CRITERIA 1.1.2

The Programmes offered by the institution focus on employability/entrepreneurship/ skill development and their course syllabi are QM adequately revised to incorporate contemporary requirements.

Programme – B.Sc. Agriculture

Color Coding: -

1) **EMPLOYABILITY**

2) **ENTREPRENEURSHIP**

3) **SKILL DEVELOPMENT**

Syllabus

For

Undergraduate Degree Programme in Agriculture

B.Sc. (Hons.) Agriculture

Session: 2021 onwards

(Syllabus As Per 5th Dean Committee ICAR Recommendation)

Netaji Subhas University

Jamshedpur, Jharkhand

Head
Department of Agriculture
Netaji Subhas University

NETAJI SUBHAS U Jamshed

Dean Academics
Netaji Subhas University
Jamshedpur, Jharkhand

Mapping of courses based on Entrepreneurship, Skill Development, and Employability

Semester-I

Paper Code	Subject	EN	SD	EM
HORT-101	Fundamentals of Horticulture	✔	✔	✔
BICM-101	Fundamentals of Plant Biochemistry and Biotechnology		✔	✔
SSAC-101	Fundamentals of Soil Science		✔	✔
AFOR-101	Introduction to Forestry	✔	✔	✔
ENGL-101	Comprehension & Communication Skills in English		✔	✔
AGRO-101	Fundamentals of Agronomy	✔	✔	✔
EMAT-101	Elementary Mathematics		✔	✔
AEXT-101	Rural Sociology & Educational Psychology	✔	✔	✔

Semester-II

Code	Subject	EN	SD	EM
GPBR-201	Fundamentals of Genetics		✔	✔
AMBE-201	Agricultural Microbiology	✔	✔	✔
SWCE-201	Soil and Water Conservation Engineering	✔	✔	✔
CPHY-201	Fundamentals of Crop Physiology		✔	✔
PATH-201	Fundamentals of Plant Pathology	✔	✔	✔
AECO-201	Fundamentals of Agricultural Economics	✔	✔	✔
ENTO-201	Fundamentals of Entomology	✔	✔	✔
AEXT-201	Fundamentals of Agricultural Extension Education	✔	✔	✔
CSPD-201	Communication Skills and Personality Development		✔	✔

Semester-III

Paper Code	Subject	EN	SD	EM
AGRO-301	Crop Production Technology – I (Kharif Crops)	✔	✔	✔
GPBR-301	Fundamentals of Plant Breeding	✔	✔	✔
AGFC-301	Agricultural Finance and Cooperation	✔	✔	✔
AGIF-301	Agri-Informatics	✔	✔	✔
AFMP-301	Farm Machinery and Power	✔	✔	✔
HORT-301	Production Technology for Vegetables and Spices	✔	✔	✔
ESDM-301	Environmental Studies and Disaster Management		✔	✔
AGSM-301	Statistical Methods		✔	✔
LSPM-301	Livestock and Poultry Management	✔	✔	✔

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Semester-IV

Paper Code	Subject	EN	SD	EM
AGRO-401	Crop Production Technology – II (Rabi Crops)	✔	✔	✔
HORT-401	Production Technology for Ornamental Crops, MAP, and Landscaping	✔	✔	✔
HORT-402	Production Technology for Fruit and Plantation Crops	✔	✔	✔
REGT-401	Renewable Energy and Green Technology	✔	✔	✔
APST-401	Principles of Seed Technology	✔	✔	✔
AMTP-401	Agricultural Marketing, Trade & Prices	✔	✔	✔
AMCC-401	Introductory Agro-Meteorology & Climate Change		✔	✔
ELCT-401	Elective Course: Micropropagation Technologies	✔	✔	✔
FSSA-401	Farming System & Sustainable Agriculture	✔	✔	✔
PBSM-401	Problematic Soils and their Management	✔	✔	✔

Semester-V

Paper Code	Subject	EN	SD	EM
MFSM-501	Manures, Fertilizers and Soil Fertility Management	✔	✔	✔
PCSM-501	Pests of Crops and Stored Grain and their Management	✔	✔	✔
DHCM-501	Diseases of Field & Horticultural Crops & their Management-I	✔	✔	✔
IPDM-501	Principles of Integrated Pest and Disease Management	✔	✔	✔
CIKC-501	Crop Improvement – I (Kharif Crops)	✔	✔	✔
EDBC-501	Entrepreneurship Development and Business Communication	✔	✔	✔
GNPF-501	Geoinformatics, Nano-technology and Precision Farming	✔	✔	✔
AIPR-501	Intellectual Property Rights	✔	✔	✔
ELCT-501	Biopesticides & Biofertilizers	✔	✔	✔
PCPK-501P	Practical Crop Production-I (Kharif Crops)	✔	✔	✔

Semester-VI

Paper Code	Subject	EN	SD	EM
RAWM-601	Rainfed Agriculture & Watershed Management	✔	✔	✔
PCSA-601	Protected Cultivation and Secondary Agriculture	✔	✔	✔
DHCM-601	Diseases of Field and Horticultural Crops and their Management-II	✔	✔	✔
PHMV-601	Post-harvest Management and Value Addition of Fruits and Vegetables	✔	✔	✔
AMBI-601	Management of Beneficial Insects	✔	✔	✔
CIRC-601	Crop Improvement-II (Rabi Crops)	✔	✔	✔
APOF-601	Principles of Organic Farming	✔	✔	✔

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FMRE-601	Farm Management, Production & Resource Economics	✔	✔	✔
ELCT-601	Elective Course: Agribusiness Management	✔	✔	✔
PFSN-601	Principles of Food Science and Nutrition	✔	✔	✔
PCPR-601P	Practical Crop Production –II (Rabi Crops)	✔	✔	✔

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Jamshedpur

For
Head
Department of Agriculture
Netaji Subhas University

B.Sc.(Hons.) Agriculture

Syllabus

Semester-I

S. No	Subject Code	Subject	Credit			
			L	T	P	Total
1	HORT-101	Fundamentals of Horticulture	1	0	1	2
2	BICM-101	Fundamentals of Plant Biochemistry and Biotechnology	2	0	1	3
3	SSAC-101	Fundamentals of Soil Science	2	0	1	3
4	AFOR-101	Introduction to Forestry	1	0	1	2
5	ENGL-101	Comprehension & Communication Skills in English	1	0	1	2
6	AGRO-101	Fundamentals of Agronomy	3	0	1	4
7	EMAT-101	Elementary Mathematics	2	0	0	2
8	AEXT-101	Rural Sociology & Educational Psychology	2	0	0	2
9	PEYP-101	NSS/NCC/Physical Education & Yoga Practices	**Non Gradial****			
		Total	**14**	**0**	**6**	**20**

Subject: Fundamentals of Horticulture

Subject Code: HORT-101 **Credit Hours: 2(1+1)**

Course-Objective:

The objective of the course *Fundamentals of Horticulture*

1. Provide students with a comprehensive understanding of the basic principles, practices, and importance of horticulture.
2. This course aims to develop foundational knowledge of plant growth, propagation, breeding, nutrition, and management, emphasizing both theoretical concepts and practical skills.
3. Students will learn about various horticultural crops, cultivation techniques, and their significance in agriculture, industry, and the environment.

Theory

Module	Topic
Module-1	• Horticulture - Its definition and branches, importance • Horticultural Zones of India And Classification of Horticultural Plants
Module-2	• Plant propagation-methods and vegetative propagation • Seed dormancy, Seed germination
Module-3	• Principles of orchard establishment; Principles of training and pruning • Unfruitfulness, its causes and measures to overcome it
Module-4	• Brief studies of pollination, pollinizers and pollinators • Brief studies of Fertilization, Polyembryony, and Parthenocarpy
Module-5	• Irrigation – Systems of irrigation and • Fertilizer application in horticultural crops.

Practical

- Identification of garden tools.
- Identification of horticultural crops.
- Preparation of seed bed/ nursery bed.
- Layout and planting of orchard.
- Training and pruning of fruit trees.
- Preparation of potting.

Course Outcomes

- CO 1. Educate about the concepts of horticulture; importance and scope, botanical classification of horticultural crops; climate and soil,and propagation methods of different horticultural crops etc.
- CO 2. Describe the various principles and methods of training and pruning, kitchen gardening, basic principles of orchard establishment, unfruitfulness etc.
- CO 3. By the end of this course students will be able to critically evaluate the information related to horticulture as being scientifically based or opinion based and contribute to the knowledge based information.
- CO 4. Analyze the various problems with horticulture crop production.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	2	3	3	2	2	2	-	-	-	1	1	1
CO-2	1	2	3	2	2	3	2	-	1	1	2	1	2
CO-3	2	1	2	1	1	1	2	-	1	1	1	2	2
CO-4	1	2	2	2	3	2	2	-	1	-	1	1	1
Average	1.5	1.8	2.5	2.0	2.0	2.0	2.0	-	1.0	1.0	1.3	1.3	1.5

Subject: Fundamentals of Plant Biochemistry and Biotechnology

Subject Code: BICM-101 **Credit Hours: 3(2+1)**

Course Objectives:

The *Fundamentals of Plant Biochemistry and Biotechnology* course aims to:

1. **Introduce Core Biochemical Principles:**
   - Provide foundational knowledge of biomolecules including carbohydrates, proteins, lipids, nucleic acids, enzymes, and vitamins, focusing on their structure, function, and metabolism in plants.
2. **Explain Metabolic Pathways:**
   - Describe essential biochemical pathways such as photosynthesis, respiration, nitrogen fixation, and secondary metabolism, emphasizing their importance in plant growth and development.
3. **Develop Understanding of Plant Biotechnology:**
   - Introduce fundamental concepts of plant tissue culture, genetic engineering, gene cloning, molecular markers, and transgenic plants for crop improvement.
4. **Foster Analytical and Practical Skills:**
   - Equip students with laboratory techniques for analyzing biochemical processes and employing biotechnological methods for research and development.
   - literature, conduct experiments, and interpret results effectively.

Theory

Module	Topic
Module-1	**Plant Biochemistry** • **Carbohydrate:**Definition and classification. Structures formula of the following- ▪ Monosaccharide- D Glucose, D Fructose, D Galactose ▪ Disaccharides – Sucrose , Maltose, Lactose ▪ Polysaccharides- Starch, cellulose, Inulin • **Lipid:** Importance and classification
Module-2	• **Amino acid-** Classification, essential and non-essential amino acid, nutritional significance of amino acid. • **Proteins:** definition, classification, composition, important functions, Structural organization of proteins, Biological significance of proteins.
Module-3	• **Nucleic acids:** Importance and classification; Structure of Nucleotides, Watson and crick modal of DNA. • **Enzymes:** General properties; Classification and mechanism.
Module-4	**Plant Biotechnology**

	• Definition, scope and application of biotechnology; • **Micro-propagation methods:** definition, explant used in micro-propagation, stages in micro-propagation, advantages and disadvantages of micro-propagation
Module-5	• **Genetic engineering or recombinant DNA technology-** definition, application, Genetic engineering through *Agrobactrium tumefaciens* • Somaclonal variation and Cryopreservation • **Transgenic plant** and their application, Genetically modified crop (GM Crop)

Practical

- Qualitative tests of carbohydrates
- Reducing and Non -reducing Sugar
- Qualitative tests of Lipid
- Qualitative tests of amino acids.
- Study of Sterilization techniques.
- Study of Composition of various tissue culture media and
- Preparation of stock solutions for MS nutrient medium.
- Study of Stages in Micro-propagation.

Course Outcomes

- CO1. Educate the outlines of bio-molecules, metabolic pathways, morphology and anatomy of living cells.
- CO2. Develop the understanding of energy synthesis, hereditary mechanisms, enzymatic reactions, cellular function and growth, molecular tests, etc.
- CO3. Develop the skills for applying principles and methods biochemistry and biotechnology to understand plant growth and metabolisms.
- CO4. Develop the ability to apply advance techniques for standardization of biochemical processes in plants, optimize cell and tissue growth and culture plant cell and tissue in the laboratory.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	2	1	2	2	1	-	-	-	1	1	1	1
CO-2	1	1	2	2	1	1	-	-	-	1	1	1	1
CO-3	1	2	1	2	3	1	-	-	-	1	1	1	2
CO-4	1	1	1	2	2	1	-	-	-	1	1	1	1
Average	1.0	1.5	1.3	2.0	2.0	1.0	-	-	-	1.0	1.0	1.0	1.3

B.Sc. (Hons.) Agriculture
1st Sem

Subject: Fundamentals of Soil Science

Subject Code: SSAC-101 **Credit Hours: 3(2+1)**

Course Objectives:

The *Fundamentals of Soil Science* course aims to:

1. **Provide Foundational Knowledge of Soil Science:**
   - Explain the origin, formation, classification, and composition of soils.
   - Describe the physical, chemical, biological, and mineralogical properties of soils.
2. **Understand Soil-Plant Relationships:**
   - Illustrate the role of soil as a medium for plant growth, including nutrient availability, water retention, and root development.
   - Explain soil fertility and its importance in sustainable crop production.
3. **Discuss Soil Management and Conservation:**
   - Identify techniques for soil conservation, erosion control, and sustainable land management practices.
   - Explore soil amendments, fertilizers, and soil health enhancement strategies.
4. **Develop Practical Skills and Analytical Techniques:**
   - Provide hands-on experience in soil sampling, analysis, and interpretation of laboratory results.
   - Enhance skills in conducting soil research and developing practical solutions for soil-related challenges.
5. **Promote Awareness of Environmental and Societal Aspects:**
   - Discuss the role of soil science in addressing environmental issues such as land degradation, pollution, and climate change.
   - Encourage responsible and sustainable soil management practices.

Theory

Module	Topic
Module-1	• **Nature and origin of soil.** ▪ **Soil genesis**: soil forming rocks and minerals; weathering, processes and factors of soil formation; ▪ **Soil Profile**; components of soil; classification and soils of India.
Module-2	• **Soil colloids** - inorganic and organic colloids and their compositions, effect on soil fertility; sources of charge; ion exchange in soil.

	• **Soil physical properties:** soil-texture, structure, density and porosity, soil colour, consistence and plasticity;
Module-3	• **Soil organic matter:** composition, properties and its influence on soil properties; humic substances - nature and properties; • **Soil reaction** – acidic, saline and sodic soils;
Module-4	• **Essential plants nutrients** – Their functions and deficiency symptoms in plants.
Module-5	• **Manure and fertilizers**; Liquid fertilizers; Important inorganic fertilizers and their reactions in soils. • Use of saline and sodic water for crop production; Gypsum requirement for reclamation of sodic soils.

Practical

- Study of soil profile in field.
- Study of Soil physical properties
- Study of soil forming rocks and minerals.
- Studies of composition and properties soil organic matter
- Study water quality parameters
- Calculation of organic matter content of soil.

Course Outcomes

- CO1. Familiarize the students with different concepts of soil, classification and soil of India.
- CO2. Understand the soil organism, organic matter and soil pollution.
- CO3. Develop the skills of soil sampling techniques and sampling tools.
- CO 4. To Develop the ability to determine the soil density, moisture content, texture, porosity, EC, cation exchange capacity and organic matter content of soil.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	2	1	1	1	1	-	-	1	1	-	2
CO-2	3	2	1	1	1	1	1	-	-	1	1	-	1
CO-3	3	2	1	1	2	-	1	-	-	1	1	-	1
CO-4	3	2	2	1	1	2	1	-	-	1	2	-	2
Average	3	2.3	1.5	1	1.3	1.3	1	-	-	1	1.3	-	1.5

Subject: Introduction to Forestry

Subject Code: AFOR-101 **Credit Hours: 2(1+1)**

Course Objectives:

The *Introduction to Forestry* course aims to:

1. **Provide Fundamental Knowledge of Forestry:**
   - Explain the concepts, definitions, and scope of forestry, including its historical development and importance to ecosystems and human societies.
2. **Introduce Forest Ecology and Management:**
   - Illustrate the principles of forest ecology, including forest structure, composition, and succession.
3. **Discuss Forest Resources and Their Utilization:**
   - Explain the economic, social, and environmental importance of forest resources such as timber, non-timber products, and ecosystem services.
4. **Develop Skills in Forest Measurement and Analysis:**
   - Introduce techniques for forest inventory, mapping, and remote sensing.
   - Equip students with skills to assess forest health, productivity, and biodiversity.
5. **Understand Forest Policies and Legislation:**
   - Provide an overview of national and international policies, laws, and conventions related to forestry and natural resource management.

Theory

Module	Topic
Module-1	• **Introduction to Forestry –** ○ Branches of forestry ○ Definitions of basic terms related to forestry, ○ Objectives of Silviculture, ○ Forest classification and function of forests ○ Salient features of Indian Forest Policies.
Module-2	• **Forest regeneration-** ○ Definition of Forest regeneration, Method of regeneration ○ **Natural regeneration** - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; ○ **Artificial regeneration** – objectives, choice between natural and artificial regeneration, • Vegetative Regeneration method
Module-3	• **Tending operations in Siliviculture** : Weeding, Cleaning, and Thinning • **Afforestation:** Definition and importance of afforestation.
Module-4	• **Forest mensuration** ○ Definition and scope of Forest mensuration ○ Objectives of Forest mensuration ○ Common formula used in measurement, ○ Diameter measurement, instruments used in diameter measurement; ○ Non instrumental methods of height measurement - shadow and single pole method; ○ Instrumental methods of height measurement - geometric and trigonometric principles,

	○ Instruments used in height measurement; • **Forest mensuration formulas,** Tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, Age determination of trees.
Module-5	• **Agroforestry** ○ Definitions and importance ○ Objective of agroforestry ○ Classification of agroforestry ○ Benefits and limitation of agroforestry • **Taungya system:** Importance Advantages and Disadvantages

Practical

- To study Identification of forest tree species.
- To study Botanical name, Common name and uses of important Forest plants.
- Diameter measurements using calipers and tape.
- Height measurement of standing trees by shadow method.
- To study Nursery lay out and vegetative propagation techniques.
- Study of Forest plantations and their management.
- Visits of nearby forest based industries.

Course Outcomes

- 1. Educate about the importance of trees in agriculture, forest regeneration, forest mensuration, agro-forest; factors affecting standing trees in forest and plantations; salient features of Indian Forest Policies, forest management, forest resources and produce, forest cover in India and in different states, social life and environmental issues, etc.
- 2. Develop the understanding of methods used in forest regeneration, land recreation, nursery and forest management, silvicultural practices, collecting of non-timber forest products, etc.
- 3. Develop the skills in nursery preparation of forest trees, tending operations, forest mensuration, selection of trees in agro-forestry, etc.
- 4. Develop the ability to measure plant and tree growth, volume of felled and standing trees, age of trees, natural and artificial regeneration, basal cover of forests,

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	2	3	2	2	3	-	-	1	1	2	3
CO-2	3	3	2	3	2	2	3	-	-	1	1	2	3
CO-3	2	3	2	3	2	2	3	-	-	1	1	2	3
CO-4	2	2	1	2	2	2	2	-	-	1	1	2	3
Average	2.5	2.8	1.8	2.8	2	2	2.8	-	-	1	1	2	3

B.Sc. (Hons.) Agriculture
1st Sem

Subject: Comprehension and Communication Skills in English

Subject Code: ENGL-101 **Credit Hours: 2(1+1)**

Course Objectives:

The *Comprehension & Communication Skills in English* course aims to:

1. **Develop Effective Communication Skills:**
   - Enhance students' ability to communicate clearly and confidently in English, both orally and in writing.
   - Build proficiency in formal, informal, and academic communication.
2. **Improve Listening and Reading Comprehension:**
   - Train students to effectively understand and interpret various texts, including essays, articles, reports, and literary works.
   - Enhance active listening skills through lectures, discussions, audio-visual materials, and presentations.
3. **Enhance Oral Communication and Presentation Skills:**
   - Encourage participation in group discussions, debates, role-plays, and presentations to build fluency and public speaking skills.
   - Develop the ability to articulate ideas effectively and confidently.
4. **Promote Critical Thinking and Analytical Skills:**
   - Cultivate the ability to analyze, evaluate, and present ideas logically and persuasively.
   - Encourage creative thinking and originality in expression.
5. **Foster Professional and Social Communication:**
   - Introduce techniques for professional communication such as interviews, meetings, and formal correspondence.
   - Promote social communication skills for effective interaction in diverse environments.

Theory

Module	Topic
Module-1	• Reading Comprehension • Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words.
Module-2	• Functional grammar: Articles, Prepositions, Verb, Subject verb. • Agreement, Transformation, Synthesis, Direct and Indirect Narration.
Module-3	• Written Skills: Paragraph writing, Precise writing, Report writing

	and Proposal writing.
Module-4	• The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing.
Module-5	• 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.

Course Outcomes

- CO1. The students acquire the significance of proficiency, both in spoken (oral) and written language.
- CO2. The student learn the ways to develop comprehension skills, improved vocabulary, significant use of grammar, acquired understanding on writing skills, corresponded with others and enhanced skills in spoken English.
- CO3. Develop the understanding on the significance of communication and compared different types of communication with their use.
- CO 4. Develop the skills in different categories of writing styles, their implications in various areas, formats to be followed under these styles of writing and their significance.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-	PSO-	PSO-	PSO-
	3	3	2	3	2	2	3	-	-	1	1	2	3
CO-2	3	3	2	3	2	2	3	-	-	1	1	2	3
CO-3	2	3	2	3	2	2	3	-	-	1	1	2	3
CO-4	2	2	1	2	2	2	2	-	-	1	1	2	3
Average	2.5	2.8	1.8	2.8	2.0	2.0	2.8	-	-	1.0	1.0	2.0	3.0

Subject: Fundamentals of Agronomy

Subject Code: AGRO-101 **Credit Hours: 4 (3+1)**

Course Objectives

The *Fundamentals of Agronomy* course aims to:

1. **Provide Fundamental Knowledge of Agronomy:**
   - Explain the basic concepts, principles, and scope of agronomy and its role in sustainable agriculture.
   - Understand the relationship between crops, soils, climate, and management practices for optimal crop production.
2. **Introduce Crop Growth and Development:**
   - Describe various growth stages of crops and factors affecting their growth, development, and productivity.
   - Explain plant nutrient requirements, deficiency symptoms, and nutrient management practices.
3. **Familiarize with Agricultural Meteorology:**
   - Understand the role of climate and weather in crop production.
   - Introduce concepts of agroclimatic zones, weather forecasting, and climate-smart agriculture.
4. **Develop Skills in Soil and Water Management:**
   - Explain soil preparation, tillage practices, irrigation methods, and soil conservation techniques.
   - Discuss the importance of soil health and fertility management for sustainable agriculture.
5. **Promote Knowledge of Crop Improvement:**
   - Introduce concepts of seed selection, sowing methods, planting techniques, and crop breeding for better yield and quality.

Theory

Module	Topic
Module-1	• Agronomy: definition and its scope • Crops: Classification, Economic and agricultural importance in India; Plant ideotypes.
Module-2	• Seeds and Sowing: Sowing methods • Tillage and Tilth: Definition, types of tillage, modern concepts of tillage;
Module-3	• Irrigation: methods, techniques of irrigation, quality of irrigation water logging • Manures and Fertilizers and Role of manures and fertilizers in crop

	production.
Module-4	• Weeds: importance, classification and concepts of weed management. Crop weed competition • Herbicides- classification and its important
Module-5	• Crop rotation and its principles; Factors affecting crop production • Harvesting and Threshing of crops.

Practical

- Study of Identification of crops and seeds,
- Study of fertilizers and pesticides,
- Identification of weeds in crops,
- Methods of herbicide and fertilizer application,
- Seed germination test,
- Numerical exercises on fertilizer requirement
- Plant population, herbicides and water requirement

Course Outcomes

- CO1. Discuss about the agronomy, fertilizer, organic manures, agricultural tools, horticultural crops; use of iron and steel in agriculture.
- CO 2. Identify the different agricultural tools, fertilizers, seeds, and weeds.
- CO3. Operate the agricultural tools in the field.
- CO4. Differentiate the fertilizers, manure & bio-fertilizers.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO -2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-2	2	1	2	-	1	1	-	-	-	-	-	-	1
CO-3	2	2	3	-	1	-	1	-		1	1	1	1
CO-4	2	3	3	-	1	1	-	-	-	1	-	-	1
Average	2.3	2	2.5	1	1.3	1	1	-	-	1	1	1	1.3

Subject: Elementary Mathematics

Subject Code: EMAT-101 **Credit Hours: 2(2+0)**

Course objectives

1. **Develop Fundamental Mathematical Skills** – Enhance students' understanding of basic mathematical operations, including addition, subtraction, multiplication, and division.
2. **Improve Problem-Solving Abilities** – Encourage logical reasoning and critical thinking through real-world problem-solving exercises.
3. **Foster Conceptual Understanding** – Build a strong foundation in key mathematical concepts such as fractions, decimals, percentages, and basic geometry.
4. **Enhance Application Skills** – Enable students to apply mathematical principles in everyday situations, such as measurements, money management, and data interpretation.
5. **Promote Mathematical Confidence** – Cultivate a positive attitude toward mathematics by making learning interactive, engaging, and accessible.

Theory

Module	Topic
Module-1	• **Straight lines:** Distance formula, section formula (internal and external division), 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 straight lines, Angles between two straight lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines.
Module-2	• **Triangle:** Area of triangle and properties of triangle • **Circle:** Equation of circle whose centre and radius is known.
Module-3	• **Differential Calculus:** Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n, e^x, sin x & cos x from first principle, Derivatives of sum, difference, product and quotient of two functions,
Module-4	• **Integral Calculus:** Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it).
Module-5	• **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.

Course Outcomes

- EMAT-101 C.O. 1. Extend the concept of straight lines, circle, calculus, functions, differentiation, integration, area of circle, triangle and quadrilateral, etc.
- EMAT-101 C.O. 2.Understand the equations of straight lines, parallel lines, perpendicular lines, angle of bisectors between two lines, point of intersection of two straight lines, circle, area of triangle, quadrilateral and circle, calculations of calculus, functions, differentiation, integration, area of circle, triangle and quadrilateral, etc.
- EMAT-101C.O.3.Validate the mathematical equation of straight lines, parallel lines, perpendicular lines, angle of bisectors, circle, calculus, functions, differentiation, integration, area of circle, triangle and quadrilateral, etc. with hypothetical values.
- EMAT-101C.O. 4. Develop ability to apply mathematical calculations in agriculture.
- EMAT-101 CO. Develop skills on principles and philosophy, self-exploration, self- awareness, and self-satisfaction.
- EMAT-101CO.4. Evaluate the changes occurred in the thinking, nature and behaviour of humans with changing eras.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	-	1	2	1	-	-	-	-	-	-	-	-
CO-2	2	-	1	2	1	-	-	-	-	-	-	-	-
CO-3	1	-	1	2	1	-	-	-	-	-	-	-	-
CO-4	2	1	1	2	2	1	1	-	-	-	-	-	-
Average	1.8	1	1	2	1.3	1	1	-	-	-	-	-	-

Subject: Rural Sociology & Educational Psychology

Subject Code: AEXT-101 **Credit Hours: 2(2+0)**

Course Objectives:

The *Rural Sociology & Educational Psychology* course aims to:

1. **Introduce Fundamental Concepts of Rural Sociology:**
   - Explain the basic principles, scope, and importance of rural sociology in understanding rural communities.
   - Analyze the structure, culture, norms, values, and traditions of rural societies and their influence on agricultural practices.
2. **Understand Rural Social Institutions and Dynamics:**
   - Examine social institutions such as family, caste, religion, education, and their roles in rural development.
   - Discuss social change, mobility, leadership patterns, and social stratification in rural areas.
3. **Study Rural Development Programs and Policies:**
   - Familiarize students with various rural development programs, policies, and strategies aimed at improving rural livelihoods.
   - Assess the impact of these programs on agricultural productivity, education, health, and socio-economic conditions.
4. **Introduce Educational Psychology Principles:**
   - Explain the basic concepts, principles, and scope of educational psychology in the context of rural education and extension work.
   - Understand various learning theories, motivation, memory, intelligence, and their applications in agricultural education.
5. **Promote Awareness of Psychological Factors:**
   - Discuss the role of attitudes, beliefs, perception, and social behavior in influencing learning and adoption of agricultural innovations.
   - Address psychological barriers and develop strategies for effective knowledge transfer.

Theory

Module	Topic
Module-1	• **Sociology and Rural sociology:** Definition and scope, its significance in agriculture extension, Social Ecology
Module-2	• Rural society, Social Groups, Social Stratification, Culture concept, Social Change & Development.

Module-3	• **Educational psychology:** Meaning & its importance in agriculture extension. Behavior: Cognitive, affective, psychomotor domain,
Module-4	• Personality, Learning, Motivation, Theories of Motivation,
Module-5	• Intelligence, Leadership concept.

Course Outcomes

- CO 1. After completing of the course the students will be able to acquaint the knowledge on various aspects related to rural society, nature and structure of Indian rural society, social stratification, social institution, cultural concept, meaning and significance of agricultural extension and social groups.
- CO 2. Develop understanding on the significance of culture for the society, connotation of personality in the corporate/professional world, learning attitude and self-motivation.
- CO 3. Develop the personality of the students for the professional world, self-assessment, learn rectification and improvement.
- CO 4. Develop the evaluative thinking on need of soft skills (self- motivation, learning attitude, positive attitude, aspiring thoughts) while improvising oneself. Analyzing attitude on rural society, nature and structure of rural society and components of rural society.
- CO 5. Analyze the salient features of Personality and Learning.
- CO 6. Evaluate intelligence, motivation, various theories of motivation.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

	COs/POs/PSOs												
COs	PO-1	PO- 2	PO-3	PO-4	PO-5	PO-6	PO- 7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	2	1	1	1	1	1	1	1	1	1	2
CO-2	2	2	1	2	1	1	-	1	1	-		-	1
CO-3	2	2	2	1	-	-	1	1	1	1	1	1	1
CO-4	1	2	1	1	2	1	-	1	1	1	-	-	1
CO-5	-	1	-	-	2	-	-	1	1	3	1	2	1
CO-6	1	1	1	1	1	1	1	1	1	1	1	1	1
Average	1.8	1.5	1.4	1.2	1.4	1	1	1	1	1.4	1	1.3	1.2

B.Sc (Hons.) Agriculture
Semester-II
Syllabus

S. No.	Subject Code	Subject	Credit			
			L	T	P	Total
1	GPBR-201	Fundamentals of Genetics	2	0	1	3
2	AMBE-201	Agricultural Microbiology	1	0	1	2
3	SWCE-201	Soil and Water Conservation Engineering	1	0	1	2
4	CPHY-201	Fundamentals of Crop Physiology	1	0	1	2
5	PATH-201	Fundamentals of Plant Pathology	3	0	1	4
6	ENTO-201	Fundamentals of Entomology	3	0	1	4
7	AEXT-201	Fundamentals of Agricultural Extension Education	2	0	1	3
8	CSPD-201	Communication Skills and Personality Development	1	0	1	2
9	AECO-201	Fundamentals of Agricultural Economics	2	0	0	2
		Total	**16**	**0**	**8**	**24**

Semester-II

Subject: Fundamentals of Genetics

Subject Code: GPBR-201 **Credit Hours: 3(2+1)**

Course Objectives:

The *Fundamentals of Genetics* course aims to:

1. **Provide Foundational Knowledge of Genetics:**
   - Explain the basic principles of genetics, including Mendelian inheritance, non-Mendelian inheritance, and molecular genetics.
   - Describe the structure and function of genes, chromosomes, DNA, and RNA.
2. **Understand Genetic Variation and Heredity:**
   - Illustrate mechanisms of genetic variation, mutation, recombination, and their roles in evolution and biodiversity.
   - Explain gene interaction, linkage, crossing over, and chromosome mapping.
3. **Familiarize with Genetic Analysis Techniques:**
   - Introduce concepts of genetic mapping, pedigree analysis, and quantitative genetics.
   - Explain various tools and techniques used in genetic research, including PCR, electrophoresis, hybridization, and sequencing.
4. **Promote Knowledge of Population Genetics:**
   - Explain the principles of population genetics, including gene pools, genetic drift, natural selection, and Hardy-Weinberg equilibrium.
   - Discuss the application of population genetics in crop improvement and conservation biology.
5. **Develop Practical and Analytical Skills:**
   - Provide hands-on experience in genetic experimentation, data analysis, and interpretation of results.
   - Enhance students' ability to conduct breeding experiments and apply statistical methods in genetic research.

Theory

Module	Topic
Module-1	• Pre and Post Mendelian concepts of heredity; Mendelian principles of heredity and exceptions to the laws. • Monohybrid, Dihybrid, Trihybrid, Multiple alleles, Pleiotropism and Pseudoalleles.
Module-2	• Architecture of chromosome; Centromere/ Primary constriction, Chromatids, Secondary constriction & Satellite, Telomere, Chromomere, Chromonema, Matrix and special types of

	chromosomes.
Module-3	• Cell division: meiosis and mitosis. • Linkage and crossing over - types and significance • Chromosomal theory of inheritance.
Module-4	• Nucleic acid as genetic material - structure, replication, genetic code, transcription and translation (Protein synthesis) • Mutation; Definition & Classification.
Module-5	• Blood group genetics • Sex chromosomes and Autosome and Genetic disorders

Practical

- Study of Microscope
- Study of Plant cell structure with Diagram.
- Study of Cell division (Mitosis and Meiosis) with Diagram.
- Calculation regarding Monohybrid, Dihybrid, Trihybrid and Polyhybrid
- Study of models on DNA and RNA structures.
- Determination of linkage and cross-over analysis
- Study of genetic disease problem.

Course Outcomes

- 1: Acquaint with concepts, scope, and importance of genetics in the field of agriculture
- 2: Develop the understanding of Mendelian principles and their significance in heredity and inheritance of Qualitative & Quantitative traits
- 3: To interpret the process and purpose of cell division, linkage, crossing over, gene interaction, sex determination, and blood group genetics
- 4: To analyze the possible genotypes that could occur in an offspring, according to the genotype of the two parents with help of Probability and Chi-square test.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	1	1	2	1	-	-	-	-	-	-	2
CO-2	3	2	2	3	3	3	-	-	-	-	-	-	2
CO-3	2	2	1	2	2	2	1	-	-	-	-	-	2
CO-4	2	1	1	3	2	1	1	-	-	-	-	-	2
Average	2.5	1.8	1.3	2.3	2.3	1.8	1.0	-	-	-	-	-	2.0

Subject: Agricultural Microbiology

Subject Code: AMBE-201 **Credit Hours: 2(1+1)**

The *Agricultural Microbiology* course aims to:

1. **Provide Fundamental Knowledge of Microorganisms:**
   - Explain the classification, structure, and functions of various microorganisms, including bacteria, fungi, viruses, algae, and protozoa.
   - Describe the role of microorganisms in soil, water, plants, and their interactions with the environment.
2. **Understand Soil Microbiology and Its Applications:**
   - Illustrate the importance of soil microorganisms in nutrient cycling, organic matter decomposition, nitrogen fixation, and mineralization.
   - Explain methods for isolating, culturing, and identifying soil microbes and their relevance to soil fertility and plant growth.
3. **Introduce Microbial Interactions and Plant-Microbe Relationships:**
   - Discuss symbiotic and non-symbiotic interactions such as mycorrhizae, rhizobia, and endophytes.
   - Explain the role of microorganisms in promoting plant health, growth, and protection against pathogens.
4. **Discuss Agricultural Biotechnology Applications:**
   - Introduce biotechnological tools for enhancing crop productivity and stress tolerance using beneficial microbes.
   - Explain the use of microbes in biocontrol, biofertilizers, bioremediation, and genetic engineering.
5. **Develop Skills in Microbiological Techniques:**
   - Provide practical training in sterilization, media preparation, inoculation, microbial culture, and microscopy.
   - Familiarize students with methods of microbial enumeration, identification, and characterization.

Theory

Module	Topic
Module-1	• **Introduction.** Microbial world: Prokaryotic and Eukaryotic microbes. • **Bacteria:** cell structure, chemoautotrophy, photoautotrophy, growth curve of bacteria.

Module-2	• **Bacterial Genetics:** Genetic recombination transformation, conjugation and transduction, plasmids, transposon.
Module-3	• Role of microbes in soil fertility and crop production • Carbon, Nitrogen, Phosphorus and Sulphur cycles.
Module-4	• **Biological Nitrogen fixation-** symbiotic, associative and asymbiotic. Azolla, Blue Green Algae and Mycorrhiza. • Rhizosphere and Phyllosphere.
Module-5	• **Microbes in Human Welfare:** Silage Production, Biofertilizers, Biopesticides, Biofuel production and biodegradation of Agro waste.

Practical

- Study of cell structure of Bacteria.
- Study of Microscope- parts, principles of microscopy, resolving power and numerical aperture.
- Study of different Methods of sterilization and Nutritional media and their preparations.
- Isolation of Rhizobium from legume root nodule /Isolation of BGA.
- Study of Grams Staining.

Course Outcomes

- 1. Acquaint with basic terms of microorganisms, prokaryotic and eukaryotic microbes, microbial growth, pure culture, microbial association, soil fertility, symbiotic, associative and asymbiotic of microbes, bio-fertilizers, bio- pesticides, bio-degradation, etc.
- 2. Develop the understanding of the role of microbes in soil fertility, crop production and human welfare.
- 3. Develop the skills in utilization of various methods, equipment, laboratory tools, glassware, etc. for isolation, identification, preservation, classification and utilization of useful microbes.
- 4. Develop the ability to differentiate useful, virulent and non-useful microbes.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	3	2	3	3	2	-	1	1	-	1	-
CO-2	3	3	3	2	3	3	2	-	1	1	-	1	-
CO-3	3	3	3	2	3	3	2	-	1	1	-	1	-
CO-4	3	2	2	2	2	3	2	-	1	1	-	1	-
Average	3.0	2.8	2.0	2.0	2.8	3.0	2.0	-	1.0	1.0	-	1.0	-

B.Sc. (Hons.) Agriculture
2nd Sem

Subject: Soil and Water Conservation Engineering

Subject Code: SWCE-201 **Credit Hours: 3(2+1)**

Course Objectives:

The *Soil and Water Conservation Engineering* course aims to:

1. **Provide Fundamental Knowledge of Soil and Water Conservation:**
   - Explain the principles, scope, and importance of soil and water conservation in sustainable agriculture.
   - Describe the processes of soil erosion, types of erosion, and their impact on soil fertility and productivity.
2. **Understand Hydrological Processes:**
   - Explain the hydrological cycle, rainfall, runoff, infiltration, and their measurement techniques.
   - Develop an understanding of soil-water-plant relationships and water balance in agricultural systems.
3. **Introduce Soil Erosion Control Techniques:**
   - Discuss various mechanical, vegetative, and structural measures for controlling soil erosion.
   - Explain the design, construction, and maintenance of terraces, bunds, check dams, and contour farming systems.
4. **Promote Knowledge of Irrigation and Water Management:**
   - Explain methods of irrigation, water use efficiency, and moisture conservation techniques.
   - Discuss the design and operation of irrigation systems and soil moisture measurement tools.
5. **Enhance Analytical and Practical Skills:**
   - Train students in conducting field surveys, data collection, and analysis for soil and water conservation planning.

Theory

Module	Topic
Module-1	• **Soil erosion** - Introduction, causes and types - geological and accelerated erosion, agents, factors affecting and effects of erosion. • **Water erosion** - Mechanics and forms; Gullies - Classification, stages of development.
Module-2	• **Soil loss estimation** – Universal soil loss equation (USLE) and modified USLE. Rainfall Erosivity - estimation by KE>25 and EI30

	methods. Soil Erodibility and other management factors. • **Water erosion control measures** - agronomical measures - contour farming, strip cropping, conservation tillage and mulching; Engineering measures– Bunds and terraces.
Module-3	• **Bunds** - contour and graded bunds - design and • **Terraces** - level and graded broad base terraces, bench terraces - planning, design and layout procedure.
Module-4	• **Gully and ravine reclamation** - principles of gully control – vegetative measures, temporary structures and diversion drains. Grassed waterways and design.
Module-5	• **Wind erosion**- Factors affecting, mechanics, soil loss estimation and control measures - vegetative, mechanical measures. • **Design of** wind breaks and shelter belts and stabilization of sand dunes.

Practical

- To Study of Soil erosion and its causes & types
- To Study of Water erosion and its causes & types
- To study Computation of soil Erodibility index in soil loss estimation.
- To .Study Design and layout of contour bunds/graded bunds.
- To study of Computation of soil loss by wind erosion.
- To study Design of wind breaks for wind erosion control.

Course Outcomes

- 1 Learn the soil and water conservation techniques and provide knowledge about soil erosion, their causes and agents.
- 2 Develop the knowledge about water erosion, Gully classification, their control and soil loss measurement techniques.
- 3 Develop the knowledge and understanding of the mechanical measure for controlling soil and water erosion.
- 4 Develop the skills about water harvesting, their techniques, wind erosion and their control.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	2	2	1	1	2	1	-	-	2	1	1	2
CO-2	2	1	2	1	1	1	1	-	-	1	-	-	3
CO-3	2	1	-	1	-	-	1	-	-	2	-	2	1
CO-4	1	2	1	1	1	2	1	-	-	1	2	1	2
Average	1.8	1.5	1.7	1.0	1.0	1.7	1.0	-	-	1.5	1.5	1.3	2.0

B.Sc. (Hons.) Agriculture
2nd Sem

Subject: Fundamentals of Crop Physiology

Subject Code: CPHY-201 **Credit Hours: 2(1+1)**

Course Objectives:

The *Fundamentals of Crop Physiology* course aims to:

1. **Provide Fundamental Knowledge of Crop Physiology:**
   - Explain the basic principles, scope, and importance of crop physiology in agriculture.
   - Describe plant cells, tissues, and their physiological functions related to growth and development.
2. **Understand Plant Metabolism and Photosynthesis:**
   - Explain the processes of photosynthesis, respiration, and transpiration, and their significance in crop growth.
   - Discuss factors affecting photosynthesis, energy transfer, and productivity in crops.
3. **Explain Water Relations and Nutrient Uptake:**
   - Illustrate the absorption, transportation, and utilization of water and nutrients in plants.
   - Discuss concepts of water potential, osmotic regulation, mineral nutrition, and nutrient deficiency symptoms.
4. **Understand Plant Growth and Development:**
   - Describe growth regulators, hormones, and their roles in plant growth, flowering, fruiting, and senescence.
   - Explain photoperiodism, vernalization, dormancy, and other physiological phenomena affecting crop yield.
5. **Promote Knowledge of Stress Physiology:**
   - Discuss the effects of abiotic and biotic stresses on plant physiology, including drought, salinity, temperature, and pest attacks.
   - Explain physiological mechanisms of stress tolerance and adaptation in crops.

Theory

Module	Topic
Module-1	• **Introduction to crop physiology** and its importance in Agriculture • **Plant cell**: an Overview; Diffusion and Osmosis.
Module-2	• **Absorption of water**, Transpiration and Stomatal Physiology; • **Mineral nutrition of Plants**: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms.
Module-3	• **Photosynthesis:** Light and Dark reactions, C3, C4 and CAM plants.
Module-4	• **Respiration**: Glycolysis, TCA cycle and electron transport chain; • **Plant growth regulators**: type and importance.
Module-5	• **Photoperiodism and Vernalization.**

Practical

- To study Microscope
- To Study structure of plant cells
- To study imbibition's, osmosis, plasmolysis,
- To study rate of transpiration,
- To study Separation of photosynthetic pigments through paper chromatography,
- To study estimation of relative water content.

Course Outcomes

- 1. Impart the knowledge of physiological phenomenon in plant cells, absorption of water, transpiration, diffusion, osmosis, imbibitions, mineral nutrition of plants, plant growth and regulators, etc.
- 2. Develop the understanding of mechanisms of various metabolic processes in plants - Photosynthesis, respiration, fat metabolism, plant growth, nutrient absorption, etc.
- 3. Develop the skills in preparation of temporary slides for morphological studying plant cells, measurement of distribution of stomata, estimation of potential of imbibitions, osmosis, plasmolysis, determination of rate of transpiration, root pressure, separation of photosynthetic pigments, estimation of relative water content, measurement of photosynthetic CO2 assimilation, etc. Determination of rate of transpiration, root pressure, separation of photosynthetic pigments, estimation of relative water content, measurement of photosynthetic CO2 assimilation, etc.
- 4. Develop an ability to identify C3, C4 and CAM plants, analyze the physical and chemical factors regulate plant growth, evaluate visual symptoms of nutrients deficiency in plants, etc.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	2	2	1	2	2	1	-	-	-	1	-
CO-2	3	2	2	2	1	2	2	1	-	-	-	1	-
CO-3	3	2	2	2	1	2	2	1	-	-	-	1	-
CO-4	3	2	2	2	1	2	2	1	-	-	-	1	-
Average	3.0	2.0	2.0	2.0	1.0	2.0	2.0	1.0	-	-	-	1.0	-

B.Sc. (Hons.) Agriculture
2nd Sem

Subject: Fundamentals of Plant Pathology

Subject Code: PATH-201 **Credit Hours: 4(3+1)**

Course Objectives:

The *Fundamentals of Plant Pathology* course aims to:

1. **Provide Basic Understanding of Plant Pathology:**
   - Explain the fundamental concepts, principles, and scope of plant pathology.
   - Discuss the importance of plant diseases in agriculture, food security, and environmental sustainability.
2. **Introduce Pathogens and Disease Causation:**
   - Describe various types of plant pathogens, including fungi, bacteria, viruses, nematodes, and phytoplasmas.
   - Explain mechanisms of pathogenicity, disease cycles, and host-pathogen interactions.
3. **Understand Epidemiology and Disease Management:**
   - Discuss disease development, spread, and factors influencing epidemics.
   - Introduce concepts of disease forecasting, monitoring, and integrated disease management (IDM).
4. **Explain Principles of Disease Diagnosis and Identification:**
   - Train students in the identification and diagnosis of plant diseases using classical and modern techniques.
   - Discuss methods of isolation, culture, and identification of pathogens.
5. **Promote Knowledge of Disease Control Strategies:**
   - Explain various disease control measures, including chemical, biological, cultural, and genetic approaches.
   - Discuss the use of resistant varieties, crop rotation, sanitation, and bio-control agents.

Theory

Module	Topic
Module-1	• **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. 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.
Module-2	• **Fungi**: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, reproduction (asexual and sexual). classification of fungi. • **Bacteria and mollicutes**: general morphological characters. Basic methods of classification and reproduction.
Module-3	• **Viruses**: nature, structure, replication and transmission. • **Nematodes**: General morphological characters. Basic methods of

	classification and reproduction. Nature of damage caused by plant nematodes (*Heterodera / Meloidogyne*)
Module-4	• **Growth and reproduction of plant pathogens.** Types of parasitism and variability in plant pathogens. Pathogenesis.
Module-5	• **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 equipment's and microscopy.
- Collection and preservation of disease specimen.
- General study of different classification of fungi.
- Study of symptoms of various plant diseases.
- General study of plant viruses.
- Study of phanerogamic plant parasites.
- Study of morphological features and identification of plant parasitic nematodes.

Course Outcomes

- 1. Imparting concepts, nomenclature, classification and characters of pathogens.
- 2. Understanding of disease identification, nature of pathogens and different strategies for management of plant diseases.
- 3. Applying different principles and methods for plant disease management.
- 4. Able to distinguish the fungicides and antibiotics (mode of action and formulations) on the basis of Nature of pathogen.
- 5. Develop the skills of crops diseases identification and marketing of relevant pesticide

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	1	1	1	1	-	2	-	-	-	-	-	-
CO-2	3	1	1	1	1	-	2	-	-	-	-	-	-
CO-3	2	1	1	2	-	-	1	-	-	-	-	-	-
CO-4	2	1	1	1	1	-	-	-	-	-	-	-	-
CO-5	2	1	1	1	-	-	1	-	-	-	-	-	-
Average	2.4	1.0	1.0	1.2	1.0	-	1.5	-	-	-	-	-	-

Subject: Fundamentals of Agricultural Economics

Subject Code: AECO-201 **Credit Hours: 2 (2+0)**

Course Objectives:

The *Fundamentals of Agricultural Economics* course aims to:

1. **Provide Basic Understanding of Agricultural Economics:**
   - Explain the fundamental concepts, principles, and scope of agricultural economics.
   - Discuss the role of agriculture in economic development and national growth.
2. **Introduce Economic Theories and Principles:**
   - Explain microeconomics and macroeconomics principles as they relate to agriculture.
3. **Develop Understanding of Farm Management:**
   - Introduce concepts of farm planning, budgeting, resource allocation, and decision-making.
   - Explain various tools and techniques used for farm management and optimization.
4. **Understand Agricultural Marketing and Trade:**
   - Discuss agricultural marketing systems, price analysis, market structures, and value chains.
   - Explain the role of agricultural trade, policies, and international trade agreements.
5. **Promote Knowledge of Agricultural Finance:**
   - Explain sources of agricultural credit, financial institutions, and rural banking systems.

Theory

Module	Topic
Module-1	• **Economics**: Meaning, scope and subject matter, definitions, micro and macro economics • **Basic concepts:** Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare.
Module-2	• **Agricultural economics**: meaning, definition, characteristics of agriculture, importance and its role in economic development • **Demand:** meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. • **Elasticity of demand:** concept and measurement of price elasticity, income elasticity and cross elasticity.

Module-3	• **Production**: process, factors of production • **Cost:** Cost concepts, short run and long run cost curves. • **Supply:** Stock v/s supply, law of supply, elasticity of supply • **Market structure:** meaning and types of market, basic features of perfectly competitive and imperfect markets.
Module-4	• **National income:** Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement • **Population:** Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, • **Money:** Barter system of exchange and its problems, evolution, meaning and functions of money.
Module-5	• **Banking**: Role in modern economy, types of banks, functions of commercial and central bank • **Agricultural and public finance:** meaning, micro v/s macro finance, need for agricultural finance • **Tax:** meaning, VAT. • **Economic systems:** Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

Course Outcomes

- 1. Understand the different concepts of Agricultural economics, nature of economics, human behaviour, goods and services, need, want, demand, etc.
- 2. Understand the law of demand, law of supply, elasticity of demand and supply, factor of production, barter system, consumer surplus etc.
- 3. Apply the different laws in agricultural market, market structure, agricultural taxation, etc.
- 4. Analyze the national income, concepts of national income accounting and approaches to measurement etc.
- 5. Evaluate the role of banking in rural credit etc.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1	1	1	3	2	-	-	3	1	-	3	-
CO-2	2	1	2	1	3	2	-	-	3	1	-	3	-
CO-3	2	1	1	1	3	2	-	-	3	1	-	3	-
CO-4	2	1	1	1	3	2	-	-	3	1	-	3	-
CO-5	2	1	1	1	3	2	-	-	3	1	-	3	-
Average	2.0	1.0	1.3	1.0	3.0	2.0	-	-	3.0	1.0	-	3.0	-

Subject: Fundamentals of Entomology

Subject Code: ENTO-201 **Credit Hours: 4(3+1)**

Course Objectives:

The *Fundamentals of Entomology* course aims to:

1. **Provide Fundamental Knowledge of Entomology:**
   - Explain the basic principles, scope, and importance of entomology in agriculture and environmental management.
2. **Understand Insect Morphology and Anatomy:**
   - Describe the structure and function of insect body systems, including integumentary, digestive, respiratory, circulatory, excretory, nervous, and reproductive systems.
3. **Explain Insect Physiology and Development:**
   - Discuss insect growth, development, and metamorphosis.
4. **Understand Insect Ecology and Behavior:**
   - Illustrate insect interactions with their environment, including feeding habits, reproduction, and dispersal.
   - and harmful insect behavior, pollination, and predator-prey relationships.
5. **Introduce Insect Classification and Identification:**
   - Provide an overview of major insect orders and families of agricultural importance.

Theory

Module	Topic
Module-1	• 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.
Module-2	• **Metamorphosis** and diapause in insects. Types of larvae and pupae. • **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.
Module-3	• **Types of Reproduction** in insects. Major sensory organs like simple and compound eyes, chemoreceptor. • Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system in insects.

Module-4	• **Systematics:** Taxonomy –importance and development and binomial nomenclature. • **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.
Module-5	• **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, Odonata, Isoptera, Thysanoptera: Hemiptera, Lepidoptera, Coleoptera, Diptera.

Practical

- Method of collection and preservation of insects including immature stages.
- To study external features of Grasshopper/Blister beetle.
- To study types of insect antennae, mouthparts and legs; Wing venation, types of wings.
- To study types of insect larvae and pupae.
- To Study of characters of orders of

Course Outcomes

- 1 Educate the basic concept of entomology, insect collection and preservation, dissection, and morphology of insects.
- 2 Develop the understanding of anatomy, physiology, the taxonomy of insects, and the effect of biotic and abiotic factors on insects.
- 3 Demonstrate the principles of Pest surveillance, Pest forecasting, recent and traditional methods of pest management including IPM
- 4 Evaluate the economic importance of insects and eco-friendly control measures for pest management to sustainable agriculture.
- 5 Formulate the application of Insecticides and mass production techniques of Bio-control agents.

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	1	1	1	1	1	2	1	-	-	2	2	1	2
CO-2	2	2	1	1	-	1	1	-	-	1	-	-	1
CO-3	1	1	-	1	2	-	1	-	-	2	-	2	1
CO-4	1	2	2	1	1	2	1	-	-	1	1	1	2
CO-5	1	-	2	-	1	-	-	-	-	-	-	1	-
Average	1.2	1.5	1.5	1.0	1.3	1.7	1.0	-	-	1.5	1.5	1.3	1.5

Subject: Fundamentals of Agricultural Extension Education Credit: Subject Code: AEXT-201: Credit Hours: 3(2+1)

Course Outcomes:

After completing the *Agricultural Extension* course, students will be able to:

1. **Explain Fundamental Concepts of Agricultural Extension:**
   - Understand the scope, objectives, principles, and importance of agricultural extension in rural development.
   - Describe the role of extension education in disseminating agricultural innovations and technologies.
2. **Analyze Extension Approaches and Methods:**
   - Identify and differentiate various extension approaches, models, and communication methods used in agriculture.
   - Apply suitable extension methods such as individual, group, and mass communication to effectively reach diverse audiences.
3. **Develop Skills in Communication and Extension Teaching:**
   - Demonstrate effective communication skills, including interpersonal communication, public speaking, and presentation techniques.
   - Prepare and utilize various teaching aids, tools, and media for knowledge transfer.
4. **Design and Implement Extension Programs:**
   - Plan, organize, and evaluate agricultural extension programs and projects.
   - Formulate strategies for promoting agricultural innovations and adoption among farming communities.
5. **Promote Participatory Approaches and Leadership:**
   - Encourage participatory extension approaches involving farmers in decision-making and problem-solving.
   - Exhibit leadership skills in managing agricultural extension activities and promoting community involvement.

Theory

Module	Topic
Module-1	• **Introduction**: **Extension Education**- meaning, definition, scope and process; objectives and principles of Extension Education; • **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.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.).
Module-2	• **New trends in agriculture extension:** privatization extension, cyber extension/ extension, market-led extension, farmer-led extension, expert systems, etc. • **Rural Development:** concept, meaning, definition; various rural development programmes launched by Govt. of India.
Module-3	• **Community Dev.**-meaning, definition, concept & principles, Philosophy of C.D. • **Rural Leadership:** concept and definition, types of leaders in rural context.
Module-4	• **Communication:** meaning and definition; Principles and Functions of Communication, models and barriers to communication.
Module-5	• **Agriculture journalism;** diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Practical

- Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids.
- 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.
- 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

Course Outcomes

- -1 Acquaint the knowledge on concept, objectives, principles and philosophy of

extension management.

- 2 Develop an understanding on the process, steps, principles and monitoring and evaluation involved in agricultural extension programme development for transfer of technology.
- 3 Develop the skills about genesis of agricultural extension, extension efforts in pre- and post independence era along with specific agricultural programmes.
- 4 Apply new trends in agricultural extension like private extension, market led extension, expert systems, farmer led extension and cyber extension.
- 5 Evaluate different facets of rural development programmes, community development programmes, rural leadership for capacity development of extension clienteles.
- 6 Apply communication strategies using agricultural journalism for innovation, diffusion and adoption of agricultural technology.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1	3	-	2	3	3	2	2	1	1	2	1
CO-2	3	1	3	-	2	3	3	3	1	1	1	2	1
CO-3	3	2	3	-	3	2	3	3	2	1	1	2	1
CO-4	3	2	3	-	3	2	3	2	1	1	1	2	1
CO-5	2	2	3	-	2	2	3	3	1	1	1	2	1
CO-6	1	2	3	-	2	2	3	3	1	1	1	3	1
Average	2.3	1.7	3.0	-	2.3	2.3	3.0	2.7	1.3	1.0	1.0	2.2	1.0

Subject: Communication skills and Personality Development

Subject Code: CSPD-201 **Credit Hours: 2(1+1)**

Course Objectives:

After completing the *Communication Skills and Personality Development* course, students will be able to:

1. **Develop Effective Communication Skills:**
   - Demonstrate proficiency in verbal and non-verbal communication.
   - Apply effective listening, speaking, reading, and writing skills in academic and professional contexts.
2. **Enhance Interpersonal Skills:**
   - Exhibit interpersonal communication techniques for effective interaction with individuals and groups.
   - Practice active listening, empathy, negotiation, and conflict-resolution skills.
3. **Improve Presentation and Public Speaking Skills:**
   - Prepare and deliver clear, concise, and impactful presentations.
4. **Build Professional Writing Competence:**
   - Develop skills for writing formal letters, reports, emails, and other professional documents.
   - Exhibit clarity, coherence, grammar, and vocabulary in written communication.
5. **Understand Principles of Personality Development:**
   - Explain various aspects of personality, including attitude, behavior, motivation, and emotional intelligence.

Theory

Module	Topic
Module-1	• Communication Skills: Structural and functional grammar;
Module-2	• Meaning and process of communication, verbal and nonverbal communication; • Listening and note taking, writing skills, oral presentation skills;
Module-3	• Field diary and lab record; indexing, footnote and bibliographic procedures.
Module-4	• Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations,

	impromptu presentation, public speaking;
Module-5	• 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.

Course Outcomes

- 1 Acquaint the knowledge on Listening, Speaking, Reading and Writing Skills along with classification; General & Technical Article and writing principles of these articles; comparison between Individual & Group presentation; organization of seminars & conferences and formats of Public Speaking.
- 2 Develop the understanding on usage of different classified skills according to situations, reading and writing of general & technical articles and the preparation and planning before organizing seminars and conferences.
- 3 Develop the skill of students towards general & technical writing, principles of reading and writing of general & technical articles and implication.
- 4 Develop evaluative thinking on variations between General & Technical Articles with the way of writing, how to prepare for public speaking and the principles to be followed and significance of Field Diary & Lab Record for an agriculture student.

