden types and parts; care and maintenance of ornamental plants; lawn making; knowledge of land scaping of rural and urban areas; exposure to important medicinal aromatic plants, spices and condiments, use of plant bio-regulators in horticulture, Post Harvest Technology-Principles and Practices.

Practicals

Identification of garden tools, horticultural crops. Preparation of seed bed/nursery bed for fruit, crops. Practice in asexual methods of propagation-cutting, layering, budding & grafting, layout and planting of orchard plants, training and pruning of fruit trees, transplanting and care of vegetable seedlings, making of herbaceous and shrubbery borders and potting mixtures; potting and repotting.

B.SC. AGRICULTURE SEMESTER – II

PAPER – III (ELEMENTARY PLANT BIOCHEMISTRY)

Recapitulation of basic chemistry and biology, water, pH and buffer, Cellular constituents: Structure and function – amino acids and protein, carbohydrates, lipids and biomembrances and nucleic acids; Enzymes-function, properties and mechanism, metabolism of cellular constituents: Central Metabolic Pathways: Degradative path ways – glycolysis, hexose monophosphate pathway, degradation of starch, sucrose, other sugars, fatty acids and acylglycerols, proteins and amino acids; Biosynthetic pathways – photosynthesis, formation of sucrose and starch, Kreb's cycle and electron transport chain; Nitrogen and sulphur cycles; Nitrogen fixation, assimilation of ammonia; Synthesis of DNA, RNA and proteins; Secondary metabolites – structure, function and metabolism.

Practicals

Preparation of standard, buffer and colloidal solution; determination of pH, qualitative tests on carbohydrates, lipids, amino acids and proteins; quantitative estimation of reducing sugars, amino acids, proteins and cholesterol; acid and enzymatic hydrolysis of starch and identification of products by paper chromatography; enzymatic hydrolysis of starch and identification of products by paper chromatography; enzymatic action of potato oxidase or urease; layer chromatography of lipids; assay of dehydrogenase and demonstration of differential centrifugation, gel electrophoresis, ion exchange chromatography and gel filtration.

B.SC. AGRICULTURE SEMESTER – II

PAPER – IV (WEED MANAGEMENT)

Introduction: Definition, costs to society from weeds, classification of weeds. Ecology of weeds: Reproduction (seed production, seeds dissemination, seeds germination, vegetative reproduction), geographics, distribution, factors influencing weed distribution, weed succession of uncultivated sites, competition between crops and weeds. Concepts of prevention, eradication and control. Weed control methods: Physical, cultural, biological, chemical, integrated weed management. Introduction to herbicides: basic concepts, polar vs. Non-polar, Esters, Salts, acids, etc. surfactant chemistry. Factors influencing foliage active herbicides: reaching the target plant, spray retention, absorption into leaf, translocation, factors influencing soil applied herbicides: microbiological effect, soil absorption, photo-decomposition and volatilization, spray of herbicides.

Practicals

Study of common Indian weeds – their characteristics, mode of propagation, occurrence and importance, techniques of weed collection and preservation, herbicide classification and identification, spray equipment and their calibration, herbicides doses calculations, effect of herbicides on growth and development of crops and weeds ours and visit to poolern areas.

B.SC. AGRICULTURE SEMESTER – II

PAPER – V (ELEMENTS OF GENETICS)

History: Pre mendelian and post-Mendelian concepts of heredity, mendelian principles of heredity, Probability and chi-square. *Cell* plant cell and animal cell, chromosome structure. Cell division mitosis, meiosis, variation in chromosomes polytene chromosome, Lampbrush chromosomes. Dominance relationship gene interaction.

Multiple alleles, pleiotropism and pseudoalleles. Sex determination and sex linkage, sex limited and sex influenced traits. Linkage, Crossing over mechanism, Chromosomes mapping, structural changes in chromosomes: Deletion and Duplication, Translocation and inversion, "Numerical changes in chromosomes, chemical basis of heredity". Gene concept made of replication of genetic material, transcription and translational mechanism of genetic material. Gene regulation and operon concept. Mutations: chemical and physical mutagens, mode of action of mutagens. Extracellular inheritance. Polygene and quantitative inheritance. Introduction to plant tissue culture.

Practicals

Simple and compound microscope, cell culture, monohybrid and dihybrid cross, test cross, back cross, epistatic interactions. Practice of mitotic and meiotic cell division; study of special chromosome. Probability, chi-square, linkage and crossing over, two point test cross linkage analysis, three point test cross linkage analysis, sex linked inheritance, pedigree analysis, DNA and RNA structure. Structural changes in chromosomes and numerical changes in chromosomes.

B.SC. AGRICULTURE SEMESTER – II

PAPER – VI (INTRODUCTORY ENTOMOLOGY)

The scope of Entomology, brief history of entomology in India, insects as Arthropods and its relationship with phylum Annelida and other classes of Arthropoda, origin in insects major points related to dominance of insects in Animal Kingdom. External morphology and anatomy of grass hopper; body segmentation, integument, thorax and abdomen, antennae, legs and wings and their modifications, generalized mouth parts and their modifications, Alimentary, Circulatory, Excretory, Respiratory, Reproductive and nervous systems, major sensory organs like simple and compound eyes chemoreceptors, endocrine glands; basic embryology and post embryonic development, basic groups of present day insects with special emphasis to orders and families of agricultural importance like Orthoptera; Tetigonidae, Gryllidae, Gryllotalpidae, Acrididae, Dictyoptera; Mantidae, Blattidae; Isoptera; Hemiptera; Pentatomidae; Coreidae; Cimicidae, Cicadellidae, Delphacidae, Lophophidae, Aleurodidae; Aphididae; Coccidae; Thysanoptera, Coleoptera. Carabidae, Meloidae, Coccinellidae, Bruchidae, Chrysomelidae, Curculionidae, Cerambycidae; Diptera; Culicidae Cephritidae, Agromyzidae, Muscidae; Lepidoptera, Pteridae; Papilionidae, Hesperidae, Sphingidae, Noctuidae, Artilidae, Pyralidae, Saturnidae, Bombycidae; Hymenoptera. Tenthredinidae, Braconidae, Chalcididae, Trichogrammatidae.

Practicals

Collection killing, planing and mounting of insects, study of different classes of phylum Arthropoda, external morphology of grasshopper, typical mouth parts and their modification of antennae, legs, wings and their coupling apparatus, structure of alimentary canal and nervous system, mcheal, reproductive and other systems in insects, post embryonic development in insects and basic of insects classification. Basic groups of present day insects with special reference to orders and families of agricultural importance.

B.SC. AGRICULTURE SEMESTER – II

PAPER – VII (INTRODUCTORY PLANT PATHOLOGY)

