

Second Semester

Sr. No.	Subject Code	Name of the Subject	Contact Hours		Marks Distribution			Credits
			Theory	Practical	Internal	External	Total	
1.	BAGRS1-251	Fundamentals of Plant Pathology	3	0	40	60	100	3
2.	BAGRS1-252	Crop Physiology	1	0	40	60	100	1
3.	BAGRS1-253	Fundamentals of Entomology	3	0	40	60	100	3
4.	BAGRS1-254	Fundamentals of Agricultural Economics	2	0	40	60	100	2
5.	BAGRS1-255	Agricultural Microbiology	1	0	40	60	100	1
6.	BAGRS1-256	Fundamentals of Genetics	2	0	40	60	100	2
7.	BAGRS1-257	Introduction to Agricultural Extension Education	2	0	40	60	100	2
8.	BAGRS1-258	Soil and Water Conservation Engineering	1	0	40	60	100	1
9.	BAGRS1-259	Fundamentals of Plant Pathology lab	0	2	20	30	50	1
10.	BAGRS1-260	Crop Physiology lab	0	2	20	30	50	1
11.	BAGRS1-261	Fundamentals of Entomology Lab	0	2	20	30	50	1
12.	BAGRS1-262	Agricultural Microbiology Lab	0	2	20	30	50	1
13.	BAGRS1-263	Fundamentals of Genetics Lab XIV	0	2	20	30	50	1
14.	BAGRS1-264	Introduction to Agricultural Extension Education Lab	0	2	20	30	50	1
15.	BAGRS1-265	Soil and Water Conservation Engineering Lab	0	2	20	30	50	1
16.	BAGRS1-266	Communication Skills and Personality Development	1	0	40	60	100	1
17.	BAGRS1-267	Communication Skills and Personality Development Lab	0	2	20	30	50	1
		Total	16	16	520	780	1300	24

SEMESTER II

FUNDAMENTALS OF PLANT PATHOLOGY

Subject Code: BAGRS1-251

L P C
3 0 3

Duration: 45 Hours

SECTION-A (12 Hours)

Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology and Pathogenesis. Causes / factors affecting disease development: disease triangle and tetrahedron and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vascular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes.

SECTION-B (12 Hours)

Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, subdivisions, orders and classes. Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction. Viruses: nature, structure, replication and transmission. Study of phanerogamic plant parasites. Nematodes: General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina, Radopholus etc.)

SECTION-C (11 Hours)

Growth and reproduction of plant pathogens. Liberation/dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defence mechanism in plants.

SECTION-D (10 Hours)

Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.

CROP PHYSIOLOGY

Subject Code: BAGRS1-252

L P C
1 0 1

Duration: 15 Hours

Section-A (4 Hours)

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology;

Section-B (4 Hours)

Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms;

Section-C (3 Hours)

Photosynthesis: Light and Dark reactions, C₃, C₄ and CAM plants; Respiration: Glycolysis, TCA cycle and electron transport chain;

Section-D (4 Hours)

Plant growth regulators: Physiological roles and agricultural uses, Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

FUNDAMENTALS OF ENTOMOLOGY

Subject Code: BAGRS1-253

L P C
3 0 3

Duration: 45 Hours

Section-A (12 Hours)

History of Entomology in India. Classification of phylum Arthropoda into classes. Relationship of class Insecta with other classes of Arthropoda. Systematics: Taxonomy – importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta into Orders, Special emphasis to orders and families of Agricultural importance like **Orthoptera**: Acrididae, Tettigoniidae, Gryllidae; **Dictyoptera**: Mantidae, Blattidae; **Odonata**; **Isoptera**: Termitidae; **Thysanoptera**: Thripidae; **Hemiptera**: Pentatomidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae; **Neuroptera**: Chrysopidae; **Lepidoptera**: Pieridae, Noctuidae, Pyralidae, Gelechiidae, Arctiidae, Bombycidae; **Coleoptera**: Coccinellidae, Chrysomelidae, Curculionidae, Bruchidae; **Hymenoptera**: Tenthredinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae; **Diptera**: Cecidomyiidae, Culicidae, Muscidae, Tephritidae.

Section-B (12 Hours)

Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure and modifications of insect antennae, mouth parts, legs, Wing modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous and reproductive system in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

Section-C (11 Hours)

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors – temperature, moisture, humidity, rainfall, light. Effect of biotic factors – food competition, natural and environmental resistance. Major points related to dominance of class Insecta in Animal kingdom. Various categories of pests.

Section-D (10 Hours)

Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control- importance, hazards and limitations. Recent methods of pest control, repellents, antifeedants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Symptoms of poisoning, first aid and antidotes.

FUNDAMENTALS OF AGRICULTURAL ECONOMICS

Subject Code: BAGRS1-254

L P C
2 0 2

Duration: 30 Hours

SECTION-A (8 Hours)

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro-economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, importance role of Agriculture in-economic development. Agricultural

planning and development in the country. Population: Malthusian theory, Elements of economic planning.

SECTION-B (7 Hours)

Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity.

SECTION-C (7 Hours)

Production: process, creation of utility, factors of production, input output relationship. *Laws of returns:* Law of variable proportions and law of returns to scale. *Cost:* concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit.

SECTION-D (8 Hours)

National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socioeconomic determinants, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning

AGRICULTURAL MICROBIOLOGY

Subject Code: BAGRS1-255

**L P C
1 0 1**

Duration: 15 Hours

SECTION-A (4 Hours)

Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photoautotrophy, growth. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, plasmids, transposons.

SECTION-B (4 Hours)

Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and sulphur cycles.