COs	PO-1	PO-2	P0-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	2	-	-	1	1	-	1	3	2	1	3
CO-2	2	2	2	-	-	1	1	-	1	3	2	1	2
CO-3	2	1	1	-	-	1	1	-	1	2	2	1	2
CO-4	1	1	1	-	-	1	1	-	1	1	1	1	1
Average	**2**	**1.5**	**1.5**	**-**	**-**	**1**	**1**	**-**	**1**	**2.3**	**1.8**	**1.0**	**2.0**

B.Sc. (Hons.) Agriculture

Semester-III

S. No.	Subject Code	Subject	Credit Hours
1	AGRO-301	Crop Production Technology – I *(Kharif Crops)*	2 (1+1)
2	GPBR-301	Fundamentals of Plant Breeding	3 (2+1)
3	AGFC-301	Agricultural Finance and Cooperation	3 (2+1)
4	AGIF-301	Agri- Informatics	2 (1+1)
5	AFMP-301	Farm Machinery and Power	2 (1+1)
6	HORT-301	Production Technology for Vegetables and Spices	2 (1+1)
7	ESDM-301	Environmental Studies and Disaster Management	3 (2+1)
8	AGSM-301	Statistical Methods	2 (1+1)
9	LSPM-301	Livestock and Poultry Management	4 (3+1)
		Total	**23** (14+9)

B.Sc.(Hons.) Agriculture
3rd Sem

Crop Production Technology-I (Kharif Crops)

Subject Code: AGRO-301 **Credit Hours: 2(1+1)**

Course Objectives:

The *Crop Production Technology – I (Kharif Crops)* course aims to:

1. **Provide Fundamental Knowledge of Kharif Crops:**
   - Explain the importance, classification, and distribution of major Kharif crops in India.
   - Discuss the agro-climatic requirements, characteristics, and growth habits of Kharif crops.
2. **Understand Crop Management Practices:**
   - Explain soil preparation, sowing methods, seed treatment, nutrient management, and irrigation practices for Kharif crops.
   - Discuss integrated weed management, plant protection measures, and harvesting techniques.
3. **Promote Knowledge of Improved Crop Varieties:**
   - Introduce high-yielding, disease-resistant, and climate-resilient varieties of major Kharif crops.
   - Explain the importance of crop improvement programs and varietal selection for specific agro-ecological conditions.
4. **Develop Practical Skills in Crop Production:**
   - Provide hands-on experience in field preparation, sowing, nutrient application, and pest management.
   - Train students in crop yield assessment, quality analysis, and record-keeping.
5. **Understand Crop Rotation and Mixed Cropping Systems:**
   - Explain the principles and benefits of crop rotation, intercropping, and mixed cropping in Kharif crop production.

Theory

Module	Topic
Module-1	• Kharif crops: Origin, geographical distribution, economic importance. • Kharif crops: Soil and climatic requirements, varieties, cultural practices and yield.
Module-2	• Cereals

	▪ Rice, Maize, Sorghum ▪ Pearl millet and Finger millet,
Module-3	• Pulses- Pigeonpea & Mungbean
Module-4	• Oilseeds- groundnut, and soybean
Module-5	• Fiber crops- cotton & jute • Forage crops-sorghum and cowpea.

Practical

- Rice nursery preparation, transplanting of rice
- Sowing of pigeonpea and maize
- Seed germination of kharif season crops
- Effect of sowing depth on germination of kharif crops
- Identification of weeds in kharif season crops
- Top dressing
- Study of crop varieties.

Course Outcomes

- 1 Acquaint the knowledge on kharif season crops, its classification (cereal crops ,oilseed crops, pulse crops, sugar crops, fodder crops) and its importance in agriculture and national economy
- 2 Discuss the production techniques of kharif crops and their origin, economic importance, geographical distribution and botanical description.
- 3 Implement the sowing methods of kharif crops in the field and their management.
- Distinguish all kharif crops (rice, millet, soybean, moong , etc.) with their cultivation practices.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	3	2	2	1	1	-	1	-	1	2	-	1	1
CO-2	2	2	2	1	-	1	-	-	1	2	2	1	1
CO-3	2	1	1	1	1	-	1	-	1	2	-	1	-
CO-4	2	1	1	1	-	1	-	-	1	1	1	1	-
Average	2.3	1.5	1.5	1.0	1.0	1.0	1.0	-	1.0	1.8	1.5	1.0	1.0

B.Sc.(Hons.) Agriculture
3rd Sem

Fundamentals of Plant Breeding

Subject Code: GPBR-301 **Credit Hours: 3 (2+1)**

Course Objectives:

The *Fundamentals of Plant Breeding* course aims to:

1. **Provide Basic Understanding of Plant Breeding:**
   - Explain the principles, scope, and importance of plant breeding in crop improvement.
   - Discuss the historical development of plant breeding and its contribution to food security and agricultural sustainability.
2. **Introduce Genetic Principles in Plant Breeding:**
   - Explain the concepts of genetic variation, inheritance, and population genetics in plant breeding.
   - Describe the principles of qualitative and quantitative traits, gene action, and heritability.
3. **Understand Breeding Methods and Techniques:**
   - Discuss various breeding methods such as selection, hybridization, mutation breeding, and polyploidy breeding.
   - Explain techniques for developing pure lines, hybrids, composites, and synthetic varieties.
4. **Develop Skills in Germplasm Collection and Evaluation:**
   - Explain the importance of genetic resources and their conservation.
   - Train students in germplasm collection, characterization, evaluation, and maintenance.
5. **Introduce Modern Breeding Approaches:**
   - Discuss marker-assisted selection (MAS), genetic engineering, molecular breeding, and gene editing techniques.
   - Explain the role of biotechnology in enhancing crop yield, quality, and stress tolerance.

Theory

Module	Topic
Module-1	• Plant Breeding- objectives, role and major achievements • Modes of reproduction, apomixes, self- incompatibility and male sterility. • Genetic consequences of self and cross pollinated crops.
Module-2	• Domestication and Plant Introduction. • Component of Genetic variation. • Hybridization and its type and importance; Emasculation • Inbreeding Depression and Heterosis
Module-3	• Concepts of population genetics and Hardy-Weinberg Law

	• Genetic basis and breeding methods in self pollinated crops - mass and pure line selection. • Genetic basis and methods of breeding cross-pollinated crops, modes of selection
Module-4	• Hybrids, Composite and Synthetic varieties • Breeding methods in asexually propagated crops, clonal selection.
Module-5	• Polyploidy in relation to plant breeding • Mutation breeding-methods and uses. • Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Practical

- Study of breeding kit.
- Study of self-pollinated and cross pollinated crops.
- Study of floral structure of self pollinated crops
- Study of Germplasm of various crops.
- Study of Emasculation and hybridization techniques in self &cross pollinated crops.
- Designs used in plant breeding experiment.
- Practical record.
- Viva-voce.

Course Outcomes

- 1 : List out various contribution, the significance of plant breeding and its milestone in the field of agriculture
- 2 :Develop the understanding about modes of selection, the evolution of crops, conservation of genetic resources, population genetics and significance of IPR in crop improvement
- 3 :Sketch the breeding objectives and implementation of different selection methods and hybridization techniques for various field crop
- 4: Distinguish the breeding method for self, cross and asexually propagated crops.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	1	2	3	1	-	1	-	-	-	-	1
CO-2	3	3	1	1	3	3	-	1	-	-	-	-	1
CO-3	2	2	1	3	3	2	1	1	-	-	-	-	1
CO-4	2	3	1	3	2	2	1	1	-	-	-	-	1
Average	2.5	2.8	1	2.3	2.8	2.0	1.0	1.0	-	-	-		1.0

B.Sc.(Hons.) Agriculture
3rd Sem

Agricultural Finance and Co-Operation

Subject Code: AGFC-301 **Credit Hours: 3 (2+1)**

Course Objectives:

The *Agricultural Finance and Cooperation* course aims to:

1. **Provide Basic Understanding of Agricultural Finance:**
   - Explain the concepts, principles, and importance of agricultural finance in farm business management.
2. **Introduce Financial Management and Planning:**
   - Explain various financial planning tools, budgeting techniques, and investment analysis in agriculture.
3. **Understand Agricultural Credit Systems:**
   - Describe the classification, sources, and types of agricultural credit (institutional and non-institutional).
4. **Promote Knowledge of Agricultural Cooperatives:**
   - Discuss the principles, objectives, and functioning of agricultural cooperatives.
5. **Develop Skills in Project Formulation and Evaluation:**
   - Train students in preparing project reports, feasibility studies, and cost-benefit analysis.

Theory

Module	Topic
Module-1	• **Definition of agricultural Finance** – nature-scope- meaning-significance - micro &macro finance. • **Agricultural credit:** meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits.
Module-2	• **Sources of agricultural finance:** institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost.
Module-3	• **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.
Module-4	• **Agricultural Cooperation** – Meaning, brief history of cooperative development in India. Objectives, principles of cooperation, significance of cooperatives in Indian agriculture.
Module-5	• **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.

Practicals

- 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.
- Techno-economic parameters for preparation of projects.
- Seminar on selected topics.
- Practical report

Course Outcomes

- 1. Develop the ability to remember the rural credit structure and its salient features.
- 2. Develop the ability to understand the terminology and facts about agriculture Finance and Cooperation.
- 3. Develop the ability to apply for loan as now they are aware about lending procedure of credit institutions.
- 4. Develop the ability to analyze the financial statements i.e., balance sheet and income statement and use it to know the performance of an institution.
- 5. Develop the ability to evaluate the credit structure of different credit institutions.
- 6. Develop the ability to create a project report of a new agri- project.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	2	1	1	1	2	1	-	-	2	3	1	2
CO-2	1	1	1	1	1	1	1	-	-	1	-	2	1
CO-3	2	2	2	1	2	-	1	-	-	2	-	2	1
CO-4	1	1	1	1	1	1	1	-	-	1	5	1	2
CO-5	1	1	1	1	1	1	1	-	-	1	5	1	2
CO-6	1	1	1	1	1	1	1	-	-	1	5	1	2
Average	1.25	1.5	1.3	1	1.3	1	1	-	-	1.5	1.3	1.5	1.5

B.Sc.(Hons.) Agriculture
3rd Sem

Agri-Informatics

Subject Code: AGIF-301 **Credit Hours: 2(1+1)**

Course Objectives:

The *Agri-Informatics* course aims to:

1. **Provide Basic Understanding of Agri-Informatics:**
   - Explain the concepts, scope, and significance of Agri-Informatics in modern agriculture.
2. **Introduce Fundamentals of Computer Applications in Agriculture:**
   - Provide knowledge of computer hardware, software, internet applications, and database management systems.
   - Explain the use of Geographic Information Systems (GIS), Remote Sensing, and Decision Support Systems (DSS) in agriculture.
3. **Develop Skills in Data Management and Analysis:**
   - Train students in data collection, processing, analysis, and interpretation for agricultural research and management.
4. **Promote Knowledge of Agricultural Information Systems:**
   - Explain the design, development, and implementation of agricultural information systems (AIS).
5. **Introduce Emerging Technologies in Agriculture:** Discuss the role of Artificial Intelligence (AI), Big Data Analytics, Internet of Things (IoT), and Blockchain in agriculture.

Theory

Module	Topic
Module-1	• Introduction to Computers, Operating Systems, definition and types
Module-2	• Applications of MSOffice for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types,
Module-3	• World Wide Web (WWW): Concepts, components and creation of web,HTML, XML coding.
Module-4	• Computer Programming: General Concepts, Introduction to programming languages, concepts and standard input/output operations.
Module-5	• e- Agriculture: concepts, design and development, application of innovative way stouse information and communication technologies (IT) in Agriculture.

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.
- Introduction to World Wide Web (WWW).
- Introduction of programming languages.

Course Outcomes

- 1. Acquaint with basic terms of software and hardware, input/output devices, database, World Wide Web, DBMS in Agriculture, ICT in Agriculture, etc.
- 2. Develop the understanding of application software, Smartphone apps, programming languages, geospatial technology for generating valuable agri-information, decision support systems, etc.
- 3. Develop the skills in selection of input and output devices, software utilization, appropriate ICT tools, preparation of crop-planning using IT tools, etc.
- 4. Apply computer models for understanding plant processes, IT application for computation of water and nutrient requirement of crops, computer- controlled devices (automated systems) for agri-input management and smart phone apps in agriculture for farm advises, market price, postharvest management, etc.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	3	2	2	1	1	1	1	-	-	1	-	1	2
CO-2	2	1	2	-	1	1	-	-	-	-	1	-	1
CO-3	1	2	2	1	2	-	-	-		1		1	2
CO-4	2	2	1	1	2	1	-	-	-	1	-		1
Average	2.0	1.8	1.8	1.0	1.5	1.0	1.0	-	-	1.0	1.0	1.0	1.5

Farm Machinery and Power

Subject Code: AFMP-301 **Credit Hours: 2(1+1)**

Course Objectives:

The *Farm Machinery and Power* course aims to:

1. **Provide Basic Understanding of Farm Machinery and Power:**
   - Explain the concepts, classification, and significance of farm machinery and power sources in agriculture.
   - Discuss the role of mechanization in enhancing agricultural productivity, efficiency, and sustainability.
2. **Introduce Sources of Farm Power:**
   - Describe various sources of power, including human, animal, mechanical, electrical, and renewable energy sources.
3. **Understand Principles of Farm Machinery:**
   - Explain the design, construction, working principles, and maintenance of primary tillage, secondary tillage, sowing, planting, irrigation, harvesting, and threshing equipment.
   - Discuss the efficiency, performance evaluation, and optimization of farm machinery.
4. **Promote Knowledge of Machinery Management:**
   - Discuss selection, operation, maintenance, and economic evaluation of farm machinery.
   - Explain the principles of ergonomics and safety measures in farm machinery operation.
5. **Introduce Precision Agriculture Technologies:**
   - Explain the application of sensors, GPS, GIS, and automation in precision farming.
   - Discuss the integration of advanced machinery for site-specific operations and resource management.

Theory

Module	Topic
Module-1	• **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.
Module-2	• **Familiarization with different systems of I.C. engines:** Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor.
Module-3	• **Familiarization with Power transmission system**: clutch, gear

	box, differential and final drive of a tractor, Tractor types.
Module-4	• **Familiarization with Primary and Secondary Tillage implement**, Implement for hill agriculture, implement for intercultural operations. • **Familiarization with Plant Protection equipment**, Familiarization with harvesting and threshing equipment.
Module-5	• **Familiarization with sowing and planting equipment,** calibration of a seed drill

Practical:

- To study of different components of I.C. engine.
- To study air cleaning and cooling system of engine.
- To study Familiarization with clutch, transmission, differential
- To study about tractor, different type of tractor and final drive of a tractor.
- Familiarization with lubrication and fuel supply system of engine,
- Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow.

Course Outcomes

- 1. State the IC engines, working principle of IC engine, primary and secondary tillage implement, sowing and planting equipment and plant protection equipment, harvesting and threshing equipment.
- 2. Understand the IC engine terminology and also equip them with technical knowledge and skills required for the operation, maintenance and evaluation of tillage, sowing and intercultural operational machinery needed for agricultural farms.
- 3. Calculate the cost analysis of tractor power and attached implements and calibration of seed drill.
- 4. Analyze the operation of farm machinery equipment also evaluate the harvesting, threshing and land preparation (heavy) machinery needed for agricultural farm.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PsO 1	PSO 2	PSO 3	PSO 4
CO1	2	1	1	2	-	-	-	-	-	-	-	-	2
CO2	2	1	1	2	-	-	-	-	-	-	-	-	2
CO3	2	1	1	2	-	-	-	-	-	-	-	-	2
CO4	2	1	1	2	-	-	-	-	-	-	-	-	2
Average	2	1	1	2	-	-	-	-	-	-	-	-	2

B.Sc.(Hons.) Agriculture
3rd Sem

Production Technology for Vegetable and Spices

Subject Code: HORT-301 **Credit Hours: 2(1+1)**

Course Objectives:

The *Production Technology for Vegetables and Spices* course aims to:

1. **Provide Basic Knowledge of Vegetable and Spice Crops:**
   - Explain the importance, classification, and distribution of major vegetables and spices.
   - Discuss the economic value, nutritional significance, and medicinal properties of various crops.
2. **Understand Crop Production Practices:**
   - Describe soil and climatic requirements, propagation methods, and planting techniques for vegetables and spices.
3. **Introduce Improved Varieties and Hybrid Technology:**
   - Discuss high-yielding, disease-resistant, and climate-resilient varieties of vegetables and spices.
4. **Promote Knowledge of Protected Cultivation:**
   - Explain principles and practices of protected cultivation such as polyhouses, net houses, and hydroponics.
   - Discuss advantages, limitations, and management of controlled environment cultivation.
5. **Develop Skills in Crop Management and Harvesting:**
   - Provide hands-on training in crop planning, nursery management, field preparation, planting, and harvesting.
   - Demonstrate post-harvest handling, storage, packaging, and value addition techniques.
6. **Promote Sustainable Production Practices:**
   - Encourage organic farming, integrated pest management (IPM), and integrated nutrient management (INM).

Theory:

Module	Topic
Module-1	• Importance of vegetables & spices in human nutrition and national economy
Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important:	
Module-2	• Vegetable and spices: Tomato, Brinjal and Capsicum
Module-3	• Bulb crops : Onion, Garlic

	• Root crops : Carrot, Raddish
Module-4	• Tuber crops : Potato • Leafy vegetables : Palak
Module-5	• Cole crops : Cabbage, Cauliflower

Practical

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

- 1. Educate concepts of vegetable and spices production, Importance in human nutrition and national economy, etc.
- 2. Describe about origin, area, production, improved varieties, soil and climate requirement for different season vegetable and spice crops, etc.
- 3. Execute various cultivation practices such as time of sowing, sowing, or transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, etc.
- 4. Analyze harvesting time and techniques of various vegetable and spices crops, storage conditions and requirements as per the cultivated crops, etc.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	2	1	2	-	2	-	-	-	1	-	2	1
CO-2	2	2	2	1	-	-	1	-	-	-	1	2	-
CO-3	1	1	1	1	-	1	-	-	-	2	1	-	1
CO-4	1	2	1	1	-	-	1	-	-	-	-	-	-
Average	1.3	1.8	1.3	1.3	-	1.5	1	-	-	1.5	1	2	1

Environmental Studies and Disaster Management

Subject Code: ESDM-301 **Credit Hours: 3(2+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with a comprehensive understanding of environmental science and disaster management principles to promote sustainable agricultural practices. The course aims to:

1. Understand Environmental Concepts:
   - Introduce students to the fundamental concepts of the environment, ecology, natural resources, biodiversity, and their importance for sustainable agriculture.
2. Promote Environmental Conservation:
   - Develop awareness about environmental degradation, pollution, and climate change, emphasizing their impact on agriculture and strategies for mitigation and adaptation.
3. Disaster Preparedness and Mitigation:
   - Train students in disaster preparedness, risk assessment, early warning systems, and mitigation techniques relevant to the agricultural sector.
4. Application of Environmental and Disaster Management Principles:
   - Equip students with practical skills to identify environmental issues and formulate disaster management plans, focusing on agriculture and rural development.

Theory

Module	Topic
Module-1	• Multidisciplinary nature of environmental studies Definition, scope and importance. • **Natural Resources**: Renewable and non-renewable resources, Natural resources and associated problems. a) Forest resources, b) Water resources, c) Mineral resources, d)Food resources, e) Energy resources f) Land resources. Role of an individual in conservation of natural resources.
Module-2	• **Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem, Energy flow in the ecosystem. Ecological succession. Characteristic features and function of the ecosystem: a. Forest ecosystem , b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems • **Biodiversity:** - Introduction- definition, genetic, species and ecosystem. Importance of Biodiversity. Bio geographical classification of India. India as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity, Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
Module-3	• **Environmental Pollution**: definition, sources, effects and control measures of a). Air pollution, b) Water pollution c) Soil pollution d) Marine pollution and e) Noise pollution
Module-4	• **Environmental ethics**: Issues and possible solutions, climate change, global

	warming, acid rain and ozone layer depletion. Environment Protection Act. • **Human Population and the Environment:** population growth, population explosion, Role of Information Technology in Environment and human health.
Module-5	***Disaster Management*** • **Natural Disasters-** Meaning and nature of natural disasters, their types and effects flood, Earthquake, cyclone, Tsunami and Landslides management. • **Man Made Disasters** Meaning and nature of natural disasters, their types and effects. Nuclear disaster, chemical disasters and biological disasters management

Practical

- Pollution case studies.
- Study about Bio geographical classification of India
- Case Studies- Field work: Visit to a local area to document environmental assets
- Visit to a local polluted site-Urban/Rural/Industrial/ Agricultural
- Study of common plants, insects, birds
- Study of Disaster management

Course Outcomes

- 1. Acquire the knowledge of the environment and its various challenges and understand the complex relationships components of the environment.
- 2. Develop the skills in identification of useful natural resources and their management practices.
- 3. Aware about the factors sensitive to the environment and environmental challenges.
- 4. Understand the values, feelings and participation of society in protection activities of the environment.
- 5. Encourage to individual or community involvement to the overall benefit of the environment.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	2	2	2	1	1	-	-	-	3	1	-
CO-2	3	2	2	2	2	1	1	-	-	-	3	1	-
CO-3	3	2	2	2	2	1	1	-	-	-	3	1	-
CO-4	3	2	2	2	2	1	1	-	-	-	3	1	-
CO-5	3	2	2	2	2	1	1	-	-	-	3	1	-
Average	3.0	3.0	2.0	3.0	3.0	3.0	3.0	2-.0	2-.0	2.0	2.0	3.0	3.0

Statistical Methods

Subject Code: AGSM-301 **Credit Hours: 2(1+1)**

Course Objective

The course objectives for **Statistical Analysis** are:

1. **Understanding Basic Statistical Concepts:** Develop a foundational understanding of statistical principles and their practical applications across various fields.
2. **Data Organization and Presentation:** Learn methods for organizing, summarizing, and visually presenting data for effective interpretation.
3. **Descriptive Statistics:** Apply measures of central tendency and dispersion to describe data sets effectively.
4. **Probability andDistributions:**Understand probability concepts and explore key distributions like binomial, normal, and Poisson.
5. **Correlation and Regression Analysis:** Analyze relationships between variables using correlation coefficients and linear regression techniques.
6. **Hypothesis Testing:** Formulate and test hypotheses using statistical tests such as t-tests, chi-square tests, and ANOVA.

Theory

Module	Topic
Module-1	• Introduction to Statistics and its Applications in Agriculture. • Graphical Representation of Data, Measures of Central Tendency & Dispersion.
Module-2	• Definition of Probability, Simple Problems Based on Probability. • Definition of Correlation, Karl Pearson's Coefficient of Correlation
Module-3	• Linear Regression Equations. • Introduction to Test of Significance, One sample & two sample test t for Means
Module-4	• Introduction to Analysis of Variance, Analysis of One Way Classification
Module-5	• Introduction to Sampling Methods, Sampling versus Complete Enumeration

Practical

- Graphical Representation of Data.
- Measures of Central Tendency
- Measures of Dispersion
- Application of One Sample t-test.
- Chi-Square test of Goodness of Fit.
- Analysis of Variance One Way Classification.

Course Outcomes

- 1: Educate basics terms used in statistics and biostatistics.
- 2: Develop the understanding of use of various formulas, principles and methods of statistical calculations used in agriculture.
- 3: Develop the skills in methods of collection of any type of data, classification of data, presentation of data, analysis of data, descriptive statistics, parametric and non-parametric tests, etc.
- 4: Develop ability to analyze results of statistical calculations and their validation.
- 5: Develop ability to make statistical hypothesis and design experiment in agriculture.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	-	1	2	1	-	-	-	-	-	-	-	-
CO-2	2	-	1	2	1	-	-	-	-	-	-	-	-
CO-3	1	-	1	2	1	-	-	-	-	-	-	-	-
CO-4	2	1	1	2	2	1	1	-	-	-	-	-	-
CO-5	2	1	1	2	2	1	1	-	-	-	-	-	-
Average	1.8	1.0	1.0	2.0	1.3	1.0	1.0	-	-	-	-	-	-

Livestock & Poultry Management

Subject Code: LSPM-301 **Credit Hours: 4 (3+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with fundamental and practical knowledge of livestock and poultry management, aimed at enhancing productivity, health, and welfare of animals through scientific methods. The course aims to:

1. Develop Understanding of Livestock and Poultry Systems:
   - Introduce students to the basics of livestock and poultry farming, including breeds, breeding techniques, feeding, housing, and management practices.
2. Enhance Knowledge of Animal Nutrition and Health
3. Understand Housing and Environmental Management:
4. Implement Efficient Management Practices:
   - Develop practical skills in dairy, meat, egg, and wool production, emphasizing quality standards, hygiene, and marketing strategies.

Theory:

Module	Topic
Module-1	• Role of livestock in the national economy • Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry.
Module-2	• Management of calves, growing heifers and milch animals. • Management of sheep, goat and swine. • Improvement of farm animals and poultry. Incubation, hatching and brooding
Module-3	• Digestion in livestock and poultry. • Reproduction in farm animals and poultry.
Module-4	• Classification of feedstuffs. Proximate principles offered. • Nutrients and their functions. • Feed ingredients for ration for livestock and poultry. Feeding of livestock and poultry.
Module-5	• Introduction of livestock and poultry diseases. • Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical

- Study of External body parts of cattle, buffalo, sheep, goat, swine and poultry.
- Study of Identification methods of farm animals and poultry.
- Visit and exposure of breeds of livestock and poultry
- Study of Judging ofcattle, buffalo and poultry. Culling of livestock and poultry.
- Study of Planning and layout of housing fordifferent types of livestock.
- Study of Clean milk production, milking methods.

Course Outcomes

- 1 Give knowledge of indigenous and exotic breeds of cattle, buffalo, sheep, goat and poultry birds (poultry, duck, fowl).
- 2 Develop the understanding of principles, planning, and technical approach for reproduction management in different farm animals. And introduce the diseases of livestock and poultry and its prevention (including vaccination schedule) and control of important diseases of livestock and poultry.
- 3 Develop ability to select types of houses suited in specific climatic conditions for best management of calves, growing heifers and milch animals.
- 4 Develop the understanding digestion system of livestock and poultry, classification of feedstuffs, nutrients and their functions, feed supplements, feed additives, and feeding of livestock and poultry and develop ability to calculate daily ration of cattle.
- 5 Visit of the IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	2	2	2	1	1	1	1	-	-	1	1	1	2
CO-2	2	1	2	2	1	1	1	-	-	-	-	-	1
CO-3	2	2	-	1	-	-	1	-		1	1	1	1
CO-4	2	2	1	1	2	1	-	-	-	2	-	-	1
CO-5	2	2	-	1	2	1	-	-	-	2	-	-	1
Average	2.0	1.8	1.7	1.2	1.5	1.0	1.0	-	-	1.5	1.0	1.0	1.2

B.Sc. Agriculture Syllabus
Semester-IV

S. No	Subject Code	Subject	Credit			
			L	T	P	Total
1	AGRO-401	Crop Production Technology – II (Rabi Crops)	1	0	1	2
2	HORT-401	Production Technology for Ornamental Crops, MAP and Landscaping	1	0	1	2
3	HORT-402	Production Technology for Fruit and Plantation Crops	1	0	1	2
4	REGT-401	Renewable Energy and Green Technology	1	0	1	2
5	APST-401	Principles of Seed Technology	1	0	2	3
6	AMTP-401	Agricultural Marketing Trade & Prices	2	0	1	3
7	AMCC-401	Introductory Agro-meteorology & Climate Change	1	0	1	2
8	ELCT-401	Elective Course: Micro propagation Technologies	1	0	2	3
9	FSSA-401	Farming System & Sustainable Agriculture	1	0	0	1
10	PBSM-401	Problematic Soils and their Management	2	0	0	2
		Total	**12**	**0**	**10**	**22**

B.Sc. (Hons.) Agriculture
4th Sem

Subject: Crop Production Technology – II (Rabi Crops)

Subject Code: AGRO-401 **Credit Hours: 2 (1+1)**

Course Objective

The objective of this course is to equip B.Sc. Agriculture students with in-depth knowledge and practical skills related to the production, management, and improvement of major Rabi crops. The course aims to:

1. Understand Rabi Crops and Their Significance:
   - Provide a thorough understanding of the characteristics, distribution, cropping patterns of major Rabi crops like wheat, barley, mustard, chickpea, lentil, linseed, and others.
2. Enhance Knowledge of Soil and Nutrient Management:
   - Familiarize students with soil fertility management, nutrient requirements, organic and inorganic fertilization, and soil conservation techniques suitable for Rabi crops.
3. Implement Integrated Pest and Disease Management:
   - Provide knowledge of common pests, diseases, and weeds affecting Rabi crops, along with integrated management practices for sustainable crop protection.
4. Introduce Climate-Resilient Farming Practices:
   - Train students to adapt crop production techniques considering climatic conditions, stress management, and resource-efficient practices.
5. Enhance Crop Improvement and Breeding Skills:
   - Provide an overview of crop improvement techniques, including varietal selection, hybridization, and biotechnology applications for developing high-yielding and stress-tolerant varieties.

Theory

Module	Topic
	Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops
Module-1	• Cereals- wheat and barley
Module-2	• Pulses- chickpea, lentil, peas
Module-3	• Oilseeds- rapeseed, mustard
Module-4	• Sugar crops- sugarcane

Module-5	• Forage crops- berseem and oat

Practical

- To study of morphological characteristics of two rabi crops
- To Study Sowing methods of wheat.
- To study of identification of weeds in rabi season crops,
- To study of morphological characteristics of two rabi crops
- To study of important agronomic experiments of rabi crops at experimental farms.
- Visit to research stations of related crops

Course Outcomes

- 1 Acquaint the knowledge on the rabi season crops, its classification (cereal crops ,oilseed crops, pulse crops, sugar crops, fodder crops) and its importance in agriculture and national economy.
- 2 Discuss the production techniques of rabi crops and their origin, economic importance, geographical distribution and botanical description.
- 3 Implement the sowing methods of rabi crops in the field and their management.
- 4 Distinguish all rabi crops (wheat, barley, pea, chickpea, mustard, sugarcane etc.) with their cultivation practices.

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	3	2	2	1	1	-	1	-	1	2	-	1	1
CO-2	2	2	2	1	-	1	-	-	1	2	2	1	1
CO-3	2	1	1	1	1	-	1	-	1	2	-	1	-
CO-4	2	1	1	1	-	1	-	-	1	1	1	1	1
Average	2.3	1.5	1.5	1	1	1	1	-	1	1.8	1.5	1	1

B.Sc. (Hons.) Agriculture
4th Sem

Subject: Production Technology for Ornamental Crops, MAP and Landscaping

Subject Code: HORT-401 **Credit Hours: 2 (1+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with knowledge and skills related to the cultivation, management, and commercial aspects of ornamental crops, medicinal & aromatic plants (MAP), and landscaping practices. The course aims to:

1. Understand the Importance and Scope:
    - Introduce students to the economic, ecological, and aesthetic significance of ornamental crops, medicinal & aromatic plants (MAP), and landscaping in agriculture and horticulture.
2. Develop Skills in Propagation and Cultivation:
    - Provide practical knowledge of propagation methods, nursery techniques, cultivation practices, and post-harvest handling for ornamental crops and MAP.
3. Introduce Landscaping Principles and Design:
    - Equip students with skills in garden planning, landscape design, plant selection, and maintenance of various landscape features (parks, gardens, home gardens, commercial landscapes, etc.).
4. Implement Conservation and Sustainable Practices:
    - Encourage conservation of genetic resources, promotion of sustainable farming practices, and utilization of organic inputs for ornamental crops and MAP.

Theory

Module	Topic
Module-1	• Ornamental crops: Importance and scope of ornamental crops • Medicinal and aromatic plants (MAP) Importance and scope of Medicinal and aromatic plants.
Module-2	• Landscaping: Principles of landscaping. Landscape uses of trees, shrubs and climbers.
Module-3	• Production technology of important cut flowers like rose, gerbera under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions.
Module-4	• Production technology of important medicinal plants like

	ashwagandha, aloe, Cinnamomum etc. and aromatic plants like mint, lemongrass, citronella, ocimum, rose.
Module-5	• Study of training and pruning of plants.

Practical

- To study Identification of Ornamental plants.
- To study Identification of Medicinal and Aromatic Plants.
- To study Nursery bed preparation and seed sowing.
- To study Planning and layout of garden.
- To study Bed preparation and planting of MAP.
- Visit to commercial flower/MAP unit.

Course Outcomes

- 1 Define concepts of ornamental crop production, medicinal and aromatic plants and landscaping, Importance of medicinal and aromatic plants in national economy, etc.
- 2 Discuss various principles of landscaping, uses of landscape trees, shrubs and climbers, production technology of important ornamental crops, etc.
- 3 Demonstrate various Package of practices for loose flowers and their transportation, storage house and required condition for cut and loose flower, etc.
- 4 Investigate the various problems with the production technology of medicinal and aromatic plants, etc.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	2	2	1	-	1	-	-	-	1	1	1	1
CO-2	2	2	2	-	-	-	1	-	-	2	1	1	2
CO-3	1	1	1	1	-	1	-	-	-	1	2	2	2
CO-4	1	1	1	2	-	-	1	-	-	1	2	2	1
Average	1.3	1.5	1.5	1.3	-	1.0	1.0	-	-	1.3	1.5	1.5	1.5

B.Sc. (Hons.) Agriculture
4th Sem

Subject: Production Technology for Fruit and Plantation Crops

Subject Code: HORT-402 **Credit Hours: 2 (1+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge and practical skills related to the production, management, and improvement of fruit and plantation crops to enhance productivity and profitability. The course aims to:

1. Understand Importance and Scope:
    - Introduce students to the economic, nutritional, ecological, and industrial significance of major fruit and plantation crops grown in different agro-climatic regions.
2. Develop Skills in Crop Propagation and Cultivation:
    - Provide practical knowledge of propagation techniques, nursery management, planting methods, spacing, irrigation, and nutrition management for fruit and plantation crops.
3. Enhance Knowledge of Orchard and Plantation Management:
    - Train students in orchard layout, establishment, training, pruning, rejuvenation, and canopy management practices for higher productivity.
4. Promote Integrated Crop Management (ICM):
    - Provide insights into pest, disease, and weed management through integrated approaches for maintaining crop health and minimizing losses.

Theory

Module	Topic
Module-1	• Importance and scope of fruit and plantation crop industry in India; • Rootstocks: Importance of rootstocks;
Module-2	• Production technologies for the cultivation of major fruits-mango, citrus, guava, papaya
Module-3	• Production technologies for the cultivation of minor fruits-jackfruit, pomegranate, pineapple,
Module-4	• Production technologies for the cultivation of plantation crops-coconut, tea & coffee

Module-5	• Growth regulator: definition, type and use of growth regulator in fruit production

Practical

- To study Seed propagation
- To study Scarification and stratification of seeds.
- To study Propagation methods for fruit and plantation crops.
- To study about description and identification of fruit.
- To study different plant Regulator
- Visit to commercial orchards.

Course Outcomes

- 1. Define importance and scope of fruit and plantation crop industry in India, concepts of production for fruit and plantation crops, new planting system and methods, soil and climatic requirement of different fruit and plantation crops, etc.
- 2. Discuss various concepts of high density planting, new techniques of high density planting, plant propagation, seed propagation, etc.
- 3. Demonstrate preparation and application of plant growth regulators to the crops, etc. Investigate the various problems with the production technology of fruit and plantation crops such as disorder, diseases and pests, etc.
- 4. Distinguish different fruits and plantation crops, symptoms of disorders, diseases, insects and pests, etc.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	2	2	1	2	-	-	-	-	-	1	-	1	-
CO-2	1	2	2	-	-	-	-	-	-	-	-	-	-
CO-3	2	1	1	1	-	-	-	-	-	2	1	-	-
CO-4	1	1	2	-	-	-	-	-	-	-	1	-	-
Average	1.5	1.5	1.5	1.0	-	-	-	-	-	0.75	0.5	0.25	-

B.Sc. (Hons.) Agriculture
4th Sem

Subject: Renewable Energy and Green Technology

Subject Code: REGT-401 **Credit Hours: 2 (1+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with foundational and practical knowledge of renewable energy sources and green technologies to enhance sustainability in agricultural systems. The course aims to:

1. Understand Renewable Energy Concepts:
    - Introduce students to the principles, importance, and types of renewable energy sources, including solar, wind, biomass, hydro, and geothermal energy.
2. Promote Sustainable Energy Use in Agriculture:
    - Demonstrate how renewable energy can be integrated into agricultural practices for improved productivity, resource efficiency, and environmental conservation.
3. Develop Skills in Green Technology Applications:
    - Provide knowledge of green technologies such as biogas production, solar drying, biofuel generation, and precision farming for sustainable agriculture.
4. Encourage Climate Change Mitigation:
    - Highlight the role of renewable energy and green technologies in mitigating climate change and promoting carbon-neutral agricultural practices.

Theory

Module	Topic
Module-1	• Energy Sources: Classification of different energy sources, contribution of these of sources in agricultural sector
Module-2	• Biofuel : definition and importance and their application • Introduction of solar energy and their application.
Module-3	• Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooil production and their utilization as bioenergy resource,
Module-4	• 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.
Module-5	• Introduction of wind energy and their application.

Practical

- Familiarization with renewable energy gadgets.
- To study biogas plants,
- To study the production process of biodiesel,
- To study the production process of bio-fuels.
- Familiarization with different solar energy gadgets.
- To study solar cooker,
- To study solar drying system.
- To study solar distillation and solar pond.

Course Outcomes

- 1 Educate the importance of renewable energy and its resources, utilization of wastes and protection of the environment.
- 2 Understanding of benefit from utilization the biomass, solar and wind energy.
- 3 Develop the skill in utilization of renewable energy recourses/ gadgets.
- 4 Ability to apply renewable energy in the agricultural sector.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	1	2	1	2	2	1	-	-	-	1	1	2	-
CO-2	1	1	2	2	1	1	-	-	-	1	1	2	-
CO-3	1	2	1	2	3	1	-	-	-	1	1	2	-
CO-4	1	1	1	2	2	1	-	-	-	1	1	2	-
Average	1.0	1.5	1.3	2.0	2.0	1.0	-	-	-	1.0	1.0	2.0	-

B.Sc. (Hons.) Agriculture
4th Sem

Subject: Principles of Seed Technology

Subject Code: APST-401 **Credit Hours: 3 (1+2)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with fundamental and applied knowledge of seed technology, focusing on seed production, processing, testing, storage, and quality control for enhanced agricultural productivity and food security. The course aims to:

1. Understand the Basics of Seed Technology:
    - Introduce students to the principles, scope, and importance of seed technology in agriculture and its role in ensuring high-quality seed production.
2. Develop Skills in Seed Production and Multiplication:
    - Provide knowledge of seed production techniques for various crops, including cereals, pulses, oilseeds, vegetables, and horticultural crops under different agro-climatic conditions.
3. Promote Seed Quality Control and Certification:
    - Familiarize students with seed certification procedures, seed laws, standards, and quality assurance systems to maintain purity and genetic identity.
4. Enhance Knowledge of Seed Processing and Storage:
    - Train students in various seed processing methods, grading, drying, treatment, packaging, and storage techniques to maintain seed viability and vigor.
5. Implement Seed Testing and Evaluation:
    - Provide practical knowledge of seed sampling, germination tests, purity analysis, moisture testing, and seed health testing following national and international standards.

Theory

Module	Topic
Module-1	• Seed and Seed Technology: Introduction and importance of seed technology. • Seed quality; Definition, characteristics of quality seeds and different classes of seed. Differences between seed and grain.
Module-2	• Seed Production: Principles of seed production- (cereals, pulses, oilseeds, and Commercial crops). • Seed certification, phases of certification, procedure for seed certification. Seed Act and Seed Act enforcement.
Module-3	• Genetically modified crops, its detection, Transgene contamination in non-GM crops, Principles of GM crop and organic seed production.
Module-4	• Seed drying, Seed processing and their steps; Seed testing for quality assessment, seed treatment, its importance, method of

	application and seed packing.
Module-5	• Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. • Seed marketing: Factors affecting seed marketing, Role of WTO and OECD in seed marketing.

Practical

- To study Seed and Grain and their differences
- To study Seed production in cereals: Wheat, Rice and Maize.
- To study Seed production in pulses: Mung, Gram. Pigenpea.
- To study Seed production in oilseeds: Soybean, and Mustard,
- To study about maintenance of seed purity in the field.
- Visit to seed production farms, seed testing laboratories and seed processing plant.

Course Outcomes

- 1. Acquaint with scope and importance of seed technology in agriculture and the role of officials and legislation, seed act and seed order in quality seed production
- 2. Develop an understanding of various seed production techniques for different field crops, the importance of maintenance of purity of crop varieties, and factors causing deterioration of variety.
- 3. Execution of various phases of seed certification, field inspection, and seed purity testing
- 4. Analyze the factors related to genetic and physical purity of seed and its health status of seeds of a variety during seed processing.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	3	2	-	-	3	1	3	1	-	-	-	-	-
CO-2	3	3	1	1	3	3	2	-	-	-	-	-	-
CO-3	3	3	1	1	3	2	1	-	-	-	-	-	2
CO-4	2	2	1	-	2	-	1	-	2	-	2	-	2
Average	2.75	2.5	1	1	2.75	2	1.75	1	2	-	2		2

B.Sc. (Hons.) Agriculture
4th Sem

Subject: Agricultural Marketing Trade & Prices

Subject Code: AMTP-401 **Credit Hours: 3 (2+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge of agricultural marketing systems, trade policies, pricing mechanisms, and marketing strategies, with an emphasis on enhancing the profitability and sustainability of agricultural enterprises. The course aims to:

1. Understand Agricultural Marketing Concepts:
    - Introduce students to the principles, scope, and importance of agricultural marketing, trade, and pricing in the agricultural economy.
2. Study Market Structure and Marketing Channels:
    - Provide insights into various marketing channels, market intermediaries, supply chains, and their roles in the distribution of agricultural produce.
3. Enhance Knowledge of Marketing Functions and Efficiency:
    - Train students in marketing functions such as assembling, grading, processing, storage, transportation, packaging, and retailing to improve market efficiency.
4. Promote Agricultural Trade and Export Management:
    - Familiarize students with trade policies, agreements, international markets, export procedures, quality standards, and trade documentation.

Theory

Module	Topic

Module-1	• Agricultural Marketing: Market, Meaning, scope and classification of markets.
	  • Definition of agricultural marketing, demand, supply and price.
	  • Marketable surplus, marketed surplus. Integrated marketing.
	  • General theory of markets and marketing.
	  • Demand for agricultural products.
	  • Production and market supply.
	• Product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC;

Module-2	• **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;
Module-3	• **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;
Module-4	• **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;
Module-5	• **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

- To Survey of a market (mandi) both primary and secondary (at least one each).
- To Study of relationship between market arrivals and prices of some selected commodities; To 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 and Visit to market institutions – NAFED, SWC, CWC etc.

Course Outcomes

- 1 Remember the concept of agricultural marketing, market structure, marketing mix, marketing segmentation, demand and supply, producer surplus etc.
- 2 Identify the product life cycle and its different aspects, product, price, place, promotion, advertising, personal selling, sales promotion and publicity etc.
- 3 Apply the different marketing functions, exchange functions, physical functions, processing functions, etc.
- 4 Analyze the marketing channels for different farm products, Integration, efficiency, costs and price spread etc.
- 5 Evaluate the role of Government in agricultural marketing, Public sector institutions- CWC, SWC, FCI, CACP & DMI etc

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1	2	1	-	1	1	-	-	3	1	1	-
CO-2	1	2	-	1	-	1	2		-	2	1	1	-
CO-3	2	1	2	1	2	1	2	-	-	2	2	1	-
CO-4	1	1	1	1	2	1	1	-	-	1	3	1	-
CO-5	1	1	1	1	2	1	1	-	-	1	3	1	-
Average	1.4	1.2	1.5	1.0	2.0	1.0	1.4	-	-	1.8	2.0	1.0	-

Subject: Introductory Agro- meteorology & Climate Change

Subject Code: AMCC-401 **Credit Hours: 2 (1+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with fundamental knowledge of agro-meteorology, weather patterns, and climate change to enhance their ability to manage agricultural practices in response to changing climatic conditions. The course aims to:

1. Understand the Basics of Agro-meteorology:
    - Introduce students to the principles, scope, and importance of agro-meteorology in agriculture, including weather elements and their impact on crop growth and development.
2. Study Weather Parameters and Measurement:
    - Provide knowledge about various meteorological instruments, their working principles, and techniques for measuring temperature, humidity, rainfall, wind speed, radiation, and other climatic factors.
3. Understand Climate and Climatic Zones:
    - Provide insights into different climatic zones, agro-climatic regions, and their influence on crop distribution and productivity.
4. Explore Climate Change and Its Impact:
    - Introduce students to the causes and consequences of climate change, including global warming, greenhouse gas emissions, and their effects on agriculture and food security.
5. Develop Climate-Resilient Agricultural Practices:
    - Promote strategies for adapting to climate change, including crop diversification, conservation agriculture, resource-efficient technologies, and disaster preparedness.
6. Introduce Climate Models and Data Analysis:
    - Familiarize students with climate models, data collection, statistical analysis, and interpretation of meteorological data for agricultural decision-making.

Theory

Module	Topic
Module-1	• Meaning and scope of agricultural meteorology; • Earth atmosphere- its composition, extent and structure;
Module-2	• 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, longwave and thermal radiation, net radiation, albedo;
Module-3	• 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;
Module-4	• Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; • Artificial rainmaking. 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.
Module-5	• Agriculture and weather relations; 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 longwave 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 windrose.
- Measurement, tabulation and analysis of rain.
- Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

Course Outcomes

- 1 Impart the knowledge of earth atmosphere, its composition, extent, structure, atmospheric weather variables, monsoon and importance in Indian agriculture.
- 2 Educate about Climate change, climatic variability, global warming, causes of

climate change and its impact on regional and national Agriculture.

- 3 Develop the understanding of the relationship between weather variables and agriculture, factors affecting the particular weather-variables, common weather hazards, methods of weather forecasting, methods of mitigation of climate change and global warming, etc.
- 4 Develop the skills in utilization of climatic normal of a crops, identification of weather variables which may affect development of crops and livestock production, modification of micro and macro climate for best crop yields, minimization of losses by using weather forecasting, etc.
- 5 Develop the skills in uses and safety measures of instruments installed in agro-meteorological observatory.

6 Ability to analyze the observations of different weather variables by instruments installed in agro-meteorological observatory and to prepare suitable conditions for field crops.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	3	3	2	2	1	-	-	-	-	-	-	-	-
CO-2	3	3	2	2	3	-	-	-	-	-	-	-	-
CO-3	2	2	2	2	3	1	-	-	-	-	-	-	-
CO-4	3	3	2	2	3	-	-	-	-	-	-	-	-
CO-5	3	1	1	2	-	-	-	-	-	-	-	-	1
CO-6	3	3	2	3	1	-	-	-	-	-	-	-	-
Average	2.8	2.5	1.8	2.2	2.2	1.0	-	-	-	-	-	-	1.0

Subject: Elective Course: Micro propagation Technologies

Subject Code: ELCT-401 **Credit Hours: 3(1+2)**

Course Objective

1. **Understanding the Principles of Micropropagation** – Develop a comprehensive knowledge of plant tissue culture techniques, including the stages of micropropagation.
2. **Skill Development in In Vitro Propagation** – Equip students with practical skills in aseptic culture techniques, media preparation, and handling of plant tissues.
3. **Application in Commercial Plant Production** – Explore the role of micropropagation in large-scale production of disease-free and high-yielding plants.
4. **Innovation in Biotechnology and Conservation** – Foster an understanding of micropropagation's applications in genetic improvement, conservation of endangered plant species, and sustainable agriculture.

Theory

Module	Topic
Module-1	• Plant tissue culture (definition , history, explant, steps, application); Types of cultures;
Module-2	• Micropropagation- introduction, history, advantages and limitations, stages of micropropagation, method of micropropagation- • Axillary bud proliferation (Shoot tip and meristem culture, bud culture), • Organogenesis - formation of shoots and roots, • Meristem and shoot-tip culture (production of virus free plants), • Somatic embryogenesis,
Module-3	• Somaclonal variation; • Secondary metabolite
Module-4	• Plant growth hormone; types and application
Module-5	• Artificial Seeds- introduction and application • Cryopreservation: introduction and application

Practical

- To study different equipment in tissue culture Laboratory
- Identification and use of equipments in tissue culture Laboratory,

- To study about Nutrition media composition,
- To study sterilization techniques for media, containers and small instruments,
- To study sterilization techniques for explants,
- To study stages of micropropagation

Course Outcomes

CO 1 Comprehensive Knowledge of Micropropagation – Students will understand the fundamental principles, stages, and techniques involved in plant tissue culture.

CO2 Proficiency in Aseptic Techniques – Students will develop hands-on skills in sterilization, media preparation, and maintaining contamination-free cultures.

CO3 Application in Large-Scale Plant Production – Students will be able to apply micropropagation techniques for mass multiplication of plants in commercial nurseries and agriculture.

CO4 Understanding of Genetic Stability and Variation – Students will analyze the significance of genetic fidelity in micropropagated plants and methods to assess variations.

CO5 Contribution to Conservation and Biotechnology – Students will learn the role of micropropagation in conserving rare and endangered plant species and its applications in genetic engineering.

CO6 Entrepreneurial and Research Opportunities – Students will explore career opportunities in plant biotechnology, horticulture industries, and research institutions related to plant propagation.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	3	3	2	2	1	-	-	-	-	-	-	-	-
CO-2	3	3	2	2	3	-	-	-	-	-	-	-	-
CO-3	2	2	2	2	3	1	-	-	-	-	-	-	-
CO-4	3	3	2	2	3	-	-	-	-	-	-	-	-
CO-5	3	1	1	2	-	-	-	-	-	-	-	-	1
CO-6	3	3	2	3	1	-	-	-	-	-	-	-	-
Average	2.8	2.5	1.8	2.2	2.2	1.0	-	-	-	-	-	-	1.0

Subject: Farming System & Sustainable Agriculture

Subject Code: FSSA-401 **Credit Hours: 1(1+0)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge and skills related to various farming systems and sustainable agricultural practices, promoting resource-efficient, eco-friendly, and economically viable farming. The course aims to:

1. Understand Concepts and Principles:
    - Introduce students to the principles of farming systems, sustainable agriculture, and their importance in ensuring food security, environmental conservation, and economic stability.
2. Study Different Farming Systems:
    - Provide knowledge of various farming systems, including integrated farming systems, mixed farming, organic farming, agroforestry, and precision farming.
3. Promote Sustainable Agricultural Practices:
    - Train students in eco-friendly practices such as crop rotation, intercropping, conservation tillage, organic farming, integrated pest management (IPM), and integrated nutrient management (INM).
4. Encourage Resource Conservation:
    - Emphasize efficient utilization of natural resources like soil, water, and biodiversity through innovative technologies and conservation methods.
5. Understand Climate-Resilient Farming:
    - Introduce climate-smart agriculture techniques to enhance resilience against climate change and minimize the environmental impact of farming activities.
6. Enhance Knowledge of Agroecology and Soil Health:
    - Provide insights into agroecological principles, soil fertility management, soil conservation practices, and sustainable land use systems.

Theory

Module	Topic
Module-1	• Farming systems – Farming systems – Definition, types and methods of farming.
Module-2	• Sustainable agriculture- Definition, scope and advantages of sustainable agriculture.

Module-3	• Modern agriculture in relation to sustainable agriculture.
Module-4	• Cropping systems: Important cropping systems for sustainable agriculture.
Module-5	• Organic farming: definition, principles, relevance to modern agriculture and components of organic farming, integrated nutrient management • Organic farming practices: weed management, pest management

Course Outcomes

- 1. Acquaint the knowledge on farming systems and sustainable agriculture, its importance and its scope.
- 2. Classify the different farming systems according to agro-climatic zones in India.
- 3.Implement the integrated farming system and sustainable method of agriculture.
- 4.Differentiate between modern and sustainable agriculture and different farming systems.

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1	2	1	-	1	1	-	-	3	1	1	-
CO-2	1	2	-	1	-	1	2		-	2	1	1	-
CO-3	2	1	2	1	2	1	2	-	-	2	2	1	-
CO-4	1	1	1	1	2	1	1	-	-	1	3	1	-
CO-5	1	1	1	1	2	1	1	-	-	1	3	1	-
Average	1.4	1.2	1.5	1.0	2.0	1.0	1.4	-	-	1.8	2.0	1.0	-

Subject: Problematic Soils and their Management

Subject Code: PBSM-401 **Credit Hours: 2(2+0)**

Course Objective

The objective of this course is to equip B.Sc. Agriculture students with knowledge and practical skills to identify, classify, and manage problematic soils for enhanced agricultural productivity and sustainability. The course aims to:

1. Understand the Concept of Problematic Soils:
   - Introduce students to various problematic soils, including saline, alkaline, acidic, waterlogged, eroded, and polluted soils, along with their characteristics and distribution.
2. Identify Causes and Impact:
   - Provide knowledge about the natural and anthropogenic causes of soil degradation and its effects on soil health, crop productivity, and environmental quality.
3. Develop Soil Diagnosis and Classification Skills:
   - Train students in soil sampling, testing, and classification techniques to accurately diagnose problematic soils and their severity.
4. Promote Soil Reclamation and Management Practices:
   - Familiarize students with chemical, physical, and biological methods of soil reclamation and improvement, including gypsum application, liming, drainage systems, organic amendments, and phytoremediation.
5. Implement Soil Conservation Techniques:
   - Encourage the adoption of soil conservation practices, including contour farming, strip cropping, mulching, and agroforestry, to prevent further degradation.

Theory

Module	Topic
Module-1	• Problematic Soils; Definition, Types of Problematic Soils • Problematic soils under different Agro ecosystems.
Module-2	• Soil management; Definition, Properties, importance and kind of soil

	• Problem soil management : Problem soil, Characterization of problem soil
Module-3	• Reclamation and management of Saline and sodic soils, Acid soils and Polluted soils.
Module-4	• Water Logging: Definition, Cause of water logging, prevention of water logging • Irrigation water – quality and standards, utilization of saline water in agriculture.
Module-5	• Remote sensing and GIS in diagnosis and management of problem soils.

Course Outcomes

- 1 The students will be able to identify problematic soils, set up a plan for their reclamation, and post-reclamation management in a manner that is sustainable.
- 2 Improve soil fertility and productivity by application of soil test based judicious use of fertilizers and application of macro & micronutrients.
- 3 Provide basic knowledge to identify Multipurpose tree species, bio remediation through MPTs of soils
- 4 Application of remote sensing and GIS for judicious use of fertilizers and application of macro & micronutrients and lowering down the soil problem.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	1	1	1	1	2	1	-	-	1	3	1	2
CO-2	2	2	2	1	-	1	1	-	-	1	-	-	3
CO-3	1	1	-	1	2	-	1	-	-	2	-	2	1
CO-4	2	1	1	1	1	2	1	-	-	1	5	1	2
Average	1.5	1.25	1.33	1	1.33	1.6	1	-	-	1.25	1.25	1	2

B.Sc. (Hons.)Agriculture Syllabus

Semester V

S. No.	Subject Code	Subject	Credit Hours
1	MFSM-501	Manures, Fertilizers and Soil Fertility Management	3 (2+1)
2	PCSM-501	Pests of Crops and Stored Grain and their Management	3 (2+1)
3	DHCM-501	Diseases of Field and Horticultural Crops and their Management -I	3 (2+1)
4	IPDM-501	Principles of Integrated Pest and Disease Management	3(2+1)
5	CIKC-501	Crop Improvement-I (Kharif Crops)	2 (1+1)
6	EDBC-501	Entrepreneurship Development and Business Communication	2 (1+1)
7	GNPF-501	Geoinformatics and Nano-technology and Precision Farming	2 (1+1)
8	ELCT-501	**Elective Course**: Biopesticides & Biofertilizers	3(2+1)
9	AIPR-501	Intellectual Property Rights	1(1+0)
10	PCPK-501P	Practical Crop Production – I (Kharif crops)	2 (0+2)
	Total Credit		**24**

Subject: Manures, Fertilizers and Soil Fertility Management

Subject Code: MFSM-501 **Credit Hours: 3(2+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge of plant nutrition, soil fertility, and the use of manures and fertilizers to enhance soil health and optimize crop productivity. The course aims to:

1. Understand Fundamentals of Soil Fertility and Plant Nutrition:
   - Introduce students to the concepts of soil fertility, soil productivity, and essential plant nutrients, including their functions, deficiency symptoms, and availability in soil.
2. Study Different Types of Manures and Fertilizers:
   - Provide detailed knowledge about organic manures (compost, FYM, green manures), biofertilizers, chemical fertilizers, and their role in improving soil fertility and crop yield.
3. Learn Fertilizer Manufacturing and Classification:
   - Explain the production processes, classification, properties, and nutrient composition of various fertilizers.
4. Promote Integrated Nutrient Management (INM):
   - Encourage the adoption of balanced nutrient management practices integrating organic, inorganic, and biological sources to maintain soil health and sustainability.
5. Understand Fertilizer Application Methods:
   - Provide practical knowledge of fertilizer application techniques, including broadcasting, band placement, foliar application, fertigation, and their efficiency in different cropping systems.

Theory

Module	Topic
Module-1	• 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.
Module-2	• 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.
Module-3	• 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.
Module-4	• Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. • Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants.
Module-5	• Methods of fertilizer recommendations to crops. • Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

- To study about Colorimetry and flame photometry.
- To study Green/leaf manuring
- To study about different fertilizers
- To Estimation of soil organic carbon
- To Estimation of N, P,K & S in plants.

Course Outcomes

- 1. Develop basic knowledge about organic manures & fertilizers and preparation of manures.
- 2. Students learn about the chemical fertilizers, their composition and classification.
- 3. Develop the skills for making recommended fertilizer doses in the crop field and method of their application to the crops.
- 4. Analyze nutrients available in soil and in plants and Learns the application of remote sensing and GIS for diagnosis and management of problem soils.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	2	1	1	1	2	1	-	-	3	3	1	2
CO-2	2	1	-	1	-	1	1	-	-	1	-	-	1
CO-3	1	1	2	1	2	-	1	-	-	1	-	1	1
CO-4	2	2	2	-	-	2	1	-	-	2	3	1	2
Average	1.5	1.5	1.7	1.0	1.5	1.7	1.0	-	-	1.8	3.0	1.0	1.5

B.Sc. (Hons.) Agriculture
5th Sem

Subject: Pests of Crops and Stored Grains and their Management

Subject Code: PCSM-501 **Credit Hours: 3(2+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge of insect pests affecting crops and stored grains, along with effective management strategies for minimizing losses and ensuring food safety. The course aims to:

1. Understand Fundamentals of Agricultural Entomology:
   - Introduce students to basic concepts of entomology, pest classifications, pest biology, ecology, and their role in agriculture.
2. Identify Major Pests of Crops and Stored Grains:
   - Provide knowledge about important insect pests affecting cereals, pulses, oilseeds, fruits, vegetables, and stored grains, including their identification, life cycle, and nature of damage.
3. Study Pest Dynamics and Surveillance:
   - Teach students about pest population dynamics, pest-host interactions, monitoring techniques, and forecasting systems for effective pest management.
4. Develop Integrated Pest Management (IPM) Strategies:
   - Familiarize students with cultural, biological, chemical, and mechanical control methods for managing field and storage pests effectively.
5. Understand Pesticides and Their Application:
   - Provide knowledge of various pesticides, their formulations, modes of action, compatibility, residue management, and safe handling practices.

