B. Sc. Agriculture (Honors) 3rd Sem. **Contact Hours: 26 Hrs.**

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG-301	Principles of Agronomy-I	2	0	0	40	60	100	2
BSAG-302	Plant Physiology	2	0	0	40	60	100	2
BSAG-303	Fundamentals of Insect Morphology and Systematics	2	0	0	40	60	100	2
BSAG-304	Introduction to Genetics	2	0	0	40	60	100	2
BSAG-305	Dimensions of Agricultural Extension	2	0	0	40	60	100	2
BSAG-306	Principles of Plant Pathology	2	0	0	40	60	100	2
BSAG-307	Soil Chemistry, Fertility and Nutrient Management	2	0	0	40	60	100	2
BSAG-308	Principles of Agronomy-I (Practical)	0	0	2	20	30	50	1
BSAG-309	Plant Physiology (Practical)	0	0	2	20	30	50	1
BSAG-310	Fundamentals of Insect Morphology and Systematics (Practical)	0	0	2	20	30	50	1
BSAG-311	Introduction to Genetics (Practical)	0	0	2	20	30	50	1
BSAG-312	Principles of Plant Pathology (Practical)	0	0	2	20	30	50	1
BSAG-313	Soil Chemistry, Fertility and Nutrient Management (Practical)	0	0	2	20	30	50	1
TOTAL		14	0	12	400	600	1000	20

B. Sc. Agriculture (Honors) 4th Sem. **Contact Hours: 29 Hrs.**

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG-401	Principles of Agronomy II (Rabi Crops)	2	0	0	40	60	100	2
BSAG-402	Organic Farming	1	0	0	40	60	100	1
BSAG-403	Farm Management & Agriculture Finance	2	0	0	40	60	100	2
BSAG-404	Insect Ecology and Integrated PestManagement	2	0	0	40	60	100	2
BSAG-405	Extension Methodology and Communication Skills for Transfer of technology	2	0	0	40	60	100	2
BSAG-406	Principles of Seed Technology	2	0	0	40	60	100	2
BSAG-407	Manures and Fertilizers	2	0	0	40	60	100	2
BSAG-408	Farm Power & Machinery	2	0	0	40	60	100	2
BSAG-409	Basic Statistics	2	0	0	40	60	100	2
BSAG-410	Principles of Agronomy II (Rabi Crops) (Practical)	0	0	2	20	30	50	1
BSAG-411	Organic Farming (Practical)	0	0	2	20	30	50	1
BSAG-412	Farm Management and Agriculture Finance (Practical)	0	0	2	20	30	50	1
BSAG-413	Insect Ecology and Integrated Pest Management (Practical)	0	0	2	20	30	50	1
BSAG-414	Principles of Seed Technology (Practical)	0	0	2	20	30	50	1
BSAG-415	Farm Power & Machinery (Practical)	0	0	2	20	30	50	1
TOTAL		17	0	12	480	720	1200	23

B. Sc. Agriculture (Honors) 5th Sem. **Contact Hours: 29 Hrs.**

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG-501	Fundamental of Soil and Water Engineering	2	0	0	40	60	100	2
BSAG-502	Plant Tissue Culture and Genetic Transformation	2	0	0	40	60	100	2
BSAG-503	Chemistry of Agrochemicals	2	0	0	40	60	100	2
BSAG-504	Agriculture Marketing Trade and Prices	2	0	0	40	60	100	2
BSAG-505	Insect Pest of Crops and Stored Grains	3	0	0	40	60	100	3
BSAG-506	Introductory Forestry	1	0	0	40	60	100	1
BSAG-507	Introduction of Plant Breeding	2	0	0	40	60	100	2
BSAG-508	Livestock Production and Management	2	0	0	40	60	100	2
BSAG-509	Fundamental of Soil and Water Engineering (Practical)	0	0	2	20	30	50	1
BSAG-510	Plant Tissue Culture and Genetic Transformation (Practical)	0	0	2	20	30	50	1
BSAG-511	Insect Pest of Crops and Stored Grains (Practical)	0	0	2	20	30	50	1
BSAG-512	Introductory Forestry (Practical)	0	0	2	20	30	50	1
BSAG-513	Introduction of Plant Breeding (Practical)	0	0	2	20	30	50	1
BSAG-514	Livestock Production and Management (Practical)	0	0	2	20	30	50	1
BSAG-515	Practical Crops Production (Kharif Crops)	0	0	2	20	30	50	1
BSAG-516	Educational Tour	0	0	2	00	00	00	N.C.*
TOTAL		16	0	16	460	690	1150	23

B. Sc. Agriculture (Honors) 6th Sem. **Contact Hours: 24 Hrs.**

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG-601	Crop Residue Management	2	0	0	40	60	100	2
BSAG-602	Diseases of Horticultural Crops and their Management	2	0	0	40	60	100	2
BSAG-603	Flower Cultivation and Landscape Gardening	2	0	0	40	60	100	2
BSAG-604	Breeding of Field and Horticultural Crops	2	0	0	40	60	100	2
BSAG-605	Environmental Science and Disaster Management	2	0	0	40	60	100	2
BSAG-606	Fundamentals of Agri-business management	2	0	0	40	60	100	2
BSAG-607	Protected Cultivation and Post-Harvest Technology	2	0	0	40	60	100	2
BSAG-608	Renewable Energy	1	0	0	40	60	100	1
BSAG-609	Post-Harvest Management of Fruits and Vegetables	2	0	0	40	60	100	2
BSAG-610	Practical Crop Production-II (Rabi Crops)	0	0	1	30	20	50	1
BSAG-611	Diseases of Horticultural Crops and their Management (Practical)	0	0	1	30	20	50	1
BSAG-612	Flower Cultivation and Landscape Gardening	0	0	1	30	20	50	1
BSAG-613	Breeding of Field and Horticultural Crops (Practical)	0	0	1	30	20	50	1
BSAG-614	Protected Cultivation and Post-Harvest Technology (Practical)	0	0	1	30	20	50	1
BSAG-615	Renewable Energy (Practical)	0	0	1	30	20	50	1
BSAG-616	Post-Harvest Management of Fruits and Vegetables (Practical)	0	0	1	30	20	50	1
TOTAL		17	0	7	570	680	1250	24

B. Sc. Agriculture (Honors) 7th Sem.

Compulsory Courses for all streams of 7th semester **Contact Hours: 8 Hrs.**

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG-701	Diseases of Field Crops & their Management	2	0	0	40	60	100	2
BSAG-702	Introduction to Molecular Biotechnology	2	0	0	40	60	100	2
BSAG-703	Diseases of Field Crops & their Management (Practical)	0	0	2	20	30	50	1
BSAG-704	Introduction to Molecular Biotechnology (Practical)	0	0	2	20	30	50	1
TOTAL		4	0	4	120	180	300	6

NOTE: Student will select ANY ONE GROUP of Elective Specialized Courses out of the following six groups of elective specialized courses as per his / her choice.

Elective Specialized Courses

1. Crop Science (Soil Science, Agronomy and Agro-Forestry) Contact Hours: 30 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG-CS 701	Soil Physical and Biological Environment	2	0	0	40	60	100	2
BSAG-CS 702	Analytical Techniques in Soils, Plants, Fertilizers and Water	2	0	0	40	60	100	2
BSAG-CS 703	Weed Management	2	0	0	40	60	100	2
BSAG-CS 704	Farming Systems and Sustainable Agriculture	2	0	0	40	60	100	2
BSAG-CS 705	Production Technology of Spices, Aromatic, Medicinal and Plantation Crops	2	0	0	40	60	100	2
BSAG-CS 706	Production Technology of Economic Forest Trees	2	0	0	40	60	100	2
BSAG-CS 707	Soil Survey, Classification and Mapping (Practical)	0	0	2	20	30	50	1
BSAG-CS 708	Soil Physical and Biological Environment (Practical)	0	0	2	20	30	50	1
BSAG-CS 709	Analytical Techniques in Soils, Plants, Fertilizers and Water (Practical)	0	0	6	60	90	150	3
BSAG-CS 710	Weed Management (Practical)	0	0	2	20	30	50	1
BSAG-CS 711	Farming Systems and Sustainable Agriculture (Practical)	0	0	2	20	30	50	1
BSAG-CS 712	Production Technology of Spices, Aromatic, Medicinal and Plantation Crops (Practical)	0	0	2	20	30	50	1
BSAG-CS 713	Production Technology of Economic Forest Trees (Practical)	0	0	2	20	30	50	1
TOTAL		12	0	18	420	630	1050	21

Elective Specialized Courses

2. Horticulture (Pomology, Olericulture & Floriculture) Contact Hours: 28 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG- HC 701	Nursery Management of Horticultural Crops	2	0	0	40	60	100	2
BSAG- HC 702	Commercial Fruit Production	2	0	0	40	60	100	2
BSAG- HC 703	Processing and Value of Addition of Horticultural Crops	2	0	0	40	60	100	2
BSAG- HC 704	Commercial Vegetable Production	2	0	0	40	60	100	2
BSAG- HC 705	Vegetable Breeding and seed Production	2	0	0	40	60	100	2
BSAG- HC 706	Forcing Techniques in vegetable Production	2	0	0	40	60	100	2
BSAG- HC 707	Commercial Floriculture and landscaping	2	0	0	40	60	100	2
BSAG- HC 708	Nursery Management of Horticultural Crops (Practical)	0	0	2	20	30	50	1
BSAG- HC 709	Commercial Fruit Production (Practical)	0	0	2	20	30	50	1
BSAG- HC 710	Processing and Value of Addition of Horticultural Crops (Practical)	0	0	2	20	30	50	1
BSAG- HC 711	Commercial Vegetable Production (Practical)	0	0	2	20	30	50	1
BSAG- HC 712	Vegetable Breeding and seed Production (Practical)	0	0	2	20	30	50	1
BSAG- HC 713	Forcing Techniques in vegetable Production (Practical)	0	0	2	20	30	50	1
BSAG- HC 714	Commercial Floriculture and landscaping (Practical)	0	0	2	20	30	50	1
TOTAL		14	0	14	420	630	1050	21

Elective Specialized Courses

3. Plant Breeding, Genetics & Biotechnology — Contact Hours: 27 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG- PGB 701	Genetics of Crop Plants	2	0	0	40	60	100	2
BSAG- PGB 702	Cytogenetic of Crop Plants	2	0	0	40	60	100	2
BSAG- PGB 703	Theory and Practice of Plant Breeding	3	0	0	60	90	150	3
BSAG- PGB 704	Breeding of Field Crops	3	0	0	60	90	150	3
BSAG- PGB 705	Crop experimentation	1	0	0	20	30	50	1
BSAG- PGB 706	Plant Tissue Culture and Transformation	2	0	0	40	60	100	2
BSAG- PGB 707	Molecular Biotechnology and Genomics	2	0	0	40	60	100	2
BSAG- PGB 708	Genetics of Crop Plants (Practical)	0	0	2	20	30	50	1
BSAG- PGB 709	Cytogenetic of Crop Plants (Practical)	0	0	2	20	30	50	1
BSAG- PGB 710	Theory and Practice of Plant Breeding (Practical)	0	0	2	20	30	50	1
BSAG- PGB 711	Crop experimentation (Practical)	0	0	2	20	30	50	1
BSAG- PGB 712	Plant Tissue Culture and Transformation (Practical)	0	0	2	20	30	50	1
BSAG- PGB 713	Molecular Biotechnology and Genomics (Practical)	0	0	2	20	30	50	1
TOTAL		15	0	12	420	630	1050	21