SECTION-C (4 Hours)

Biological nitrogen fixation- symbiotic, associative and aysmbiotic. *Azolla*, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

SECTION-D (3 Hours)

Introduction to mushroom cultivation; types of mushrooms; designing and construction of mushroom farm; composting (*Agaricus biosporus*; *Pleurotus spp.*, *Volvariella spp.*) spawn production.

FUNDAMENTALS OF GENETICS

Subject Code: BAGRS1-256

**L P C
2 0 2**

Duration: 30 Hours

SECTION-A (8 Hours)

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes. Chromosomal theory of inheritance. Cell cycle and cell division- mitosis and meiosis. Probability and Chi-square. Dominance relationships, Epistatic interactions with example

SECTION-B (7 Hours)

Multiple alleles, pleiotropism and pseudoalleles. Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping.

SECTION-C (8 Hours)

Structural and numerical variations in chromosomes and their implications, Mutation, classification, methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. Genetic disorders.

SECTION-D (7 Hours)

Nature, structure & replication of genetic material. Protein synthesis, transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

INTRODUCTION TO AGRICULTURAL EXTENSION EDUCATION

Subject Code: BAGRS1-257

**L P C
2 0 2**

Duration: 30 Hours

Section-A (8 Hours)

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning-Meaning, Process, Principles and Steps in Programme Development. Extension systems in India:

Section-B (8 Hours)

Extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP etc.), Newtrends in agriculture extension, privatization extension, cyber extension/e-extension, expert system etc., market-led extension, farmer-led extension, Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles.

Section-C (7 Hours)

Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and

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models, capacity building of extension personnel, extension teaching methods: meaning, classification, individual, group and mass contact methods.

Section-D (7 Hours)

ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

SOIL AND WATER CONSERVATION ENGINEERING

Subject Code: BAGRS1-258

L P C
1 0 1

Duration: 15 Hours

SECTION-A (4 hours)

- 1) Soil Erosion Principles.
- 2) Erosivity and Erodibility
- 3) Factors affecting water erosion
- 4) Types of water erosion (Raindrop, sheet, rill and gully erosion)

SECTION-B (4 hours)

- 5) Gully classification
- 6) Gully control measures

SECTION-C (4 hours)

- 7) Factors affecting wind erosion
- 8) Wind erosion control measures (wind breaks and shelter belts)

SECTION-D (3 hours)

- 9) Universal Soil loss Equation for water erosion
- 10) Conservation measure for hill slopes
- 11) Conservation measures for agricultural lands

FUNDAMENTALS OF PLANT PATHOLOGY LAB

Subject Code: BAGRS1-259

L P C
0 2 1

Duration: 30 Hours

Practical

Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Staining and identification of plant pathogenic bacteria. Study of representative fungal genera. Transmission of plant viruses. Study of phanerogamic plant parasites. Study of morphological features and identification of plant parasitic nematodes. Sampling and extraction of nematodes from soil and plant material, preparation of nematode mounting. Study of fungicides and their formulations. Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations.

CROP PHYSIOLOGY LAB

Subject Code: BAGRS1-260

**L P C
0 2 1**

Duration: 30 Hours

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content. Measurement of photosynthetic CO₂ assimilation by Infrared Gas Analyser (IRGA).

FUNDAMENTALS OF ENTOMOLOGY LAB

Subject Code: BAGRS1-261

**L P C
0 2 1**

Duration: 30 Hours

Methods of collection and preservation of insects including immature stages; External features of Grasshopper Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance. Insecticides and their formulations. Pesticide appliances and their maintenance. Sampling techniques for estimation of insect population and damage.

AGRICULTURAL MICROBIOLOGY LAB

Subject Code: BAGRS1-262

**L P C
0 2 1**

Duration: 30 Hours

Practical

Introduction to microbiology laboratory and its equipments; Microscope- parts, principles of microscopy, resolving power and numerical aperture. Methods of sterilization. Nutritional media and their preparations. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes. Methods of isolation and purification of microbial cultures. Isolation of *Rhizobium* from legume root nodule. Isolation of *Azotobacter* from soil. Isolation of *Azospirillum* from roots. Isolation of BGA. Staining and microscopic examination of microbes. Study of spawn production for mushroom cultivation. Study about composting for mushroom cultivation.

FUNDAMENTALS OF GENETICS LAB

Subject Code: BAGRS1-263

**L P C
0 2 1**

Duration: 30 Hours

Practical

Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Practice on mitotic and meiotic cell division, Experiments on epistatic interactions including test cross and back cross, Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two point test cross and three point test cross data). Study on sex linked inheritance in *Drosophila*. Study of models on DNA and RNA structures.

INTRODUCTION TO AGRICULTURAL EXTENSION EDUCATION LAB

Subject Code: BAGRS1-264

**L P C
0 2 1**

Duration: 30 Hours

Practical

To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA and other development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media: Role of community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television.

SOIL AND WATER CONSERVATION ENGINEERING LAB

Subject Code: BAGRS1-265

**L P C
0 2 1**

Duration: 30 Hours

Practical:

- 1) General Status of Soil Conservation in India
- 2) Calculation of erosion index
- 3) Estimation of soil loss
- 4) Measurement of soil loss. Preparation of contour maps, Design of grassed water ways.
- 5) Design of contour bunds
- 6) Design of graded bunds
- 7) Design of bench terracing system
- 8) Problems on wind erosion

COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

Subject Code: BAGRS1-266

**L P C
1 0 1**

Duration: 15 Hours

Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and non-verbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT LAB

Subject Code: BAGRS1-267

**L P C
0 2 1**

Duration: 30 Hours

Practical

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations.