COURSE CONTENTS
B.Sc. (Ag) First Year Even Semester

S. No.	Course Title	Credit Hrs	Theory		Practical	Total
			Ex.	Int.		
1.	Fundamentals of Soil Science	2+1	35	15	25	75
2.	Fundamental 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**

Paper I. Fundamentals of Soil Science

Soil as a natural body and medium for plant growth; soil component and soil plant relationship; soil farming rocks and minerals; weathering and process 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 wastes in soil- Urban and Industrial wastes. Soil water retention, dynamics and availability; soil air composition and dynamic; source, amount and flow of heat in soils; soil temperature and plant growth; soil survey and classification, soil of India; soil pollution behavior of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practical

Use of soil sampling tools, collection, preservation and storage of soil sample. Study of soil forming rocks, mineral density and porosity. Study of soil texture by feel method. Study of 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 changes on soil colloids and its nutrient retention capacity. Estimation of organic matter content and buffering capacity of soil. Microscopic examination of soil microbes.

Paper II. Fundamentals of Horticulture

Horticulture: Definition and its 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 propagation; causes of unfruitfulness; pollinizers and pollinators; environmental and soil factors affecting vegetable production, kitchen gardening; typesof gardens and their parts; care and maintenance of ornamental plants; lawn making; knowledge of landscaping of rural and urban areas; exposure to important medicinal & aromatic plants, spices and condiments, use of plant bio-regulator in Horticulture, post Harvest Technology- Principles and Practices.

Practical

Identification of garden tools and horticulture 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 seedling, making of herbaceous and shrubbery borders and potting mixture; potting and repotting.

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: Derivative path ways- glycolysis, hexose mono phosphate pathways, degradation of starch, sucrose, other sugars, fatty acids and acylglycerols, proteins and amino acids; Biosynthetic path ways, photosynthesis, formation of sucrose and starch, Kreb's cycle and electron transport chain; Nitrogen and sulpher cycles; Nitrogen fixation, assimilation of ammonia; synthesis of DNA,RNA and proteins; Secondry metabolites- structure, function and metabolism.

Practical

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 and protein and cholesterol; acid and enzymatic hydrolysis of starch and identification of products by paper chromatography; enzymatic hydraolysis of starch and dentification of products by paper chromatography of lipids; assay of dehydrogenase and demonstration of differential centrifugation, gel electrophoresis, ion exchange caromatography and gel filtration.

Paper IV. Weed Management

Introduction: definition, costs to society from weeds, classification of weed, Ecology of weeds: Reproduction (Seed production, seed dissemination, seed germation, vegetative reproduction), geographical distribution, factor influencing weed distribution, weed succession on uncultivates sites, competition between crops and weeds. Concepts of prevention, eradication and control of weeds. Weed control methods: Physical, cultural, biological, chemical and integarated weed management, Introduction to herbicids: basic concepts, polar vs. Non-polar, Esters, Salts, acids etc, Surfactant chemistry. Factors affecting foliage active herbicides: reaching the target plants, spray retention, absorption into leaf, translocation, and factors influencing soil applied herbicides: microbiological effect, soil absorption, photo-decomposition and volatilization, spray of herbicides.

Practicals

Study of common Indian weeds and 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 growth and development of crops and weeds. Tours and visits to weed affected field & areas.

Paper V. Elements of Genetics

History: pre-mendelian and post-mendelian concepts of heredity, mendelian principles of heredity, probability and chi-square,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 pseudoalles. Sex determination, sex linkage, sex limited and sex influenced traits. Linkage, crossing over mechanism, chromosomes mapping, structural change in chromosoces: Deletion and Duplication, Translocation and inversion, “Numererical change in chromosomes, chemical basis of heredity” Gene concept, mode of replication of genetic material, transcript and translation genetic material. Gene regulation and operon concept. Mutation- chemical and physical mutagens, mode of action of mutagens. Extra nucear inheritance. Polygene and quantitative inheritance. Introduction to plant tissue culture.

Practicals

Simple and compound microscope, cell culture, monohybrid and dihybrid cross, epistatic interactions. Practice of mitrotic and meiotic cell division over two point test cross linkage analysis, three point test cross linkage analysis, sex linked inheritance, pedigree analysis, DNA and RNA structure. Structural change in Chromosomes and numerical change in chromosomes.

Paper VI. Introduction Entomology

Introdcution and scope of Entomology, brief history of entomology in India, Insects as Arthropods and its relationship with phylum Annelida and other classes of Arthropoda, origin of insects, major points related to dominance of insects in Animal Kingdom. External morphology and antomy of grasshopper; body segmentation, integument, thorex and abdomen, antennae, legs and wings and their modifications, generalized mouth parts and their modification, Alimentary, Circulatory, Excretory, Respiratory, Reproductive and nervous system, 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 order and families of agricultural importance like Orthoptera; Tectigonidae, Gryllidae, Gryllotalpidae, Acrididate; Dictyoptera: Mantidae, Blattidae; Isoptera: Hemiptera, Coreidae, Cimicidae, Cicadellidae, Delphacidae, Lophophidae, Aleurodidae, Aphididae, Coccidae; Thysanoptera Coleoptera. Carabidae, Meloidas, Coccinellidae, Bruchidae, Chrysomelidae, Curculionidae, Cerambycide;Diptera: Culicidae Cephritidae, Agromyzidae, Muscidae; Lepidoptera: Pieridae, Papillionidae, Hespiriidae, Sphingidae, Noctuidae, Artiidae, Pyralidae, Saturnidae, Bombycide; Hymenoptera. Tenthredinidae, Braconidae, Chalcididae, Trichogrammatidae.

Practical

Collection, Killing, Pinning and mounting of insects, study of different classes of phylum Arthropoda, external morphology of grasshopper, typical mouth parts and their modifications of antennae, legs, wings and parts and their coupling apparatus, structure of alimentary canal and nervous system, tracheal, reproductive and other system in insects, post embryonic development in insects and basics of insects classification. Basic groups of present day insects with special reference to orders and families of agricultural.

Paper VII. Introduction Plant Pathology

Importance of plant disease, scope and objectives of plant pathology. Concept of plant diseases inanimate cause and plant virus. Classification of plant disease. Definition and terms, parasites, pathogens, biotrophs and hemibotrophs, necrotrophs, pathogenecity, pathogenesis, virulence, infection, primary infection, innoculum, invasion and colonisation, inoculum potential, symptoms, incubation period, disease cycle, disease syndrome, single cycle disease, multiple cycle disease, alternate host, collateral host, predisposition, physiologicerace, biotype, symbiosis, mutualism, antagonism. History of plant pathology with special reference to Indian work. Pathogenesis & parasitism, Koch’s postulate. Effect of pathogenesis on the plants, morphological changes, physiological changes. Developemnt of epidemics. Principles and methods of plant disease management. Basic concepts; avoidance, eradication, protection, disease resistance and therapy.

General morphology, characteristics of fungi and somatic structure, reproduction of various structure. Basic and different methods of classification of fungi, taxonomy and nomenclature. Study of selected genera. Plasmodiophora, spongospora (Myxomycota), Synchitryum, Physeoderma, pythium,phytophthora, albugo, sclerophthora, pernospora (Mastigomycotina); Taphrina, Erisyphe, claviceps, Sclerotina (Ascomycotina), Puccinia, Melampsora, Uromyces, Ustilego, Tilletia, Neovossia, Sphacelotheca, Tolyposporium (Basidiomycotina), Colletotrichum,Alternaria,Cercospora, Fusarium, Helmenthosporium, Pyricularia, sclerotium, Rhizoctonia, Phyllosticta,Phoma (Deutromycotina). General morphologcal and cultural characters of procaryotes (Bacteria, basic methods of classification, taxonomy and nomenclature. Nutrition and effects of physiochemical factors on growth. Reprodcution and life cycle. Genetics and variability, imporatance and general characters of mycoplasma, spiroplasma & Fastidious bacteria, reproduction, nomenclature and classification. Physical architecture and chemical composition of virus & viriods. Nomenclature and criteria of identification, multiplication, transmission and infective nature. General morphological characters, life cycle, reproduction of nematodes behaviour in soil and nematodes as vectors for other plant pathogens. Classification and general identifying characters of phenerogames plant parasites, reproduction and life cycle.

Practical

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

Paper VIII. Microbiology

Microbial word 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 symbiotic nitrogen fixation, Azolla and micorrhiza biodegradation of Agricultural chemical pesticides, herbicides and agricultural organic wastes; Microbiology of milk and Milk products, rural microbiology and silage production; Microbes in human welfare bio-fertilizers bio-pesticides, waste treatment and recycling; composting, ethanol production, antibiotic production, human and plant pathogenic microbes.

Practical

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 mad utensils, methods of disinfections and sterilization, microbial analysis of air, water, soil and compost, microbial examination of storeal products, microbial analysis of fresh food vegetables, milk and dairy products, microbial examination offeriented food products, antibiotic assay.