Importance of plant diseases, scope and objectives of plant pathology concept of plant disease, of cause of plant disease, inanimate causes and plant viruses. Classification of plant diseases. Definition and terms, parasites, pathogens biotrophs, herbivores, necrotrophs, pathogenicity, pathogen virulence, infection primary infection, inoculum, invasion and colonization, inoculation potential, symptoms, incubation period, disease cycle, disease syndrome, single cycle disease, multiple cycle, single cycle period, multiple cycle disease, alternate host collateral host, predisposition, physiological characters biotype, symbiosis, mutualism, antagonism. History of plant pathology with special reference to Indian work. Pathogenesis and parasitism, Koch's postulate. Effect of pathogenesis on the plants, morphological changes, physiological changes, symptom of plant diseases. Development of identities. Principles and methods of plant disease management. Basic concepts avoidance, exclusion, eradication, protection, disease resistance and therapy. Methods of plant disease management. General morphology, characters of fungi and somatic structure, reproduction of various structure. Basic and different methods of classification of fungus, taxonomy and nomenclature. Study of selected genera, Plasmodiophora, Spongospora (Mycozoa), Sclerotinia, Thanatephthora, Pythium, Phytophthora, Albugo, Sclerotinia, Peronospora and Peronospora (Mastigomycota); Tapinaria, Erysiphe, Claviceps, Sclerotinia (Ascomycota), Puccinia, Melampsora, Uromyces, Ustilago, Tilletia, Neovossia, Splachnoidium, Telyposporium (Basidiomycota); Collectotrichum, Alternaria, Cercospora, Fusarium, Helminthosporium, Pyricularia, Sclerotinia. Rhizoctonia, Phyllosticta, Phoma (Deuteromycota). General morphological and cultural characters of prokaryotes (bacteria), basic methods of classification taxonomy and nomenclature. Nutrition and effects of physiochemical factors on growth, reproduction and life cycle genetics and variability. Importance and general original characters of mycoplasmas, spiroplasma and fastidious bacteria. Reproduction nomenclature and classification physical architecture and chemical composition of viruses and viroids, nomenclature and criteria for identification, multiplication, transmission and infective nature. General morphological characters, life cycle and reproduction of nematodes, behaviour in soil and nematodes as vectors for other plant pathogens. Classification and general identifying characters of phanerogamic plant parasite reproduction and life-cycle.

Practicals

Acquaintance with various laboratory equipment and microscopy. General study of different structures of representative fungal genera, staining and identification of plant pathogenic bacteria, diagrammatic representation, identification and transmission of plant viruses. Extraction and identification of plant parasitic nematodes, study of phanerogamic plant parasite. Preparation of media, isolation and Koch's postulates and use of chemicals and plant disease control.

B.SC. AGRICULTURE SEMESTER – II

PAPER – VIII (MICROBIOLOGY)

Microbial world history- History of microbiology prokaryotic and eukaryotic microbes, their cell structure, genetics distribution in nature and importance in agriculture, microorganisms in soil fertility and crop production; carbon, nitrogen, phosphorus and sulphur cycles, plant microbes association symbiotic associative and a symbiotic nitrogen fixation, Azolla and mycorrhiza biodegradation of agricultural chemicals pesticides, herbicides and agricultural organic wastes; Microbiology of milk and milk products, rural microbiology and silage production; Microbes in human welfare biofertilizers, biopesticides, waste treatment and recycling; composting, ethanol production, antibiotic production, Human and plant pathogenic microbes.

Practicals

Introduction to microbiology laboratory and its equipments, study of microscope, observation of microbial studies, nutritional media and their preparation, staining techniques, microbial analysis of household working areas and utensils, methods of disinfections and sterilization, microbial analysis of air, water, soil and compost, microbial examination of stored produce, microbial analysis of fresh food vegetables, milk and dairy products, microbial examination of fermented food products, antibiotic assay.

B.SC. AGRICULTURE SEMESTER – III

PAPER – I (VEGETABLE PRODUCTION)

Importance of vegetables in human nutrition and national economy, factors effecting vegetable productivity viz. light, temperature, moisture, oxygen, CO₂ mineral nutrients, soil reaction, disease and insect pests; types of vegetable farming; types of classification of vegetable viz, botanical, classification, based on col: mandness, parts used duration of crop; weed management, use of bioregulation seed production, harvesting and marketing. Cultivation practices vis. time of sowing nursery management, transplanting, sowing/planning distance, recommended cultivars seed rate, manure and fertilizers doses, harvesting, storage, physiological disorders, diseases and insect pests and their control measure of various vegetable crops namely potato, tomato, onion, garlic, okra, sweet corn pea, beans, cucurbitaceous crops-pumpkin, bottle gourd, sponge gourd, ridge gourd, pointed gourd, bitter gourd, cucumbers etc.

Practicals

Identification of vegetable crops seeds, study of orphotogical characters; practice of nursery raising. Transplanting of seedlings and direct seed sowing in the field; fertilizer application by different methods; raising of vegetable seed crops, seed extraction; harvesting and preparation for market, economics of vegetable production.

B.SC. AGRICULTURE SEMESTER – III

PAPER – II (IRRIGATION WATER MANAGEMENT)

Water resources of India, source of irrigation, irrigation water demand, supply and resources development of irrigation, soil moisture and its characteristics soil water potential, retention and movement of soil water. Water intake and infiltration. Importance of water in plants life, plant water status, absorption, transportation and transpiration, moisture sensitive stage, water availability and nutrient up take. Scheduling of irrigation based on soil moisture status. Physiological stages of crop and meteorological parameters, irrigation under limited water supply conditions. Methods of irrigation; surface irrigation, flooding, furrow, border and basin irrigation. Irrigation; drip and sprinkler irrigations. Water stress and plant growth effect of water stress on physio-morphological characteristics and productivity of plant, deficit irrigation and strategy for optimizing yield. Water quality standards and its suitability for irrigation, water use efficiency, agronomic technique to boost water use efficiency, factors affecting water use-efficiency. Irrigation management in soils with low intake rate, saline and alkali soil, soil with shallow ground water table and in poorly drained soil. Water requirement of crops, factor affecting the water requirement of crops, method of determining water requirement, effective rainfall, actual transpiration and potential evapotranspiration and consumptive use. Irrigation of principal crops critical stages of crops, depth and schedule of irrigation, reducing irrigation requirement of major crops.

Practicals

Soil moisture measuring instruments, measurement of soil and plant water status with the help of different instruments. Measurement of irrigation water and efficiency of different methods. Use of meteorological data in scheduling irrigation, scheduling of irrigation on the basis of ET demand of crops, measurement of ground water, irrigation water quality determination, exercise on field capacity, PWP, Bulk density, consumptive use, irrigation water requirement irrigation plant form farm and fertilizer application with pressurized irrigation system.

B.SC. AGRICULTURE SEMESTER – III

PAPER – III (PRINCIPLES OF PLANT BREEDING & BREEDING OF FIELD CROPS)

Historical development of plant breeding plant breeding concept, nature and role of plant breeding major achievements and future prospects, genetics in relation of plant breeding, modes of reproduction, self incompatibility and male sterility. Plant Breeders materials domestication, centers of origin, centers of density acclimatization and components of genetic variation and heritability. Breeding methods in self pollinated crops: Introduction, selection pure line theory, multilane war eties, hybridization techniques and handling of segregating populations, Hardy-Weinberg law, Methods of breeding cross pollinated crops system of mating heterosis and inbreeding depression development of inbred lines and hybrids and synthetic varieties, breeding methods in asexually propagated crops, clonal selection and hybridization polyploidy in relation to plant breeding, mutation breeding methods, uses nature of gene mutation mutagenic agents, induced mutation in plant breeding, breeding for important biotic and abiotic stresses, and use of biotechnology implant breeding, procedure for release of new varieties.

Crop systematic, species relationship, floral biology and inheritance of economically important characters, breeding objectives development of varieties with desired yield, adaptability, stability, disease and pest resistance and quality (Physical, chemical, nutritional) and marketing Important varieties along with parentage and characteristics, future thrust area in varieties improvement in crops like wheat, rice, maize, soybean, fieldpea, pigeon pea, urbean and rapeseed mustard, sunflower, groundnut, sorghum, sugarcane, potato, cotton and tobacco.

Practicals

Germplasm of various crops, floral structure and biology of self pollinated and cross pollinated crops. Self incompatibility, emasculation and hybridization techniques in self pollinated crops. Study of variation in segregating population for qualitative and quantitative traits, Methods of calculating mean, range, variances, standard covation etc. and important designs used in plant breeding experiments. Study of component of genetic variation and genet advance; heteroils and inbreeding depression, prediction of performance of double cross hydras comparative study of selection, method. In self pollinated crops, induction of polyploidy through colchicines and other methods. Induction of mutation through chemical mutagens eg. EMS etc. Germolasm, breeding trials in field and selicar feature of the popular varieties of the region of crops viz. wheat, bailey, pea, maize, sugarcane, rapeseed, custard, sunflower, oat, potato, urbean and cotton.

B.SC. AGRICULTURE SEMESTER – III

PAPER – IV (SOIL FERTILITY AND NUTRIENT MANAGEMENT)

History of plant nutrition and soil fertility, soil fertility and productivity, problems of soil fertility in India, plant growth and development, factors affecting plant growth; essential plant nutrients, their role and deficiency and toxicity symptoms; Ion exchange phenomena in soil and its role in plant nutrient availability; movement of nutrients from soil to plant roots, their uptake and translocation.

Chemistry of soil nitrogen- Nitrogen cycle, mineralization and immobilization, properties and use of inorganic and organic nitrogenous fertilizers in crop production. Chemistry of phosphorus in soil, phosphate fixation and availability chemistry of potassium in soil, potassium fixation and availability; properties and use of phosphorus and potassium fertilizers, chemistry of calcium, magnesium and sulphur in soil, their sources and usage; soil fertility evaluation and fertilizer recommendations; biofertilizers; integrated nutrient management ; methods and time of application of fertilizers, efficient of fertilizers.

Practicals

Estimation of total and different inorganic forms of nitrogen in soil. Determination of available nitrogen, phosphorus, potassium sulphate and micronutrients in soil. Estimation of cation exchange capacity and exchangeable bases in soil. Interpretation of soil test data/report.

Determination of moisture, total N, water soluble P and soluble K in fertilizers, Rapid plant tissue test and use of soil water plant test kit. Field trip for studying visual symptoms of nutritional disorders in plants.

B.SC. AGRICULTURE SEMESTER – III

PAPER – V (AGRICULTURE MARKETING & INTERNATIONAL TRADE)

Concepts of marketing, human needs and marketing the marketing mix, the marketing strategy, product planning, promotion Physical distribution and pricing, marketing and different levels of development, function of prices and role of price in economic development, marketing planning and organizational elements of marketing mix, Concept of market segment, market segmentation, basis of market segmentation, Types of markets, classification and characteristics of agricultural market; Demand for farm products; determinants of consumer behavior, consumers of farm products factors affecting demand and consumption of farm products; supply of farm produces; product decision and strategies, product life cycle and new product development, characteristics of farm firm, farm products and farm production, spatial and temporal distribution of farm products, marketed and marketable surplus, factors affecting supply of marketed surplus and marketable surplus of farm products; women's role in agricultural produce marketing; pricing and promotion strategies market structure, determination of price under alternates market structures, price movement overtime seasonal cyclical and trend marketing communication, advertising, publicity, personnel selling and cales promotion; Marketing function, exchange function's buying and rolling physical function storage, transportation and processing; facilitating functions- packaging, branding, financing, market information, grading etc. Management of marketing functions, marketing channels; stages of marketing, selection and management of marketing channels for farm products; meaning and components of marketing cost, price spread and market margins, Marketing efficiency, concept and measurements of marketing efficiency; Role of government in Agricultural marketing, public sector institutions. CACP, FCL, CWC, DMI, Far price shops, Exim Bants etc. The concept and importance of inter-regional and International trade; emerging scenario of international trade in Agricultural commodities; basic theories of international trade; concept of terms of trade and BOP, implications of new GATT agreement (WTO).

Practicals

Plotting and study of demand and supply curves and calculation of their elasticity. Relationship between market arrivals and prices of some selected agricultural commodities and their temporal behavior. Acquaintance with pricing methods. Visit to local agricultural markets and cooperative marketing societies study their organization, functioning and performance. Collection of data from the agricultural markets for some selected commodities to study the marketing margins and costs. Class discussion on marketing practices and problems related to major farm produce cereals, pulses, off seeds, livestock and livestock products. Application of comparative cost advantage principle in international trade.

B.SC. AGRICULTURE SEMESTER – III

PAPER – VI (FIELD CROPS 1 (KHARIF))

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices yield of kharif crops. Cereals-rice, maize, sorghum pearl millet and finger millet; pulses – pigeon pea, mungbean and urdbeans oilseeds groundnut, sesame and soybean; fibre crops cotton, jute and sunhemp; and forage crops sorghum, maize, cowpea, cluster bean and napier.

Practicals

Rice nursery preparation and their transplanting. Sowing of soybean, pigeon pea, mungbean, maize, ground nut and cotton. Effect of seed on germination and seedling vigour of soybean/groundnut. Effect of sowing depth on germination soybean. Identification of weeds in rice, maize and soybean fields and study of weed control experiments in these crops. Top dressing of nitrogen in maize and rice and study of fertilizer experiments on rice, maize, sorghum millets. Study-of yield contributing characters, yield calculation, harvesting and yield estimation of above crops. Study of crop varieties and important agronomic experiment. Study of forage experiments.

B.SC. AGRICULTURE SEMESTER – III
PAPER – VII (CROP DISEASE AND THEIR MANAGEMENT)

Wheat disease rusts, loose nut, kernallunt, powdery mildew, alternaria blight, yellow ear rot, ear cocile, Rice disease blast, brown spot, bacterial blight, sheath blight khaira and tungro; Maize disease stalk rots, downy mildews, leaf spots and Heininthosporium leaf sports; Sorghum disease smuts. Grain mold, anthracites and strgaa; Bajra disease downy mildews and ergot; Sugarcane disease redrot, smut, and with Groundnut disease early and late leaf sports, Sclerotium stem rot, seedling rot and seedling blight; Sunflower disease Sclerotinia stem rot and Alternaria blight; mustard disease. Alterniaria blight, white rust, downy mildew, Sclerotinia stem rot, and bacterial rot; soybean disease Rhizoctonia blight, pod blight, seed rot, bacterial pustule seedling blight and mosaic; pigeonepea diseases Phytophthora blight, wilt and sterility mosaic; Gram diseases Wilt, grey mould and Ascochyta blight; Lentil disease rust and wilt; Cotton disease anthracnose; vascular wilt, and black gram; Tobacco diseases damping off early and late blight, black scarf, common scab, bacterial wilt and virus diseases; Tomato diseases damping off, late and early blight, wilts root knot and virus diseases; Brinjal diseases Phomopsis blight, fruit rot, Sclerotinia rot, bacteria wilt and rot knot, Chillies diseases anthracnose and virus diseases, vegetable crucifer diseases damping off, Downey mildew, and black not, vegetable cucurbit diseases powdery mildew and rust, Bean diseases anthracnose, blights, and virus diseases; Mango diseases Mango malformation. Powdery mildew and bacterial blight; Apple diseases scab, collar rot, powdery mildew; fire blight, stem black and brown, pink diseases, Papaya diseases stem and foot rot, leaf curl, and mosaic, Citrus diseases canker, anthracnose, citrus decline and virus disease; Peach and pear disease leaf curl, brown rot, and scab; Guava wilt, anthracnose and stem canker.

Practicals

Colour preservation of diseased plant materials and dry preservation concept and methods, study of the three wheat rust (black rust, brown rust and yellow rustly, specimens of plants with references to symptomatology and casual fungi. Study of the loose smut and kernel bunt diseases of wheat comparative differences between causal fungi and symptoms, study of bacterial blight of rice with references to symptomatology and casual bacterium microscopic studies. Differential staining and identification of plant pathogenic bacteria. Study of sorghum smuts, ergot of bajra and downey ,mildew of bajra symptomatology and morphological characteristics of the casual fungi, study of red rot of sugarcane and cercospora leaf spots of groundnut symptomatology and characteristics of the casual fungi. Histopathological studies of *Albugo candida* causing white rust of mustard. Mungbean yellow mosaic symptoms and transmission through vector, *Bemisia tabaci*. Histopathological studies of wilts (*Fusarium oxysporum*) of chickpea and cotton. Study of the late blight and early blight and mosaic diseases of potato and isolation and microscopic study of root knot nematode. *Meloidogyne incognita*. Study of mango malformation and powdery mildew of mango; etiology and histopathology and study of citrus canker apple scab and guava application of fungicides; sprayers and dusters and disease measurement concerning presencence, incidence and severity etc.

**B.SC. AGRICULTURE SEMESTER – IV
PAPER – I (ECONOMIC ENTOMOLOGY)**

How insects become pest economic importance of insects, classification of pests, principles and methods of pest control, viz, physical mechanical, cultural, legal, genetical chemical. Biological, principles and methods of insecticidal applications, Apiculture, Sericulture and lac cultivation with special reference to equipment used insect pests and diseases, production and marketing.

Practicals

Insecticide formulation; application, equipment, their handling and maintenance. Identification of commonly available natural enemies, honey bee, silkworm and lac insect species and their rearing. Visit to institutes devoted to bee keeping, sericulture and lac insects.

B.SC. AGRICULTURE SEMESTER – IV
PAPER – II (INTRODUCTION TO PLANT BIOTECHNOLOGY)

Introduction: History of Plant tissue culture and biotechnology, scope and importance of agricultural biotechnology, Gene technology, Tissue and cell culture: Media, various modes of culture and their application. Organ culture cell suspension culture, Callus culture, Micropropagation methods; Organogenesis and embryogenesis, their significance, Anther culture; haploid production, diploidization and their significance, Proto plasts isolation, fusion, somatic hybridization and hybrids, Somaclonal variation and its use in crop improvement, Germplasm storage and cryopreservation, Secondary metabolite production, Introduction to genetic engineering and genetechnology. Gene transfer methods: Physical Chemical and Agrobacterium dependent methods, Generation of transgenic plants and their identification, Molecular markers, RFLP, RAPD, Simple sequence repeats etc, Role of biotechnology in crop improvement.

Practicals

Plant tissue culture laboratory working procedure. Preparation of nutrient culture medium. Study of different micropropagation approaches viz, meristem shoot tip culture, axillary bud etc. Organogenesis in tissue culture and other approaches.

**B.SC. AGRICULTURE SEMESTER – IV
PAPER – III (FIELD CROPS II (RABI))**

Origin geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; cereals wheat, barley and triticale; pulses chickpea, lentil, peas, frenchbean; Oil seeds, rapeseed and mustard, sunflower, safflower and linseed; sugar crops sugarcane and sugarbeet, Regional medicinal and aromatic crops such as mentha, lemon grass, citronella, palma rosa, Isabgol and posts, potato and tobacco, Forage crops berseem, Luceme and Oat.

Practicals

Sowing of wheat sugarcane and sunflower. Top dressing of nitrogen in wheat and study of fertilizer experiments on wheat and mustard. Identification of weeds in wheat and grain legumes, application of weedicides and study of weed control experiments. Morphological characteristics of wheat, sugarcane, chickpea and mustard. Yield contributing characters of wheat. Yield and quality analysis of sugarcane. Crop distribution in the state and the region, important agronomic experiments of rabi crops and visit to research stations related to rabi crops.

B.SC. AGRICULTURE SEMESTER – IV
Paper – IV (Agricultural Cooperation, Finance and Business Management)

Cooperation- Meaning, significance under Indian agricultural conditions, objectives principles of cooperatives. Agricultural cooperation in India credit marketing consumer and multi- purpose cooperatives, farming cooperatives, processing cooperatives, cooperative warehousing, role of ICA, NCU, NCDC, NAFED etc. women cooperatives. Agriculture finance meaning, scope and significance, credit needs of Indian agriculture, economic principles in capital acquisition and use decisions, preparation and analysis of financial statements, balance sheet and income statement, cost of credit, Access for women to agricultural credit facilities. Agricultural credit market- institutional and non-institutional sources of credit, cooperatives credit system, commercial banks and regional rural banks, NABARD and AFC, problems and issues in institutional agricultural credit system. Business management environment of agricultural business, tasks of a professional manager, management system and processes, types of management decisions, decisions, decision making techniques and processes, organizational culture and management ethics.

Practicals

Estimation of credit requirement of farm, preparation and analysis of the balance sheet and income statement, appraisal of the loan, interest and performance of cooperative, commercial banks and RRBs, analysis of the relevant published data. Class seminars and discussion on selected topics. Visits of commercial bank, cooperative bank, agricultural cooperative societies and agri-business units in order to impart first hand knowledge of their management and working.

B.SC. AGRICULTURE SEMESTER – IV
Paper – V (INSECT PESTS AND THEIR MANAGEMENT)

Nature and extent of damage, life cycle seasonal history, host range, distribution and management of the major insect pests attacking field crops; Cereals, pulses, oilseeds, fiber, sugar crops, Horticultural crops; brinjal, okra, potato, tomato, cole crops, leguminous vegetables, cucurbits, chillies sweet potato, leafy vegetables, onion and garlic, colocasia, yam. Fruit crops (tropical/sub tropical); jack fruit, papaya, coconut and date palm, mango, citrus, litchi, banana, guava, peach, pear, plum, apricot, chestnut, almond. Plantation and garden crops: maricots, spices and condiments. Stored grain and household pests; Locust and other major polyphagous insects, Rodents and mites of agricultural importance.

Practicals

Nature of damage, life cycle and seasonal cycle and seasonal cycles of insect pests attacking field, vegetable and fruit crops including stored grains: rodents and mites, their nature of damage, life cycle and management. Visit to cold storage research and Training institutes and Horticultural research station.

B.SC. AGRICULTURE SEMESTER – IV
Paper – VI (FRUIT AND PLANTATION CROPS)

Importance and scope of fruit and plantation crop industries in India Cultivation practices of important fruit and plantation crops with reference to their origin, soil and climatic requirements; botany, important cultivars, plant propagation practices, resources and planting. Care and management in respect of irrigation, nutrition and other cultural operations including training and pruning, nutrient deficiencies of fruit plant and their collection, inter cropping, major cultivation problem and their control measures, harvesting, yield, storage and marketing; application of plant bioregulators; post-harvest and technology of plantation crops. Management of major insect- pests and disease, principles and methods of evaluation of fruit trees, project formulation and evaluation, commercial orchard.

Practicals

Introduction of fruit plants-vernacular and botanical names, families, distinguishing vegetables, floral, fruit characters, lifting and packing of fruit plants from nursery, nursery operations lifting and shifting plants, weeding and hoeing; orchard layout and planting; plant propagation methods sexual and sexual; seed treatment, seed sowing and germination, planting; cuttings and preparation of seed beds, study of bud intake and success in manuring operations in the orchards, training and pruning of fruit plants, use of plant bio-regulators in fruit set, fruit drop, fruit growth and fruit ripening, harvesting, handling, sorting, grading, packing and storage. Visit to temperate fruit research station/tea nursery and garden.

B.SC. AGRICULTURE SEMESTER – IV
Paper – VII (LIVESTOCK PRODUCTION)

Place of livestock in the national economy, efficient livestock development programme of government of India, importance of exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Measures and factors affecting livestock fertility, reproductive behaviour like estrus, parturition, farrowing, milk secretion, milking of animal and factors affecting milk yield and composition of milk. Selection and breeding of livestock for higher milk and meat production. Feeding and management of calves, growing of heifers and milch animal and other classes and types of animals. Housing principles, space requirement for different species of livestock. Disease control and measures of measure livestock diseases, sanitation and care. Breeding feeding and production records.

Practicals

Identification, handling and restraining of animals, judging and cutting, feeding and ration formulation, visit to livestock farms, economics of livestock production.