Theory

Module	Topic
Module-1	• General account of the nature and type of damage by different arthropods pest. • Scientific name, order, family, host range & nature of damage of major pests in of field crop
Module-2	• Scientific name, order, family, host range & nature of damage of major pests in vegetable crop and fruit crops • Scientific name, order, family, host range & nature of damage of major pests in ornamental crops and spices
Module-3	• Factor affecting losses of stored grains • Role of physical, mechanical, biological and chemical factor in deterioration of grains.

Module-4	• Insect, rodents, birds, pests and microorganism associated with stored grain and their management.
Module-5	• Storage structure and methods of grain storage • Fundamental principal of grain store management.

Practical

- To study identification of different type of damage in three crops
- To study identification type of damage in three fruits.
- To study fumigation of grain store/ godown
- To study identification of rodents & rodent control program in godowns.
- Visit to nearest FCI/nutritional industrial godowns

Course Outcomes

- 1 Memorise the Identification, taxonomy, host range, biology and bionomics, nature of the damage and preventive and curative control measures of crop and stored grain pests.
- 2 Develop the understanding of operating various pesticide appliances as a knap-sack sprayer, foot sprayer, aerosol, fumigators, etc, for pesticide application.
- 3 Develop the ability to examine insect infestation, loss assessment, pesticide doses, and preparation of solution to spray for pest management.
- 4 Formulate crop-wise IPM modules for sustainable agriculture and Storage structure and methods of grain storage to minimize the risk of food security.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	1	2	2	1	1	2	1	-	-	2	1	1	2
CO-2	1	1	2	1	1	1	1	-	-	1	-	-	3
CO-3	2	1	-	1	-	-	1	-	-	2	-	2	1
CO-4	1	2	1	1	1	2	1	-	-	1	2	1	2
Average	1.3	1.5	1.3	1.0	1.0	1.3	1.0	-	-	1.5	1.5	1.0	2.0

B.Sc. (Hons.) Agriculture
5th Sem

Subject: Diseases of Field & Horticultural Crops & their Management-I

Subject Code: DHCM-501 **Credit Hours: 3(2+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with in-depth knowledge of various plant diseases affecting field and horticultural crops, along with effective management practices to ensure healthy and productive crops. The course aims to:

1. Understand Fundamentals of Plant Pathology:
    - Introduce students to the basic concepts of plant pathology, including definitions, classifications, and principles of plant diseases.
2. Identify Major Diseases of Field and Horticultural Crops:
    - Provide knowledge of symptoms, causal organisms, disease cycles, epidemiology, and factors influencing disease occurrence in various crops.
3. Study Disease Diagnosis and Detection:
    - Train students in traditional and modern diagnostic techniques, including visual assessment, microscopic examination, molecular tools, and disease forecasting.
4. Learn Integrated Disease Management (IDM):
    - Familiarize students with cultural, biological, chemical, and mechanical control methods for effective disease management in crops.
5. Develop Disease Management Packages:
    - Teach students to formulate crop-specific disease management strategies based on epidemiological studies, resistant varieties, and environmental conditions.

Theory

Module	Topic
	Symptom, etiology, disease cycle and management of major diseases of following crops:
Module-1	**Field Crops:** • **Rice**: blast, brown spot, bacterial blight, false smut, khaira and tungro; • **Maize**: downy mildew, leaf spots;
Module-2	• **Sorghum**: smuts; • **Bajra** : downy mildew; • **Finger millet**: Blast and leaf spot;

Module-3	• **Groundnut**: early and late leaf spots; • **Pigeonpea**: Phytophthora blight; • **Castor**: Phytophthora blight; • **Tobacco**: mosaic.
Module-4	**Horticultural Crops:** • **Guava:** wilt and anthracnose; • **Banana:** Panama wilt, **Papaya**: foot rot, leaf curl, • **Pomegranate**: bacterial blight;
Module-5	• **Cruciferous vegetables**: Alternaria leaf spot, • **Tomato**: early and late blight, buck eye rot; • **Colocasia:** Phytophthora blight; • **Coconut:** wilt; **Tea:** blister blight; **Coffee**: rust

Practical

- Identification and histo-pathological 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;

Course Outcomes

- 1. After completing this course students will study the symptoms, involved pathogens, disease cycle, best possible management practices available and able to resolve the problem of yield reduction in crops.
- 2. In this course students are able for isolation of culture, techniques, identification and biology of pathogens in the laboratory.
- 3. Students demonstrate crop fields and suggest best possible management practices available and able to resolve the problem of yield reduction in crops.
- 4. In this course students apply different fungicides and antibiotics (mode of action and formulations) on the basis of Nature of pathogen, manage crops disease corresponding to involved pathogen and examine loss in quality and yield.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1	1	1	1	-	-	-	-	-	-	-	-
CO-2	1	2	1	1	1	-	1	-	-	-	-	-	-
CO-3	1	1	1	2	-	-	1	-	-	-	-	-	-
CO-4	1	-	1	1	1	-	-	-	-	-	-	-	-
CO-5	-	1	1	1	-	-	1	-	-	-	2	-	-
Average	1.3	1.3	1.0	1.3	1.0	-	1.0	-	-	-	2.0	-	-

B.Sc. (Hons.) Agriculture
5th Sem

Subject: Principles of Integrated Pest and Disease Management

Subject Code: IPDM-501 **Credit Hours: 3(2+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge and practical skills in integrated pest and disease management (IPDM) for promoting sustainable and eco-friendly agricultural practices. The course aims to:

1. Understand the Concepts and Principles of IPDM:
   - Introduce students to the principles, objectives, and significance of integrated pest and disease management in agriculture.
2. Identify Pests and Diseases:
   - Provide knowledge about the identification, classification, biology, and ecology of major insect pests, plant pathogens, nematodes, and weeds affecting crops.
3. Study Pest and Disease Dynamics:
   - Teach students about pest and disease life cycles, population dynamics, epidemiology, and factors influencing their occurrence and spread.
4. Develop Integrated Management Strategies: Familiarize students with various control methods including cultural, biological, chemical, mechanical, genetic, and regulatory practices to minimize crop damage.
5. Promote Safe and Eco-friendly Approaches: Encourage the use of biological control, biopesticides, host resistance, and cultural practices to reduce dependence on harmful chemicals.

Theory

Module	Topic
Module-1	• Categories of insect pests, • Economic importance of insect pests.
Module-2	• IPM: Introduction, importance, concepts, principles and tools of IPM.
Module-3	• Biological- parasitoids, predators and transgenic plant pathogens such as bacterial, fungi and viruses.
Module-4	• Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control.
Module-5	• Insecticides Act 1968- important provisions. Safety issues in pesticide uses.

Practical

- Practicable IPM practices- Mechanical and physical methods,
- Methods of diagnosis and detection of various insect pests, and plant diseases,
- Identification of bio control agents, different predators and natural enemies.
- Identification and nature of damage of important insect pests and diseases and their management.
- Vermiculture –visit to vermiculture unit,

Course Outcomes

- 1. Educate concepts, tools and principles of integrated pest and disease management.
- 2. Develop understanding of the role of IPM in sustainable agriculture as the future of modern plant protection in pest and disease control strategy.
- 3. Development of skills about methods of detection and diagnosis of insect pest and diseases and application of different pest and disease control techniques.
- 4. Analyze agricultural ecosystem, level of pest damage, Pest risk and timing of different pest control tactics to manage the pest population effectively.
- 5. Evaluate Economic Injury Level and Economic Threshold Level for timely application of control measures for pest management.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	1	1	1	1	1	2	1	-	-	2	2	1	2
CO-2	2	2	1	1	-	1	1	-	-	1	-	-	1
CO-3	1	2	-	1	2	-	1	-	-	2	-	2	1
CO-4	1	1	2	-	1	2	1	-	-	1	1	1	2
CO-5	1	-	2	1	1	-	-	-	-	-	-	1	-
Average	1.2	1.5	1.5	1	1.2	1.3	1	-	-	1.5	1.5	1.2	1.5

B.Sc. (Hons.) Agriculture
5th Sem

Subject: Crop Improvement – I (*Kharif*)

Subject Code: CIKC-501 **Credit Hours: 2(1+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge and practical skills in the principles, methods, and techniques of crop improvement for Kharif crops, focusing on developing high-yielding, disease-resistant, and climate-resilient crop varieties. The course aims to:

1. Understand Fundamentals of Crop Improvement:
   - Introduce students to the basic concepts of plant breeding, genetic principles, breeding objectives, and methods used for crop improvement.
2. Study Genetic Resources and Breeding Techniques:
   - Provide knowledge about germplasm collection, conservation, evaluation, and utilization in Kharif crop breeding programs.
3. Develop Stress-Resistant Varieties:
   - Emphasize breeding strategies aimed at developing crop varieties resistant to biotic stresses (diseases, pests) and abiotic stresses (drought, salinity, heat).
4. Promote Marker-Assisted Selection (MAS):
   - Introduce modern tools like molecular markers, genomics, and biotechnology to enhance the precision and efficiency of breeding programs.

Theory

Module	Topic
Module-1	• Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibers; fodders and cash crops; vegetable and horticultural crops;
Module-2	• Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters;
Module-3	• Important concepts of breeding self-pollinated, cross pollinated and vegetative propagated crops;
Module-4	• Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc.
Module-5	• Ideotype concept and climate resilient crop varieties for future.

Practical

- Floral biology, emasculation and hybridization techniques in different crop species;
- 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.

Course Outcomes

- 1 . Remember the evolutionary history of important field crops along with their centre of origin, its wild species and wild relatives that can be utilized in crop improvement
- 2. Develop the understanding of germplasm conservation, utilization, and genetics of qualitative and quantitative characters, and their inheritance.
- 3 Analyze breeding procedures and methods breeding objectives in different crop important for the development of improved varieties.
- 4. Able to differentiate seed production technology in different classes of Kharif field crops

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	3	2	1	1	-	-	-	-	-	-
CO2	1	1	2	2	1	2	-	-	1	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	-	-	-	-
CO4	2	-	1	1	1	1	1	-	1	-	-	-	-
CO5	3	2	1	1	3	2	1	-	-	-	-	-	-
Average	2.2	1.3	1.6	1.8	1.8	1.5	1	-	1	-	-	-	-

B.Sc. (Hons.) Agriculture
5th Sem

Subject: Entrepreneurship Development and Business Communication

Subject Code: EDBC-501 **Credit Hours: 2(1+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with essential knowledge and skills in entrepreneurship, business management, and effective communication, enabling them to establish, manage, and promote agribusiness enterprises successfully. The course aims to:

1. Understand the Fundamentals of Entrepreneurship:
    - Introduce students to the concepts, characteristics, and importance of entrepreneurship in agriculture and agribusiness sectors.
2. Develop Entrepreneurial Skills and Competencies:
    - Foster creativity, innovation, risk-taking ability, leadership, and decision-making skills essential for entrepreneurial success.
3. Learn Business Planning and Project Management:
    - Teach students how to prepare business plans, feasibility studies, and project reports, including budgeting, marketing, and financial planning.
4. Understand Agribusiness Management:
    - Provide knowledge about various aspects of agribusiness, including marketing, finance, supply chain management, and value addition.

Theory

Module	Topic
Module-1	• Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; • SWOT Analysis & achievement motivation,
Module-2	• Government policy and programs and institutions for entrepreneurship development, • Impact of economic reforms on Agribusiness/ Agrienterprises,
Module-3	• Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), • Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem

	solving skill,
Module-4	• Supply chain management; • Total quality management,
Module-5	• Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

Practical

- Assessing entrepreneur potential
- Assessment of problem solving ability
- Exercises in creativity
- Conducting market survey to know the demands for different products
- Preparing advertisements for popularization of products and news writing
- Preparing project proposals
- Seminar and conferences : Use of body language
- Preparation of business plan and proposal writing
- Visit to entrepreneurship development institute and entrepreneurs.

Course Outcomes

- 1. Acquaint knowledge on the concept of Business, Enterprise, Entrepreneurs and Entrepreneurship Development.
- 2. Develop the understanding on different government policies and programmes in entrepreneurship development.
- 3. Evaluate the principles of Business Leadership Skills, Problem Solving Skills, Managerial Skills, Problem Solving Skills and Project Planning.
- 4. Develop ability to analyze SWOT analysis and formulation of project, implement planning, formulation and preparation to set-up their own business.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	1	2	2	2	3	3	1	1	1	1
CO2	3	3	2	1	2	2	2	2	3	1	1	1	1
CO3	2	2	1	-	1	1	1	2	3	1	-	1	-
CO4	1	1	-	-	-	1	1	1	3	-	-	-	-
CO5	2.3	2.3	1.7	1.0	1.7	1.5	1.5	2.0	3.0	1.0	1.0	1.0	1.0
Average	3	3	2	1	2	2	2	3	3	1	1	1	1

Subject: Geoinformatics, Nano-technology and Precision Farming

Subject Code: GNPF-501 **Credit Hours: 2(1+1)**

Course Objective

The objective of this course is to provide B.Sc. Agriculture students with comprehensive knowledge and practical skills in geospatial technologies, nanotechnology, and precision farming techniques to enhance agricultural productivity, sustainability, and resource-use efficiency. The course aims to:

1. Understand Fundamentals of Geo-informatics:
    - Introduce students to the basic concepts, principles, and applications of remote sensing, Geographic Information Systems (GIS), and Global Positioning Systems (GPS) in agriculture.
2. Learn Remote Sensing and GIS Applications:
    - Teach students how to collect, analyze, and interpret geospatial data for crop monitoring, soil mapping, watershed management, and precision agriculture.
3. Study Precision Farming Techniques:
    - Provide knowledge about site-specific crop management, variable rate technology (VRT), and decision support systems to optimize input use and enhance crop productivity.
4. Introduce the principles, tools, and applications of nanotechnology, including nanopesticides, nanofertilizers, and nanosensors for improving agricultural practices.

Theory

Module	Topic
Module-1	• **Precision agriculture:** concepts and techniques; their issues and concerns for Indian agriculture;
Module-2	• **Geo-informatics**- definition, concepts, tool and techniques; their use in Precision Agriculture.
Module-3	• **Remote sensing concepts** and application in agriculture; • **Global positioning system(GPS),** components and its functions;

Module-4	• Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs;
Module-5	• **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

- To study about Geo-informatics
- To study about Global positioning system(GPS), components and its functions
- To study fertilizers recommendations based of VRT and STCR techniques.
- To study Crop stress (biotic/abiotic) monitoring using geospatial technology.
- To study Use of GPS for agricultural survey.
- To study about Nanotechnology and applications of nanoparticles in agriculture.
- Projects formulation and execution related to precision farming.

Course Outcomes

- 1. Acquaint the concept of simulation and modeling in agriculture.
- 2. Make aware of issues and concern of precision farming in context of Indian agriculture.
- 3. Understand of the basic concept of geo-informatics, its tool and techniques (GPS, GIS, Remote sensing, STCR, etc.) and application in precision farming.
- 4. Understand the concept of nanotechnology, its tools and techniques, its application and future prospects in agriculture.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	2	2	2	1	-	1	-	1	1	1	1	-
CO2	3	2	2	2	1	-	-	-	1	1	-	-	-
CO3	3	2	2	2	1	-	-	-	-	1	-	-	-
CO4	3	2	2	2	1	-	-	-	-	1	-	-	-
Average	3.0	2.0	2.0	2.0	1.0	-	-	-	-	1.0	1.0	1.0	-

Subject: Intellectual Property Rights

Subject Code: AIPR-501 **Credit Hours: 1(1+0)**

Course Objectives:

1. **To provide a comprehensive understanding of the fundamental** concepts and principles of Intellectual Property Rights, including patents, trademarks, copyrights, geographical indications, industrial designs, and trade secrets.
2. To familiarize students with the legal framework governing IPR at the national and international levels, including key treaties and conventions like the TRIPS Agreement, Berne Convention, and Paris Convention.
3. To develop skills for identifying, protecting, and managing intellectual property assets in various fields such as agriculture, biotechnology, pharmaceuticals, technology, and creative industries.
4. To enhance awareness about the economic, ethical, and societal implications of IPR, including issues related to innovation, public interest, access to knowledge, and sustainable development.
5. To train students in the process of patent searching, drafting, filing, and prosecution, along with understanding infringement and enforcement mechanisms.

Theory

Module	Topic
Module-1	• Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO. • Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets.
Module-2	• Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent.
Module-3	• Origin and history including a brief introduction to UPOV for protection of plant varieties, Plant breeder's rights.
Module-4	• Registration of plant varieties under PPV&FR Act 2001, breeders,

	researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.
Module-5	• Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features.

Course Outcomes

- **1** Acquaint with the meaning of intellectual property and differentiate it from tangible property
- **2** Develop the understanding about the history of IPR development with various treaties and conventions, laws of IPR, various forms of IPR property, and their importance in research.
- **3** Apply intellectual property law principles (including copyright, patents, designs, and trademarks) to real problems and analyze the social impact of intellectual property law and policy
- **4** Make able to differenciate various forms of intellectual properties and eligibility for their protection

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	3	2	1	2	1	1	-	-	-	-	-	-
CO2	2	2	2	-	2	2	1	-	-	-	-	-	1
CO3	2	1	2	2	3	2	1	-	1	-	-	1	-
CO4	1	-	1	1	2	1	-	-	-	-	-	-	1
Average	1	-	1	1	2	1	-	-	-	-	-	-	1

Subject: Elective Course: Biopesticides & Biofertilizers

Subject Code: ELCT-501 **Credit Hours: 3(2+1)**

Course Objective :

1. Understand the Fundamentals of Biopesticides and Biofertilizers – Develop knowledge of the types, sources, and mechanisms of action of biopesticides and biofertilizers.
2. Learn Sustainable Agricultural Practices – Explore the role of biopesticides and biofertilizers in promoting eco-friendly and sustainable farming methods.
3. Develop Practical Skills in Production and Application – Gain hands-on experience in the formulation, application, and quality assessment of biopesticides and biofertilizers.
4. Analyze the Environmental and Economic Benefits – Evaluate the impact of biopesticides and biofertilizers on soil health, crop productivity, and environmental sustainability.
5. Explore Innovations and Commercial Potential – Understand recent advancements, regulatory aspects, and business opportunities in the field of biopesticides and biofertilizers.

Theory

Module	Topic
Module-1	• **Biopesticides:** Definitions and classification of bio pesticides viz. Microbial pesticides, Plant-incorporated-protectants (PIPs), Biochemical pesticides, Botanical pesticides, Biotic agents (parasitoids and predators) and commerce of biopesticide, • Advantage of biopesticides
Module-2	• Importance of **Trichoderma spp.** and **Bacillus spp. (Bacillus thuringiensis)** – its characteristics and application. • Methods of application of biopesticides and Mass production of biopesticides.
Module-3	• **Biofertilizers:** Definition, type of biofertilizer; nitrogen biofertilizers, Compost biofertilizers, & Phosphorous biofertilizers, • Importance of biofertilizers, Advantages and disadvantages of biofertilizer. Mass production of biofertilizer.
Module-4	• **Bacterial biofertilizers-** Azospirillum, Azotobacter, Bacillus, Rhizobium and Frankia; • **Cynobacterial biofertilizers-** Anabaena & Nostoc
Module-5	• **Hapalosiphon and fungal biofertilizers-** Mycorrhiza - VAM association, Types of mycorrhiza (AM mycorrhiza and ectomycorhiza)

	• **Nitrogen fixation** -Free living and symbiotic nitrogen fixation. Factors influencing the efficacy of biofertilizers

Practical

- To study important biopesticides: Trichoderma Pseudomonas, Bacillus.
- Visit to biopesticide laboratory in nearby area
- Field visit to explore naturally infected cadavers.
- To study important biofertilizers Rhizobium, Azospirillum , Azotobacter, P-solubilizers and cyanobacteria
- Visit to Biofertilizers laboratory in nearby area.
- To study Mass production of biofertilizers.
- To study Isolation of VAM fungi

Course Outcomes:

- CO1. Understanding of Eco-Friendly Pest and Soil Management – Students will gain knowledge of biopesticides and biofertilizers as sustainable alternatives to chemical inputs in agriculture.
- CO2 Practical Skills in Production and Application – Students will develop hands-on expertise in the preparation, formulation, and field application of biopesticides and biofertilizers.
- CO3 Assessment of Environmental and Agricultural Impact – Students will evaluate the benefits of biopesticides and biofertilizers in enhancing soil fertility, crop productivity, and biodiversity conservation.
- CO4 Exploration of Career and Entrepreneurial Opportunities – Students will identify potential career paths in organic farming, agribusiness, and research related to biopesticides and biofertilizers.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	2	2	2	1	-	1	-	1	1	1	1	-
CO2	3	2	2	2	1	-	-	-	1	1	-	-	-
CO3	3	2	2	2	1	-	-	-	-	1	-	-	-
CO4	3	2	2	2	1	-	-	-	-	1	-	-	-
Average	3.0	2.0	2.0	2.0	1.0	-	-	-	-	1.0	1.0	1.0	-

Subject: Practical Crop Production-I *(Kharif Crops)*

Subject Code: PCPK-501P **Credit Hours: 2(0+2)**

Course Objectives:

1. To impart practical knowledge of the cultivation practices and management techniques for major *Kharif crops* such as rice, maize, cotton, soybean, sorghum, pearl millet, groundnut, etc.
2. To develop skills in land preparation, seed selection, sowing methods, nutrient management, irrigation, pest and disease control, and harvesting techniques for *Kharif crops*.
3. To understand the principles of crop rotation, intercropping, and mixed cropping systems to enhance productivity and sustainability.
4. To familiarize students with modern agricultural practices and machinery used in the cultivation of *Kharif crops*.
5. To provide hands-on training in the recording of crop growth, yield estimation, and economic analysis of production practices.

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.

Course Outcomes

- 1. Acquaint the knowledge on the method of field preparation for crop production and arrange the resources required in the field.
- 2. Develop the understanding on production techniques of major Kharif season crops according to resources available in the field.
- 3. Apply the production techniques of crops in the practical crop production field.
- 4. Examine the production of sown crops in the practical crop production

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3
Average	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

B.Sc. (Hons.) Agriculture
Semester – VI

S. No	Subject Code	Subject	Credit	Examination Marks Detail				
				External Exam	Internal Exam		Practical	Total
					Internal Exam	Assignments		
1	RAWM-601	Rainfed Agriculture & Watershed Management	2 (1+1)	50	20	15	15	100
2	PCSA-601	Protected Cultivation and Secondary Agriculture	2 (1+1)	50	20	15	15	100
3	DHCM-601	Diseases of Field and Horticultural Crops and their Management-II	3 (2+1)	50	20	15	15	100
4	PHMV-601	Post-harvest Management and Value Addition of Fruits and Vegetables	2 (1+1)	50	20	15	15	100
5	AMBI-601	Management of Beneficial Insects	2 (1+1)	50	20	15	15	100
6	CIRC-601	Crop Improvement-II (Rabi crops)	2 (1+1)	50	20	15	15	100
7	APOF-601	Principles of Organic Farming	2 (1+1)	50	20	15	15	100
8	FMRE-601	Farm Management, Production & Resource Economics	2 (1+1)	50	20	15	15	100
9	ELCT-601	Elective Course : Agribusiness Management	3(2+1)	50	20	15	15	100
10	PFSN-601	Principles of Food Science and Nutrition	2(2+0)	50	30	20	-	100
11	PCPR-601P	Practical Crop Production –II (Rabi crops)	2 (0+2)	-	-	-	100	100
		Total	**24(13+11)**					**1100**

Rainfed Agriculture and Watershed Management: 2(1+1)

Course Objectives:

1. To provide fundamental knowledge about the principles, practices, and challenges of rainfed agriculture and watershed management.
2. To understand the characteristics of rainfed farming systems, including soil, climate, cropping patterns, and water availability.
3. To develop skills for assessing, planning, and implementing watershed management techniques to enhance productivity and sustainability of rainfed agriculture.
4. To study soil and water conservation measures, such as contour farming, terracing, bunding, mulching, and water harvesting techniques.
5. To enhance understanding of drought management strategies, including moisture conservation, crop diversification, and contingency planning.
6. To promote the integration of traditional knowledge and modern technologies for effective rainwater management and soil health improvement.

Theory:

Module	Topic
Module 1	• Rainfed agriculture: Introduction & its types • History of rainfed agriculture and watershed in India • Problems and prospects of rainfed agriculture in India
Module 2	• Soil and climatic conditions prevalent in rainfed areas • Soil and water conservation techniques
Module 3	• Drought: types, effect of water deficit on physio-morphological characteristics of the plants • Crop adaptation and mitigation to drought
Module 4	• Water harvesting: importance & its techniques, • Efficient utilization of water through soil and crop management practices, • Management of crops in rainfed areas
Module 5	• Watershed management: 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.
- Field demonstration on soil & moisture conservation measures.
- Field demonstration on construction of water harvesting structures.
- Visit to rainfed research station/watershed

Course Outcomes

- 1 Acquaint rainfed agriculture, rainfall distribution and collection of rainwater.
- 2 Develop ability to classify the crops and their growing regions according to the rainfall.
- 3 Execute the production techniques of crops and rainwater harvesting in rainfed areas.
- 4 Examine the seasonal rainfall and different types of watershed and its components.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	2	2	1	1	-	1	-	1	2	-	1	1
CO-2	2	2	2	1	1	1	-	-	1	2	2	1	1
CO-3	2	2	1	2	1	-	1	-	1	2	-	1	-
CO-4	2	1	2	1	-	1	-	-	1	1	1	1	1
Average	2.3	1.8	1.8	1.3	1.0	1.0	1.0	-	1.0	1.8	1.5	1.0	1.0

B.Sc. (Hons.) Agriculture
6th Sem

Protected Cultivation and Secondary Agriculture 2(1+1)

Course Objectives:

1. To provide a comprehensive understanding of protected cultivation techniques, including greenhouse farming, net houses, polyhouses, shade nets, and low tunnels.
2. To study the principles and practices of secondary agriculture, including value addition, agro-processing, and post-harvest management of crops.
3. To develop skills in designing, constructing, and managing protected structures for optimal crop growth and productivity.
4. To impart knowledge about environmental control systems, such as temperature, humidity, light, and CO2 management, for enhancing crop yield and quality.
5. To familiarize students with modern technologies and innovations in protected cultivation, including hydroponics, aeroponics, and vertical farming.
6. To promote the understanding of crop selection, nutrient management, irrigation, pest, and disease control in protected cultivation systems.

Theory

Module	Topic
Module 1	• Green house technology: Introduction, Types of Green Houses; • Plant response to Green-house environment, • Planning and design of greenhouses, • Design criteria of green house for cooling and heating purposes.
Module 2	• 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 green house heating systems, green house drying.
Module 3	• Threshing –threshers for different crops, parts, terminology, care and maintenance
Module 4	• Drying – Grain Drying, types of drying, types of dryers, Importance of drying.
Module 5	• Storage- Grain Storage – Types of storage structures. • Evaporation – Principles, Types of evaporators.

Practical

- Study of different type of green houses based on shape
- Determination of drying rate of agricultural products inside green house.
- Study of green house equipments.
- Visit to various Post Harvest Laboratories.

Course Outcomes

- 1. Study the fundamental principles of crop cultivation under controlled conditions.
- 2 This course will help the students to know the design criteria and material for construction of greenhouse.
- 3 Students able to perform the various research investigations under greenhouse.
- 4 Students can easily interact with the farmers to give knowledge about the protected cultivation.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1	1	1	-	1	1	-	-	1	1	2	-
CO-2	2	1	-	2	-	-	-	-	-	-	2	1	1
CO-3	1	-	2	-	-	1	-	-	-	2	-	1	2
CO-4	1	2	2	1	-	2	1	-	-	1	2	2	2
Average	1.5	1	1.3	1	-	1	-	-	-	1	1.3	1.5	1.3

B.Sc. (Hons.) Agriculture
6th Sem

Diseases of Field & Horticultural Crops & their Management-II
3(2+1)

Course Objectives:

1. To provide comprehensive knowledge of major diseases affecting important *field and horticultural crops* with emphasis on symptoms, causal organisms, epidemiology, and disease cycles.
2. To understand the principles and methods of disease diagnosis, including field observation, laboratory techniques, and pathogen identification.
3. To familiarize students with integrated disease management (IDM) strategies, including cultural, biological, chemical, and genetic control methods.
4. To study disease forecasting, monitoring, and surveillance systems for effective crop protection.
5. To impart knowledge on modern disease management practices, including biocontrol agents, fungicides, resistant varieties, and organic approaches.
6. To develop skills in developing disease management plans, including crop rotation, sanitation, and use of disease-free planting material.

Theory

Module	Topic
Module 1	Symptoms, etiology, disease cycle and management of following diseases: **Field Crops:** • Wheat: rusts, loose smut, karnal bunt • Sugarcane: red rot, smut • Sunflower: Alternaria blight
Module 2	Symptoms, etiology, disease cycle and management of following diseases: **Field Crops:** • Mustard: Alternaria blight, white rust, downy mildew • Gram: wilt • Cotton: anthracnose • Pea: powdery mildew
Module 3	Symptoms, etiology, disease cycle and management of following diseases: **Horticultural Crops:** • Mango: anthracnose • Citrus: canker ; Grape vine: downy mildew; Apple: scab

Module 4	**Symptoms, etiology, disease cycle and management of following diseases:** **Horticultural Crops:** • Strawberry: leaf spot Potato • Cucurbits: downy mildew, • Onion purple blotch
Module 5	**Symptoms, etiology, disease cycle and management of following diseases:** **Horticultural Crops:** • Chillies: anthracnose ; Marigold: Alternaria blight; • Rose: 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.

Course Outcomes

- **1:** Educate basic knowledge of the causal organisms and systematic positions involved in causing pathogens in crops are studied
- **2:** Develop the understanding about isolation of culture, techniques, identification and biology of pathogens in the laboratory.
- **3:** Demonstrate the field of horticultural, medicinal crops and cash crops; disease symptoms include pathogen, disease cycle, and best possible management practices and propose the solution of problems causing yield reduction in crops.
- **4:** Apply fungicides and antibiotics (mode of action and formulations) on the basis of nature of pathogen, manage crops disease corresponding to involved pathogen and examine loss in quality and yield.
- **5:** Develop the skills about detection and diagnosis of plant diseases and application of pesticides.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1	-	-	-	-	-	-	-	-	-	-	-
CO-2	1	2	1	1	1	-	2	-	-	-	-	-	3
CO-3	1	1	1	2	-	-	1	-	-	-	-	-	-
CO-4	1	-	1	1	1	-	-	-	-	-	-	-	1
CO-5	-	1	1	1	-	-	3	-	-	-	2	-	2
Average	1.3	1.3	1.0	1.3	1.0	-	2.0	-	-	-	2.0	-	2.0

B.Sc. (Hons.) Agriculture
6th Sem

Management of Beneficial Insects 2(1+1)

Course Objectives:

1. To provide foundational knowledge of beneficial insects, including pollinators, predators, parasitoids, and decomposers, and their roles in agriculture and ecosystems.
2. To understand the taxonomy, biology, and behavior of major beneficial insects relevant to crop protection, pollination, and soil health.
3. To study the principles and practices of conservation, augmentation, and utilization of beneficial insects for integrated pest management (IPM).
4. To impart knowledge about mass production, rearing techniques, and field release of biological control agents.
5. To familiarize students with pollinator management practices, including habitat enhancement, beekeeping, and protection from pesticides.
6. To enhance skills in designing and implementing biological control programs, particularly for managing pests in agricultural and horticultural crops.

Theory

Module	Topic
Module 1	• **Beneficial Insects:** Definition and Importance of beneficial Insects • Honeybee, Silkworm, Lac insects, Bioagents as natural enemies, Various Institutes related to beneficial insects.
Module 2	• **Apiculture:** introduction, bee biology, Beekeeping and pollinators, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease • Bee hives and their description, Bee pasturage, bee foraging and communication
Module 3	• **Sericulture:** Related terminologies, 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.
Module 4	• **Lac culture:** Species of lac insect, morphology, biology, host plant, • Lac production and its uses, Types of lac- seed lac, button lac, shellac, and lac-products
Module 5	• **Biocontrol agents (Natural Enemies):** Introduction of bioagents, • Ideal characteristics of bioagents, Successful examples of biological control

Practical

- To study of different Beneficial Insects
- To study to honey bee species, castes of bees. Beekeeping appliances and seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication.
- To study of 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.
- Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies.

Course Outcomes

- 1 This course will help the students to remember the knowledge of Importance of beneficial Insects, Beekeeping, sericulture and lac culture etc.
- 2 The students will understand about commercial methods of rearing honey bees, silkworm lac insects and pollinators, and their enemies.
- 3 This course will help students in applying the modern techniques and equipment for healthy production in apiculture and sericulture.
- 4 After completing this course, the students will be able to evaluate specific major parasitoids and predators commonly being used in biological control.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PsO1	PSO2	PSO3	PSO-4
CO1	3	2	2	-	1	-	-	-	-	-	2	1	-
CO2	2	1	2	-	-	-	-	-	-	-	1	-	1
CO3	1	2	1	-	2	-	-	-	-	-	-	-	-
CO4	2	2	2	-	1	-	-	-	-	-	1	-	1
Average	2	1.8	1.8	-	1.3	-	-	-	-	-	1.3	1.0	1.0

B.Sc. (Hons.) Agriculture
6th Sem

Post-harvest Management and Value Addition of Fruits and Vegetables
2(1+1)

Course Objectives:

1. To provide comprehensive knowledge about post-harvest physiology, ripening, and senescence of fruits and vegetables.
2. To understand the principles and practices of post-harvest handling, including harvesting, grading, sorting, packaging, storage, and transportation of fresh produce.
3. To impart knowledge about various methods of preservation, including refrigeration, canning, drying, pickling, and minimal processing.
4. To familiarize students with value addition techniques for fruits and vegetables, such as processing, product development, packaging, and labeling.
5. To study the factors influencing post-harvest losses and strategies to minimize them through improved handling and storage practices.
6. To enhance skills in designing and managing cold chain systems for maintaining the quality and safety of fresh produce.

Theory

Module	Topic
Module 1	• Importance of post-harvest processing of fruits and vegetables • Extent and possible causes of post harvest losses
Module 2	• Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; • Harvesting and field handling
Module 3	• Storage (ZECC, cold storage, CA, MA, and hypobaric); • Value addition concept; Principles and methods of preservation
Module 4	• Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards; • Fermented and non-fermented beverages.
Module 5	• Tomato products- Concepts and Standards; • Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. • Canning – Concepts and Standards, packaging of products.

Practical

- Study of importance of post-harvest processing of fruits
- Application of different types of packaging, containers for shelf life extension.
- 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.
- Visit to processing unit/ industry.

Course Outcomes

- 1 Define the fundamentals application of post and pre harvest technologies in agricultural commodities and post harvest management and novel packaging techniques.
- 2 Identify various problems (storage, shelf life of food product spoilage etc.) faced by the farmers.
- 3 Design and development of various products related to food processing or prevent the food from microorganism or enzymatic spoilage, i.e. self- decomposition of the food by naturally occurring enzymes within it.
- 4 Design and development of various products related to food processing.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PsO1	PSO 2	PSO 3	PSO 4
CO1	3	-	1	-	-	-	-	-	-	1	-	-	-
CO2	2	1	-	2	-	1	-	-	-	-	2	-	-
CO3	2	1	-	2	-	1	-	-	-	-	2	-	-
CO4	-	-	1	1	-	1	1	-	1	-	-	1	-
Average	2.3	1.0	1.0	1.6	-	1.0	1.0	-	1.0	-	2.0	1.0	-

Crop Improvement – II (*Rabi*) 2(1+1)

Course Objectives:

1. To provide a thorough understanding of breeding principles and techniques for the improvement of *Rabi crops* such as wheat, barley, chickpea, mustard, pea, lentil, oats, and other cool-season crops.
2. To study the genetic resources, variability, and breeding objectives aimed at enhancing yield, quality, biotic and abiotic stress resistance, and adaptation in *Rabi crops*.
3. To familiarize students with breeding methodologies, including conventional breeding, hybridization, mutation breeding, polyploidy, and participatory plant breeding.
4. To impart knowledge on advanced tools and technologies, such as marker-assisted selection (MAS), genetic engineering, and molecular breeding for *Rabi crop improvement*.
5. To develop practical skills in designing and conducting breeding experiments, including crossing techniques, progeny evaluation, and selection strategies.
6. To provide training in the development, release, and maintenance of improved crop varieties, with emphasis on seed production, certification, and quality control.

Theory

Module	Topic
Module 1	• Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops;
Module 2	• Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters;
Module 3	• Major breeding objectives and procedures for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)
Module 4	• Hybrid seed production technology of *rabi* crops.
Module 5	• Ideotype concept and climate resilient crop varieties for future

Practical

- Floral biology, emasculation and hybridization techniques in different crop species namely
  - Wheat
  - Field pea
  - Rapeseed Mustard
  - Sunflower
  - Sugarcane
  - Chilli
- Study of field techniques for seed production and hybrid seeds production in *Rabi* crops
- Layout of field experiments
- Visit to seed production plots
- Visit to AICRP plots of different field crop

Course Outcomes

- 1: Remember the evolutionary history of important field crops along with their centre of origin, its wild species and wild relatives that can be utilized in crop improvement
- 2: Develop the understanding of germplasm conservation, utilization, and centre of origin of various rabi field crops, genetics of qualitative and quantitative characters, and their inheritance.
- 3: Apply breeding procedures and objectives in different crop important for the development of improved varieties
- 4: Make able to differentiate seed production technology in different classes of rabi field crop.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	-	2	1	1	-	-	-	-	-	-
CO2	1	1	2	-	1	2	-	-	1	-	-	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	-	-
CO4	2	-	1	-	1	1	1	-	1	-	-	-	-
CO5	3	2	1	-	3	2	1	-	-	-	-	-	-
Average	2.2	1.3	1.6	-	1.8	1.5	1	-	1	-	-	-	-

B.Sc. (Hons.) Agriculture
6th Sem

Principles of Organic Farming 2(1+1)

Course Objectives:

1. To provide fundamental knowledge of the principles, concepts, and practices of *organic farming* for sustainable agricultural production.
2. To understand soil health management, including soil fertility, biological activity, and organic matter maintenance through crop rotation, green manuring, composting, and bio-fertilizers.
3. To familiarize students with pest, disease, and weed management techniques based on cultural, mechanical, biological, and botanical methods in organic farming.
4. To promote awareness of organic certification standards and regulations, including national and international guidelines for organic agriculture.
5. To develop skills in planning and designing organic farming systems, considering ecological, economic, and social sustainability.
6. To study the role of biodiversity, crop diversification, and integrated farming systems (IFS) in enhancing productivity and resilience in organic farming.

Theory

Module	Topic
Module 1	• Organic farming, principles and its scope in India; • Initiatives taken by Government (central/ state), NGOs and other organizations for promotion of organic agriculture;
Module 2	• