B.Sc. Agriculture (Hons.) course as per ICAR Fifth Dean Committee

❖ Semester-wise distribution of courses

I Semester		
1	Fundamentals of Horticulture	2 (1+1)
2	Fundamentals of Plant Biochemistry and Biotechnology	3(2+1)
3	Fundamentals of Soil Science	3(2+1)
4	Introduction to Forestry	2 (1+1)
5	Comprehension & Communication Skills in English	2 (1+1)
6	Fundamentals of Agronomy	4(3+1)
7	Introductory Biology*/Elementary Mathematics*	2 (1+1)/ 2(2+0)*
8	Agricultural Heritage*	1(1+0)*
9	Rural Sociology & Educational Psychology	2 (2+0)
10	Human Values & Ethics (non gradial)	1(1+0)**
11	NSS/NCC/Physical Education & Yoga Practices**	2 (0+2)**
TOTAL *R: Remedial course; **NC: Non-gradial courses		**18+03*+03****
II Semester		
1	Fundamentals of Genetics	3(2+1)
2	Agricultural Microbiology	2(1+1)
3	Soil and Water Conservation Engineering	2(1+1)
4	Fundamentals of Crop Physiology	2(1+1)
5	Fundamentals of Agricultural Economics	2(2+0)
6	Fundamentals of Plant Pathology	4(3+1)
7	Fundamentals of Entomology	4(3+1)
8	Fundamentals of Agricultural Extension Education	3(2+1)
9	Communication Skills and Personality Development	2(1+1)
Total		**24(16+8)**
III Semester		
1	Crop Production Technology – I *(Kharif Crops)*	2 (1+1)
2	Fundamentals of Plant Breeding	3 (2+1)
3	Agricultural Finance and Cooperation	3 (2+1)
4	Agri- Informatics	2(1+1)
5	Farm Machinery and Power	2 (1+1)
6	Production Technology for Vegetables and Spices	2 (1+1)
7	Environmental Studies and Disaster Management	3(2+1)
8	Statistical Methods	2(1+1)
9	Livestock and Poultry Management	4 (3+1)
Total		**23(14+9)**
IV Semester		
1	Crop Production Technology –II *(Rabi Crops)*	2(1+1)

2	Production Technology for Ornamental Crops, MAP and Landscaping	2(1+1)
3	Renewable Energy and Green Technology	2(1+1)
4	Problematic Soils and their Management	2(2+0)
5	Production Technology for Fruit and Plantation Crops	2(1+1)
6	Principles of Seed Technology	3(1+2)
7	Farming System & Sustainable Agriculture	1(1+0)
8	Agricultural Marketing Trade & Prices	3(2+1)
9	Introductory Agro-meteorology & Climate Change	2(1+1)
10	Elective Course	3 credit
Total		**19(11+8) + 3**
V Semester		
1	Principles of Integrated Pest and Disease Management	3(2+1)
2	Manures, Fertilizers and Soil Fertility Management	3 (2+1)
3	Pests of Crops and Stored Grain and their Management	3 (2+1)
4	Diseases of Field and Horticultural Crops and their Management -I	3 (2+1)
5	Crop Improvement-I *(Kharif Crops)*	2 (1+1)
6	Entrepreneurship Development and Business Communication	2 (1+1)
7	Geoinformatics and Nano-technology and Precision Farming	2 (1+1)
8	Practical Crop Production – I (*Kharif* crops)	2 (0+2)
9	Intellectual Property Rights	1(1+0)
10	Elective Course	3 credit
Total		**21(12+09)+ 3**
VI Semester		
1	Rainfed Agriculture & Watershed Management	2 (1+1)
2	Protected Cultivation and Secondary Agriculture	2 (1+1)
3	Diseases of Field and Horticultural Crops and their Management-II	3 (2+1)
4	Post-harvest Management and Value Addition of Fruits and Vegetables	2 (1+1)
5	Management of Beneficial Insects	2 (1+1)
6	Crop Improvement-II *(Rabi crops)*	2 (1+1)
7	Practical Crop Production –II (*Rabi* crops)	2 (0+2)
8	Principles of Organic Farming	2 (1+1)
9	Farm Management, Production & Resource Economics	2 (1+1)
10	Principles of Food Science and Nutrition	2(2+0)
11	Elective Course	3 credits
Total		**21 (11 + 10)+ 3**

VII Semester

S. No.	**Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE &AIA)**		
	Activities	**No. of weeks**	**Credit Hrs.**
1	General orientation & On campus training by different faculties	1	14
2	Village attachment	8	
3	Unit attachment in Univ. / College. KVK/ Research Station attachment	5	
4	Plant clinic	2	02

5	Agro-Industrial Attachment	3	04
6	Project Report Preparation, Presentation and Evaluation	1	
Total weeks for RAWE & AIA		**20**	**20**

- **Agro- Industrial Attachment:** The students would be attached with the agro-industries for a period of 3 weeks to get an experience of the industrial environment and working**.**
- Educational tour will be conducted in break between VII & VIII Semester.

RAWE Component-I

Village Attachment Training Programme

S. No.	**Activity**	**Duration**
1	Orientation and Survey of Village	1 week
2	Agronomical Interventions	1 week
S. No.	**Activity**	**Duration**
3	Plant Protection Interventions	1 week
4	Soil Improvement Interventions (Soil sampling and testing)	1 week
5	Fruit and Vegetable production interventions	1 week
6	Food Processing and Storage interventions	
7	Animal Production Interventions	1 week
8	Extension and Transfer of Technology activities	1 week

RAWE Component –II

Agro Industrial Attachment

- Students shall be placed in Agro-and Cottage industries and Commodities Boards for 03 weeks.
- Industries include Seed/Sapling production, Pesticides-insecticides, Post-harvest-processing-value addition, Agri-finance institutions, etc.

Activities and Tasks during Agro-Industrial Attachment Programme

- Acquaintance with industry and staff
- Study of structure, functioning, objective and mandates of the industry
- Study of various processing units and hands-on trainings under supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business network including outlets of the industry
- Skill development in all crucial tasks of the industry
- Documentation of the activities and task performed by the students
- Performance evaluation, appraisal and ranking of students

Modules for Skill Development and Entrepreneurship: A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the **VIII semester.**

S. No.	Title of the module	Credits
1	Production Technology for Bioagents and Biofertilizer	0+10
2	Seed Production and Technology	0+10
3	Mushroom Cultivation Technology	0+10
4	Soil, Plant, Water and Seed Testing	0+10
5	Commercial Beekeeping	0+10
6	Poultry Production Technology	0+10
7	Commercial Horticulture	0+10
8	Floriculture and Landscaping	0+10
9	Food Processing	0+10
10	Agriculture Waste Management	0+10
11	Organic Production Technology	0+10
12	Commercial Sericulture	0+10

NOTE: In addition to above ELP modules other important modules may be given to the students.

Evaluation of Experiential Learning Programme/ HOT

S. No.	Parameters	Max. Marks
1.	Project Planning and Writing	10
2.	Presentation	10
3.	Regularity	10
4.	Monthly Assessment	10
5.	Output delivery	10
6.	Technical Skill Development	10
7.	Entrepreneurship Skills	10
8.	Business networking skills	10
9.	Report Writing Skills	10
10.	Final Presentation	10
	Total	**100**

SCHOOL OF AGRICULTURAL SCIENCES
(Syllabus & Scheme of Studies w.e.f. 2023-24)
B.Sc. Agriculture (Hons.)
I Year (I semester)

S. No.	Subject	Subject Code (T/ P)	Credit Hours (T+ P)	Lectures	Practical
1.	Fundamentals of Horticulture	AHR-T-101/ AHR-P-101	2 (1+1)	1	1
2.	Fundamentals of Plant Biochemistry and Biotechnology	ABB-T-101/ ABB-P-101	3(2+1)	2	1
3.	Fundamentals of Soil Science	ASS-T-101/ ASS-P-101	3(2+1)	2	1
4.	Introduction to Forestry	AES-T-101/ AES-P-101	2 (1+1)	1	1
5.	Comprehension & Communication Skills in English	ECT-T-101/ ECT-P-101	2 (1+1)	1	1
6.	Fundamentals of Agronomy	AAG-T-101/ AAG-P-101	4(3+1)	3	1
7.	Introductory Biology*/Elementary Mathematics*	(ABI-T-101/ ABI-P-101)/ (AEM-T-101)	2(1+1)/ 2(2+0)*	1/2	1/0
8.	Agricultural Heritage*	AEX-T-101	1(1+0)*	1	0
9.	Rural Sociology & Educational Psychology	ASP-T-101	2 (2+0)	2	0
10.	Human Values & Ethics (non gradial)	HME-T-101	1(1+0)**	1	0
11.	NSS/NCC/Physical Education & Yoga Practices**	NS/NC/PEY-P-101	2(0+2)**	0	2
TOTAL			18+03*+03**		

*R: Remedial course; **NC: Non-gradial courses

1. **Fundamentals of Horticulture (AHR-T-101/ AHR-P-101) 2(1+1)**

Theory

UNIT-I

Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops.

UNIT-II

Plant propagation-methods and propagating structures; Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning.

UNIT-III

Juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy.

UNIT-IV

Medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation methods, Fertilizer application in horticultural crops.

Practical

Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/ nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard. Training and pruning of fruit trees. Preparation of potting mixture. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

Recommended Books:

1. Parthasvathy. V. A. Chattopadhyay. P.K. and Bose. T.K., Plantation Crops. Naya Prokash, Kolkatta 2006
2. Bose. T.K., Kabir.J., Das.P. & Joy.P.P., Tropical Horticulture. Naya Prokash. Calcutta 2000
3. Bal. J.S., Fruit Growing. Kalyani Publisher, New Delhi 1997
4. Singh. S.P., Commercial Fruits. Kalyani Publishers, New Delhi 1997

2. **Fundamentals of Plant Biochemistry and Biotechnology (ABB-T-101/ ABB-P-101) 3(2+1)**

Theory

UNIT-I

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharide's, Reducing and oxidizing properties of Monosaccharide's, Mutarotation; Structure of Disaccharides and Poly saccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids.

UNIT-II

Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes. Nucleic

acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

UNIT-III

Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cell suspension culture, callus culture, another culture, pollen culture and ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; somatic hybridization and cybrids; Somaclonal variation and its use in crop improvement; cryo-preservation.

UNIT-IV

Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breeding in crop improvement; Biotechnology regulations.

Practical

Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paper chromatography/ TLC demonstration for separation of amino acids/ Mono-saccharides. Sterilization techniques. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants. Micro-propagation, hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing.

Recommended Books:

1. Lehninger AL, Principles of Biochemistry, Freeman and Company, USA2004
2. Goodwin, TW and Mercer EI, Introduction to Plant Biochemistry, Progamon Press Inc. Deffered UK 1998
3. Sahney SK and Singh RR, Introductory Practical Biochemistry, Narosa Publishing House, New Delhi 2002
4. Yadav VK and Yadav N, Biochemistry and Biotechnology-A laboratory Manual, Pointer Publishers, Jaipur 2007

3. Fundamentals of Soil Science (ASS-T-101/ ASS-P-101) 3(2+1)

Theory

UNIT-I

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity.

UNIT-II

Elementary knowledge of soil taxonomy classification and soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth.

UNIT-III

Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation.

UNIT-IV

Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and microorganisms, their beneficial and harmful effects; Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practical

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos Methods. Studies of capillary rise phenomenon of water in soil column and water movement in soil. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Study of soil map. Determination of soil colour. Demonstration of heat transfer in soil. Estimation of organic matter content of soil.

Recommended Books:

1. Sharma, N.L. & Singh, T.B. Soil Science, Rama pub. House, Barot Merrut (U.P) 1996
2. Das, D.K. Introductory Soil Science, Kalyani publisher, New Delhi 2002
3. Mehra R.K. Text book of Soil Science, ICAR, New Delhi 2004
4. Biswas, T.D. and Mukherjee, S.K. Text book of soil science. Tata McGraw Hill publishing Co. Ltd, New Delhi 2006

4. Introduction to Forestry (AES-T-101/ AES-P-101) 2(1+1)

Theory

UNIT-I

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, and salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration objectives, choice between natural and artificial regeneration, essential preliminary considerations.

UNIT-II

Crown classification, tending operations – weeding, cleaning, thinning-: mechanical, ordinary, crown and advance thinning. Forest menstruation – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method.

UNIT-III

Instrumental methods of height measurement geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

UNIT-IV

Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.

Practical

Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer. Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.

5. Comprehension and Communication Skills in English (ECT-T-101/ ECT-P-101) 2(1+1)

Theory

UNIT-I

War minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond, B. Fosdick. You and Your English – Spoken English and broken English G.B. Shaw.

UNIT-II

Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations.

UNIT-III

Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing.

UNIT-IV

The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.

Practical

Listening Comprehension: Listening to short talk's lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness &Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussions.

6. Fundamentals of Agronomy (AAG-T-101/ AAG-P-101) 4(3+1)

Theory

UNIT-I

Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency.

UNIT-II

Water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, logging.

UNIT-III

Weeds- importance, classification, crop weed competition, concepts of weed management- principles and methods, herbicides- classification, selectivity and resistance, allelopathy.

UNIT-IV

Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

Practical

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro- climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements- reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.

Recommended Books:

1. De, Gopal Chandra, Fundamentals of Agronomy. Oxford & IBH Publishing Co., New-Delhi 1989
2. ICAR, Handbook of Agriculture, Indian Council of Agricultural Research, New-Delhi 1989
3. Michael, A.M. and Ojha, T.P. Principles of Agricultural Engineering, Vol.II Jain Brothers, New Delhi. 1986
4. Morachan, Y.B., Crop production and management, Oxford & IBH Publishing Co., New-Delhi 1986

7. Introductory Biology (ABI-T-101/ ABI-P-101) 2(1+1)

Theory

UNIT-I

Introduction to the living world, diversity and characteristics of life, origin of life.

UNIT-II

Evolution and Eugenics. Binomial nomenclature and classification Cell and cell division.

UNIT-III

Morphology of flowing plants. Seed and seed germination.

UNIT-IV

Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Practical

Morphology of flowering plants – root, stem and leaf and their modifications. Inflorescence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants - Brassicaceae, Fabaceae and Poaceae.

Recommended Books:

1. Biology NCERT 2015
2. General Biology I: Molecules, Cells and Genes Dog Ear Publishing, LLC 2017
3. General Biology II: Organisms and Ecology Dog Ear Publishing, LLC 2017

Elementary Mathematics (AEM-T-101) 2(2+0)

THEORY

UNIT-I

Straight lines : Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral.

UNIT-II

Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2), Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$.

UNIT-III

Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of xn , ex , sin x & cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it).

UNIT-IV

Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

Recommended Books:

1. Algebra: Hall & Knight
2. Trigonometry: S.L. Loney
3. Coordinate- Geometry: S. L. Loney
4. Differential –Calculus: Gorakh-Prasad

8. Agricultural Heritage (AEX-T-101) 1(1+0)

Theory

UNIT-I

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society.

UNIT-II

Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world.

UNIT-III

Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications.

UNIT-IV

National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

9. **Rural Sociology & Educational Psychology (ASP-T-101) 2(2+0)**

Theory

UNIT-I

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society, Social Groups.

UNIT-II

Social Stratification, Culture concept, Social Institution, Social Change & Development.

UNIT-III

Educational psychology: Meaning & its importance in agriculture extension.

UNIT-IV

Behavior: Cognitive, affective, psychomotor domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

Recommended Books:

1. Bhatia, H.R. A Text Book of Educational Psychology, Asia Publishing House, New Delhi 1965

2. Chitamber, J.B., Introductory Rural Sociology: Willey Easter Ltd. New Delhi. 1990

3. Dhama, O.P. & Bhatnagar, O.P., Education & Communication for Development,

10. **Human Value and Ethics (HME-T-101) 1(1+0)**

Theory

UNIT-I

Values and Ethics-An Introduction. Goal and Mission of Life.

UNIT-II

Vision of Life. Principles and Philosophy. Self-Exploration. Self-Awareness. Self-Satisfaction.

UNIT-III

Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives.

UNIT-IV

Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination.

Recommended Books:

1. R.R. Gaur, R. Sangal and G.P. Bagaria A Foundation Course in Human Values and Professional Ethics 2010

2. Govindarajan M Professional Ethics &Human Value 2013

11. **NSS/NCC/Physical Education & Yoga Practices 2 (0+2)**

SCHOOL OF AGRICULTURAL SCIENCES
(Syllabus & Scheme of Studies w.e.f. 2023-24)
B.Sc. Agriculture (Hons.)
I Year (II semester)

S. No.	Subject	Subject Code (T/P)	Credit Hrs (T+P)	Lectures	Practical
1.	Fundamentals of Genetics	AGN-T-101/ AGN-P-101	3(2+1)	2	1
2.	Agricultural Microbiology	AMB-T-101/ AMB-P-101	2(1+1)	1	1
3.	Soil and Water Conservation Engineering	AEN-T-101/ AEN-P-101	2(1+1)	1	1
4.	Fundamentals of Crop Physiology	ACP-T-101/ ACP-P-101	2(1+1)	1	1
5.	Fundamentals of Agricultural Economics	AEC-T-101	2(2+0)	2	0
6.	Fundamentals of Plant Pathology	APP-T-101/ APP-P-101	4(3+1)	3	1
7.	Fundamentals of Entomology	AET-T-101/ AET-P-101	4(3+1)	3	1
8.	Fundamentals of Agricultural Extension Education	AEX-T-102/ AEX-P-102	3(2+1)	2	1
9.	Communication Skills and Personality Development	AEX-T-103/ AEX-P-103	2(1+1)	1	1
Total			**24(16+8)**		

1. **Fundamentals of Genetics (AGN-T-101/ AGN-P-101)** **3(2+1)**

Theory

UNIT-I

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

UNIT-II

Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation.

UNIT-III

Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material.

UNIT-IV

Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Practical

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

Recommended Books:

1. Singh, B.D., Plant Breeding. Kalyani Publishing House, New Delhi. 2005
2. Singh, P., Essentials of Plant Breeding-Principles and Methods. Kalyani Publishing House, New Delhi. 2001
3. Singh, P., Essentials of Plant Breeding-Principles and Methods. Kalyani Publishing House, New Delhi. 2001
4. Alard, R.W., Principles of Plant Breeding. John Willey & Sons, New York. 2000

2. **Agricultural Microbiology** (AMB-T-101/ AMB-P-101) **2(1+1)**

Theory

UNIT-I

Introduction Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth.

UNIT-II

Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, plasmids, transposon.

UNIT-III

Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere.

UNIT-IV

Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

Practical

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

Recommended Books:

1. Mukherjee, N. and Ghosh T., Agricultural Microbiology, Kalyani Publishers, New Delhi. 1998.

2. Pelczar, Jr. Michel J. Chan, E.C.S. and Krieg, Noel R., Microbiology. Tata McGraw - Hill Edition, 1993. India. 1997.

3. Mukherjee, N. and Ghosh T., Agricultural Microbiology, Kalyani Publishers, New Delhi. 1998.

4. Rao, N.S., Soil Microbiology, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 2000.

3. **Introductory Soil and Water Conservation Engineering** (**AEN-T-101/ AEN-P-101) 2(1+1)**

Theory

UNIT-I

Introduction to Soil and Water Conservation causes of soil erosion. Definition and agents of soil erosion, water erosion: Forms of water erosion. Gully classification and control measures.

UNIT-II

Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques. Principles of erosion control: Introduction to contouring, strip cropping. Contour bund.

UNIT-III

Graded bund and bench terracing. Grassed water ways and their design. Water harvesting and its techniques.

UNIT-IV

Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion control and its control measures.

Practical

General status of soil conservation in India. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss. Preparation of contour maps. Design of grassed water ways. Design of contour bunds. Design of graded bunds. Design of bench terracing system. Problem on wind erosion.

Recommended Books:

1. Majumdar, D.K. Irrigation Water Management- Principles and Practice. Prentice Hall of India New-Delhi. 2004
2. Reddy,S.R. Principles of Crop Production , Kalyani Publishers, New-Delhi. 2000
3. Lenka, D. Irrigation and Drainage. Kalyani Publishers, New-Delhi. 1999
4. Sankara Reddy, G.H. and Yellamanda Reddi, T. Efficient use of Irrigation Water. Kalyani Publishers, NewDelhi. 1995
5. Parihar, S.S. and Sandhu, B.S. Irrigation of Field Crops- Principles and Practices, ICAR, New-Delhi. 1978

4. Fundamentals of Crop Physiology (ACP-T-101/ ACP-P-101) 2(1+1)

Theory

UNIT-I

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

UNIT-II

Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants.

UNIT-III

Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown.

UNIT-IV

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

Practical

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

Recommended Books:

1. N.K. Gupta & Sunita Gupta, Plant Physiology. Oxford & IBH Publication, New Delhi 2004 2. R.L. Agarwal, Seed Technology, Oxford & IBH Publication, New Delhi 1995

3. J.B. Salisbury and C.W. Ross. Plant Physiology, Wadswar Publishing Company, Belmont, California 1992

4. S.N. Pandey & B.K. Sinha. Vikas, Plant Physiology, Publishing House Pvt. Ltd., New Delhi. 1995

5. Fundamentals of Agricultural Economics (AEC-T-101) 2(2+0)

Theory

UNIT-I

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

UNIT-II

Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity.

UNIT-III

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

UNIT-IV

Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio- economic determinants, current policies

and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

Recommended Books:

1. G.B. Jathar and S.G. Beri, Elementary Principles of Economics, Oxford University Press (10th Edition), Delhi. 1996
2. S.K. Mishra and V.K. Puri, Indian Economy, Himalaya Publishing House, New Delhi 1996 3. P.A. Samuelson & W.D. Nordhaus, Economics, McGraw-Hill, Singapore 1987
4. K.K. Dewett and J.D. Verma, Elementary Economic Theory, S.Chand & Company, New Delhi. 1986

6. Fundamentals of Plant Pathology (APP-T-101/ APP-P-101) 4(3+1)

Theory

UNIT-I

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

UNIT-II

Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes.

UNIT-III

Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction. *Viruses*: nature, structure, replication and transmission. Study of phanerogamic plant parasites. *Nematodes:* General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (*Heterodera, Meloidogyne, Anguina, Radopholus* etc.)

UNIT-IV

Growth and reproduction of plant pathogens. Liberation / dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants**.** Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.

Practical

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

Recommended Books:

1. Mehrotra, R.S. and Aggarawal, A. Plant Pathology. Tata McGraw Hill Publishing Co. Ltd., New Delhi. 2007

2. Agrios, G.N. Plant Pathology, Academic Press, New Delhi. 1996

3. Singh, R.S. Introduction to Principles of Plant Pathology. Oxford & IBH, New Delhi. 1996

4. Alexopolus, C.J., Mims, C.W. and Blackwell, M. Introductory Mycology, John Wiley Estern Private Limited, New York. 1996

7. Fundamentals of Entomology (AET-T-101/ AET-P-101) 4(3+1)

Theory

UNIT-I

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

UNIT-II

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance.

UNIT- III

Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control- importance, hazards and limitations. Recent methods of pest control, repellents, anti-feed ants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes.

UNIT – IV

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, lchneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae,Muscidae, Tephritidae.

Practical

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

Recommended Books:

1. Shravan Haldhar, Agricultural Entomology, New Vishal Publication, New Delhi
2. T. V. Prasad, Handbook of Entomology, New Vishal Publication, New Delhi
3. S. V. Sai Prasad, Agri Facts – Entomology & Nematology, New Vishal Publication, New Delhi
4. K. Sankari Meena, P. Manji, Glimpses of Crop Protection, New Vishal Publication, New Delhi
5. K. Sankari Meena, P. Manji, Plant Nematology - a quick glance, New Vishal Publication, New Delhi

8. Fundamentals of Agricultural Extension Education (AEX-T-102/ AEX-P-102) 3(2+1)

Theory

UNIT-I

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process, objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.)

UNIT-II

Various extension/ agriculture development programs launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.

UNIT-III

Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions.