B.SC. AGRICULTURE SEMESTER – IV
Paper – VIII (RAINFED AGRICULTURE)

History of rainfed agriculture, magnitude of its problem and delineating criteria for rainfed and drylands, soil and climatic conditions prevalent in rainfed area. Water stress in relation to crop productivity, concept of crop productivity and plant type for rainfed farming areas and crop improvement for efficient water use, drought resistance in crop plants. Efficient utilization of water through soil and crop management practices; reducing water losses through mulching and use of anti-transpirants, their kinds, mode of action and effect on crop yield. Increasing water storage by reducing run off and increasing infiltration through mechanical and cultural measures, water harvesting techniques, watershed management. Efficient management of rainfed crops; land preparation, seeding and crop density, selection of efficient crops and their varieties, alternate cropping and land use strategies, soil fertility management and fertilizer use techniques, weed control and interculture operation, mid season correction for mitigating the aberrant weather, agro techniques for hilly tracts.

Practicals

Climatic conditions prevalent at the various dryland research centres of the country and delineating criteria for rainfed and drylands; Pattern of rainfall in different dryland tracts of the country; onset and withdrawal of the monsoon, amount, intensity and distribution, and studies of the effective cropping season; critical analysis of rainfall and estimation of moisture index, probable seeding time and possible drought period, crops and application and effect on soil and crop growth; seedling emergence survival and initial growth of crops at different moisture regimes. Seed soaking, seed treatment with chemicals and depth of seeding under moisture stress on emergence and seedling vigour, methods of fertilizer application in dryland areas; Effect of plant density, thinning, leaf removal under moisture stress condition on crop growth. Study of the salient features of a model water shed; methods of measurement and determination of run-off; alternate land use strategies: Agroforestry, grass legume forage and alley cropping system; Visit to dry land research stations and operational research projects to expose students to the latest agro techniques, and watershed management practices.

B.SC. AGRICULTURE SEMESTER – V
Paper – I (POULTRY MANAGEMENT)

Important Breed characteristics of poultry, their methods of rearing, breeding, leeding and management. Incubation hatching and breeding, vaccination and prevention of diseases. Preservation and marketing of eggs, its economics and keeping quality. Broiler production and rearing, hatchery management.

Practicals

Visit to poultry farm, economics of poultry management, identification of important poultry breeds.

B.SC. AGRICULTURE SEMESTER – V
Paper – II (MUSHROOM CULTIVATION)

First record of cultivated edible fungi, definition of mushrooms, present scenario of mushroom cultivation uses nutritional and medicinal values of mushrooms, general morphological features and important characters for identification of different edible mushrooms and biological backgrounds for mushroom breeding. Definition of spawn and their types, methods of spawn production raising cultures, preparation of spawn media/master culture/commercial grade spawn, characteristics of good spawn, storage of spawn. Cultivation of *Agricus* species: Compost and its formulations, preparation of compost using short and long methods of composting, turning schedules, compost microflora and different temperatures zones. Spawning and methods of spawning. Preparation of casing mixture and its sterilization, identification, isolation and management of different diseases, pests and competitors/moulds. Methods of harvesting mushrooms, after care of harvested fruit bodies, after care of beds and crop rooms on ruminant of crop. Cultivation of *Pleurotus*, *Volvareilla*, *Lentinus* and *Auricularia* sp: Types of substrate, substrate preparation and its sterilization; spawn and methods of spawning, spawn run and cropping, harvesting and packing, processing of mushrooms: Different methods- canning, dehydration, freeze drying and bringing etc.

Practicals

Preparation of spawn, preparation of casing material, identification of various type of edible mushrooms. Post harvest handling of various kinds of mushrooms such as canning, dehydration, drying etc.

B.SC. AGRICULTURE SEMESTER – V
Paper – III (ELEMENTARY CROP PHYSIOLOGY)

An introduction to plant physiology, plant cell an introduction, laws of thermodynamics, diffusion and osmosis, the concept of water potential, cell water relations, absorption of water, transpiration, stomatal physiology, ascent of sap, ion uptake and metabolic utilization of mineral ions, deficiencies of mineral ions in plants, photosynthesis, respiration, fat metabolism, physiology of growth and development, growth regulators, physiological parameters influencing the productivity of major cereal, pulse and oilseed crops.

Practicals

Cell structure, process of diffusion osmosis and plasmolysis, structure and distribution of stomata in monocot and dicot leaves, process of transpiration with the help of cobalt chloride paper and other methods, demonstration of the measurement of photosynthetic rates by infra red gas analyzer, factors affecting the process of photosynthesis, separation of photosynthetic pigments by paper chromatography, process of root pressure by exudation method and manometer, detection of certain essential micro and macro-mineral elements in crop plants, process of aerobic respiration in germinated seed and alcoholic fermentation, tropism and movement.

B.SC. AGRICULTURE SEMESTER – V
Paper – IV (FARM MACHINERY AND POWER)

Sources of farm power including non-conventional sources, farm mechanization, tillage, primary and secondary tillage equipment, specialized tillage tools, seeding and fertilizer machinery, specialized sowing and planting machine, inter culture equipment, plant protection equipment, harvesting and threshing machinery, chaff cutter. Estimation of operating cost of farm equipment. Basic engine types, parts of I.C. engine, working of different engine systems, types of tractors, working of different tractor systems.

Practicals

Study and identification of parts of a country plough, mould board plough, disc plough and different type of barrows, Study of seed-cum-fertilizer drill and its calibration. Study of sugarcane and potato planter, identification of different plant protection equipment, study of a tractor drawn reaper and different types of threshers. Identification of different types of engines and their parts. Acquaintance of different system and controls. Tractors and practice in tractor driving.

B.SC. AGRICULTURE SEMESTER – V
Paper – V (Farm Management and Natural Resources Economics)

Meaning, concept, objectives, nature and scope of farm management. Meaning and definition of farm, structure and characteristics of farm business. Different types of farms and factors determining types and size of farm. Basic principles of farm management factor – factor and product-product relationships, law of equilmarginal returns and law of comparative advantage. Meaning and concept of cost, types of cost and their importance in farm management decision making. Concepts of farm returns. Farm business analysis and various measures of efficiency. Importance of farm business records and accounts, inventory balance sheet. Profit and loss accounts of farm. Status of farm inputs land, labour, capital. Farm planning and budgeting meaning and importance of farm plan and farm budget, partial and complete budgeting, formulation of farm plan and budget. Concept, subject matter and importance of natural resources economics. Classification of natural resources and the basic terms ecosystem, biomass, biosphere, reserves, rate of use, environment, pollution etc. and concepts of natural resources of economics-ecology. Natural resources management and conservation, issues in natural resource use of management the benefit cost approach to natural resource problems. Time element in decision making and benefit cost analysis. The basic theory of natural resource economics efficiency in private market economy, externalities in natural resource use and alternative solution thereof, Important issues in economics and management of land, water and forest resources and the environment. Natural resources administration and policy formulation.

Practicals

Preparation of farm layout including determination of cost of fencing, application of different farm management principles concerning resources allocation, determination of most profitable level of an input use, least cost combination of inputs, optimum enterprise combination through empirical data and computation. Application of cost principles in the estimation of cost of crop and livestock enterprises and preparation of farm plan and budget. Estimation of cost of cultivation of major important crops of the area. Collection and analysis of relevant data on various natural resources in the country and review and discussion of case studies. Methodology of economic analysis of project in the context of natural resource projects.

B.SC. AGRICULTURE SEMESTER – V
Paper – VI (Fundamentals of Extension, Education and Rural Development)

Meaning, concept and process of extension education, objectives, principles and philosophy of extension. History of extension work. Education-formal and non-formal. Components of behaviour-knowledge, attitude, skills and motivation. Principles and steps in teaching learning process, learning situation, Implications of teaching.

Concept need and steps in programme planning. Principles of programme planning, programme planning process. Panchayati Raj Institute, reorganization and its role in programme planning. Extension evaluation its meaning, principles, steps, techniques and criteria. Critical analysis of various extension programme.

Meaning and importance of rural leadership, Types, selection and qualities, training of leadership. Meaning of administration, public administration and extension administration. Coordination and team work. Organization POSDCORB, organization and management of NES and reorganized extension system. Rural development programme: an over view of CD programme before 1952, agricultural/rural development programme ADP, LAAP, CADP, HYVP, SFDA, hill area development programme, integrated tribal development project, integrated dryland farming project, integrated child development scheme, IRDP, TRYSEM, JRY, DWCRA, *mahila uthan yojana*, *Sunishchit rojgar yojana*. Role of voluntary organizations in rural development, women in agriculture and rural development.

Practicals

Visit to block/extension training centre, acquaintance with university extension system, study of rural development programmes in villages, evaluation of extension programme, visit and study of Panchayati Raj Institution.

B.SC. AGRICULTURE SEMESTER – V
Paper – VII (Post Harvest Management & Processing of Fruits and Vegetables)

Importance of PHM for fruits and vegetable. Total production, consumption pattern and Post harvest losses in fruits and vegetables. Maturity and ripening process, biochemical changes after harvesting, quality management for fresh marketing and processing. Storage of fruits and vegetables – ambient, low temperature and controlled atmosphere storage system. Packaging of fresh and processed products. Transportation system, mode of marketing, sorting, grading and handling. Pretreatment of fresh produce for marketing and processing. General principles and methods of preservation preparation of jam, marmalade, tomato products pickles and chutney, drying fruits and vegetables, fruit beverages juices, squashes, nectars, cordials, by products of fruits and vegetables processing industries such as vinegar, cider. Canned fruits and vegetable products, frozen fruits and vegetables, government policies regulation and specifications for fresh and processed products. Export promotion agencies and their role in export of fresh and processed products.

Practicals

Determination of respiration rate and detection of post harvest disorders/diseases. Marketing losses in fresh produce. Calculation of refrigeration load for processing/storage. Effect of packaging material/transport system on their quality. Preparation of jam, jellies, chutneys/sauces, ketchup and pickles. Canning dehydration and freezing of fruits and vegetables. Chemical analysis of fresh and processed products and visit to mandi, export terminals and processing industries.

B.SC. AGRICULTURE SEMESTER – V
Paper – VIII (PRACTICAL CROPS PRODUCTION - I)

Complete Practical acquaintance relating to scientific production technique of major field crops of the season including sowing weeding hoeing fertilizer and manure application, harvesting etc.

B.SC. AGRICULTURE SEMESTER – VI
Paper – I (FARMING SYSTEM AND SUSTAINABLE AGRICULTURE)

Definition and concepts of farming system. Historical developments in farming system. Farming systems in India based on cultivation system viz. shifting, regulated, semi-permanent and permanent cultivation on rainfed and irrigated lands with perennial crops; grazing systems, enterprise mix, resources, technology and orientation. The types of farming system, geographical distribution, general characteristics including relevant case studies, weaknesses as well as development path of each system. Concepts, importance, need and indicators of sustainability. Ecological basis of sustainability/resource management. A profile of Indian agriculture in terms of availability of natural resources and their carrying capacity, demographic compulsions, increasing fuel and fodder needs, problems of soil health, land degradation and conservation of natural resources including soil and water as part of sustainable resource management. Maintenance of the production base in irrigated agriculture. Modernization of agriculture and its relation with sustainability, natural resource centered versus commodity led production system, low versus excessive external input agriculture (LELA v/s HELA), necessity and limits of using external inputs in LELA with particular references to artificial fertilizers, pesticides, improved seeds, irrigation and mechanization and their implication on sustainability. Basic ecological principles of low external input sustainable agriculture (LEISA), securing favorable soil condition for plant growth, optimizing nutrient availability and cycling, managing flow of solar radiation, water and air, exploiting complementarity, synergies and combining mixing crop, mixing livestock and integrating crops and livestock including aquaculture, exploiting indigenous plants and animals. Some promising LEISA techniques and practices – improved manure handling, composting, green manuring and bio-fertilizers, crop residue management and strategic use of mineral fertilizers. Mulching, wind breaks, water harvesting, tied ridging, strip cropping. Permeable contour line barriers and water ponds. Practical Inter-cropping trap and decoy crops, constructed traps, repellents, biological control and strategic used of pesticides in crop and natural medicines in animal health care. Bio-intensive gardening, contour farming, integrated crop livestock fish farming, integrated forage production and farmer – centered techniques and practices thereof. Evaluation of constraint and optimization of farming systems.

B.SC. AGRICULTURE SEMESTER – VI
Paper – II (Conservation and Management of Soil and Water Resources)

Soil resources of India; distribution of waste land problem soils; water resources of India and their utilization in crop production; soil tilth management and relationship with tillage; tilth requirement of different crops; soil impedance layers and their improvement; management of soil water energy state of water in soil and availability to plants; management of soil moisture under different climates; water harvesting techniques, effect of water quality on soil and plants; soil aeration problems and management; soil thermal regimes in relation to crops and their optimization.

Recycling of agricultural and industrial organic wastes; wastelands and their management; reclamation and management of acidic, saline and sodic soils, soil erosion; extent, type and effects; soil conservation techniques, watershed mgt.; application of remote sensing for assessment of soil and water resources.

Practicals

Evaluation of irrigation water quality using water quality indices such as pH, EC RSC and SAR. Tensiometer and their use. Measurement of water holding and field capacities of soil. Preparation of saturation paste and saturation extracts of salt affected soils. Determination of pH, EC, Ca, Mg and Na in saturation extracts Measurement of infiltration rate of soil. Determination of CaCO₃ equivalent of liming material. Estimation of lime requirement of acid soils and gypsum requirement sodic soils. Measurement of ODR and ER of soil. Estimation of water stable aggregate in soil and field trip to study the problems and management of soil and water resources.

B.SC. AGRICULTURE SEMESTER – VI
Paper – III (ORNAMENTAL HORTICULTURE)

Importance of ornamental gardening in human life, theory and practice of landscape and formal garden for various places, identification, use of ornamental plants for the beautification of private and public places, styles of gardens, formal, informal etc. landscape and town planning, ornamental plants for rural and urban areas, indoor gardening, post culture; bonsai, hanging baskets etc. Principles and practices involved in growing ornamental annual and perennial plants, planning and layout of various parts of garden, herbaceous and shrubbery borders, lilly pots, rock gardens etc. cultivation of important ornamental plants, rose, gladiolus, chrysanthemum, tuberose, orchids, authurium, gerbera, dahlia, fern, palms, cycades, cacti etc. Post harvest technology, project formulation and evaluation.

Practicals

Identification of ornamental plants, preparation, planting and care of lawn seed bed preparation and sowing, potting and repotting of ornamental plants, training and pruning of ornamental plants, cultural practices in important ornamental plants, bonsai culture, planning and layout of gardens, project formulation use of flowers for different purpose, care and maintenance of green house/polyhouse plants and arranging flower show, visit to nurseries and florist centres.

B.SC. AGRICULTURE SEMESTER – VI
Paper – IV (ENVIRONMENTAL SCIENCE)
Unit – I (BASICS OF ENVIRONMENTAL SCIENCES)

Introduction to Environmental Sciences:

- Definition, scope and importance (the multidisciplinary nature of environmental sciences)
- Need for public awareness on Environment, Role of individual in Environmental protection

Natural Resources (Renewable and Non-renewable Resources):

- Natural Resource conservation: concepts
- Freshwater resources: use and over-exploitation of surface and ground water, conflict over water, hydroelectric projects, problems, traditional methods of harvesting of freshwater resources.
- Mineral resources: use and exploitation, environmental effects of extracting mineral resources, Lime stone quarrying in Uttaranchal
- Food resources: World food problems, changes caused by agriculture and overgrazing, effect of modern agriculture, fertilizer operated problem, water logging, salinity.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
- Land resources: Land as a resources, land degradation, landslides, soil erosion and desertification.

Ecosystems:

- Concept, structure, and components of an ecosystem.
- Abiotic and biotic variables.
- Ecosystem function, trophic levels, energy flow, food chain, food web, Ecosystem, homeostasis.
- Examples of ecosystems (aquatic: pond, lake, river)
- Terrestrial ecosystem: Forest, mountain
- Ecological succession.

Biodiversity and its conservation:

- Introduction:- Definition, genetic, species and ecosystem diversity.
- Bio-geographical classification of India
- Values of biodiversity: 5 Es (Esthetic (Aesthetic), Economic, Environment, Ethical, Emotional).
- Biodiversity at global, national and local levels.
- India as a mega diversity nation, hot spots of biodiversity.
- Himalayan wildlife: Habitat loss/poaching of wildlife, man-wildlife conflicts, and conservation.
- Threatened categories as per IUCN.
- Conservation of biodiversity: *In-situ* and *Ex-situ* conservation of biodiversity.

Unit – II (APPLIED ENVIRONMENTAL SCIENCE)

Environmental Pollution:

- Definition, causes, effects and measures of Air pollution.
- Water pollution and thermal pollution.
- Marine pollution.
- Noise and radioactive pollution.
- Solid waste and their management (municipal, industrial (hazardous and non-hazardous), problems of solid waste disposal in Uttarakhand and integrated Solid Waste Management (ISWM).
- Environmental hazards in Himalayas (floods, river, blockades, cloud burst, landslides, earthquakes).

Environmental problems and Environmental Protection:

- *Anthropogenic* and natural environmental problems.
- Environmental ethics; issues and possible solutions.
- Climate change, global warming: causes, effects and mitigation (national and international efforts)
- Ozone layer depletion: causes, effects and mitigation. (national and international)
- Environmental Protection Act 1986
- Air (Prevention and Control of pollution) Act, Water (Prevention and control of Pollution) Act.
- Wildlife Protection Act 1972
- Forest Conservation Act 1980
- The Biological Diversity Act 2002
- Issues involved in enforcement of environmental legislation, public awareness, Article 48A and 51A
- Automobile Emission standards (Eco/Bharat), Ecomark

Human Population and the Environment:

- Population growth, variation among nations, population explosion Family Welfare Programme.
- Environment and human health.
- Role of Information Technology in environment and human health.

Sustainable Development:

- Definition, concepts and currencies
- Sustainable development of agro-ecosystem (organic farming)
- Sericulture, floriculture, bee keeping
- Sustainable development of hydroenergy in Uttaranchal
- Traditional Ecological knowledge (TEK)

Field Work/Practicals

- Documentation of natural resources of local area (river, forest, lake, pond, mountain, grassland)
- Visit to local polluted sites-urban/rural/industrial/agricultural
- Study of Common plants, birds and mammals
- Study of simple ecosystem (pond, river, lake, hill slopes, etc.)
- Visit to sanctuaries, national parks and biosphere reserves.

B.SC. AGRICULTURE SEMESTER – VI
Paper – V (SILVICULTURE AND AGRO-FORESTRY)

Introduction basic terms, concepts and scope, national and global need, growth and development of trees and forest stands growth and developmental stages and growth measurements, factors affecting tree and stand growth, plant succession kinds and causes, natural and artificial regeneration establishment and care of tree nurseries tending operations cleaning, weeding, thinning, pruning and other cultural operation classification, regeneration and crop characteristics of major Silvicultural systems, basic concepts of rotation, sustainable yield management and multiple use, establishment of forest stands/crops and agroforestry-selection and management of tree and crop species i.e. planting density, geometry and Silviculture, comparison among various land uses-mixed farming, multiple cropping and agroforestry, Interactions between components of agroforests for various resources and productivity. Problems, choice and management of agro-forestry systems in various agro-climatic zones.

Practicals

Identification and judging of tree species for their agro-forestry potentials, growth and development stages of forest trees and shrubs, Qualification of growth (tree height, diameter, volume and increment) in trees, forest types natural regeneration, seed collection, storage and testing. Planning forest nurseries site preparation and planting, computation of biological rotation in tree crop and tree crop interaction studies in agro forestry.

B.SC. AGRICULTURE SEMESTER – VI
Paper – VI (SEED PRODUCTION AND PROCESSING TECHNOLOGY)

Seed, its importance in green revolution difference between grain and seed, concept of seed quality, steps involved in seed production. Seed technology, its objectives and its role in increasing agriculture production. Seed industry in India. Development of seed programmes, general principles of seed production. Seed replacement rate, multiplication rate, Breeder's, foundation and certified seed, maintenance of genetic purity, Nucleus and breeders seed production of newly released and established varieties of self pollinated crops, viz, Rice, Wheat Soybean/chickpea, Pigeonpea, Rapeseed and Mustard etc Maintenance of nucleus and breeder's seed in cross pollinated crop varieties, inbreds and non-inbreds, maintenance of seed of established varieties. Foundation and certified seed production of maize inbreds, single and double cross hybrids. Hybrid seed production of Sunflower, Sorghum, pearl millet and Rice using male sterility systems. Latest released hybrids of Maize, Sorghum, Bajra and Rice their characteristic feature, seed production of Wheat, Rice, Oats, Soybean, Gram, Urd, Moong, Sunflower, Pigeonpea etc. seed certification, its concepts, roles and goals, seed certification agencies, certified and truthfully labeled seeds. Seed processing, storage and marketing, Minimum seed certification standards for self and cross-pollinated crops. Field and seed inspections objectives, general principles and methods, Seed sampling and seed testing for analytical purity, varietal identification through electrophoreses, Grow out test for cultivar purity, seed legislation and seed law enforcement including IPR, PBR in India, Record developments in seed

Practicals

Seed production in major crops viz, Rice, Wheat, Soybean, pulses, Oil seeds, Maize, Sunflower, Sorghum, Bajra and Forage crops, Seed testing approaches and techniques in cereals, pulses, oilseeds and other crops.

B.SC. AGRICULTURE SEMESTER – VI
Paper – VII (PRACTICAL CROPS PRODUCTION - II)

Complete Practical acquaintance relating to scientific production technique of major field of the season crop(s) including sowing weeding, hoeing, fertilizer and manure application, harvesting etc.

B.SC. AGRICULTURE SEMESTER – VII
Paper – I (GENERAL ECONOMICS)

Nature, scope and subject matter of economics, approaches to economic analysis and nature of economic theory, basic terms and concepts; law of demand, determinants of demand, price, cross price and income elasticity of demand and their applications; law of diminishing marginal utility and principle of equi-marginal utility, consumer's equilibrium and derivation of demand curve; factors of production and input-output relationships, law of variable proportions and laws of scale; cost concepts, law of supply, determinants of supply, elasticity of supply; firm's equilibrium and market equilibrium in short run and long run; features of perfectly competitive market, price determination under perfect competition, basic features of monopoly, duopoly, oligopoly and monopolistic competition; meaning of distribution, factor market and pricing of factors of production.

Importance of national income, concepts of national income, approaches of measuring national income, difficulties and limitations of national income accounting; importance of population studies, determinants of population, theories of population; barter system of exchange and its problems, classification of money and concepts of money supply, quantity theory of money. GPT, inflation, deflation; role of bank money in modern economy, types of banks and their function, credit creation by commercial banks, functions of central bank and instruments of credit control, current changes in banking; concept of economy and economic system, basic feature of capitalistic, socialistic and mixed economic systems, elements of economic planning; international trade, its need and importance, theories of absolute and comparative advantage, exchange rate, TOT, BOP, devaluation of currency, recent developments in world trade.

Special characteristics of agriculture and its role in economic development, agricultural planning and development in the country. Role of women in Indian Agriculture.

B.SC. AGRICULTURE SEMESTER – VII
Paper – II (BREEDING AND IMPROVEMENT OF FARM ANIMALS)

Reproductive systems of farm animals. Qualitative and quantitative inheritance and effect of environment on them. Various qualitative and quantitative traits of livestock. Weinberg law, variation, its measures, genetic, phenotypic and environmental variances. Heritability and repeatability, its measurement and uses. Selection its genetic effect, selection for dominant and recessive gene and quantitative traits, selection differential, response to selection, generation interval and annual rate of gain. Genetic correlation and correlated response. Basic of selection, individual, family, progeny, pedigree and combined selection. Methods of selection for one or more traits random, independent culling level and selection index. Inbreeding its consequences, inbred lines, line breeding, inbreeding, coefficient and relationship coefficient, out breeding – various types of our crossing and cross-breeding, species hybridization and development of new breeds.

Practicals

Computation of mean, variance, standard deviation, correlation and regression coefficients, inbreeding coefficients and relationship coefficient in economic traits of livestock, estimation of gene frequency, repeatability and heritability in animal population.

B.SC. AGRICULTURE SEMESTER – VII
Paper – III (PRINCIPLES OF ANIMAL NUTRITION)

Introduction to expanding field of nutrition, chemical composition of animal and its food, digestive systems and processes of farm animals. Digestion, absorption and metabolism of carbohydrates, lipids and proteins in protein content in various classes of feeds. Concept of essential amino acids for non-ruminants and protein quality of feeds. The absorption and metabolism of essential minerals and vitamins; symptoms of their deficiencies; minerals and vitamin content of various classes of feeds. The nutritive evaluation of feeds for energy and protein, digestibility of feeds values of feeds, nutrient requirements of farm animals for maintenance, growth reproduction and lactation. Growth stimulating substances.

Practicals

Study of plant cell, forages and fodders, cereals, cereal offals and oil cakes, animal, avain and marine offals, mineral and vitamin supplements and other feed additives. Least cost ration formulation, proximate analysis of feed samples for moisture, crude protein, crude fat, crude fibre, ash, acid insoluble ash and nitrogen free extractive. Formulation of ration for cattle, buffaloes, sheep, goat, swine and poultry.

B.SC. AGRICULTURE SEMESTER – VII
Paper – IV (ELEMENTS OF FOOD TECHNOLOGY)

Scope and importance of food technology in Indian economy. Handling, transportation and storage of food grains, fresh milk, meat, fish and eggs; physical, chemical and nutritional characteristics of food grains – fresh meat, fish, milk and eggs; role of milling and size reduction in food processing; Use of low temperatures in processing and storage of food grains, fresh milk, meat, fish and eggs; Drying and dehydration of food grains and concentration and evaporation of milk; Food fermentations and their application in food processing. Role of food additives in the processing of food grains, milk, meat, fish, eggs and their products; Food irradiation and its application in extending shelf life of food grains, meat, fish, eggs and their products; Food packaging and its functions; By product's utilization and disposal of food industry wastes; quality control, total quality assurance (TQA) and various systems of TQA.

Practicals

Milling of wheat and rice and testing quality of milled products; baking of bread, biscuits and cakes; physical and chemical properties of milk, separation of cream and ghee making, preparation of chhena, paneer, khoa, ice cream and cottage cheese. Slaughtering of poultry and pickling of culled meat, Preparation of meat kabab and patties. Evaluation and preservation of fresh eggs, Visit to food industries.

B.SC. AGRICULTURE SEMESTER – VII
Paper – V (HUMAN FOOD AND NUTRITION)

Trends in food production and consumption in India. Role of agricultural scientists and food technologist in meeting national nutritional requirements.

Definition of human nutrition, nutrient, nutritional care, health, nutritional status and good nutrition. Food and its functions and functional classification. Calorific value of foods and its measurement. Digestion and absorption of various nutrients present in foods. Energy and nutrient needs of human body. Recommended dietary allowances for various age groups and classes of individuals. Common nutritional problems in India and their causes. Specific nutritional deficiencies and disorders including protein calorie malnutrition, nutritional anaemias, vitamin deficiencies, obesity, atherosclerosis. Clinical symptoms and diagnosis of deficiency disorders. Important food groups and their role in the management of deficiency disorders and diseases. Food habits and their effect on regional balance. Balanced diet and its formulation.

Food borne infections and food hygiene. Effect of processing on the nutritional value of foods. Applied nutritional programme in country, nutritional policies of government. Food fortification, enrichment and restoration, supplementary feeding programmes for vulnerable groups. State, national and international agencies dealing with nutritional programmes.

Practicals

Determination of proximate composition, pH, acidity, minerals and vitamins (B¹, B¹², and C) in foods. Detection of adulteration in various foods. Determination of calorific value of foods and formulation of balanced diets. Microbiological analysis of foods (SPC, coliform, and yeast and mould count). Signs of malnutrition in animals. Diagnosis of nutritional deficiency disorders in human being.

B.SC. AGRICULTURE SEMESTER – VII
Paper – VI (SOIL TAXONOMY, SOIL SURVEY AND REMOTE SENSING)

Types of soil survey, morphological, physical and chemical properties used in distinguishing and classifying soils. Principles of soil taxonomy, classification system. Soils of India and their classification. Advantages of taxonomic classification of soils.

Remote sensing introduction, definition, concept, principles, importance, scope, types, merits and demerits and its application in agriculture and soil classification.

Practicals

Field visit and practice of judging soil texture by feel method; examination of soil profile. Study of base maps used for soil survey, village or cadastral maps, topographic maps, aerial photographs and use of stereoscope, satellite imagery. Examination of soil properties of some important soils of India. Aerial photographs, adjustment of stereoscope. Area estimation of eroded land from F.C.C. (False colour composite). Visit of Remote Sensing application centre/soil survey organization.

B.SC. AGRICULTURE SEMESTER – VII
Paper – VII (Production Technology of Medicinal and Aromatic Plants)

Importance and scope of medicinal and aromatic plants, geographical distribution of species, botanical description, management of nurseries, climate and relation to medicinal and aromatic plants, improved varieties, soil and land preparation, intercultural practices, irrigation and insect-pest management, post harvest techniques, harvesting processing, storage and herbage/constituent yield. The following medicinal and aromatic plants shall be covered.

Medicinal Plants: Sarpagandha, poppy, sadabahar, digitallis, dioscora, solanum, brahmi, isabgol, senna, aloe, neem, cinchona and Ipecac.

Aromatic Plants: Essential oils: Mints-menthol mint, pepper mint, Spearmint, bergamot mint; Aromatic grasses lemon grass, palmarosa, citronella, vetiver; Ocimum, geranium, pachauli, dill (Sowa), Cinamon, pine, eucalyptus, sandalwood, liquorice

Flower perfume: lavender, rose, rosemary, jasmine

Practicals

Identification and preparation of herbarium, techniques of sowing/planting, study of morphological and chemical characteristics, yield, techniques for quality analysis and visit to related research institution/drug farms and pharmaceutical industries involved in the cultivation and processing of medicinal and aromatic plants.

B.SC. AGRICULTURE SEMESTER – VIII

RURAL AGRICULTURAL WORK EXPERIENCE

Each student will have a choice to opt any of the four components given below. He/she will submit his/her work in form of a report and present the results in the seminar. The work will be evaluated internally in which seminar will be of 50% marks of the total.

- i. Agro-based Industries – Seed processing plants and industries, fruit preservation industries, food processing industries etc.
- ii. Plant clinics
- iii. NGO
- iv. Socio economic studies
- v. Apiculture
- vi. Sericulture
- vii. Mushroom Cultivation
- viii. Attachment with agriculture Departments
- ix. Attachment with Agriculture research institutes/organizations/agencies.