Elective Specialized Courses

4. Agri-extension, Economics & Business Management Contact Hours: 25 Hrs.

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG- AEB 701	Visual and Graphic Communication	1	0	0	20	30	50	1
BSAG- AEB 702	Communication and Information Technology	2	0	0	40	60	100	2
BSAG- AEB 703	Behavioral Skills for Human Resource Development	2	0	0	40	60	100	2
BSAG- AEB 704	Micro Economic Analysis	3	0	0	60	90	150	3
BSAG- AEB 705	Macro Economic Analysis	3	0	0	60	90	150	3
BSAG- AEB 706	Financial and Project Management	3	0	0	60	90	150	3
BSAG- AEB 707	Retailing and Supply Chain Management	3	0	0	60	90	150	3
BSAG- AEB 708	Visual and Graphic Communication (Practical)	0	0	2	20	30	50	1
BSAG- AEB 709	Communication and Information Technology (Practical)	0	0	2	20	30	50	1
BSAG- AEB 710	Micro Economic Analysis (Practical)	0	0	2	20	30	50	1
BSAG- AEB 711	Financial and Project Management (Practical)	0	0	2	20	30	50	1
TOTAL		17	0	8	420	630	1050	21

Elective Specialized Courses

5. Plant Protection **Contact Hours: 32 Hrs.**

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG- PP 701	Apiculture	1	0	0	20	30	50	1
BSAG- PP 702	Biocontrol and Integrated Pest Management	2	0	0	40	60	100	2
BSAG- PP 703	Pesticides and Plant Protection Equipment	2	0	0	40	60	100	2
BSAG- PP 704	Biocontrol and Integrated Disease Management	2	0	0	40	60	100	2
BSAG- PP 705	Post Harvest Diseases and Their Management	2	0	0	40	60	100	2
BSAG- PP 706	Plant Nematology	1	0	0	20	30	50	1
BSAG- PP 707	Plant Disease Diagnosis (Practical)	0	0	4	40	60	100	2
BSAG- PP 708	Apiculture (Practical)	0	0	4	40	60	100	2
BSAG- PP 709	Biocontrol and Integrated Pest Management (Practical)	0	0	4	40	60	100	2
BSAG- PP 710	Pesticides and Plant Protection Equipment (Practical)	0	0	2	20	30	50	1
BSAG- PP 711	Biocontrol and Integrated Disease Management (Practical)	0	0	4	40	60	100	2
BSAG- PP 712	Post Harvest Diseases and Their Management (Practical)	0	0	2	20	30	50	1
BSAG- PP 713	Plant Nematology (Practical)	0	0	2	20	30	50	1
TOTAL		10	0	22	420	630	1050	21

B. Sc. Agriculture (Honors) 8th Sem.

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BSAG-801	Rural Experience	0	0	6	100	-	100	3
BSAG-802	On-campus Learning	0	0	12	300	-	300	12
BSAG-803	Industrial Attachment (Off campus)	0	0	8	100	-	100	4
BSAG-804	Documentation, reporting and Presentation	0	0	2	100	-	100	1

BSAG-301 Principles of Agronomy-I

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Meaning and scope of Agronomy; tillage and crop stand establishment. Planting geometry and its effect on growth and yield; Cropping systems- origin, geographic distribution, economic importance, soil and climatic requirements of major crops

Section-2

Varieties, cultural practices and yield of kharif cereal crops- rice, maize, sorghum, pearl millet

Section-3

Varieties, cultural practices and yield of kharif pulses- pigeon pea, mungbean, urdbean and oilseeds - groundnut, sesame, soybean

Section-4

Varieties, cultural practices and yield of kharif fiber crops- cotton, jute, sun hemp and forage crops - sorghum, maize, cowpea, cluster bean and napier

Suggested Books:

1. Handbook of Agriculture-ICAR
2. Package of Practices for Kharif Crops, PAU
3. Text book of Field crops Production-Food grain crops by ICAR
4. Text book of Field Crops Production- Commercial Crops by ICAR

BSAG-302 Plant Physiology

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Introduction and importance of plant physiology in agriculture

Section-2

Seed structure; Morpho-physiological and biochemical changes during seed development; Physiological and harvestable maturity; Seed germination and seed dormancy

Section-3

Growth and development; Crop water relations; Transpiration and its significance in relation to crop productivity; Water use efficiency; Significance of C3, C4 and CAM pathways; Photorespiration; Photosynthesis and crop productivity; Translocation of assimilates. Source-sink reletionship; its types and significance

Section-4

Mineral nutrition; physiology of nutrient uptake, deficiency and toxicity symptoms and hydroponics; Photoperiodism and vernalization; Plant growth regulators- occurrence, biosynthesis, mode of action and commercial applications; Senescence and abscission; Fruit ripening and its hormonal regulation.

Suggested Books:

1. Introduction to Plant Physiology by William G.Hopkins and Norman P.A. Huner

BSAG-303 Fundamentals of Insect Morphology and Systematics

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Entomology- definition and its history; importance and scope; Factors affecting insect abundance

Section-2

Integument, body regions and segmentation; Modification and function of mouth parts, antennae, legs and wings; wing venation and wing coupling apparatus; Sense organs; metamorphosis and diapauses; Types of reproduction.

Section-3

Morphology and anatomy of Grasshopper

Section-4

Taxonomy- its importance, history, development and binomial nomenclature; Classification of class Insecta up to orders, suborders and important families with special emphasis on distinguishing morphological characters.

Suggested Books:

1. A General Text Book of Entomology by A.D. Imms
2. Principles of Insect Morphology by R.E. Snodgrass.
3. The Insects: Structure and Function by R.F. Chapman.
4. Text Book of Agricultural Entomology by H.S. Pruthi.
5. General Entomology by M.S. Mani
6. Text Book of Agricultural Entomology by P.M. Srivastava and Ashok Kumar

BSAG-304 Introduction to Genetics

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section- 1

Mitosis and meiosis, their significance and differences between them; Study of chromosome structure, morphology, number and types; Karyotype and idiogram; Mechanism of crossing over and cytological proof of crossing over; Numerical and structural chromosomal aberrations.

Section- 2

Mendel's laws of inheritance and exceptions to the laws, Cytoplasmic inheritance, its characteristic features and difference between chromosomal and cytoplasmic inheritance; Types of gene action, Multiple alleles, Pleiotropism, Penetrance and expressivity; Qualitative traits, Quantitative traits and differences between them; Multiple factor hypothesis;

Section- 3

DNA and its structure, function, types, modes of replication and repair. RNA and its structure, function and types; Transcription, Translation. Genetic code and outline of protein synthesis; Linkage, types of linkage and estimation of linkage; Mutation and its characteristic features; Methods of inducing mutations and detection of sex linked and autosomal mutations, (CLB technique).

Section- 4

Evolution of different crop species like cotton, wheat, gram, triticale and Brassicas.

Suggested Books:

1. Fundamentals of Genetics by B.D.Singh
2. Genetics by P.K. Gupta
3. Principles of Genetics by E.J. Gardner and M.J. Simmons

BSAG-305 Dimensions of Agricultural Extension

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Education-meaning and types; agricultural extension education - its meaning, objectives, principles, philosophy and emerging problems and challenges with reference to Human values

Section-2

Introduction, importance and problems of rural development, Historical perspective of major agricultural and rural development programmes of pre and post independence era

Section- 3

Panchayati Raj System – Brief history, objectives, Powers, functions and organizational set up of three-tier Panchayati Raj System, emerging problems of Panchayati Raj institutions

Section-4

New trends in agricultural extension education and privatization of extension; women development programmes, emergence of broad based extension in the context of international and national developments

Suggested Books:

1. Extension Education by A.K. Nayak Singh
2. Agricultural Extension by A.W. van den Ban and H. Staurt Hawkins
3. Panchayti Raj in India by Ravi Goel.

BSAG-306 Principles of Plant Pathology

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Introduction, importance and general characters of fungi, bacteria, fastidious bacteria, nematodes, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa and phanerogamic parasites . Definition, objectives, history, terms and concept of plant pathology.

Section-2

Study of genera Pythium, Phytophthora, Albugo, Sclerospora, Peronosclerospora, Pseudoperonospora, Peronospora, Plasmopara, Bremia, Mucor, Rhizopus, Oidium,Erysiphe, Phyllactinia, Uncinula, Podosphaera, Puccinia, Uromyces, Hemileia, Sphacelotheca, Ustilago, Tolyposporium, Agaricus, Pleurotus, Ganoderma, Septoria, Colletotrichum, Pestalotia, Pyricularia, Aspergillus, Penicillium, Trichoderma, Fusarium, Drechslera, Alternaria, Stemphyllium, Cercospora, Phaeoisariopsis, Rhizoctonia, Sclerotinia, Xanthomonas, Pseudomonas, Meloidogyne and Anguina.

Section-3

Survival and dispersal of plant pathogens, Phenomenon of infection; defence mechanisms in plants; Plant disease epidemiology and forecasting.

Section-4

General principles of plant disease management. Plant quarantine and inspection. Genetic, cultural, biological, physical and chemical methods of plant disease management. Integrated plant disease management

Suggested Books:

1. Plant Pathology in India by S.S. Chahal
2. Introduction to Principles of Plant Pathology by R.S. Singh
3. Principles of Plant Pathology by M.K. Dasgupta

BSAG-307 Soil Chemistry, Fertility and Nutrient Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Soil as a source of plant nutrients. Essential and beneficial elements- criteria of essentiality, forms of nutrients in soil, mechanisms of nutrient transport to plants. Factors affecting nutrient availability to plants.

Section-2

Measures to overcome deficiencies and toxicities. Problem soils- acid, salt affected and calcareous soils, characteristics, nutrient availabilities, Reclamation- mechanical, chemical and biological methods

Section-3

Fertilizer and insecticides and their effect on soil, water and air. Irrigation water- quality of irrigation water and its appraisal. Soil fertility- approaches for soil fertility evaluation. Methods of soil testing. Critical levels of different nutrients in soil. Plant analysis- DRIS approach, critical levels in plants. Rapid tissue tests.

Section-4

Indicator plants. Biological methods of soil fertility evaluation. Soil test based fertilizer recommendations to crops. Factors influencing nutrient use efficiency (NUE) in respect of N, P, K, S, Fe and Zn fertilizers. Source, method and scheduling of nutrients for different soils and crops grown under rainfed and irrigated conditions.

Suggested Books:

1. The Nature and Properties of Soils by N.C. Brady and Ray R. Well
2. Soil Fertility & Nutrient Management by S.S. Singh

BSAG-308 Principles of Agronomy-I (Khairf Crops) Practical

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of tillage implements. Practice of ploughing and puddling. Seed bed preparation, sowing, fertilizer application, nursery raising and transplanting of Kharif crops. Calculations of seed rate Effect of seed size and sowing depth on germination. Identification of weeds of Kharif crops; Study of yield components; Study of kharif crops and their important agronomic practices

BSAG-309 Crop Physiology (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Seed structure, germination and seed dormancy. Growth analysis. Calculation of growth parameters. Methods of measuring water status in roots, stems and leaves. Measurement of water potential, Absorption spectrum of chloroplastic pigments. Transpiration. Photosynthesis and respiration. Stomatal frequency and index. Deficiency symptoms of nutrients. Leaf anatomy of C3 and C4 plants.

BSAG-310 Fundamentals of Insect Morphology and Systematics (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Collection and preservation of insects including immature stages; Morphology and anatomy of grasshopper; different types of antennae, mouth parts, legs and wings; Wing venation and wing coupling apparatus; Types of larvae and pupae; Study of characters of orders - Odonata, Orthoptera, Dictyoptera, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

BSAG-311 Introduction to Genetics (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Microscopy (Light microscopes and electron microscopes; Preparation and use of fixatives and stains for light microscopy; Preparation of micro slides and identification of mitosis and meiosis; Monohybrid, Dihybrid and Trihybrid ratios and their modifications; Chi- square analysis; Interaction of factors; Epistatic factors, Supplementary factors and Duplicate factors; Complementary factors, Additive factors and Inhibitory factors; Linkage - Two point test cross; Linkage - Three point test cross; Induction of polyploidy using colchicine; Induction of chromosomal aberrations using chemicals.

BSAG-312 Principles of Plant Pathology (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Acquaintance to plant pathology laboratory equipments. Preparation of culture media for fungi and bacteria. Isolation techniques and preservation of plant disease samples. Study of important plant pathogenic genera. Demonstration of Koch's postulates. Study of different groups of fungicides and antibiotics. Bio-control of plant pathogens; Visit to remote sensing laboratory and experimental area.

BSAG-313 Soil Chemistry Fertility and Nutrient Management (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Principles of analytical instruments and their calibration and applications, Colorimetry and flame photometry. Estimation of available N, P, K, S and Zn in soils. pH, Electrical Conductivity, carbonates, bicarbonates, Ca++ and Mg++ in soil and water. Lime requirement and gypsum requirement of problem soils. Estimation of N, P and K in plants

BSAG-401: Principles of Agronomy -II (Rabi Crops)

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Origin, geographic distribution of crops, Area, yield and production of rabi crops in different states of India; Causes of variation in productivity; National and International Agricultural Research Institutes in India and their mandate.

Section-2

Economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi cereal crops

Section-3

Economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi pulse crops-chickpea, lentil, field pea, French bean and oilseed crops- rapeseed and mustard, sunflower, safflower, linseed

Section-4

Economic importance, soil and climatic requirements, varieties, cultural practices and yield of other rabi crops such as sugarcane, sugar beet, potato, tobacco and forage crops- berseem, Lucerne and oats

BSAG-402 Organic Farming

(In collaboration with Department of Soil Science, Entomology and Plant Pathology)

L	T	P
1	0	0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Organic farming: introduction, concept, relevance in the present context; Organic production requirements; Biological intensive nutrient management.

Section-2

Recycling of organic residues; Soil improvement and amendments; integrated diseases and pest management

Section-3

Use of bio-control agents; bio-pesticides; pheromones, trap crops and bird perches

Section-4

Weed management; Quality considerations- certification, labeling and accreditation processors, marketing and exports.

BSAG-403 Farm Management and Agricultural Finance

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Agricultural Production Economics: definition, nature and scope; Laws of returns; Factor-product Relationships; determination of optimum input and output; Farm management: meaning, definition and Importance; Economic principles applicable to the organizations of farm business.

Section-2

Types and systems of farming; Farm planning and budgeting; Risk and uncertainty

Section-3

Agricultural finance: nature and scope, compounding and discounting. Agricultural credit: meaning, definition, need and classification; Credit appraisal; History of financing agriculture in India. Agricultural Financial Institutions

Section-4

Assessment of crop losses; Determination of compensation; Crop insurance; Agricultural Cooperation- philosophy and principles; History of Indian Cooperative Movement; Reorganization of cooperative credit structure and single window system

Suggested Books:

1. Farm Business Accounting-Joginder Singh
2. Agricultural Economics-Lekhi and Singh
3. Fundamental of Farm Management- Johl and Kapoor

BSAG-404 Insect Ecology and Pest Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Insect Ecology- Introduction, environment and its components, effect of abiotic and biotic factors. Biotic potential, environmental resistance and causes of pest outbreaks in agro-ecosystem. Categories of pests. Insects, Pests and Crop Losses; Present agriculture and pest problems. Beneficial insects: important pollinators, weed killers and scavangers; their importance. Important non-insect pests: mites, rodents and birds.

Section-2

Chemical Control: importance, hazards and limitations. Integrated Pest Management(IPM): need; its tools and limitations. Natural Control. Host plant resistance. Physical, Mechanical and Cultural Control. Biological Control: parasitoids, predators and microbes. Legislative Control. Insecticide Act 1968.

Section-3

Classification, toxicity and formulations of insecticides. Study of important insecticides: botanicals, organochlorines, organophosphates, carbamates, synthetic pyrethroids, neonicotinoids, oxydiazines, nereistoxin derivatives, phenyl pyrazoles, thiourea derivatives, pyridines, pyroles,etc., rodenticides,acaricides and fumigants. Biorational and other innovative approaches in pest management: insect growth regulators, semiochemicals, light-activated pesticides, propesticides, avermectins, antifeedants, chemosterilants, genetic control etc.

Section-4

Pest surveillance, monitoring and forecasting. Economic threshold and Economic injury levels.Integration of various control tactics. IPM in important vegetables.

Suggested Books:

1. Agricultural Pests of South Asia and Their Management. A. S. Atwal and G.S Dhaliwal. Kalyani Publishers, Ludhiana.

2. Principles of Insect Pest Management. G. S. Dhaliwal and Ramesh Arora. National Agricultural Technology Information Centre, Ludhiana.

3. Entomology At a Glance. R.C. Saxena and R. C. Srivastava. Agrotech Publishing Academy, Udaipur.

4. Applied Animal Ecology. S.S.Bains and A.S. Atwal.Kalyani Publishers, Ludhiana.

BSAG-405 Extension Methodologies and Communication Skills for Transfer of Technology

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Meaning, nature, importance, models and barriers in communication; Extension programme planning; Principles and steps in programme development process; Monitoring and evaluation of extension programmes

Section-2

Extension teaching methods and factors influencing their selection and use; Combination (Media Mix) of teaching methods; Innovative information sources; Audio- visual aids; Meaning, scope and importance of agricultural journalism.

Section-3

Diffusion and adoption of innovations; Models of adoption process. Factors influencing adoption process.

Section-4

Capacity building of extension personnel and farmers; Communication skills for effective transfer of technology; Organizing Field days, exhibitions; seminars and conferences

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BSAG 406: Principles of Seed Technology

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section -1

Introduction to seed production; seed policy; deterioration of crop varieties; maintenance of genetic purity during seed production; seed quality

Section-2

Different classes of seed; Nucleus, Breeder, Foundation and certified seed production of varieties and hybrids of field and vegetable crops

Section-3

Seed certification, phases of certification, procedure for seed certification, field inspection and field counts etc.; central seed committee, central seed certification board, state seed certification agency, central and state seed testing laboratories; duties and powers of seed inspectors, offences and penalties; seed control order; Seed Act; other issues related to WTO, IPRs, Patenting, Plant Breeder's Rights; varietal identification through grow-out test and electrophoresis; seed drying; establishment of seed processing plant; establishing a seed testing laboratory

Section-4

Seed testing procedures for quality assessment, seed treatment, importance of seed treatment, types of seed treatment, seed packing and seed storage, stages of seed storage, factors affecting seed longevity during storage and conditions required for good storage, general principles of seed storage, measures for pest and disease control, temperature control, seed marketing, factors affecting seed marketing.

BSAG-407 Manures and Fertilizers

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Fertilizers- classification, manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate), phosphatic (single super phosphate, enriched super phosphate, diammonium phosphate, ammonium poly phosphate), potassic and complex fertilizers

Section-2

Fate and reactions of various types of fertilizers in the soil

Section-3

Secondary and micronutrient fertilizers and amendments; Adulteration in fertilizers; Fertilizer Control Order; Fertilizer storage

Section-4

Bio-fertilizers and their advantages; Manures- bulky and concentrated, Farm Yard and poultry Manures; Composting – different methods, mechanical compost plants, vermin-composting, green manuring, oil cakes. Sewage and sludge-biogas plant slurry, plant and animal refuges.

BSAG-408 Farm Power & Machinery

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Historical perspective of farm power development in India, socio-economic implications of farm mechanization in India, internal combustion (IC) engines and terminology; working principles of two stroke and four stroke engines

Section-2

Different systems of tractors- types and selection

Section-3

Primary and secondary tillage implements; implements for agricultural operations; seed drills, paddy translators- their calibrations

Section-4

Plant protection equipments; harvesting and threshing equipments; cost of operation of tractor and other farm machinery

BSAG 409: Basic Statistics

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Section-1

Definition of statistics, its use and limitations; frequency distribution and frequency curves; Measures of central tendency- arithmetic mean, geometric mean, harmonic mean, median, mode, weighted mean; Measures of dispersion- mean de4viation, standard deviation, coefficient of variation; Basic applications of probability theory; Normal distribution and its properties

Section-2

Introduction to sampling; tests of significance, standard normal deviate test for means, student's t-test for single sample, two samples and paired t-test, F-test, Chi-square test in 2*2 contingency tables; Yates correction for continuity

Section-3

Correlation; computation of correlation coefficient and its testing; linear regression of Y upon X and X upon Y; interrelation between correlation and regression coefficients

Section-4

Experimental designs, layout and analysis of Completely Randomized Design; Randomized Block Design, Latin Square Design and Factorial Design

BSAG 410: Principles of Agronomy -II (Rabi Crops) (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of manures, fertilizers and green manure crops; Study of interculture implements; Methods of fertilizer application; Seed bed preparation and sowing of wheat, sugarcane and sunflower; Calculations of seed rate; Identification of weeds in wheat and grain legumes; Morphological characteristics of wheat, sugarcane, chickpea and mustard; Yield components of wheat and sugarcane.

BSAG-411 Organic Farming (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Raising of vegetable crops through organic sources. Diseases and pest management; Vermi-composting; Vegetable and ornamental nursery raising; Macro quality analysis; Grading, packaging and post harvest management.

BSAG 412 Farm Management and Agricultural Finance (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Methods of depreciation. Analysis of net-worth statement. Farm inventory analysis: preparation of farm plans and budgets, profit and loss account. Break-even analysis. Economic analysis of different crop and livestock enterprises. Compounding and discounting. Preparation of balance sheet, income statement and cash flow analysis. Estimation of credit needs. Determination of unit costs. Preparations and analysis of loan proposals.

BSAG-413 Insect Ecology and Pest Management (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of terrestrial and pond ecosystem, behaviour, orientation, distribution patterns of insects. Sampling techniques for the estimation of insect poplulation and damage. Pest surveillance through light and pheromone traps. Practicable IPM practices. Insecticides and their formulations; calculation of doses of insecticides. Compatibility of pesticides. Identification of common insect-pests, phytophagous mites, rodent, bird pests and their damage, other beneficial insect-pollinators, weed killers and scavangers.

BSAG-414 Principles of Seed Technology (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Seed sampling principles and procedures; physical purity analysis of field crops; germination analysis of field crops; moisture tests of field crops; viability test of field crops; seed health test of field crops; seed dormancy and breaking methods; grow out tests for varietal identification; visit to seed production plots; visit to seed processing plants; visit to seed testing laboratories; planting ratios, isolation distance and rouging, etc.

BSAG-415 Farm Power & Machinery (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of different IC engines; Working of two stroke and four stroke engines; various systems of tractor, disc plough, seed-cum-fertilizer drills, furrow openers, metering mechanism and calibration; study of different types of farm machinery and equipment, repair, adjustment and operation of sprayers and dusters; registration procedures.

BSAG 501 Fundamentals of Soil and Water Conservation Engineering

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Surveying- survey equipments, chain survey. Plotting procedure. Calculations of area of regular and irregular fields. Levelling- terminology, equipments, methods of calculation; types of levelling and contouring.

Unit II

Irrigation- classification of projects, flow irrigation and lift irrigation. Water sources. Water lifting devices; pumps, their capacity and power calculations.

Unit III

Irrigation water measurement- weirs, flumes and orifices, Water conveyance systems- open channel and underground pipeline. Surface, drip and sprinkler irrigation methods.

Unit IV

Soil and water conservation, soil erosion, types and control measures.

BSAG 502: Plant Tissue Culture and Genetic Transformation

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Tissue culture, Concepts and history; Various aspects of plant tissue culture. Somatic cell cultures. Somatic embryogenesis. Meristem culture. In vitro grafting. Micropropagation. Somaclonal variation.

Unit II

Anther and pollen culture. Embryo/ovule/ovary culture.. Production of secondary metabolites through tissue culture.

Unit III

Protoplast culture and somatic hybridization; Cryopreservation of germplasm.

Unit IV

Methods of Genetic Transformation, commercialization of transgenic crops.

BSAG 503: Chemistry of Agrochemicals

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Organic chemistry as prelude to agrochemicals. Diverse types of agrochemicals.

Unit II

Synthetic organic insecticides, major classes, chemistry and use of some important insecticides under each class.

Unit III

Herbicides-major classes, chemistry and use of 2,4-D, atrazine, glyphosate, butachlor, benthiocarb. Fungicides - major classes, Chemistry and use of carbendazim, carboxin, captan, tridemorph and copper oxychloride.

Unit IV

Botanical insecticides (neem), pyrethrum and synthetic pyrethroids. Plant growth regulators.

BSAG 504: Agricultural Marketing, Trade and Prices

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Agricultural marketing: concept, definition, scope, components, classification, market structure, conduct and performance; Market functionaries; Producer's surplus: meaning, types, marketable surplus, marketed surplus. Marketing efficiency: meaning, marketing costs, margins and price spreads.

Unit II

Trade: domestic trade, free trade, international trade, GATT, WTO, implications of AOA. Market access, domestic support, export subsidies, EXIM policy and Ministerial conferences.

Unit III

Market integration: definition, types; Cooperative marketing; State trading. Ware Housing Corporation: objectives, functions and advantages. Food Corporation of India: objectives and functions.

Unit IV

Quality Control: agricultural products, AGMARK, meaning and need for agricultural marketing policy. Risk in marketing: meaning, importance and types; Speculations and hedging. Futures trading, Contract farming.

BSAG505: Insect Pests of Crops and Stored Grains

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Distribution, biology, symptoms of damage and management strategies of insect pests of rice, sorghum, maize, cotton, groundnut, sugarcane, ragi (Eleucine coracana), wheat, sunhemp, pulses, castor, safflower, sunflower, mustard,

Unit II

Distribution, biology, symptoms of damage and management strategies of insect pests of brinjal, bhindi, tomato, cruciferous and cucurbitaceous vegetables, potato, sweet potato, chillies, turmeric, onion, coriander, garlic, ginger

Unit III

Distribution, biology, symptoms of damage and management strategies of insect pests of mango, citrus, grapevine, cashew, banana, pomegranate, guava, sapota, ber, apple, coconut

Unit IV

Distribution, biology, symptoms of damage and management strategies of insect pests of tobacco, coffee, tea, ornamental plants and stored grain insect pests.

BSAG 506: Introductory Forestry

L T P
1 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Forestry - definition, scope and important terminology. Status of forests in India and their role. History of forestry development in India. National and International Forestry Organizations. Distribution of forests and their classification.

Unit II

Tending operations. Locality factors: climatic, edaphic, topographical and biotic. Agroforestry, farm forestry and social forestry - definition, objectives and need. Role of trees in rural economy.

Unit III

Choice of species w.r.t. site/economic uses and constraints of tree growing. Tree propagation and planting methods.

Unit IV

Deforestation - forms, causes and remedial measures. Forest management: growing stock, normal forest, sustained yield, increment and rotation. Forest utilizationmajor and minor forest products. Forest policy and laws.

BSAG 507: Introduction to Plant Breeding

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Floral biology, emasculation and pollination techniques in cereals, millets, pulses, oilseeds, fibers, plantation crops etc. Modes of reproduction- sexual and asexual

Unit II

Plant Breeding- Aims and objectives; Significance in plant breeding; Modes of pollination, genetic consequences, differences between self- and cross- pollinated crops; Methods of breeding - Introduction and Domestication; Johannsen's pure-line theory and its genetic basis; Selection: mass selection, pure-line selection; Hybridization, aims and objectives, types of hybridization; Methods of handling segregating generations, pedigree method, bulk method, back cross method

Unit III

Incompatibility and male sterility and their utilization in crop improvement; Heterosis, inbreeding depression, various theories of heterosis, exploitation of hybrid vigor, development of inbred lines, single-cross and doublecross hybrids; population improvement programmes, recurrent selection, synthetics and composites

Unit IV

Mutation breeding; Ploidy breeding; Apomixis- its types and significance; Wide hybridization and its role crop improvement.

BSAG 508 Livestock Production and Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Place of livestock in the national economy. Livestock development programmes. Exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Reproductive behaviour; estrous cycle, Artificial Insemination, Pregnancy and parturition in various livestock species. Care of pregnant animal and new born young one. Measures and factors affecting fertility in livestock

Unit II

Physiology of milk secretion and different milking methods. Factors affecting milk yield and composition. Selection procedure and various systems of breeding in livestock.

Unit III

Feeding and management of calves, heifers, pregnant and milch anima sheep, goat and swine. Housing principles for livestock. Vaccination and prevention of important diseases of livestock and poultry.

Unit IV

Important breeds of poultry, egg formation, abnormal eggs and factors affecting egg size. Moulting, incubation, hatching and brooding. Housing, breeding, feeding and management of poultry. Biotechnological interventions in animal production and reproduction.

BSAG-509 Fundamentals of Soil and Water Conservation Engineering (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Acquaintance with chain survey equipment. Ranging and measurement of offsets. Chain triangulation and plotting. Levelling equipments. Differential levelling. Profile levelling. Contour survey and plotting. Study of centrifugal pumping system and irrigation water measuring devices. Surface irrigation methods. Study of different components of sprinkler and drip irrigation systems. Uniformity of water application in drip and sprinkler systems. Study of soil and water conservation measures.

BSAG 510: Plant Tissue Culture and Genetic Transformation (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Medium preparation. Surface sterilization of explants. Establishment of callus/cell suspension cultures. Induction of plant regeneration. Hardening and transfer to soil. Micropropagtaion. Embryo culture. Anther and pollen culture. Particle Gun Bombardment.

BSAG511: Insect Pests of Crops and Stored Grains (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Identification of insect pests and their damage symptoms of rice, sorghum, maize, wheat, sugarcane, cotton, pulses, oil seeds crops and store gains ; important vegetables and fruits crops in the Punjab .

BSAG 512: Introductory Forestry (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Identification of trees. Measurement of tree height, diameter, girth, bark thickness, increment, age and volume. Nursery raising and silvicultural practices of some economic forest trees viz., safeda, poplar, shisham, mulberry, kikar, sagwan, dek, bamboo and subabul.

BSAG 513: Introduction to Plant Breeding (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Botanical description and floral biology; Study of megasporogenesis and microsporogenesis. Fertilization and life cycle of an angiospermic plant; Plant Breeder's kit: Hybridization techniques and precautions to be taken while attempting crosses; Floral morphology, selfing, emasculation and crossing techniques in different self and cross pollinated species; Study of male sterility and incompatibility.

BSAG 514 Livestock Production and Management (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Visit to livestock farms and breed identification. Study of external body parts. Handling and restraining of animals. Judging of animals. Milking methods. Feeding and ration formulation. Record keeping. Study of reproductive organs, artificial insemination and physiological norms in cattle and buffaloes. Hatching, housing and management of poultry.

BSAG 515 Practical Crops Production (*Kharif Crops)*

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Crop planning, Raising filed corps in multiple cropping systems using improved agronomic practices. Field preparation, seed treatment, sowing, fertigation, water management and weed management. Disease and insect pest management in the crop. Harvesting, threshing, drying, winnowing, storage and marketing of the produce. Preparation of balance sheet including cost of cultivation.
(Above mentioned operation shall be conducted by students themselves under the supervision of teacher).

BSAG-601 Crop Residue Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit-I

Significance of crop residue management. Challenges for diversified use of crop residue in high cropping intensity areas.

Unit-II

Crop residue in relation to agricultural ecosystems and conservation agriculture. On-site and off-site management of crop residues and soil health indicators.

Unit-III

Beneficial effects of crop residue on soil health crop yields, social and environmental concerns

Unit-IV

Recent technologies for conservation agriculture. Policy options for efficient residue management in Punjab

Books

1. Crop residue management in Rice-wheat cropping system by M.L. Dotaniya. Published by Lambard Academic Publishing.
2. Crop residue management for conservation by Verlon K Vrana.
3. Crop residue management by J.L.Hatfield & A.Stewart.
4. Managing Agricultural Residues by Paul W. Unger.
5. Crop residue management: for Soil Health, crop productivity, & Environmental Quality by S.K. Sharma.
6. Residue Management Devices for No- till Drills by Rashad Hegazy.
7. Agricultural Residue management In developing Countries by lea Kai

BSAG-602 Diseases of Horticultural Crops and their Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit-I

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of citrus, mango, banana, grapevine, pomegranate and papaya

Unit-II

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of guava, sapota, ber, apple, pear, peach and plum

Unit-III

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of chilli, brinjal, okra, potato, crucifers, cucurbits, tomato, pea, beans, onion and garlic

Unit-IV

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of rose, chrysanthemum, gladiolus, marigold and jasmine

Books recommended

1. Diseases of Horticulture crops & their management by GP Jagtap.
2. Fungal diseases & Their Management In Horticulture crops By P. Parvatha Reddy.
3. Field Problems of Crops By Pau Ludhiana
4. Introductory Plant Pathology by Tripathi DP.

BSAG-603 Flower Cultivation and Landscape Gardening

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit-I

Introduction to floriculture and landscaping. Package of practices for rose, jasmine, chrysanthemum, gladiolus, marigold and tuberose.

Unit-II

Planning of gardens. Landscape-art principles, Formal and informal gardens.

Unit-III

Use of trees, shrubs, climbers, palms and houseplants

Unit-IV

Seasonal flowers and their use in the gardens, Making and maintenance of lawns.

Books recommended

1. Introductory Ornamental Horticulture by JS Arora.
2. Garden Flowers by Swarup, S.
3. Flowers Cultivation & Landscaping By PAU Ludhiana
4. Flouriculture at a Glance by Desh Raj

BSAG-604 Breeding of Field and Horticultural Crops

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit-I

Breeding objectives and concepts of breeding self-pollinated, cross-pollinated and vegetative propagated crops; Hardy-Weinberg Law; Origin of crops and distribution of species, wild relatives and forms, Cereals, (rice, wheat, maize and millets); Pulses (red gram, green gram, black gram, soybean); Oilseeds (groundnut, sesame, sunflower, brassicas) etc, Fibres (Cotton) etc, Vegetables (tomato, potato, onion, okra); Flower crops (chrysanthemum, rose, gaillardia and marigold); Fruits (citrus, amla, guava, mango, papaya)

Unit II

Breeding methods for development of varieties/hybrids in various crops; Ideotype concept in crop improvement; Plant genetic resources their conservation and utilization in crop improvement; IPR and its related issues.

Unit III

Variability in pathogen and pests; Mechanisms of resistance in plants to pathogens and pests; Genetic basis of adaptability to unfavourable environments; Breeding for resistance to biotic and abiotic stresses.

Unit IV

Biometrical genetics- definition and concept; Variability types & method of assessment, gene effects i.e. additive, dominance and epistasis; Genotype x Environment interaction and its significance in crop improvement

Books recommended

1. Principles and procedures of Plant Breeding by G.S. Chahal and S.S. Gosal
2. Principles of Cultivar Development: Theory and Technique (Vol. 1) by Walter R. Fehr.
3. Plant Breeding Principles and methods by B.D. Singh
4. Handbook of Agriculture Compiled by S.S. Singh, Kalyani Publishers, New Delhi
5. Vegetable Breeding-Principles and Practices –Hari Har Ram
6. Breeding Tropical and Subtropical Fruits-P. K. Ray

BSAG-605 Environmental Science and Disaster Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit-I

Environment - basic concepts scope and importance. Natural Resources - renewable and non-renewable resources and their sustainable utilization. Ecosystem concepts - types, structure and functions of ecosystem. Pollution of water, air, soil, noise, thermal and nuclear hazard. Types, causes, methods of measurement, standards and management

Unit-II

Solid and liquid waste management - treatment and disposal. Vulnerability, adaptability and sustainable development; International conventions and treaties. Biodiversity and conservation - value, utilization and threats

Unit-III

Threatened/endangered species and hotspots. Human population and environment - environment and human health. Environment management laws and conservation projects of Government of India. Climate change - history and future projections, greenhouse gases, effects and mitigation strategies

Unit-IV

Natural Disasters - causes, phenomenon and impacts; Global and national events for disaster management; Agricultural Disaster phenomenon, events and their management; Acts and policies in India.

Books recommended

1. Environmental Studies by MenakashiVerma
2. Text book of Environmental Studies by D.K.Asthana, Meena Asthana (S.Chand)
3. Disaster Management by Mukesh Kapoor

BSAG-606 Fundamentals of Agri-business Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit I

Entrepreneurship Development Agri-business- meaning, definition, features and structure of agri-business (input, farm and processing sectors); Importance of agri-business in the Indian economy; Management- definitions, importance and functions.

Unit II

Planning- meaning, definition and process; Types of plans and characteristics of a sound plan; Introduction to organising, staffing, directing and controlling. Introduction to marketing management components of marketing mix.

Unit III

Project definitions; Project cycle- identification, formulation, appraisal, implementation, monitoring and evaluation. Entrepreneurship development- concept of entrepreneurship, entrepreneurial and managerial characteristics.

Unit IV

Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs; Procedure and constraints in setting up agro-based industries.

Books recommended

1. Objective Agribusiness management by S.R Panigrahy AMAZON INDIA
2. Fundamentals of Agribusiness management by Shoji Lal Bairwa, Kalyani Publishers
3. Agribusiness management by Jay T. Akridge, Freddie Barnard, Frank J. Dooley

BSAG-607 Protected Cultivation and Post-Harvest Technology

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit-I

Introduction, planning, design and application of green houses; Plant response to greenhouse environment; Green house equipment.

Unit-II

Materials of construction for traditional and low cost green houses; Irrigation systems used in greenhouses; Cost estimation and economic analysis; Winnowing; Groundnut decorticators. Maize and castor shellers.

Unit-III

Drying- grain drying, types of drying, types of dryers. Storage grain storage, types of storage structures; Cleaning and grading equipment for fruits and vegetables; Size reduction equipment; Evaporation- principle and types; Quality standards.

Unit-IV

Crops selection and constraints of greenhouse cultivation; Growing media, drainage, flooding and leaching, soil pasteurization, nutrient film technique (NFT) / hydroponics.

Books recommended

1. Protected cultivation by Adikant Pardan
2. Advances in protected cultivation by Brahma Singh & Balraj Singh
3. Protected Cultivation of Horticultural Crops by D K Singh
4. Protected Cultivation of Vegetables by Balraj Singh

BSAG-608 Renewable Energy

L T P
1 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

UNIT-I

Energy sources- Introduction and classification. Types of biogas plants and utilization of biogas. Agricultural wastes.

UNIT-II

Principles of combustion, pyrolysis and gasification. Types of gasifiers. Producer gas and its utilization. Briquettes- briquetting machine, uses of briquettes.

UNIT-III

Solar energy- solar flat plate and focusing plate collectors. Introduction to solar air heaters, cookers, water heating systems, grain dryers, refrigeration system, ponds, lantern, street lights, fencing and pumping systems.

UNIT-IV

Wind energy- types and application of wind mills. Liquid bio fuels- biodiesel and ethanol from agricultural produce and its uses.

Books recommended

1. Renewable Energy sources & Emerging Technology by Kothari.
2. Renewable Energy Technologies- A practical Guide for Beginners by Solanki.
3. Renewable energy- Power for suitable future by Boyle
4. Fundamentals of Renewable energy.

BSAG-609 Post-harvest Management of Fruits and Vegetables

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Unit-I

Importance. Maturity indices, harvesting and post-harvest handling of fruits and vegetables; Maturity and ripening process. Factors affecting ripening and deterioration of fruits and vegetables.

Unit-II

Chemicals used for delaying and hastening ripening. Methods of storage and low cost storage structures.

Unit-III

Methods of packing, packaging materials and transport; Types of containers, cushioning material, vacuum packing, shrink packing.

Unit-IV

Specific packing for export of mango, banana, grapes, Kinnow, sweet orange, and mandarin etc. Unit layout - selection of site and precautions for hygienic conditions.

Books recommended

1. Post harvest management of Horticulture Crops by Dr. S Saraswathy
2. Post Harvest Technology Of Horticulture Crops by KP Sudeer.
3. Prevention of Post harvest losses , Fruits, Vegetables and Root crops by FAO

BSAG-610 Crop Production-II (Rabi Crops) Practical

L T P
0 0 1

Internal Marks: 30
External Marks: 20
Total Marks: 50

Crop planning; Raising field crops in multiple cropping systems using improved agronomic practices; Field preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops. Harvesting, threshing, drying, winnowing, storage and marketing of produce; Preparation of balance sheet including cost of cultivation, net returns per student.

BSAG-611 Diseases of Horticultural Crops and their Management (Practical)

L T P
0 0 1

Internal Marks: 30
External Marks: 20
Total Marks: 50

Study of symptoms and host-parasite relationships of important diseases of horticultural crops; Field visits at appropriate time during the semester

BSAG-612 Flower Cultivation and Landscape Gardening (Practical)

L T P
0 0 1

Internal Marks: 30
External Marks: 20
Total Marks: 50

Identification of trees, shrubs, climbers, houseplants, seasonal flowers; Layout of lawns and maintenance; Potting, repotting and maintenance of houseplants; Training and pruning of rose; Pinching and disbudding chrysanthemum; Planning of gardens and development of garden features; Post-harvest handling of cut flowers

BSAG-613 Breeding of Field and Horticultural Crops (Practical)

L	T	P
0	0	1

Internal Marks: 30
External Marks: 20
Total Marks: 50

Handling of segregating generations-pedigree method, bulk method, back cross methods; Field layout of experiments; Field trials; Estimation of heterosis and inbreeding depression; Estimation of heritability; GCA and SCA; Estimation of variability parameters; Problems on Hardy-Weinberg Law; Study of quality characters; Sources of donors for different characters; Visit to research stations and seed production and certification plots

BSAG-614 Protected Cultivation and Post Harvest Technology (Practical)

L	T	P
0	0	1

Internal Marks: 30
External Marks: 20
Total Marks: 50

Study of different types of green houses; Calculation of air rate exchange system; Estimation of drying rate of agricultural products; Testing of soil and water suitability and fertigation requirements for greenhouses; Study of threshers, Winnowers, groundnut decorticator and maize and castor shellers - their components, operation and adjustments; Improved grain storage structures; Study of dryers, cleaners and graders. Visit to commercial greenhouses. Growing media - their preparation and pasteurization/sterilization IKG PTU B.Sc. Agriculture Batch 2014 onwards

BSAG-615 Renewable Energy (Practical)

L T P
0 0 1

Internal Marks: 30
External Marks: 20
Total Marks: 50

Constructional details of biogas plants; Constructional details of different types of gasifiers; To study and find the efficiency of solar cooker, dryers, domestic water heater; Performance of wind mills; Field visit to biogas plants and wind mills; Bio-diesel preparation

BSAG-616 Post-harvest Management of Fruits and Vegetables(Practical)

L T P
0 0 1

Internal Marks: 30
External Marks: 20
Total Marks: 50

Judging maturity of various fruits and vegetables;. Conservation of zero energy cool chambers for on farm storage; Determination of physiological loss in weight, total soluble solids, total sugars, acidity and ascorbic acid content in fruits and vegetables; Types of packing and importance of ventilation; Pre cooling of horticultural crops; Methods of prolonging storage life; Effect of ethylene on ripening of fruits; Identification of equipments and machinery used in preservation of fruits and vegetables; Preservation by drying and dehydration. Visit to local market yards, cold storage units and packing house

Compulsory Courses for all streams of 7th semester

BSAG-701 Diseases of Field Crops & their Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Economic importance, symptoms, causal organism, epidemiology, disease cycle and integrated management of diseases of rice, sorghum, bajra, maize, wheat, barley, sugarcane, turmeric, tobacco, groundnut, sesamum, castor, sunflower, rapeseed & mustard, cotton, pulses, mentha and berseem.

BSAG-702 Introduction to Molecular Biotechnology

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Genome organization of prokaryotes and eukaryotes; Restriction endonucleases- classification, properties and uses in molecular biology; Recombinant DNA technology; Construction and uses of genomic and cDNA libraries; Southern, Northern and Western Hybridization; RFLPs; Polymerase Chain Reaction and its variants; PCR based markers like RAPDs, SSRs, AFLPs, SNPs and their variants; uses of molecular markers in generation of molecular linkage maps, gene mapping and marker assisted breeding; DNA sequencing; gene cloning approaches.

BSAG-703 Diseases of Field Crops & their Management (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of symptoms and host-parasite relationships of important diseases of field crops. Field visits at appropriate time during the semester.

BSAG-704 Introduction to Molecular Biotechnology (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Preparation of competent cells and Transformation. Isolation and purification of and fractionation of plant DNA. Agarose and PAGE Gel electrophoresis. Measurement of nucleic acids concentration using photospectometer and gel electrophoresis. DNA amplification using RAPD primers and its fractionation in agarose gel. DNA amplification using microsatellite primers and its fractionation using polyacrylamide gels. Estimation of genetic similarities and generation of dendrograms using NTSYS/DARwin software. Introduction to various databases.

Crop Science (Soil Science, Agronomy and Agro-Forestry)

BSAG-CS701 Soil Physical & Biological Environment

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Soil physical properties in relation to crop production. Soil thermal regime and its management. Soil air - composition, renewal, characterization of soil aeration in relation to plant growth. Movement of water in soil. Infiltration and redistribution of water in soil. Evaporation from soils and its management. Runoff from the agricultural fields and factors affecting. Soil organisms and their distribution, ecology, classification and activities in soil. Microbiological transformations of C, N and S in soils.

BSAG-CS702 Analytical Techniques in Soils, Plants, Fertilizers and Water

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Colorimetric and flame photometric methods. Atomic absorption spectrophotometry. Cation and anion exchange phenomenon and their importance. Ion adsorption, desorption and fixation in soils. Methods of soil fertility evaluation. Fertilizer control order. Acid, saline, sodic, calcareous soils and their amelioration. Planning and formulation of project on establishment of soil water and plant testing laboratory.

BSAG-CS703 Weed Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Weeds- Introduction, harmful and beneficial effects, characteristics and classification. Weed biology and ecology. Crop weed association, competition and allelopathy. Concepts of weed prevention, control and eradication. Methods of weed control. Physical, cultural, chemical, biological and integrated weed management. Herbicides- classification, formulation, advantages, disadvantages and methods of application. Introduction to adjuvants and their use in herbicides. Introduction to selectivity of herbicides. Mode of action and fate of herbicides in soil. Compatibility of herbicides with other agrochemicals. Weed management in major field and horticultural crops and in non cropped areas. Shift in weed flora in cropping systems. Classification, useful and harmful aspects and control measures of aquatic weeds. Problematic weeds and their control.

BSAG-CS704 Farming System & Sustainable Agriculture

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Farming systems, definition, principles and components. Farming System models for irrigated, dryland situations and modules for marginal, small and large farmers. Farming systems of the world-arable, 92 pastoral, lay farming, shifting cultivation, ranching and agro-forestry systems. Energy and fuel wood plantations. Specialized and diversified farming, family co-operative and collective farming: their occurrence, adaptations and weaknesses. Factors affecting choice of farming systems. Cropping systems, their characteristics and management. Cropping patterns. Agro-ecosystem and agro-ecological zones of India. Efficient food producing systems. Sustainable agriculture- Introduction, definition, goal and current concepts, factors affecting ecological balance and ameliorative measures, land degradation and conservation of natural resources

BSAG-CS705 Production Technology of Spices, Aromatic, Medicinal and Plantation Crops

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Important Spice crops- Ginger, Turmeric, Dill Seed, Pepper, Cardamom, Coriander, Cumin, Fennel, Celery and Fenugreek. Aromatic crops- Mentha, Lemongrass, Citronella, Palmarosa, Vetiver and Geranium. Medicinal plants- Dioscoria, Rauvolfia, Opium, Periwinkle, Guggal, Belladonna, Nuxvomica, Solanum nigrum, Senna, Amla, Isabgol, Coleus, Acorus and Pipli (mug); Plantation crops- Coconut, Arecanut, Betelvine, Cashew, Cocoa and Coffee with special reference to their origin and distribution, adaptation, classification, growth and development in relation to environment, climatic requirements, varieties, agronomic practices for sustained production, harvesting, processing marketing and quality aspects and uses.

BSAG-CS706 Production Technology of Economic Forest Trees

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Plantation silviculture: native versus exotics; even-aged versus uneven-aged; monoculture versus mixed culture. Plantation technology and tending operations of economically important tree species. Agroforestry concept and suitable agroforestry systems/models for different regions. Economic and ecological aspects of agroforestry systems. Importance of superior phenotypes, their evaluation and use in plantations. Climate change and forests. Forest regeneration, productivity and rotation. Desertification and rehabilitation of waste lands. Short rotation intensive management of forest plantations. Trees 133 outside forests, energy/industrial plantation and dendro- remediation. Production and marketing of forestry produce. Forest fire and its management. Wood based industries and importance of nontimber forest produce. Framework for forestry extension: participatory rural appraisal and joint forest management.

BSAG-CS707 Soil Survey, Classification and Mapping (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Application and use of global positioning system for soil survey. Macro-morphological study of soils. Classification of soils developed on different landforms. Study of base maps-cadastral maps, toposheets, aerial photographs and satellite imageries. Soil survey of project area-preparation of base maps, analysis of soil characteristics, classification of surveyed soils, mapping and report writing. Interpretation of soil survey data for land capability and crop suitability classifications. Use of geographical information system for preparing thematic maps

BSAG-CS708 Soil Physical & Biological Environment (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Determination of dry and wet stability of aggregates. Measurement of in situ soil bulk density and filling of soil columns with a particular bulk density. Measurement of soil porosity. Determination of consistency limits of soils. Soil moisture characteristics. Measurement of soil temperature using thermocouples. Determination of infiltration rate under different surface conditions. In situ measurement of soil moisture by neutron probe and Time Domain Reflectrometry. In situ measurement of soil matric potential using tensiometers. Enumeration of soil bacteria, fungi and actinomycetes. Isolation of Rhizobium and Azotobacter and measurement of respiration rate.

BSAG-CS709 Analytical Techniques in Soils, Plants, Fertilizers and Water (Practical)

L T P
0 0 6

Internal Marks: 60
External Marks: 90
Total Marks: 150

Preparation of standard solutions. Collection of soil, water, plant and fertilizer samples. Analysis of soil samples for fertility and quality evaluation for field crops and orchard plantations. Analysis of irrigation water for quality appraisal. Fertilizers analysis for quality control. Soil, water and fertilizer analysis reports for recommendation purposes. Analysis of forms of nitrogen , phosphorous, potassium and sulphur in soils. Determination of DTPA- extractable micronutrients. Plant analysis for total N, P, K and micro-nutrients. Determination of CEC and AEC of soils. Nutrient adsorption and fixation capacities of soils.

BSAG-CS710 Weed Management (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Identification of weeds and weed seeds. Survey of weeds in crop fields and other habitats. Preparation of weed herbarium. Computation of herbicide doses, weed control efficiency and weed index. Methods of recording weed intensity under different situations. Herbicide label information of commonly available herbicides. Herbicide application equipments and their calibration. Diagnosis of herbicide toxicity symptoms in different crops and weeds. Visits to problem areas.

BSAG-CS711 Farming System & Sustainable Agriculture (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Preparation of cropping scheme and integrated farming system models for irrigated and dryland situations. Preparation of enriched Farm Yard Manure and Vermicompost. Visit to urban waste recycling unit, organic farm and model farmers' field. Preparation of farm lay out plans, different intensity crop rotations and cropping schemes. Estimating crop yields. Energy budgeting in different crops and cropping systems. Working out ecological optimum crop zones. Project making exercises for establishment of crop production farms under different situation.

BSAG-CS712 Production Technology of Spices, Aromatic, Medicinal and Plantation Crops (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Identification of crops based on morphological and seed characteristics. Propagation, seed selection, seed treatment, processing and distillation techniques for different medicinal, aromatic and spice crops.

BSAG-CS713 Production Technology of Economic Forest Trees (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Nursery management: propagation methods, quality planting stock, preparation of nursery and plantation schedule. Layout and establishment of agroforestry models. Estimation of tree volume and biomass; enumeration and vegetation survey. Methods of vegetation analysis: measurement of biomass and productivity. Visit to commercial plantations, wood based industries and forestry institutes.

Horticulture (Pomology, Olericulture & Floriculture)

BSAG-HC701 Nursery Management of Horticultural Crops

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Principles of plant propagation. Seed dormancy and germination. Selection of rootstock and scion. Stock scion relationship. Factors affecting successful propagation. Physiology of dwarfing rootstock. Different methods of propagation like division, cutting, layering, budding and grafting, and tissue culture. Containers, media and mixtures. Propagation structures. Nursery act, quarantine and certification. Nutrient management and plant protection measures in nursery. Economics of raising fruit plant nursery.

BSAG-HC702 Commercial Fruit Production

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Importance and uses, botany, flowering and fruiting, climate and soil, promising varieties, horti-agri techniques, production, plant protection measures and special problems in fruits such as citrus, mango, guava, apple, pear, peach, plum, ber, litchi, grapes, pomegranate, papaya, pineapple, phalsa, banana and sapota.

BSAG-HC703 Processing and Value Addition of Horticultural Crops

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Scope of fruit preservation industry in India, present status, constraints and prospects. Importance, principles and practices of fruit processing. Maturity indices, harvesting, transportation and quality 138 parameters of fruits. Pre and post harvest factors affecting processing quality of fruits. Commercial processing technologies for fruits like mango, citrus, guava, grapes, ber, apple, pear, peach, plum, phalsa, litchi, pomegranate and papaya etc. Packing technology for export and value addition.

BSAG-HC704 Commercial Vegetable Production

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Role of soil, climatic and agronomic factors in vegetable production. Principles of cultivation including direct sowing, nursery management, transplanting, hardening of seedlings and vegetable forcing. Weeds and their control. Rotation and Intercropping in vegetable crops. Export potentiality, post harvest handling, processing, storage and marketing of vegetables.

BSAG-HC705 Vegetable Breeding and Seed Production

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Scope of vegetable breeding and seed production. Origin, floral biology and breeding systems in vegetable crops. Germplasm resources. Principles and methods of breeding self-pollinated, often cross-pollinated and cross- pollinated vegetable crops. Plant introduction, selection, hybridization, population improvement, mutation and polyploidy. Seed production of conventional varieties. Production of F1 hybrids using male sterility, self-incompatibility, various sex-forms etc. Methods of production of nucleus, breeder, foundation and certified seeds isolation pollination, seed harvesting, processing and storage. Seed testing and certification. Seed Act. Vegetable seed industry and its problems

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BSAG-HC706 Forcing Techniques in Vegetable Production

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Objectives, importance and scope of protected cultivation. Nursery raising techniques. Environmental factors. Vegetable growing media. Irrigation and fertigation. Sustainable land use systems. Maximising land use efficiency in protected structures. Problems of growing vegetables in protected structures,. Soil sterilization techniques. Hydroponics cultivation. . Pest management in green house/glass house. Crops and varieties suitable for protected cultivation. Specific technology for raising tomato, sweet pepper, cucumber and high value crops in off season. Cladding material for protected structures - use of mulches. Seed production of vegetables.

BSAG-HC707 Commercial Floriculture and Landscaping

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Scope, importance and export potential of floriculture, environment factors influencing plant growth and flower production in cut flowers. Production technology including varieties, propagation, soil, nutrition, disease and pests of important cut flowers. Post harvest handling, grading and packing cut flowers, pot and bedding plants. Flower seed production. History of gardening, characteristics of Hindu, Mughal, Japanese and English gardens. Principle groups of plants like trees, shrubs, climbers, shade loving plants, ground covers, their analysis and use in landscape composition. Principles of art and landscaping. Preparation of landscape plans for homes, farm complexes, small parks and institutions. Development and maintenance of rock, water and terrace gardens. Bonsai and dish gardens, project formulation and evaluation.

BSAG-HC708 Nursery Management of Horticultural Crops (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Raising of rootstock. Methods to break seed dormancy. Propagation techniques. Training, lifting and packing of nursery plants. Preparation of media and mixtures, and raising nursery in poly bags. Project formulation and valuation of nursery raising.

BSAG-HC709 Commercial Fruit Production (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Identification of species and fruit varieties, training and pruning, maturity standards, harvesting, handling, grading and packing of fruits. Project formulation and valuation of orchard management.

BSAG-HC710 Processing and Value Addition of Horticultural Crops (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Judging of maturity of different fruits. Methods of preparation of jam, jelly, ready to serve, squash, nectar, canning, chutteny, pickle and marmalade etc. Packing technologies. Drying and dehydration of fruits. Visit to local processing unit.

BSAG-HC711 Commercial Vegetable Production (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Sowing and transplanting of vegetable crops. Effect of soil conditions on seedling emergence and plant growth. Nutrient deficiency symptoms. Common weeds, their identification and control. Project formulation and evaluation for vegetable nursery production and vegetable forcing techniques.

BSAG-HC712 Vegetable Breeding and Seed Production (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of inflorescence and flower structures. Practice in emasculation and artificial pollination. Inspection and rouging. Testing of seeds for purity and germination. Project formulation and evaluation for seed production of vegetable crops.

BSAG-HC713 Forcing Techniques in Vegetable Production (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of various types of structures. Methods to control temperature, CO2, light. Demonstration for sanitation measures. Hydroponics. Maintenance of parental lines and hybrid seed production in glasshouse. Fertigation and nutrient management. Control of diseases and insect pests in glasshouse. Visit to established greenhouses in the region.

BSAG-HC714 Commercial Floriculture and Landscaping (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Preparation of plans and laying out of gardens. Identification of planting material and commercial varieties of flowers. Seed collection, germination tests and storage. Harvesting and handling of cut flowers. Judging of flowers and pot plants. Visit to local nurseries and florist centers.

Plant Breeding, Genetics & Biotechnology

BSAG-PGB 701 Genetics of Crop Plants

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Genetic analysis in different systems. Genetic recombination in prokaryotes and eukaryotes. Detection and estimation of linkage from test cross and F2 data. Genetic material - organization, structure and replication. Extra nuclear inheritance. Genetic of quantitative traits. Genetic equilibrium and forces changing gene frequency. Induction, detection and uses of mutations. Gene function. Gene expression. Gene regulation. Environmental influence on gene expression. Gene cloning. Genetic transformation.

BSAG-PGB 702 Cytogenetics of Crop Plants

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Structure and function of cell organelles. Chromosomal theory of inheritance. Morphology, ultra structure and differential staining of chromosomes. Unusual chromosomes. Cell cycle. Cytological, genetic and morphological effects of chromosomal aberrations. Classification, induction, characterization and utilization of haploids, euploids and aneuploids. In situ hybridization. Evolution of karyotype. Genome analysis in wheat, cotton, Brassica species.

BSAG-PGB 703 Theory and Practice of Plant Breeding

L T P
3 0 0

Internal Marks: 60
External Marks: 90
Total Marks: 150

Role of plant breeding. Centres of origin of crop plants. Plant genetic resources and their utilization. Breeding systems. Breeding methods in self-pollinated, cross-pollinated and vegetatively propagated crops and their genetic basis. Heterosis and its exploitation. Male sterility and self-incompatibility. Mutation and polyploidy. Breeding for quality traits. Breeding for abiotic and biotic stresses. Wide hybridization. Procedures for the release of new varieties. Plant breeding for sustainable agriculture. Plant Variety Protection and Breeders' Rights.

BSAG-PGB 704 Breeding of Field Crops

L T P
3 0 0

Internal Marks: 60
External Marks: 90
Total Marks: 150

Application of genetic, cytogenetic and biotechnological techniques in breeding of wheat, triticale, rice, maize, bajra, barley, sorghum, cotton, sugarcane, important pulses, oilseeds and forage crops including their origin and germplasm sources. Problems and present status of crop improvement in India with emphasis on the work done in Punjab. National and International centres of crop improvement.

BSAG-PGB 705 Crop Experimentation

L T P
1 0 0

Internal Marks: 20
External Marks: 30
Total Marks: 50

Experiments in Plant Breeding - objectives, analysis and interpretation of results. Statistics in relation to crop experimentation. Principles of experimental designs. Uniformity trials, progeny rows trials, compact family block design, completely randomized block design, randomized block design, incomplete block 145 designs. Simple lattice. Augmented designs. Varietal trials over years and locations. G x E and estimation of genetic components. Analysis of co-variance. Determination of yield through its components.

BSAG-PGB 706 Plant Tissue Culture and Transformation

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Concepts of plant tissue culture and transformation. Various aspects of plant tissue culture. GMO's / LMO's/ transgenics. Gene transfer methods. Agrobacterium mediated plant transformation. Particle gun mediated plant transformation. Molecular characterization of transgenic plants using PCR, Southern and Western analysis. Bioassays with transgenic plants. Genetic engineering of crop plants for useful traits. Foods for the future. Biosafety concerns and regulatory mechanisms. Commercialization of transgenic products.

BSAG-PGB 707 Molecular Biotechnology and Genomics

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Classification, properties and uses of restriction endonucleases. Characteristics and uses of plasmids in molecular biology. Recombinant DNA technology. Construction and uses of genomic and cDNA libraries. Genome organization of prokaryotes and eukaryotes. Southern, Northern and Western hybridization. RFLPs. Polymerase chain reaction. PCR-based markers like RAPDs, SSRs, ISSRs, STS, Scars. Generation of molecular maps. Applications of biotechnology in crop improvement. DNA sequencing. Gene cloning approaches. Functional genomics, proteomics and bioinformatics.

BSAG-PGB 708 Genetics of Crop Plants (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Study of autosomal monogenic and digenic inheritance. Three point test cross and gene mapping. Detection and estimation of linkage using test cross and F2 data. Segregation in corn. Gene frequency analysis - autosomal, sex-linked and multiple allelic traits. Genetic equilibrium. Demonstration of quantitative inheritance.

BSAG-PGB 709 Cytogenetics of Crop Plants (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Microscopy. Techniques of cytological preparations. Fixation of material for mitosis and meiosis. Preparation of permanent slides of cell division. Karyotype analysis. Production and study of polyploids and haploids. Identification of aneuploids.

BSAG-PGB 710 Theory and Practice of Plant Breeding (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Emasculation, crossing and selfing in various crops. Collection, viability and germination of pollen. Handling of breeding materials. Study of variability, male sterility and self-incompatibility. Quality testing in crop plants. Screening for disease resistance.

BSAG-PGB 711 Crop Experimentation (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Statistical parameters and tests of significance. Use of computer packages for analysis. Layout of field experiments. Analysis of experimental designs. Character association. Analysis of varietal trials and G x E interactions.

BSAG-PGB 712 Plant Tissue Culture and Transformation (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Establishment of direct and indirect in vitro plant regeneration methods for genetic transformation. Gene constructs and their maintenance. Agrobacterium mediated genetic transformation. Particle mediated genetic transformation. Histochemical GUS assays. PCR screening of putative transgenic plants. Raising transgenic plants under contained conditions.

BSAG-PGB 713 Molecular Biotechnology and Genomics (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Isolation, purification and fractionation of DNA and proteins. Isolation and purification of plasmids. Measurement of protein and nucleic acid concentration using photospectrometer. DNA amplification using RAPD/SSR primers and its fractionation in agarose gel. Generation of linkage maps and mapping of qualitative genes using important web sites on computer.

Agri-extension, Economics & Business Management

BSAG-AEB 701 Visual and Graphic Communication

L T P
1 0 0

Internal Marks: 20
External Marks: 30
Total Marks: 50

Definition, characteristics, classification, principles and role of visuals in communication. Contribution of visual perception in learning process. Planning, preparation, presentation and evaluation of visual aids, low cost visuals, photographs and pictures. Computer based digitized visual materials. Use of drawing techniques for visuals. Selection and use of animation tools in transfer of technology. Preparation and use of resource map for extension work. Designing of visuals for print and electronic media. Scope and importance of journalism in agriculture.

BSAG-AEB 702 Communication & Information Technology

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Introduction to communication. Problems in communication and feedback. Role of information and communication technology in agriculture and rural development. Extension teaching methods and their use. Trends in agriculture information management system. Need and scope of cyber extension. Importance of kiosks, agri- portal, internet café, community and FM radio in villages. Privatization of cyber extension. Public-private partnership. Development of Information Communication Technology (ICT) in changing the agricultural scenario.

BSAG-AEB 703 Behavioural Skills for Human Resource Development

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Concept of human behaviour. Taxonomy of behavioural domains. Human needs and their hierarchy. Attitude, its characteristics and measurement. Perception and its principles, selectivity in perception. Motivational skills for attitudinal and perceptional changes. Problem-solving skills. Innovativeness in human behaviour, response and resistance to change. Concept of self, Johari's window model. Defence mechanism. Group dynamics. Group behaviour and conflict management. Decision-making process. Theories of leadership. Concept of human resource development and human relations. Human interaction, its importance and types. Interpersonal perception and social behaviour.

BSAG-AEB 704 Micro Economic Analysis

L T P
3 0 0

Internal Marks: 60
External Marks: 90
Total Marks: 150

Micro Economics: meaning, definition, importance, nature and scope. Theory of consumer behavior: marginal utility analysis and indifference curve analysis. Demand analysis: meaning, definition, derivation of demand curve. Firm and industry: meaning, types, difference between firm and industry, equilibrium conditions, short-run and long-run analysis. Production: meaning, process and factors of production, relationship between production and different factors, production lags. Theory of producer behaviour: production function, costs, optimization of inputs use and product combinations, maximization of returns, specialization and diversification and supply analysis. Product market: meaning, types, assumptions, conditions of perfect and imperfect markets. Equilibrium of a firm and industry, determination of price and output of commodities under different market situations. Factor pricing: meaning, different theories for determination of rent, wages, interest and profit

BSAG-AEB 705 Macro Economic Analysis

L T P
3 0 0

Internal Marks: 60
External Marks: 90
Total Marks: 150

Macro Economics: meaning, definition, importance, limitations, scope and integration of micro and macro analysis. Basic macro economic concepts. National income: meaning, definition, types, measurement and social accounting. Circular flow of money. Simple Keynesian model of income determination, shifts in aggregate demand. Multiplier. Theories of consumption and investment. Income determination model including money and interest. Monetary policy: meaning, instruments, indicators, lags and effectiveness. Fiscal policy: meaning, definition, different tools and limitations. Wage and employment policies: meaning, need, demand and supply of labour, measures of full employment, relationship between level of employment and output. Inflation and recession: process, causes, types and remedies. Introduction to Indian economy and comparison with other related economies. Significant economic problems in Indian agriculture relating to agricultural production and productivity, credit, marketing, labour and environment.

BSAG-AEB 706 Financial & Project Management

L T P
3 0 0

Internal Marks: 60
External Marks: 90
Total Marks: 150

Importance, need, scope and functions of finance. Concept of time value of money. Capital budgetingconcept and steps in capital budgeting, appraisal criteria- pay back period, average rate of return, net present value, benefit cost ratio and internal rate of return. Working Capital Management- concept, determinants and need for working capital in agribusiness. Introduction, objectives and techniques of inventory management for agribusiness. Introduction to cost of capital and capital structure. Project management- concept, characteristics and types of projects. Project feasibility- market, technical, financial and economic feasibility. Project risk analysis. Estimating financial requirements of projects and sources of finance.

BSAG-AEB 707 Retailing and Supply Chain Management

L	T	P
3	0	0

Internal Marks: 60
External Marks: 90
Total Marks: 150

Introduction to retailing- definition, concept and overview. Types of retail institutions related to agri- business. Changing food consumption patterns in India. Store location and site selection. Managing retail operationsprocurement and inventory management. Store design- the exterior, interior, layout and display. Promoting store. Introduction to customer relationship management in retail business. Supply chain managementconcept, definition and importance. Elements of physical distribution systems, building and operating supply chains in agribusiness. Role of IT in supply chain management.

BSAG-AEB 708 Visual and Graphic Communication (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Preparation and use of visual aids. Generating computer aided presentation of graphics. Scanning of visuals, image editing and script writing for radio & TV. Developing agricultural video films. Visit to animation, print and electronic media centers. Writing of news items, articles, success stories etc. for print and electronic media. Presentation and evaluation of visuals.

BSAG-AEB 709 Communication & Information Technology (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Studying problems faced by farmers at Agri-clinic and analyzing communication problems of extension personnel. Use of different extension teaching methods in field and simulated conditions. Practice in planning and conducting video- conferencing. Visit to information kiosks. Identifying problems in agriculture information management system.

BSAG-AEB 710 Micro Economic Analysis (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Practical training to study consumer behavior in relation to demand of various commodities, consumer survey. Economic analysis of a firm and industry. Working knowledge of relationship between production and different factors of production, production costs and optimum input use. Product market survey. Practical training of price determination in different types of markets.

BSAG-AEB 711 Financial & Project Management (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Case studies related to financial management and project management. Visits to agri-business industrial houses. Numerical problems based on capital budgeting. Preparation of project report for various agri-business ventures.

Plant Protection

BSAG-PP 701 Apiculture

L T P
1 0 0

Internal Marks: 20
External Marks: 30
Total Marks: 50

Indian history of beekeeping. Species and races of honey bees. Morphology and anatomy of honey bee. Colony organization, life cycle and division of labour in Apis mellifera. Seasonal management of honey bee colonies; swarming, drifting and curbing drone population. Management of queenless and laying worker colonies. Colony multiplication. Bee enemies and diseases. Protection from pesticidal hazards. Maximizing honey production. Bee flora. Managed bee pollination of crops. Colony migration. Apicultural diversification. Honey and its quality. Economics of beekeeping.

BSAG-PP 702 Biocontrol and Integrated Pest Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

History and concept of biological control, different groups of biological control agents and biopesticidesmacrobials (parasitoids and predators), microbials (bacteria, viruses, fungi, protozoa and nematodes) and botanical- neem, pyrethrum, nicotine, rotenone and others, their use in pest management along with advantages and limitations. Methods of mass production for each of these groups. National and international agencies dealing with biological control. IPM-history, definition and concept. Concept of economic threshold. Pest monitoring and surveillance. Different tools of IPM including physical, mechanical, cultural, biological (parasite and predators, microbial agents), host plant resistance, botanical, chemical, biorationals and biotechnological approaches. Integration of different IPM tactics. Decision making systems. Potential of IPM, its implementation and constraints. Successful example in IPM.

BSAG-PP 703 Pesticides and Plant Protection Equipment

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Pesticides- classification, properties, entry and mode of action. Formulations and toxicity of pesticides. Factors affecting toxicity of pesticides.Compatibility and synergism. Antidotes. Problems associated with the use of pesticides. Role of repellents, attractants, pheromones, hormones, chemosterilants and antifeedants in pest control. Pest control equipment - history of development, classification, constructional features, principles of working, operation, maintenance and selection. Planning of pest control operations.

BSAG-PP 704 Biocontrol and Integrated Disease Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

History and principles underlying host resistance, chemical, physical, cultural, biological and legislative measures of plant disease management. Scope and factors affecting biological control. Mechanisms of bio-control. Characterization of bioagents and their commercial formulations. Limitations of biocontrol. Commercial production and distribution system. Integrated disease management. Historical developments and classification of fungicides and antibiotics. Mode of action, uptake , translocation, disease control and factors affecting their efficacy and field performance. Registration, commercial development and compatibility of fungicides with other chemicals. General account of plant protection appliances. Development of resistance in pathogens against fungicides .Non-target effects of fungicide use. Methods of screening for disease resistance. Seed certification standards and phytosanitory measures

BSAG-PP 705 Post Harvest Diseases and their Management

L T P
2 0 0

Internal Marks: 40
External Marks: 60
Total Marks: 100

Importance of post-harvest diseases. Important post-harvest diseases of fruits and vegetables. Factors affecting ripening of fruits and vegetables. Factors favoring development of post-harvest diseases. Effect of 154 handling and storage practices on the development of post-harvest diseases. Storage methods and conditions. Disease management strategies for post-harvest diseases.

BSAG-PP 706 Plant Nematology

L T P
1 0 0

Internal Marks: 20
External Marks: 30
Total Marks: 50

History and economic importance of plant parasitic nematodes. General characteristics, identification, their classification and relationship with other organisms. Morphology and biology of important genera, namely Meloidogyne, Heterodera, Globodera, Anguina, Rotylenchulus, Ditylenchus, Tylenchulus, Pratylenchus, Radopholus and virus vectors. Principles and methods of control.

BSAG-PP 707 Plant Disease Diagnosis (Practical)

L T P
0 0 4

Internal Marks: 40
External Marks: 60
Total Marks: 100

Field diagnosis of important diseases of Rabi and Kharif crops, vegetables, fruits , forest and ornamental plants. Estimation of losses and methods for assessing the intensity of diseases like angular leaf spot of cotton, Tikka disease of groundnut, yellow mosaic of beans , downy mildew of bajra, rusts and loose smut of wheat, Alternaria blight, downy mildew of mustard and powdery mildew of pea. Methods of soil sterilization for raising healthy nursery plants. Solar-heat treatment. Methods of producing virus-free citrus and potato. Diagnosis and differentiation of disorders due to viruses, nutritional imbalances, genetic variations and toxaemias. Types of chemicals used for the control of plant diseases and methods of their application. Cultural and biological methods of plant disease control.

BSAG-PP 708 Apiculture (Practical)

L T P
0 0 4

Internal Marks: 40
External Marks: 60
Total Marks: 100

Important species of honey bees, castes differentiation and body structure. Handling of colonies. Colony organization and food storage pattern. Langstroth hive, apicultural equipment and machinery. Bee flora. Seasonal management practices. Colony division. Mass queen bee rearing techniques. Queen introduction, clipping and marking. Bee pollination of crops. Management of bacterial, viral and fungal diseases of honey bees. Identification and management of parasitic mites, wax moths, ants, wasps and predatory birds. Honey extraction. Pollen, propolis and bee venom collection. Processing of bees wax. Royal jelly production and collection. Honey processing and packaging. Honey testing. Visit to beekeeping industry (Hive manufacturing, equipment manufacturing, honey processing and exporting commercial units).

BSAG-PP 709 Biocontrol and Integrated Pest Management (Practical)

L T P
0 0 4

Internal Marks: 40
External Marks: 60
Total Marks: 100

Identification of important groups of parasitoids, predators and microbial control agents. Laboratory multiplication of parasitoids, predators and microbial control agents. Determination of economic threshold 100 levels. Demonstration of cultural and mechanical control measures of different pests. Use of pheromones, colour, sticky and light traps for monitoring and surveillance of pests. Study of IPM module in cotton, rice, sugarcane, maize, fruits and vegetables.

BSAG-PP 710 Pesticides and Plant Protection Equipment (Practical)

L T P
0 0 2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Familiarization with different formulations of pesticides, their preparation and use. Toxicity to insects and plants. Calculation of dosages of pesticides and fumigants. Practice in the use of various types of pest-control equipments. Study of factors affecting efficacy of pesticide spray. Calibrations of plant protection equipments. Common troubles in the use of pest-control equipment and their remedies. Estimation of pesticide residue in food commodities.

BSAG-PP 711 Biocontrol and Integrated Disease Management (Practical)

L T P
0 0 4

Internal Marks: 40
External Marks: 60
Total Marks: 100

Isolation and Identification of bio-control agents. Evaluation of bio-control agents against plant pathogens in vitro and in vivo. Production and application procedures. Laboratory evaluation of fungicides and antibiotics by various methods against different groups of pathogens. Methods of application of fungitoxicants. Absorption, translocation and persistence of different fungitoxicants. Integration of bio-control agents with other methods of plant disease control.

BSAG-PP 712 Post Harvest Diseases and their Management (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Important post-harvest diseases of fruits and vegetables like mango, citrus, guava, grapes, pear, cucurbits, chilli, tomato and potato. Study of factors favouring development of post-harvest diseases. Disease development under different storage conditions. Demonstration of various methods of disease management. Visit to a packing house.

BSAG-PP 713 Plant Nematology (Practical)

L	T	P
0	0	2

Internal Marks: 20
External Marks: 30
Total Marks: 50

Methods of survey, collection of soil and plant samples. Extraction of nematodes and population estimation. Preparation of temporary and permanent mounts. Study of morphological characteristics and disease symptoms. Application of nematicides.

BSAG 801; Rural experience:

A coordinator from the department of Extension Education will handle this course. For practically showing, he will take the students to an average village and make them aware the socio-economic structure of the villager such as sources of livelihood and occupational pattern, village infrastructure in terms of health, education, vet services, cooperative societies, banks, marketing facilities, farming conditions with reference to cropping pattern & livestock situation etc. The time allocated to this activity is three weeks in the beginning of semester.

BSAG 802 On-campus learning

After attaining the rural experience, for about 12 weeks, on-campus learning will be planned. Detailed Practical Field Learning Programme of each specialization is given below;

BSAG 803 Industrial attachment (Off-campus)

Students from each stream will be divided into groups each having 5 to 10 students and each group will visit an agro-industrial (processing) unit with the help of extension agencies and prepare a report of the organizational set-up, operational working and performance of the unit with SWOT analysis. Next 4 weeks are to be devoted to this activity.

BSAG 804 Documentation, reporting and presentation

Each group of students will write a detailed report of their rural and specialized practical training taken and give a Power Point Presentation in the presence of concerned teachers who will evaluate the performance of the students. It will be completed in one week.

Details of On-campus and off-campus Practical Field Learning Programme

Title of Module (on-campus)	Industrial attachment (Off-campus)
1. Elective: Soils, Agronomy and Agro forestry	
Module for evaluating soil health and irrigation water quality (Deptt. of Soil Science)	•Fertilizer industries • Vermi-compost units • Bio-fertilizer units • Mineral mines • Organic Farming
Practical seed production (Deptt. of Agronomy)	• Seed industries / companies • Herbicide formulators • Agro-processing units such as Mentha distillation plants, Soybean processing units, Rice Shelling, Sugar Mill
2. Elective: Crop Protection	
Production of bio-agents against plant pathogens (Deptt. of Plant Pathology/ Entomology)	• Pesticide and biopesticide industries • Bio-control agents production units • Plant Quarantine Station • Virus free potato tubers production units
3. Elective: Horticulture	
Nursery production of fruit crops (Deptt. of Fruit Science)	• Commercial fruit nurseries • Orchards of Progressive growers
Nursery raising techniques and protected cultivation of Vegetables (Deptt. of Vegetable Science)	• Commercial vegetable nurseries Farms of Progressive vegetable growers • Vegetables seed production units
Mushroom production (Deptt. of Microbiology)	• Mushroom production units
4. Elective: Plant Breeding, Genetics and Biotechnology	
Hybrid seed production of sunflower (Deptt. of Plant Breeding and Genetics)	• Commercial hybrid seed production units • Maintaining parental lines • Hybrid Seed production units at private farm
Biotechnological tools in crop improvement (Biotechnology unit)	• Biotechnological and tissue culture labs
5. Elective: Post Harvest Technology and Value Addition	
Production of value added processed food products (Deptt. of Food Science and Technology)	• Food processing and packaging industries • Quality Control • Marketing management