UNIT-IV

Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practical

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

Recommended Books:

1. Dhama, O.P. & Bhatnagar, O.P., Education and Communication for Development, Oxford & IBH Publishing Co. New-Delhi. 1985

2. Kelsey, L.D. & Hearne, C.C., Cooperative Extension Work: Cornell University Press, New York, USA. 1963
3. Ray, G.L., Extension Communication and Management, Naya Prakash, 206 Bidhan Sarni, Calcutta-6. 2003
4. Reddy, A.A., Extension Education, Shri Laxmi Press, Baptala. 1993

9. Communication Skills and Personality Development (AEX-T-103/ AEX-P-103) 2 (1+1)

Theory

UNIT-I

Communication Skills: Structural and functional grammar; meaning and process of communication.

UNIT-II

Verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures.

UNIT-III

Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation.

UNIT-IV

Public speaking; Group discussion. Organizing seminars and conferences.

Practical

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

SCHOOL OF AGRICULTURAL SCIENCES
(Syllabus & Scheme of Studies w.e.f. 2023-24)
B.Sc. Agriculture (Hons.)
II Year (III semester)

S. No.	Subject	Subject Code (T/P)	Credit Hours (T+P)	Lectures	Practical
1.	Crop Production Technology – I (*Kharif* Crops)	AAG-T-201/ AAG-P-201	2(1+1)	1	1
2.	Fundamentals of Plant Breeding	AGN-T-201/ AGN-P-201	3 (2+1)	2	1
3.	Agricultural Finance and Cooperation	AEC-T-201/ AEC-P-201	3 (2+1)	2	1
4.	Agri- Informatics	ACS-T-201/ ACS-P-201	2(1+1)	1	1
5.	Farm Machinery and Power	AEN-T-201/ AEN-P-201	2 (1+1)	1	1
6.	Production Technology for Vegetables and Spices	AHR-T-201/ AHR-P-201	2 (1+1)	1	1
7.	Environmental Studies and Disaster Management	AES-T-201/ AES-P-201	3(2+1)	2	1
8.	Statistical Methods	AST-T-201/ AST-P-201	2(1+1)	1	1
9.	Livestock and Poultry Management	AAP-T-201/ AAP-P-201	4 (3+1)	3	1
Total			**23(14+9)**		

1. Crop Production Technology-I (*Kharif* Crops)(AAG-T-201/ AAG-P-201) 2(1+1)

Theory

UNIT-I

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops. Cereals – rice, maize, sorghum, pearl millet and finger millet.

UNIT-II

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Pulses- pigeonpea, mungbean and urdbean.

UNIT-III

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Oilseeds- groundnut, and soybean.

UNIT-IV

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Fibre crops- cotton & jute; forage crops-sorghum, cowpea, cluster bean and napier.

Practical

Rice nursery preparation, transplanting of rice, sowing of soybean, pigeonpea and mungbean. maize, groundnut and cotton, effect of seed size on germination and seedling vigour of *kharif* season crops, effect of sowing depth on germination of *kharif* crops, identification of weeds in *kharif* season crops, top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of *kharif* season crops, study of crop varieties and important agronomic experiments at experimental farm. Study of forage experiments, morphological description of *kharif* season crops, visit to research centers of related crops.

Recommended Books:

1) Dr. Rajendra Prasad, Text book of Field crops production Volume-I & II, Publisher ICAR, New Delhi.
2) S.R. Reddy & Ramu Y. Reddy, Agronomy of Field Crops, Kalyani Publishers 2006
3) U.S.Walia, Science of Agronomy, Scientific Publishers 2012
4) P. Balasubrananiyan, S.P.Palaniappan, Principles and Practices Of Agronomy, Agrobios India 2010
5) S.R. Reddy., Principles of Agronomy, Kalyani Publishers 2015

2. Fundamentals of Plant Breeding (AGN-T-201/ AGN-P-201) 3(2+1)

Theory

UNIT-I

Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self-incompatibility and male-sterility- genetic consequences, cultivar options.

UNIT-II

Domestication, Acclimatization and Introduction; Centre's of origin/ diversity, components of Genetic variation; Heritability and genetic advance. Genetic basis and breeding methods in self- pollinated crops - mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept.

UNIT-III

Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross pollinated crops, modes of selection; Population improvement Schemes- Ear to row method, Modified Ear to Row, recurrent selection schemes. Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties; Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection.

UNIT-IV

Wide hybridization and pre- breeding; Polyploidy in relation to plant breeding. Mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses; Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross pollinated crops. Emasculation and hybridization techniques in self & cross pollinated crops. Consequences of inbreeding on genetic structure of resulting populations. Study of male sterility system. Handling of segregation populations. Methods of calculating mean, range, variance, standard deviation, heritability. Designs used in plant breeding experiments, analysis of Randomized Block Design. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids.

3. Agricultural Finance and Co-Operation (AEC-T-201/ AEC-P-201) 3(2+1)

Theory

UNIT-I

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks.

UNIT-II

Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, World Bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit.

UNIT-III

Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis. Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture.

UNIT-IV

Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Practical

Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures. Estimation of credit requirement of farm business – A case study. Preparation and analysis of balance sheet – A case study. Preparation and analysis of income statement- A case study. Appraisal of a loan proposal- A case study. Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural products and its value added products. Seminar on selected topics.

4. Agri-Informatics (ACS-T-201/ ACS-P-201) 2(1+1)

Theory

UNIT-I

Introduction to Computers, Operating Systems, definition and types, Applications of MS- Office for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (www): Concepts and components.

UNIT-II

Introduction to computer programming languages, concepts and standard input/output operations. E-Agriculture, concepts and applications, Use of ICT in Agriculture. Computer Models for understanding plant processes.

UNIT-III

IT application for computation of water and nutrient requirement of crops, Computer controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc.

UNIT-IV

Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning using IT tools.

Practical

Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of

scientific data. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introduction to World Wide Web (WWW). Introduction of programming languages. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/Crop Syst / Wofost; Computation of water and nutrient requirements of crop using CSM and IT tools. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hands on Decision Support System. Preparation of contingent crop planning.

5. Farm Machinery and Power (AEN-T-201/ AEN-P-201) 2(1+1)

Theory

UNIT-I

Status of Farm Power in India, Sources of Farm Power , I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines , Study of different components of I.C. engine, I.C. engine terminology and solved problems.

UNIT-II

Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor, Familiarization with Power transmission system: clutch, gear box, differential and final drive of a tractor.

UNIT-III

Tractor types, Cost analysis of tractor power and attached implement, Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations,

UNIT-IV

Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment, Familiarization with harvesting and threshing equipment.

Practical

Study of different components of I.C.engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow . Familiarization with seed- cum-fertilizer drills their seed metering mechanism and calibration, planters and transplanter Familiarization with different types of sprayers and dusters Familiarization with different inter- cultivation equipment, Familiarization with harvesting and threshing machinery.

Recommended Books:

1. Michael, A.M. and T.P. Ojha. Principles of Agricultural Engineering. Vol. I. Jain Brothers, Jodhpur. 1987

2. Rai and Jain, Farm Tractors, Maintenance and Repair. Tata Mc Graw Hill Publ. New Delhi. 1989

3. Elements of Farm Machinery. Srivastava, A.C. Oxford IBH Publ. Company, New Delhi. 1989

4. Singhal, O.P., Elements of Agricultural Engineering, Vol. I & III. Suraj Prakashan, Allahabad. 1989
5. Sahay and Jagdishwar, Element of Agricultural Engineering. Agro. Book Agency, New Chitragupta Nagar, Patna. 1990

6. Production Technology for Vegetable and Spices (AHR-T-201/ AHR-P-201) 2 (1+1)

Theory

UNIT-I

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening, brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices **Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin.**

UNIT-II

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices **-French bean, Peas Cole crops such as Cabbage, Cauliflower, Knol-khol.**

UNIT-III

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices **Bulb crops such as Onion, Garlic; Root crops such as Carrot, Raddish, Beetroot.**

UNIT-IV

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices **Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak. Perennial vegetables).**

Practical

Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Harvesting & preparation for market. Economics of vegetables and spices cultivation.

7. Environmental Studies and Disaster Management (AES-T-201/ AES-P-201) 3 (2+1)

Theory

UNIT-I

Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non- renewable energy sources, use of alternate energy sources. Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

• Role of an individual in conservation of natural resources.

• Equitable use of resources for sustainable lifestyles.

UNIT-II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III

Environmental Pollution: definition, cause, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution, g. nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: From Unsustainable to Sustainable development, urban problems related to energy, Water conservation, rain water harvesting, and watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust dies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

UNIT-IV

Disaster Management

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change:

global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

Practical

Pollution case studies. Case Studies- Field work: Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain, visit to a local polluted site-Urban/Rural/Industrial/ Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

8. Statistical Methods (AST-T-201/ AST-P-201) 2(1+1)

Theory

UNIT-I

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency & Dispersion, Definition of Probability, Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability.

UNIT-II

Binomial & Poisson Distributions, Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations.

UNIT-III

Introduction to Test of Significance, One sample & two sample test t for Means, Chi-Square Test of Independence of Attributes in 2 ×2 Contingency Table. Introduction to Analysis of Variance, Analysis of One Way Classification.

UNIT-IV

Introduction to Sampling Methods, Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement, Use of Random Number Tables for selection of Simple Random Sample.

Practical

Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Dispersion (Ungrouped Data). Measures of Dispersion (Grouped Data). Moments, Measures of Skewness & Kurtosis (Ungrouped Data). Moments, Measures of Skewness & Kurtosis (Grouped Data). Correlation & Regression Analysis. Application of One Sample t-test. Application of Two Sample Fisher's t-test. Chi-Square test of Goodness of Fit. Chi-Square test of Independence of Attributes for 2 ×2 contingency table. Analysis of Variance One Way Classification. Analysis of Variance Two Way Classification. Selection of random sample using Simple Random Sampling.

Recommended Books:

1. C.H. Goulden, Method of Statistical Analysis.
2. G.W. Snedecor and W.G. Cochran, Statistical Methods.
3. R.G. Steel and J.H. Torrie, Principles and Procedures of Statistics (with special reference to Biological Sciences)
4. V.G. Panse and P.V. Sukhatme, Statistical Methods for Agricultural workers.
5. .Ram Singh Chandel, A Handbook of Agricultural Statistics.
6. R.Rangaswamy, A Text Book of Agricultural Statistics.

9. Livestock & Poultry Management (AAP-T-201/ AAP-P-201) 4 (3+1)

Theory

UNIT-I

Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry. Management of calves, growing heifers and milch animals.

UNIT-II

Management of sheep, goat and swine. Incubation, hatching and brooding. Management of growers and layers. Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry.

UNIT-III

Digestion in livestock and poultry. Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock and poultry. Feed supplements and feed additives. Feeding of livestock and poultry.

UNIT-IV

Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical

External body parts of cattle, buffalo, sheep, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo and poultry. Culling of livestock and poultry. Planning and layout of housing for different types of livestock. Computation of rations for livestock. Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments. Management of chicks, growers and layers. Debeaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

SCHOOL OF AGRICULTURAL SCIENCES
(Syllabus & Scheme of Studies w.e.f. 2023-24)
B.Sc. Agriculture (Hons.)
II Year (IV semester)

S. No.	Subject	Subject Code (T/P)	Credit Hrs. (T+P)	Lectures	Practical
1.	Crop Production Technology –II (*Rabi* Crops)	AAG-T-202/ AAG-P-202	2(1+1)	1	1
2.	Production Technology for Ornamental Crops, MAP and Landscaping	AHR-T-202/ AHR-P-202	2(1+1)	1	1
3.	Renewable Energy and Green Technology	AEN-T-202/ AEN-P-202	2(1+1)	1	1
4.	Problematic Soils and their Management	ASS-T-201/ ASS-P-201	2(2+0)	2	0
5.	Production Technology for Fruit and Plantation Crops	AHR-T-203/ AHR-P-203	2(1+1)	1	1
6.	Principles of Seed Technology	AGN-T-202/ AGN-P-202	3(1+2)	1	2
7.	Farming System & Sustainable Agriculture	AAG-T-203	1(1+0)	1	0
8.	Agricultural Marketing Trade & Prices	AEC-T-202/ AEC-P-202	3(2+1)	2	1
9.	Introductory Agro-meteorology & Climate Change	AAG-T-204/ AAG-P-204	2(1+1)	1	1
10	**Elective Course**	**3 credit**			
i	Agrochemicals	AET-T-201/ AET-P-201	3(2+1)	2	1
ii	Agribusiness Management	AEC-T-203/ AEC-P-203	3(2+1)	2	1
iii	Commercial Plant Breeding	AGN-T-203/ AGN-P-203	3(2+1)	2	1
iv	Landscaping	AHR-T-204/ AHR-P-204	3(2+1)	2	1
Total			**19(11+8) + 3**		

1. Crop Production Technology-II (*Rabi* crops) (AAG-T-202/ AAG-P-202) 2(1+1)

Theory

UNIT-I

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops; **Cereals –wheat and barley**

UNIT-II

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of **Pulses-chickpea, lentil, peas**

UNIT-III

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of **Oilseeds-rapeseed, mustard and sunflower**

UNIT-IV

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of **Sugar crops-sugarcane; medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat.**

Practical

Sowing methods of wheat and sugarcane, identification of weeds in *rabi* season crops, study of morphological characteristics of *rabi* crops, study of yield contributing characters of *rabi* season crops, yield and juice quality analysis of sugarcane, study of important agronomic experiments of *rabi* crops at experimental farms. Study of *rabi* forage experiments, oil extraction of medicinal crops, visit to research stations of related crops.

Recommended Books:

1. S.R. Reddy & Ramu Y. Reddy, Agronomy of Field Crops, Kalyani Publishers 2006
2. U.S.Walia, Science of Agronomy, Scientific Publishers 2012
3. P. Balasubrananiyan, S.P.Palaniappan, Principles and Practices Of Agronomy, Agrobios India 2010
4. S.R. Reddy., Principles of Agronomy, Kalyani Publishers 2015

2. Production Technology for Ornamental Crops, MAPs and Landscaping (AHR-T-202/ AHR-P-202) 2 (1+1)

Theory

UNIT-I

Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of trees, shrubs and climbers.

UNIT-II

Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions.

UNIT-III

Package of practices for loose flowers like marigold and jasmine under open conditions.

UNIT-IV

Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver. Processing and value addition in ornamental crops and MAPs produce.

Practical

Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nursery bed preparation and seed sowing. Training and pruning of Ornamental plants. Planning and layout of garden. Bed preparation and planting of MAP. Protected structures care and maintenance. Intercultural operations in flowers and MAP. Harvesting and post-harvest handling of cut and loose flowers. Processing of MAP. Visit to commercial flower/MAP unit.

Recommended Books:

1. S.K. Bhatacharjee & L.C. De., Post Harvest Technology of Flowers and Ornamental Plants, M/s. Advance Books Shastri Nagar, Jaipur 2006
2. Bose,Maity,Dhua and Das, Floriculture and Landscaping, N.P Sales Pvt.Ltd 2014
3. J.S. Arora, Introduction to Floriculture, Kalyani Publishers 2001
4. G.S. Randhawa & A. Mukhopadhyay, Floriculture in India, Allied Publishers, New Delhi 2001

3. Renewable Energy and Green Technology(AEN-T-202/ AEN-P-202) 2(1+1)

Theory

UNIT-I

Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application.

UNIT-II

Familiarization with types of biogas plants and gasifiers, biogas, bio-alcohol, biodiesel and bio-oil production and their utilization as bio-energy resource, introduction of solar energy, collection and their application.

UNIT-III

Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application.

UNIT-IV

Introduction of wind energy and their application.

Practical

Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio-fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, and solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

Recommended Books:

1. Ghanshyan Das, Hydrology and Soil Conservation Engineering, McGraw Hill
2. Dutta SK., Soil Conservation and Land Management, International Distributors, Dehradun
3. Loucks D.P., Water Resource System Planning and Analysis, Prentice Hall

4. Problematic Soils and their Management (ASS-T-201/ ASS-P-201) 2(2+0)

Theory

UNIT-I

Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties.

UNIT-II

Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.

UNIT-III

Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.

UNIT-IV

Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems.

Recommended Books:

1. D. K. Das, Introductory Soil Science, Kalyani Publishers 2015
2. R.K Mehra, Textbook of Soil Science, ICAR Publication 2006
3. V.N. Sahai, Fundamentals of Soil, Kalyani Publishers 2015
4. A. Rathinasamy & B. Bakiyathu Saliha, Fundamentals of Soil Science, Scientific Publisher 2014

5. Production Technology for Fruit and Plantation Crops (AHR-T-203/ AHR-P-203) 2(1+1)

Theory

UNIT-I

Importance and scope of fruit and plantation crop industry in India; Importance of **rootstocks.**

UNIT-II

Production technologies for the cultivation of **major fruits-mango, banana, citrus, grape, guava, litchi, papaya, sapota, apple, pear, peach, walnut, almond.**

UNIT-III

Production technologies for the cultivation of **minor fruits- date, ber, pineapple, pomegranate, jackfruit, strawberry.**

UNIT-IV

Production technologies for the cultivation of **plantation crops-coconut, arecanut, cashew, tea, coffee & rubber.**

Practical

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruit. Preparation of plant bio regulators and their uses, important

pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

Recommended Books:

1. S. N. Ghosh, Tropical & Sub Tropical Fruit Crops: Corp Improvement& Varietal Wealth 2 Vols Set, Narendra Publishing House 2014

2.Nirmal Sharma, V. K. Wali, Parshant Bakshi, Biometrical Methods in Horticulture Sciences, New India Publishing Agency 2016

3. Dhillon & Bhatt, Fruit Tree Physiology, Narendra Publishing 2011

4. A.S. Salaria, B.S. Salaria, A2Z Solutions Horticulture at a Glance Vol. - I, (Fruits and Plantation Crops), Intellects - Nurture to Excel 2016

6. Principles of Seed Technology (AGN-T-202/ AGN-P-202) 3(1+2)

Theory

UNIT-I

Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed.

UNIT-II

Foundation and certified seed production of important **cereals, pulses, oilseeds, fodder and vegetables**. Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement.

UNIT-III

Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983, Varietal Identification through Grow Out Test and Electrophoresis, Molecular and Biochemical test. Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production.

UNIT-IV

Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Practical

Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi. Seed production in major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea. Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production in important vegetable crops. Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test.

Genetic purity test: Grow out test and electrophoresis. Seed certification: Procedure, Field inspection, Preparation of field inspection report. Visit to seed production farms, seed testing laboratories and seed processing plant.

Recommended Books:

1. P.K. Agrawal, Principles of Seed Technology, Indian Council of Agricultural Research 2010
2. Phundan Singh, Principles of Seed Technology, Kalyani Publishers 2013
3. P. Ravishankar, G. Sarika, G.V. Basauaraju, A Text Book of Seed Science and Technology 2014
4. Phundan Singh, Seed Technology at a Glance, Kalyani Publishers 2016

7. Farming System and Sustainable Agriculture (AAG-T-203) 1(1+0)

Theory

UNIT-I

Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, Cropping system and pattern, multiple cropping system.

UNIT-II

Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system; Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture.

UNIT-III

HEIA, LEIA and LEISA and its techniques for sustainability, Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques.

UNIT-IV

Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

Recommended Books:

1. S.R. Reddy., Principles of Agronomy, Kalyani Publishers 2015
2. P.L. Maliwal, Agronomy at a Glance, Jain Brothers 2013
3. S.C. Panda, Organic Farming for Sastainable Agriculture, Kalyani Publishers 2014
4. S.Krishnaprabu, Agronomy: Theory and Practice, Satish Serial Publishing House 2016

8. Agricultural Marketing, Trade and Prices (AEC-T-202/ AEC-P-202) 3(2+1)

Theory

UNIT-I

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets**;** demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities.

UNIT-II

Product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark).

UNIT-III

Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs.

UNIT-IV

Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Practical

Plotting and study of demand and supply curves and calculation of elasticity's**;** Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

Recommended Books:

1. S.S. Acharya, Agricultural Marketing in India, OXF-IBH
2. A N Sadhu, Amarjit Singh, Fundamentals of Agricultural Economics, Himalayan Publishing House
3. Lakshmi Dhar Hatai, Agricultural Marketing Management, NIPA Publications, New Delhi
4. H. S. Agarwal, A Textbook Of Economic Analysis, Ane Books Pvt Ltd.

9. Introductory Agrometeorology & Climate Change (AAG-T-204/ AAG-P-204) 2(1+1)

Theory

UNIT-I

Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo.

UNIT-II

Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking.

UNIT-III

Monsoon- mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave. Agriculture and weather relations.

UNIT-IV

Modifications of crop microclimate, climatic normals for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

Practical

Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording. Measurement of total, shortwave and long wave radiation, and its estimation using Planck's intensity law. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis. Measurement of soil temperature and computation of soil heat flux. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions. Measurement of wind speed and wind direction, preparation of wind rose. Measurement, tabulation and analysis of rain. Measurement of open pan evaporation and evapo-transpiration. Computation of PET and AET.

Recommended Books:

1. G.S. Mahi, P.K. Kingro, Fundamentals of Agrometerology, Kalyani Publishers 2015
2. K. Govindan, K. Thirumurugan, Agricultural Metrology and Dry Farming, Kalyani Publishers 2013
3. S.R. Reddy, D.S. Reddy, Agrometerology, Kalyani Publishers 2015
4. P. Balasubrananiyan, S.P. Palaniappan, Principles and Practices Of Agronomy, Agrobios India 2010

10. Elective Courses

I. Agrochemicals (AET-T-201/ AET-P-201) 3 (2+1)

Theory

UNIT-I

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides. Fate of herbicides. Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride.

UNIT-II

Organic fungicides- Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and maneb. Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

UNIT-III

Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassiumchloride, potassium sulphate and potassium nitrate.

UNIT-IV

Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Practical

Sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticides appliances. Quick tests for identification of common fertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used. To study and identify various formulations of

insecticide available kin market. Estimation of nitrogen in Urea. Estimation of water soluble P2O5 and citrate soluble P2O5 in single super phosphate. Estimation of potassium in Muraite of Potash/ Sulphate of Potash by flame photometer. Determination of copper content in copper oxychloride. Determination of sulphur content in sulphur fungicide. Determination of thiram. Determination of ziram content.

II. Agri-business Management (AEC-T-203/ AEC-P-203) 3 (2+1)

Theory

UNIT-I

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries.

UNIT-II

Constraints in establishing agro-based industries. Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget.

UNIT-III

Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies.

UNIT-IV

Consumer behaviour analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.

Practical

Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products. Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD. Preparations of projects and Feasibility reports for agribusiness entrepreneur. Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques. Case study of agro-based industries. Trend and growth rate of prices of agricultural commodities. Net present worth technique for selection of viable project. Internal rate of return.

III. Commercial Plant Breeding (AGN-T-203/ AGN-P-203) 3(1+2)

Theory

UNIT-I

Types of crops and modes of plant reproduction. Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production. Genetic purity test of commercial hybrids.

UNIT-II

Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc. Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.

UNIT-III

IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India.

UNIT-IV

Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Practical

Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system. Learning techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing hybrid seed production. Concept of rouging in seed production plot. Concept of line its multiplication and purification in hybrid seed production. Role of pollinators in hybrid seed production. Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops. Sampling and analytical procedures for purity testing and detection of spurious seed. Seed drying and storage structure in quality seed management. Screening techniques during seed processing viz., grading and packaging. Visit to public private seed production and processing plants.

IV. Landscaping (AHR-T-204/ AHR-P-204) 3(2+1)

Theory

UNIT-I

Importance and scope of landscaping. Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes.

UNIT-II

Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents.

UNIT-III

Pot plants: selection, arrangement, management. Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions.

UNIT-IV

Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

Practical

Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Use of computer software, visit to important gardens/ parks/ institutes.

SCHOOL OF AGRICULTURAL SCIENCES
(Syllabus & Scheme of Studies w.e.f. 2023-24)
B.Sc. Agriculture (Hons.)
III Year (V semester)

S. No.	Subject	Subject Code (T/ P)	Credit Hours (T+P)	Lectures	Practical
1.	Principles of Integrated Pest and Disease Management	APP-T-301/ APP-T-301	3(2+1)	2	1
2.	Manures, Fertilizers and Soil Fertility Management	**ASS-T-301/ ASS-P-301**	3(2+1)	2	1
3.	Pests of Crops and Stored Grain and their Management	**AET-T-301/ AET-P-301**	3(2+1)	2	1
4.	Diseases of Field and Horticultural Crops and their Management -I	**APP-T-302/ APP-P-302**	3(2+1)	2	1
5.	Crop Improvement-I (*Kharif* Crops)	**AGN-T-301/ AGN-P-301**	2(1+1)	1	1
6.	Entrepreneurship Development and Business Communication	**AEX-T-301/ AEX-P-301**	2 (1+1)	1	1
7.	Geoinformatics and Nano-technology and Precision Farming	**AAG-T-301/ AAG-P-301**	2(1+1)	1	1
8.	Practical Crop Production – I (*Kharif* crops)	**AAG-P-302**	2(0+2)	0	2
9.	Intellectual Property Rights	**IPR-T-301**	1(1+0)	1	0
10	Elective Course		3 credit		
i	Food Safety and Standards	**AFT-T-301/ AFT-P-301**	3(2+1)	2	1
ii	Biopesticides & Biofertilizers	**AET-T-302/ AET-P-302**	3(2+1)	2	1
iii	Protected Cultivation	**AEN-T-301/ AEN-P-301**	3(2+1)	2	1
iv	Micro propagation Technologies	**AHR-T-301/ AHR-P-301**	3(2+1)	2	1
Total			**21(12+09)+ 3**		

1. Principles of Integrated Pest and Disease Management (APP-T-301/ APP-P-301) 3(2+1)

Theory

UNIT-I

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis.

UNIT-II

Methods of detection and diagnosis of insect pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control.

UNIT-III

Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module.

UNIT-IV

Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programmes. Case histories of important IPM programmes.

Practical

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of *Trichoderma*, *Pseudomonas*, *Trichogramma*, NPV etc. Identification and nature of damage of important insect pests and diseases and their management. Crop (agro- ecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. Crop monitoring attacked by insect, pest and diseases. Awareness campaign at farmer's fields.

Recommended Books:

1. Reddy, S M & H N Gour, Integrated Plant Pathology, Today & Tomorrows Printers and Publishers 2009

2. Amerika Singh, O.P. Sharma, D.K. Garg, Integrated Pest Management: Principles and Applications, CBS Publishers 2005

3. J.N. Sharma, R.C. Sharma, Integrated plant Disease Management, Scientific Publishers 2011

4. A. Ciancio, K.G. Mukerji, General Concepts in Integrated Pest and Disease Management, Springer 2007

2. Manures, Fertilizers and Soil Fertility Management(ASS-T-301/ ASS-P-301) 3(2+1)

Theory

UNIT-I

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management.

UNIT-II

Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.

UNIT-III

History of soil fertility and plant nutrition. Criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.

UNIT-IV

Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, and rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under Rainfed and irrigated conditions.

Practical

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeable K; Ca and Mg in soils. Estimation of soil extractable S in soils.. Estimation of DTPA extractable Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of Sin plants.

Recommended Books:

1. K.S Yawalkar, J.P Agarwal, S. Bokde, Manures and Fertilizers, Agri Horticultural House 1996

2. Sharma, Renuka, Fertilizer and manures, Discovery Publishing house 2014

3. M.V Durani, A Handbook of Soil- Plant-Water-Fertilizer, NIPA Publisher 2014

4. Rakshit, A., Manures Fertilizers and Pesticides Theory and Applications, CBS Publishers & Distributors 2015.

3. Pests of Crops and Stored Grains and their Management (AET-T-301/ AET-P-301) 3(2+1)

Theory

UNIT-I

General account on nature and type of damage by different arthropods pests.

UNIT-II

Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crop, fruit crop, plantation crops, ornamental crops, spices and condiments.

UNIT-III

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management.

UNIT-IV

Storage structure and methods of grain storage and fundamental principles of grain store management.

Practical

Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (a) Field Crops; (b) Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI Godowns.

Recommended Books:

1. M.C. Bhargava, K.C. Kumawat, Pests of Stored Grains and Their Management, NIPA Publishers, New Delhi

2. B.P. Khare, Stored grain pests and their management, CRC Press

3. Omkar, Pests and their Management, Springer 2018

4. Abhishek Shukla, Crop Pest and Their Management, LAP Lambert Academic Publishing 2011

4. Diseases of Field & Horticultural Crops & their Management-I (APP-T-302/ APP-P-302) 3(2+1)
Theory

UNIT-I

Symptoms, etiology, disease cycle and management of major diseases of following crops:

Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro;Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose.

UNIT-II

Bajra: downy mildew and ergot; Groundnut: early and late leaf spots, wilt, Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic.

UNIT-II

Castor: Phytophthora blight;Tobacco: black shank, black root rot and mosaic. Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top;Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot.

UNIT-IV

Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well- mounted specimens.

Recommended Books:

1. A.K. Misra, Diseases of Fruit Crops, Indian Phytopathological Society 2014
2. S.K. Gupta, T. S. Thind, Disease Problems in Vegetable Production, Scientific Publishers 2012
3. M. K. Kalita, Diseases of Field Crop and their Management, Kalyani Publishers 2014
4. Tarlochan S. Thind, Diseases of Field Crops and Their Management, Daya Publishing House 2007

5. Crop Improvement – I (*Kharif*) (AGN-T-301/ AGN-P-301) 2(1+1)

Theory

UNIT-I

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops.

UNIT-II

Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters; important concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops.

UNIT-III

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional);

UNIT-IV

Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for future.

Practical

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Seasame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different *kharif* crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

Recommended Books:

1. D.A. Sleper, J. M. Poehlam, Breeding Field Crops 5th edn, Wiley Publication 2006
2. J.A.S. Watson, Crops: Varieties and Plant Breeding, Satish Serial Publishing House 2005 3. G.A. Slafer, Genetic Improvement of Field Crops, Marcel Dekker 1993
4. M.Jackson, B.Fordloyd, M. Parry, Plant Genetic Resource and Climate Change, Cabi Publication 2013

6. Entrepreneurship Development and Business Communication (AEX-T-301/ AEX-P-301) 2(1+1)

Theory

UNIT-I

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs.

UNIT-II

SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agrienterprises, Entrepreneurial Development Process.

UNIT-III

Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills).

UNIT-IV

Problem solving skill, Supply chain management and Total quality management, Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri- entrepreneurship and rural enterprise.

Practical

Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

Recommended Books:

1. Renu Arora, S. K. Sood, Entrepreneurship & Fundamentals of Small Business, Kalyani Publishers 2012
2. H. S. Mukerjee, Business Communication, Oxford University Press 2016
3. S. Sharma, Entrepreneurship Development, PHI Learning Pvt. Ltd. 2017
4. S.S. Khanka, Entrepreneurial Development, S. Chand & Company 2006

7. Geoinformatics, Nano-technology and Precision Farming (AAG-T-301/ AAG-P-301) 2(1+1)

Theory

UNIT-I

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture.

UNIT-II

Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; spatial data and their management in GIS; Remote sensing concepts and application in agriculture.

UNIT-III

Image processing and interpretation; Global positioning system (GPS), components and its functions; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture.

UNIT-IV

Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Practical

Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

Recommended Books:

1. A.K. Singh & U.K. Chopra, Geoinformatics application in Agriculture, New India Publishing Agency, NewDelhi-110088
2. B.L.Jana, Precision Farming, Agrotech Publishing Academy, New Delhi
3. K.S. Subramanian, Nano-Technology in Agriculture New India Publishing Agency, 2015 New Delhi110088

8. Practical Crop Production-I *(Kharif Crops) (*AAG-P-302*)* **2(0+2)**

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

Recommended Books:

1. S.Krishnaprabu, Agronomy: Theory and Practice, Satish Serial Publishing House 2016
2. P.C.Das, Crops and their Production: Technology under Different Conditions, Kalyani Publishers 2010
3. S.R. Reddy, Ramu Y. Reddy, Agronomy of Field Crops, Kalyani Publishers 2006
4. S.S. Singh, Rajesh Singh, Crop Management, Kalyani Publishers 2016

9. Intellectual Property Rights (IPR-T-301) 1(1+0)

Theory

UNIT-I

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc. Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets.

UNIT-II

Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

UNIT-III

Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeder's rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights.

UNIT-IV

Traditional knowledge-meaning and rights of TK holders. Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Recommended Books:

1. N. Pandey, Intellectual Property Rights, PHI Learning 2014
2. P. Singh, IPR and Plant Breeder's Rights, New Vishal Publications 2009
3. B.L. Wadehra, Law Relating to Intellectual Property, Universal Law Publishing 2016
4. M. Venkataraman, An Introduction to Intellectual Property Rights, Innovative Timber leaf 2015

10. Elective

1. Food Safety and Standards (AFT-T-301/ AFT-P-301) 3(2+1)

Theory

UNIT-I

Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control. Food storage. Product design.

UNIT-II

Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series.

UNIT-III

TQM concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food.

UNIT-IV

Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

Practical

Water quality analysis physico-chemical and microbiological. Preparation of different types of media. Microbiological Examination of different food samples. Assessment of surface sanitation by swab/rinse method. Assessment of personal hygiene. Biochemical tests for identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000.

2. Biopesticides & Biofertilizers (AET-T-302/ AET-P-302) 3(2+1)

Theory

UNIT-I

History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses. Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes. Methods of application of biopesticides. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticide.

UNIT-II

Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia*; Cynobacterial biofertilizers- *Anabaena, Nostoc*, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorhiza.

UNIT-III

Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers.

UNIT-IV

FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

Practical

Isolation and purification of important biopesticides: *Trichoderma Pseudomonas*, *Bacillus, Metarhyzium* etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides. Isolation and purification of *Azospirillum* , *Azotobacter, Rhizobium*, P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.

3. Protected Cultivation (AEN-T-301/ AEN-P-301) 3(2+1)

Theory

UNIT-I

Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly house. Greenhouse design, environment control, artificial lights, Automation.

UNIT-II

Soil preparation and management, Substrate management. Types of benches and containers.
Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops.

UNIT-III

Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc.

UNIT-IV

Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management.

Practical

Raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production, Inter cultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging ad misting.

4. Micro propagation Technologies (AHR-T-301/ AHR-P-301) 3(1+2)

Theory

UNIT-I

Introduction, History, Advantages and limitations; Types of cultures (seed, embryo, organ, callus, cell).

UNIT-II

Stages of micropropagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture),

UNIT-III

Organogenesis (callus and direct organ formation), Somatic embryogenesis, cell suspension cultures,

UNIT-IV

Production of secondary metabolites, Somaclonal variation, Cryopreservation.

Practical

Identification and use of equipments in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants, Preparation of stocks and working solution, Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.

SCHOOL OF AGRICULTURAL SCIENCES
(Syllabus & Scheme of Studies w.e.f. 2023-24)
B.Sc. Agriculture (Hons.)
III Year (VI semester)

S. No.	Subject	Subject Code (T/ P)	Credit Hours (T+P)	Lectures	Practical
1.	Rainfed Agriculture & Watershed Management	AAG-T-303/ AAG-P-303	2(1+1)	1	1
2.	Protected Cultivation and Secondary Agriculture	AEN-T-302/ AEN-P-302	2(1+1)	1	1
3.	Diseases of Field and Horticultural Crops and their Management-II	APP-T-303/ APP-P-303	3(2+1)	2	1
4.	Post-harvest Management and Value Addition of Fruits and Vegetables	AHR-T-302/ AHR-P-302	2 (1+1)	1	1
5.	Management of Beneficial Insects	AET-T-303/ AET-P-303	2(1+1)	1	1
6.	Crop Improvement-II (*Rabi* crops)	AGN-T-302/ AGN-P-302	2(1+1)	1	1
7.	Practical Crop Production –II (*Rabi* crops)	AAG-P-304	2(0+2)	0	2
8.	Principles of Organic Farming	AAG-T-305/ AAG-P-305	2(1+1)	1	1
9.	Farm Management, Production & Resource Economics	AEC-T-301/ AEC-P-301	2(1+1)	1	1
10	Principles of Food Science and Nutrition	AFT-T-302	2(2+0)	2	0
	Elective Course	**3 credits**			
i	Hi-tech. Horticulture	AHR-T-303/ AHR-P-303	3(2+1)	2	1
ii	Weed Management	AAG-T-306/ AAG-P-306	3(2+1)	2	1
iii	System Simulation and Agro-advisory	AAG-T-307/	3(2+1)	2	1

		AAG-P-307			
iv	Agricultural Journalism	AEX-T-302/ AEX-P-302	3(2+1)	2	1
Total			**21 (11 + 10)+ 3**		

1. Rainfed Agriculture and Watershed Management (AAG-T-303/ AAG-P-303) 2(1+1)

Theory

UNIT-I

Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India.

UNIT-II

Soil and climatic conditions prevalent in rainfed areas; Soil and water conservation techniques, Drought: types, effect of water deficit on physio-morphological characteristics of the plants,

UNIT-III

Crop adaptation and mitigation to drought; Water harvesting: importance, its techniques, efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas.

UNIT-IV

Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

Practical

Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed.

2. Protected Cultivation and Secondary Agriculture (AEN-T-302/ AEN-P-302) 2(1+1)

Theory

UNIT-I

Green house technology: Introduction, Types of Green Houses; Plant response to Greenhouse environment, Planning and design of greenhouses, Design criteria of green house for cooling and heating purposes.

UNIT-II

Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar green house, hot air greenhouse heating systems, green house drying. Cost estimation and economic analysis.

UNIT-III

Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation.

UNIT-IV

Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, re-circulatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

Practical

Study of different type of greenhouses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of greenhouse equipments. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.

3. Diseases of Field & Horticultural Crops & their Management-II (APP-T-303/ APP-P-303**) 3(2+1)**

Theory

UNIT-I

Symptoms, etiology, disease cycle and management of following diseases:

Field Crops: Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng; Sunflower: Sclerotinia stem rot and Alternaria blight.

UNIT-II

Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; Gram: wilt, grey mould and Ascochyta blight; Lentil: rust and wilt; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.

UNIT-III

Horticultural Crops: Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl. Strawberry: leaf spot

UNIT-IV

Potato: early and late blight, black scurf, leaf roll, and mosaic; Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leaf spot.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium.

Note: **Students should submit 50 pressed and well-mounted specimens.**

4. Post-harvest Management and Value Addition of Fruits and Vegetables (AHR-T-302/ AHR-P-302) 2(1+1)

Theory

UNIT-I

Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post-harvest losses; Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening.

UNIT-II

Respiration and factors affecting respiration rate; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric).

UNIT-III

Value addition concept; Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards; Fermented and non-fermented beverages.

UNIT-IV

Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning - Concepts and Standards, packaging of products.

Practical

Applications of different types of packaging, containers for shelf life extension. Effect of temperature on shelf life and quality of produce. Demonstration of chilling and freezing injury in vegetables and fruits. Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomato products, canned products. Quality evaluation of products -- physico-chemical and sensory. Visit to processing unit/ industry.

5. Management of Beneficial Insects (AET-T-303/ AET-P-303) 2(1+1)

Theory

UNIT-I

Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants.

UNIT-II

Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

UNIT-III

Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac-products. Identification of major parasitoids and predators commonly being used in biological control.

UNIT-IV

Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.

Practical

Honey bee species, castes of bees. Beekeeping appliances and seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniques for mass multiplication of natural enemies.

6. Crop Improvement – II (*Rabi*) (AGN-T-302/ AGN-P-302) 2(1+1)

Theory

UNIT-I

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops;

UNIT-II

Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters;

UNIT-III

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional).

UNIT-IV

Hybrid seed production technology of *rabi* crops. Ideotype concept and climate resilient crop varieties for future.

Practical

Floral biology, emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem. Sugarcane, Tomato, Chilli, Onion; Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Rabi* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.

7. Practical Crop Production-II *(Rabi Crops)(AAG-P-304)* 2(0+2)

Practical

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

8. Principles of Organic Farming (AAG-T-305/ AAG-P-305) 2(1+1)

Theory

UNIT-I

Organic farming, principles and its scope in India; Initiatives taken by Government (central/ state), NGOs and other organizations for promotion of organic agriculture.

UNIT-II

Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming;

UNIT-III

Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP.

UNIT-IV

Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

Practical

Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

9. Farm Management, Production and Resource Economics (AEC-T-301/ AEC-P-301) 2(1+1)

Theory

UNIT-I

Meaning and concept of farm management, objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product- product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage.

UNIT-II

Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labour income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises.

UNIT-III

Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises.

UNIT-IV

Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance- weather based crop insurance, features, determinants of compensation. Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Practical

Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resources in India.

10. Principles of Food Science and Nutrition (AFT-T-302) 2(2+0)

Theory

UNIT-I

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.).

UNIT-II

Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colors, miscellaneous bioactive, important reactions).

UNIT-III

Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.).

UNIT-IV

Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.

11. Elective Courses

1. Hi-tech. Horticulture (AHR-T-303/ AHR-P-303) 3(2+1)

Theory

UNIT-I

Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods.

UNIT-II

Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management, high density orcharding.

UNIT-III

Components of precision farming: Remote sensing, Geographical Information System (GIS), Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA).

UNIT-IV

Application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.

Practical

Types of polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.

2. Weed Management (AAG-T-306/ AAG-P-306) 3(2+1)

Theory

UNIT-I

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds.

UNIT-II

Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity. Allelopathy and its application for weed management.

UNIT-III

Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application.

UNIT-IV

Integration of herbicides with non-chemical methods of weed management. Herbicide Resistance and its management.

Practical

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixture of herbicide. Herbicide and agro- chemicals study. Shift of

weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. Calculations of herbicide doses and weed control efficiency and weed index.

3. System Simulation and Agro advisory (AAG-T-307/ AAG-P-307) 3(2+1)

Theory

UNIT-I

System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.

UNIT-II

Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modeling techniques for their estimation.

UNIT-III

Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance. Weather forecasting, types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity; Crop-Weather Calendars.

UNIT-IV

Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Practical

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production; yield forecasting, insect & disease forecasting models. Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast. Feedback from farmers about the agro-advisory.

4. Agricultural Journalism (AEX-T-302/ AEX-P-302) 3(2+1)

Theory

UNIT-I

Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism.

UNIT-II

Newspapers and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines: Style and language of newspapers and magazines, parts of newspapers and magazines.

UNIT-III

The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information: Sources of agricultural information, interviews,

coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources.

UNIT-IV

Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, readability measures. Illustrating agricultural stories: Use of photographs, use of artwork (graphs, charts, maps, etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.

Practical

Practice in interviewing. Covering agricultural events. Abstracting stories from research and scientific materials and from wire services. Writing different types of agricultural stories. Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading, headline and title writing, proofreading, layouting. Testing copy with a readability formula. Visit to a publishing office.

Scheme of Examinations of B.Sc. Agriculture (Hons.)

SCHOOL OF AGRICULTURAL SCIENCES

SCHEME OF STUDIES AND EXAMINATION w.e.f.

B.Sc. Agriculture (Hons.) I year (I Semester) Batch - 2023-27

S. No.	Subjects	Paper code No.	Name of paper	Teaching scheme Hrs/Weeks		Examination Scheme						Duration of Exam Hours	Credits	Theory/ Practical
				L	P	Internal Assessment	Mid Terms	Practical	End term exam	Total	Grand Total			
1	HORTICULTURE	AHR-T-101	Fundamentals of Horticulture	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
2		AHR-P-101	Fundamentals of Horticulture	0	2	**20**	-	**30**	-	**50**			1	
3	BIOCHEMISTRY/ PHYSIOLOGY/ MICROBIOLOGY/ ENVIRONMENTAL SCIENCES	ABB-T-101	Fundamentals of Plant Biochemistry and Biotechnology	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
4		ABB-P-101	Fundamentals of Plant Biochemistry and Biotechnology	0	2	**20**	-	**30**	-	**50**			1	
5	SOIL SCIENCE & AGRICULTURAL CHEMISTRY	ASS-T-101	Fundamentals of Soil Science	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
6		ASS-P-101	Fundamentals of Soil Science	0	2	**20**	-	**30**	-	**50**			1	
7 8	BIOCHEMISTRY/ PHYSIOLOGY/ MICROBIOLOGY/ ENVIRONMENTAL SCIENCES	AES-T-101	Introduction to Forestry	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
9		AES-P-101	Introduction to Forestry	0	2	**20**	-	**30**	-	**50**			1	
10	LANGUAGE	ECT-T-101	Comprehension & Communication Skills in English	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P

11		ECT-P-101	Comprehension & Communication Skills in English	0	2	**20**	**-**	**30**	**-**	**50**			1	
12	AGRONOMY	AAG-T-101	Fundamentals of Agronomy	3	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	3	T+P
13		AAG-P-101	Fundamentals of Agronomy	0	2	**20**	**-**	**30**	**-**	**50**			1	
14	REMEDIAL COURSES	ABI-T-101	Introductory Biology*	**1***	**0**	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	**1**	T+P
15		ABI-P-101	Introductory Biology* Practical	**1***	**2***	**20**	**-**	**30**	**-**	**50**			**1**	
16	REMEDIAL COURSES	AEM-T-101	Elementary Mathematics*	**2***	**0**	**20**	**30**	**-**	**50**	**100**	**100**	**3**	**2**	**T**
17	REMEDIAL COURSES	AEX-T-101	Agricultural Heritage*	1	0	**20**	**30**	**-**	**50**	**100**	**100**	**3**	**1**	**T**
18	AGRICULTURAL EXTENSION and COMMUNICATION	ASP-T-101	Rural Sociology & Educational Psychology	2	0	**20**	**30**	**-**	**50**	**100**	**100**	**3**	**2**	**T**
19	NON-GRADIAL COURSES	HME-T-101	Human Values & Ethics (non gradial)	1	0	**20**	**30**	**-**	**50**	**100**	**100**	**3**	**1**	**T**
20	NON-GRADIAL COURSES	NS/NC/PEY-P-101	NSS/NCC/Physical Education & Yoga Practices**	0	2	-	-	-	**100**	**100**	**100**	**-**	**2****	**P**

SCHOOL OF AGRICULTURAL SCIENCES															
SCHEME OF STUDIES AND EXAMINATION w.e.f.															
B.Sc. Agriculture (Hons.) I year (II Semester) Batch - 2023-27															
S. No.	**Subjects**	**Paper code No.**	**Name of paper**	**Teaching scheme Hrs/Weeks**		**Examination Scheme**						**Duration of Exam Hours**	**Credits**	**Theory/ Practical**
				L	**P**	**Internal Assessment**	**Mid Terms**	**Practical**	**End term exam**	**Total**	**Grand Total**			
1	GENETICS AND PLANT BREEDING	AGN-T-101	Fundamentals of Genetics	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
2		AGN-P-101	Fundamentals of Genetics	0	2	**20**	-	**30**	-	**50**			1	
3	MICROBIOLOGY	AMB-T-101	Agricultural Microbiology	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
4		AMB-P-101	Agricultural Microbiology	0	2	**20**	-	**30**	-	**50**			1	
5	AGRICULTURAL ENGINEERING	AEN-T-101	Soil and Water Conservation Engineering	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
6		AEN-P-101	Soil and Water Conservation Engineering	0	2	**20**	-	**30**	-	**50**			1	
7	BIOCHEMISTRY/ PHYSIOLOGY/ MICROBIOLOGY/ ENVIRONMENTAL SCIENCES	ACP-T-101	Fundamentals of Crop Physiology	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
8		ACP-P-101	Fundamentals of Crop Physiology	0	2	**20**	-	**30**	-	**50**			1	
9	AGRICULTURAL ECONOMICS	AEC-T-101	Fundamentals of Agricultural Economics	2	0	**20**	**30**	-	**50**	**100**	**100**	**3**	2	T

10	PLANT PATHOLOGY	APP-T-101	Fundamentals of Plant Pathology	3	0	-	**20**	-	**30**	**50**	**100**	**3+3**	3	T+P
11		APP-P-101	Fundamentals of Plant Pathology	0	2	**20**	-	**30**	-	**50**			1	
12	ENTOMOLOGY	AET-T-101	Fundamentals of Entomology	3	0	-	**20**	-	**30**	**50**	**100**	**3+3**	3	T+P
13		AET-P-101	Fundamentals of Entomology	0	2	**20**	-	**30**	-	**50**			1	
14	AGRICULTURAL EXTENSION and COMMUNICATION	AEX-T-102	Fundamentals of Agricultural Extension Education	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
15		AEX-P-102	Fundamentals of Agricultural Extension Education	0	2	**20**	-	**30**	-	**50**			1	
16	AGRICULTURAL EXTENSION and COMMUNICATION	AEX-T-103	Communication Skills and Personality Development	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
17		AEX-P-103	Communication Skills and Personality Development	0	2	**20**	-	**30**	-	**50**			1	
18				**Total credit**									**24(16+8)**	

SCHOOL OF AGRICULTURAL SCIENCES														
SCHEME OF STUDIES AND EXAMINATION w.e.f.														
B.Sc. Agriculture (Hons.) II year (III Semester) Batch - 2023-27														
S. No.	**Subjects**	**Paper code No.**	**Name of paper**	**Teaching scheme Hrs/Weeks**		**Examination Scheme**						**Duration of Exam Hours**	**Credits**	**Theory/ Practical**
				L	**P**	**Internal Assessment**	**Mid Terms**	**Practical**	**End term exam**	**Total**	**Grand Total**			
1	AGRONOMY	AAG-T-201	Crop Production Technology – I (Kharif Crops)	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
2		AAG-P-201	Crop Production Technology – I (Kharif Crops)	0	2	**20**	-	**30**	-	**50**			1	
3	GENETICS AND PLANT BREEDING	AGN-T-201	Fundamentals of Plant Breeding	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
4		AGN-P-201	Fundamentals of Plant Breeding	0	2	**20**	-	**30**	-	**50**			1	
5	AGRICULTURAL ECONOMICS	AEC-T-201	Agricultural Finance and Cooperation	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
6		AEC-P-201	Agricultural Finance and Cooperation	0	2	**20**	-	**30**	-	**50**			1	
7	STATISTICS, COMPUTER APPLICATION AND IPR	ACS-T-201	Agri-Informatics	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
8		ACS-P-201	Agri-Informatics	0	2	**20**	-	**30**	-	**50**			1	
9	AGRICULTURAL ENGINEERING	AEN-T-201	Farm Machinery and	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P

			Power											
10		AEN-P-201	Farm Machinery and Power	0	2	**20**	**-**	**30**	**-**	**50**			1	
11	HORTICULTURE	AHR-T-201	Production Technology for Vegetables and Spices	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
12		AHR-P-201	Production Technology for Vegetables and Spices	0	2	**20**	**-**	**30**	**-**	**50**			1	
13	BIOCHEMISTRY/ PHYSIOLOGY/ MICROBIOLOGY/ ENVIRONMENTAL SCIENCES	AES-T-201	Environmental Studies and Disaster Management	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
14		AES-P-201	Environmental Studies and Disaster Management	0	2	**20**	**-**	**30**	**-**	**50**			1	
15	STATISTICS, COMPUTER APPLICATION AND IPR	AST-T-201	Statistical Methods	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
16		AST-P-201	Statistical Methods	0	2	**20**	**-**	**30**	**-**	**50**			1	
17	ANIMAL PRODUCTION	AAP-T-201	Livestock and Poultry Management	3	0	-	**20**	-	**30**	**50**	**100**	**3+3**	3	T+P
18		AAP-P-201	Livestock and Poultry Management	0	2	**20**	**-**	**30**	**-**	**50**			1	
				Total credit									**23(14+9)**	

SCHOOL OF AGRICULTURAL SCIENCES														
SCHEME OF STUDIES AND EXAMINATION w.e.f.														
B.Sc. Agriculture (Hons.) II year (IV Semester) Batch - 2023-27														
S. No.	**Subjects**	**Paper code No.**	**Name of paper**	**Teaching scheme Hrs/Weeks**		**Examination Scheme**						**Duration of Exam Hours**	**Credits**	**Theory/ Practical**
				L	**P**	**Internal Assessment**	**Mid Terms**	**Practical**	**End term exam**	**Total**	**Grand Total**			
1	AGRONOMY	AAG-T-202	Crop Production Technology –II (Rabi Crops)	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
2		AAG-P-202	Crop Production Technology –II (Rabi Crops)	0	2	**20**	-	**30**	-	**50**			1	
3	HORTICULTURE	AHR-T-202	Production Technology for Ornamental Crops, MAP and Landscaping	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
4		AHR-P-202	Production Technology for Ornamental Crops, MAP and Landscaping	0	2	**20**	-	**30**	-	**50**			1	
5	AGRICULTURAL ENGINEERING	AEN-T-202	Renewable Energy and Green Technology	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
6		AEN-P-202	Renewable Energy and Green Technology	0	2	**20**	-	**30**	-	**50**			1	
7	SOIL SCIENCE & AGRICULTURAL CHEMISTRY	ASS-T-201	Problematic Soils and their Management	2	0	**20**	**30**	**0**	**50**	**100**	**100**	3	2	T

8	HORTICULTURE	AHR-T-203	Production Technology for Fruit and Plantation Crops	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
9		AHR-P-203	Production Technology for Fruit and Plantation Crops	0	2	**20**	-	**30**	-	**50**			1	
10	GENETICS AND PLANT BREEDING	AGN-T-202	Principles of Seed Technology	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
11		AGN-P-202	Principles of Seed Technology	0	4	**20**	-	**30**	-	**50**			2	
12	AGRONOMY	AAG-T-203	Farming System & Sustainable Agriculture	1	0	**20**	**30**	**0**	**50**	**100**	**100**	**3**	1	T
13	AGRICULTURAL ECONOMICS	AEC-T-202	Agricultural Marketing Trade & Prices	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
14		AEC-P-202	Agricultural Marketing Trade & Prices	0	2	**20**	-	**30**	-	**50**			1	
15	AGRONOMY	AAG-T-204	Introductory Agro-meteorology & Climate Change	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
16		AAG-P-204	Introductory Agro-meteorology & Climate Change	0	2	**20**	-	**30**	-	**50**			1	
17	ELECTIVE COURSE	AET-T-201*	Agrochemicals	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2*	T+P
18		AET-P-201*	Agrochemicals	0	2	**20**	-	**30**	-	**50**			1*	
19		AEC-T-203	Agribusiness Management	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
20		AEC-P-203	Agribusiness Management	0	2	**20**	-	**30**	-	**50**			1	

21		AGN-T-203	Commercial Plant Breeding	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
22		AGN-P-203	Commercial Plant Breeding	0	4	**20**	-	**30**	-	**50**			2	
23		AHR-T-204	Landscaping	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
24		AHR-P-204	Landscaping	0	2	**20**	-	**30**	-	**50**			1	
				Total credit									**19(11+8) + 3**	

SCHOOL OF AGRICULTURAL SCIENCES														
SCHEME OF STUDIES AND EXAMINATION w.e.f.														
B.Sc. Agriculture (Hons.) III year (V Semester) Batch - 2023-27														
S. No.	**Subjects**	**Paper code No.**	**Name of paper**	**Teaching scheme Hrs/Weeks**		**Examination Scheme**						**Duration of Exam Hours**	**Credits**	**Theory/ Practical**
				L	**P**	**Internal Assessment**	**Mid Terms**	**Practical**	**End term exam**	**Total**	**Grand Total**			
1	PLANT PATHOLOGY	APP-T-301	Principles of Integrated Pest and Disease Management	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
2		APP-P-301	Principles of Integrated Pest and Disease Management	0	2	**20**	-	**30**	-	**50**			1	
3	SOIL SCIENCE & AGRICULTURAL CHEMISTRY	ASS-T-301	Manures, Fertilizers and Soil Fertility Management	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
4		ASS-P-301	Manures, Fertilizers and Soil Fertility Management	0	2	**20**	-	**30**	-	**50**			1	
5	ENTOMOLOGY	AET-T-301	Pests of Crops and Stored Grain and their Management	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
6		AET-P-301	Pests of Crops and Stored Grain and their Management	0	2	**20**	-	**30**	-	**50**			1	
7	PLANT PATHOLOGY	APP-T-302	Diseases of Field and Horticultural Crops and their Management -I	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P

8		APP-P-302	Diseases of Field and Horticultural Crops and their Management -I	0	2	**20**	-	**30**	-	**50**			1	
9	GENETICS AND PLANT BREEDING	AGN-T-301	Crop Improvement-I (Kharif Crops)	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
10		AGN-T-301	Crop Improvement-I (Kharif Crops)	0	2	**20**	-	**30**	-	**50**			1	
11	AGRICULTURAL EXTENSION and COMMUNICATION	AEX-T-301	Entrepreneurship Development and Business Communication	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
12		AEX-P-301	Entrepreneurship Development and Business Communication	0	2	**20**	-	**30**	-	**50**			1	
13	AGRONOMY	AAG-T-301	Geoinformatics and Nano-technology and Precision Farming	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
14		AAG-P-301	Geoinformatics and Nano-technology and Precision Farming	0	2	**20**	-	**30**	-	**50**			1	
15	AGRONOMY	AAG-P-302	Practical Crop Production – I (Kharif crops)	0	4	**20**		**80**	**0**	**100**	**100**	3	2	P
16	Intellectual Property Rights	IPR-T-301	Intellectual Property Rights	1	0	**20**	**30**	**0**	**50**	**100**	**100**	3	1	T
17	Elective Course	AFT-T-301	Food Safety and Standards	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P

18		AFT-P-301	Food Safety and Standards	0	2	**20**	**-**	**30**	**-**	**50**			1	
19		AET-T-302	Biopesticides & Biofertilizers	2	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	2	T+P
20		AET-P-302	Biopesticides & Biofertilizers	0	2	**20**	**-**	**30**	**-**	**50**			1	
21		AEN-T-301	Protected Cultivation	2	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	2	T+P
22		AEN-P-301	Protected Cultivation	0	2	**20**	**-**	**30**	**-**	**50**			1	
23		AHR-T-301	Micro propagation Technologies	1	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	1	T+P
24		AHR-P-301	Micro propagation Technologies	0	4	**20**	**-**	**30**	**-**	**50**			2	
				Total credit									**21(12+09)+ 3**	

SCHOOL OF AGRICULTURAL SCIENCES															
SCHEME OF STUDIES AND EXAMINATION w.e.f.															
B.Sc. Agriculture (Hons.) III year (VI Semester) Batch - 2023-27															
S. No.	**Subjects**	**Paper code No.**	**Name of paper**	**Teaching scheme Hrs/Weeks**		**Examination Scheme**					**Grand Total**	**Duration of Exam Hours**	**Credits**	**Theory/ Practical**
				L	**P**	**Internal Assessment**	**Mid Terms**	**Practical**	**End term exam**	**Total**				
1	AGRONOMY	AAG-T-303	Rainfed Agriculture & Watershed Management	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
2		AAG-P-303	Rainfed Agriculture & Watershed Management	0	2	**20**	-	**30**	-	**50**			1	
3	AGRICULTURAL ENGINEERING	AEN-T-302	Protected Cultivation and Secondary Agriculture	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P
4		AEN-P-302	Protected Cultivation and Secondary Agriculture	0	2	**20**	-	**30**	-	**50**			1	
5	PLANT PATHOLOGY	APP-T-303	Diseases of Field and Horticultural Crops and their Mgt. -II	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
6		APP-P-303	Diseases of Field and Horticultural Crops and their Mgt.-II	0	2	**20**	-	**30**	-	**50**			1	
7	HORTICULTURE	AHR-T-302	Post-harvest Management and Value Addition of Fruits and	1	0	-	**20**	-	**30**	**50**	**100**	**3+3**	1	T+P

			Vegetables											
8		AHR-P-302	Post-harvest Management and Value Addition of Fruits and Vegetables	0	2	**20**	**-**	**30**	**-**	**50**			1	
9	ENTOMOLOGY	AET-T-303	Management of Beneficial Insects	1	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	1	T+P
10		AET-P-303	Management of Beneficial Insects	0	2	**20**	**-**	**30**	**-**	**50**			1	
11	GENETICS AND PLANT BREEDING	AGN-T-302	Crop Improvement-II (Rabi crops)	1	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	1	T+P
12		AGN-P-302	Crop Improvement-II (Rabi crops)	0	2	**20**	**-**	**30**	**-**	**50**			1	
13	AGRONOMY	AAG-P-304	Practical Crop Production – II (Rabi crops)	0	4	**20**		**80**	**0**	**100**	**100**	3	2	P
14	AGRONOMY	AAG-T-305	Principles of Organic Farming	1	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	1	T+P
15		AAG-P-305	Principles of Organic Farming	0	2	**20**	**-**	**30**	**-**	**50**			1	
16	AGRICULTURAL ECONOMICS	AEC-T-301	Farm Management, Production & Resource Economics	1	0	**-**	**20**	**-**	**30**	**50**	**100**	**3+3**	1	T+P
17		AEC-P-301	Farm Management, Production & Resource Economics	0	2	**20**	**-**	**30**	**-**	**50**			1	

18	FOOD SCIENCE & TECHNOLOGY	AFT-T-302	Principles of Food Science and Nutrition	2	0	**20**	**30**	**0**	**50**	**100**	**100**	3	2	T
19	Elective Course	AHR-T-303	Hi-tech. Horticulture	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
20		AHR-P-303	Hi-tech. Horticulture	0	**2**	**20**	-	**30**	-	**50**			**1**	
21		AAG-T-306	Weed Management	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
22		AAG-P-306	Weed Management	0	**2**	**20**	-	**30**	-	**50**			**1**	
23		AAG-T-307	System Simulation and Agro-advisory	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
24		AAG-P-307	System Simulation and Agro-advisory	0	**2**	**20**	-	**30**	-	**50**			**1**	
25		AEX-T-302	Agricultural Journalism	2	0	-	**20**	-	**30**	**50**	**100**	**3+3**	2	T+P
26		AEX-P-302	Agricultural Journalism	0	**2**	**20**	-	**30**	-	**50**			**1**	
				Total credit									**21 (11 + 10)+ 3**	

SCHOOL OF AGRICULTURAL SCIENCES			
SCHEME OF STUDIES AND EXAMINATION w.e.f.			
B.Sc. Agriculture (Hons.) IV year (VII Semester) Batch - 2023-27			
Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE &AIA)			
S. No.	**Activities**	**No. of weeks**	**Credit Hours**
1	General orientation & On campus training by different faculties	1	14
2	Village attachment	8	
3	Unit attachment in Univ. / College. KVK/ Research Station Attachment	5	
4	Plant clinic	2	2
5	Agro-Industrial Attachment	3	4
6	Project Report Preparation, Presentation and Evaluation	1	
Total weeks for RAWE & AIA		20	20

B.Sc. Agriculture (Hons.) IV year (VIII Semester) Batch - 2023-27		
S. No.	**Title of the Module**	**Credits**
1	Production Technology for Bioagents and Biofertilizer	0+10
2	Seed Production and Technology	0+10
3	Mushroom Cultivation Technology	0+10
4	Soil, Plant, Water and Seed Testing	0+10
5	Commercial Beekeeping	0+10
6	Poultry Production Technology	0+10
7	Commercial Horticulture	0+10
8	Floriculture and Landscaping	0+10
9	Food Processing	0+10
10	Agriculture Waste Management	0+10
11	Organic Production Technology	0+10
12	Commercial Sericulture	0+10
Modules for Skill Development and Entrepreneurship: A student has to register 20 credits opting for two modules of (0+10) credits each (total 20 credits) from the package of modules in the VIII semester.		

Raffles University, Neemrana

School of Agricultural Sciences

Examination and Evaluation Policy

1. Theory= (50%)
2. Internal Assessment + Practical= (50%)

Courses with Theory and Practical

- Mid Term (20%) + End Term (30%)
- Internal Assessment (20%) + Practical (30%)

Courses with only Theory

- Mid Term (30%) + End Term (50%)
- Internal Assessment (20%)

Courses with only Practical

- Internal Assessment (20%) + Practical (80%)
- Non-Gradial Practical Courses- 100% Practical

Raffles University, Neemrana

School of Agricultural Sciences

Promotion Policy

B.Sc. Agriculture (Hons.) (I year)	
Passing Per cent in Practical+ Internal Assessment	40
Passing Per cent in individual subject	40
Overall Passing Per cent in B.Sc. (Hons.) Agriculture **(I year)**	40
B.Sc. Agriculture (Hons.) (II year)	
Passing Per cent in Practical+ Internal Assessment	40
Passing Per cent in individual subject	40
Overall Passing Per cent in B.Sc. (Hons.) Agriculture **(II year)**	40
B.Sc. Agriculture (Hons.) (III year)	
Passing Per cent in Practical+ Internal Assessment	40
Passing Per cent in individual subject	40
Overall Passing Per cent in B.Sc. (Hons.) Agriculture **(III year)**	40
Overall % in B.Sc. Agriculture (Hons.)	**50**

Divisions/Departments/Sections proposed along with Cadre-wise teaching staff required

S. No.	Divisions/Departments/Sections including mergers shown in bracket	Minimum Requirement Professor	Teaching Staff required			Total
			Professor	Assoc Prof.	Asstt Prof.	
A. Divisions/Departments						
1.	Agronomy + (Agro-forestry)	5	1	1	4+1	7
2.	Agricultural Economics + (Basic Economics, Maths & Computer Science and Statistics)	5	0	1	2+3	6
3.	Agriculture Extension & Communication + (Sociology and Psychology, English)	3	0	1	1+2	4
4.	Entomology	2	0	1	2+0	3
5.	Genetics & Plant Breeding + (Seed Science & Technology)	3	1	1	2+1	5
6.	Horticulture + (Food Science & Technology)	4	1	1	2+1	5
7.	Soil Science and Agricultural Chemistry + (Microbiology, Agro-meteorology, Environmental Sciences)	4	0	1	2+3	6
8.	Plant Pathology	2	0	1	2+0	3
	Total	28	3	8	17+11	39
B. Sections						
9.	Animal Sciences including Fisheries, Dairy Sciences & poultry units	1	0	0	1+1	2
10.	Agriculture Engineering +(Farm Management)	1	0	0	1+1	2
11.	Biochemistry and Crop Physiology	1	0	0	1+1	2
	Total	31	3	8	20+14	45

Note: Total strength after four years should have 45 teachers as faculty. However, in extreme cases, it can be 31 and few courses viz. Basic Sciences, and Humanities, Math's, and Computer Sciences, etc. can be completed by hiring the teachers.

Administrative Staff requirement for Divisions/Departments/Sections

S. No.	Divisions/Departments/Sections	Assistant*	Lab Asstt.	Field Asstt.	Attendant/ Messenger	Total
1	Agronomy + (Agro-forestry)		2	3	-**	6
2	Agricultural Economics + (Basic Economics, Math's & Computer Science and Statistics)	1	3	-	-	4
3	Agriculture Extension & Communication + (Sociology and Psychology, English)	1	1	-	-	2
4	Entomology	1	1	1	-	3
5	Genetics & Plant Breeding + (Seed Science & Technology)	1	2	2		5
6	Horticulture + (Food Science & Technology)	1	2	2		5
7	Soil Science and Agricultural Chemistry + (Microbiology, Agro-meteorology, Environmental Sciences)	1	3	1		5
8	Plant Pathology	1	2	1		4
9	Animal Sciences including Fisheries, Dairy Science & Poultry units)	1	1	1		3
10	Agriculture Engineering + (Farm Management)	1	1	2		4
11	Biochemistry and Crop Physiology	1	1	-		2
	Total	11	19	13		43

*Assistant should have computer literacy, accounts and store handling training

**Attendant/Messenger/Janitor/Security/watch and ward to be outsourced.

Educational Tours: Educational tour held for final year students (more than 7 days) to well-known ICAR institutions and organizations and interactions with their faculty, helps students broaden their knowledge and skills.

LOCATIONS FOR EDUCATIONAL TOURS		
STATIONS/INSTITUTIONS/CENTRE/UNIVERSITY		
S. No.	**UNIVERSITIES**	**Place**
1	Chaudhary Charan Singh Haryana Agricultural University, Hisar	Haryana
2	Lala Lajpat Rai University of Veterinary & Animal Sciences, Hisar	Haryana
3	Haryana State University of Horticultural Sciences, Karnal	Haryana
4	Ch. Sarwan Kumar Himachal Pradesh Krishi Viswavidyalaya, Palampur	Himachal Pradesh
5	Dr. Yaswant Singh Parmar University of Horticulture & Forestry, Solan	Himachal Pradesh
6	Sher-e-Kashmir University of Agricultural Science & Technology, Srinagar	Jammu & Kashmir
7	Sher-e-Kashmir University of Agricultural Science & Technology, Jammu	Jammu & Kashmir
8	Rajmata Vijayaraje Scindia Krishi VishwaVidyalaya, Gwalior	Madhya Pradesh
9	Nanaji Deshmukh Pashu ChikitsaVisvaVidyalaya, Jabalpur	Madhya Pradesh
10	Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur	Madhya Pradesh
12	Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana	Punjab
13	Punjab Agricultural University, Ludhiana	Punjab
14	Maharana Pratap University of Agriculture & Technology, Udaipur	Rajasthan
15	Swami Keshwanand Rajasthan Agricultural University, Bikaner	Rajasthan
16	SKN Agriculture University, Jobner	Rajasthan
17	Agriculture University, Kota	Rajasthan
18	Agriculture University, Jodhpur	Rajasthan
19	G.B. Pant University of Agriculture & Technology, Pantnagar	Uttarakhand
20	VCSG Uttarakhand University of Horticulture & Forestry, Bharsar	Uttarakhand
21	Chandra Shekhar Azad University of Agricultural & Technology, Kanpur	Uttar Pradesh
22	Narendra Deva University of Agriculture & Technology, Faizabad	Uttar Pradesh
23	Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut	Uttar Pradesh

24	U.P. Pt. Deen Dayal Upadhyaya Pashu Chikitsa VigyanVishwaVidhyalaya Evem Go Anusandhan Sansthan, Mathura	Uttar Pradesh
25	Banda University of Agricultural and Technology, Banda	Uttar Pradesh
RESEARCH STATIONS/INSTITUTE		
26	Indian Agricultural Research Institute, Pusa	New Delhi
27	National Dairy Research Institute, Karnal	Haryana
28	Central Arid Zone Research Institute , Jodhpur	Rajasthan
29	Central Institute for Arid Horticulture, Bikaner	Rajasthan
30	Central Sheep and Wool Research Institute, Avikanagar	Rajasthan
31	Central Institute for Research on Buffaloes, Hissar	Haryana
32	Central Institute for Research on Goats, Makhdoom	Uttar Pradesh
33	Central Institute of Sub Tropical Horticulture, Lucknow	Uttar Pradesh
34	Indian Grassland and Fodder Research Institute, Jhansi	Uttar Pradesh
35	Indian Institute of Pulses Research, Kanpur	Uttar Pradesh
36	Indian Institute of Sugarcane Research, Lucknow	Uttar Pradesh
37	Indian Institute of Vegetable Research, Varanasi	Uttar Pradesh
38	Central Institute for Research on Cattle, Meerut	Uttar Pradesh
39	Central Agroforestry Research Institute , Jhansi	Uttar Pradesh
40	Central Institute of Temperate Horticulture, Srinagar	Jammu & Kashmir
41	Indian Institute of Soil and Water Conservation, Dehradun	Uttarakhand
42	Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora	Uttarakhand
43	Central Soil Salinity Research Institute, Karnal	Haryana
44	Indian Institute of Wheat and Barley Research, Karnal	Haryana
45	Indian Institute of Soil Sciences, Bhopal	Madhya Pradesh
46	Indian Institute of Maize Research, Ludhiana	Punjab

Student READY Programme/ Internship for B.Sc. Agriculture (Hons.) (IV year)

Introduction of internship to get hands on knowledge in their career field which play a crucial role in shaping their career by exposure to real working environments and help them develop the necessary skill required to stand out in a saturated job market.

The internship must start from the fourth year and the duration of the internship must be at least of 21 days.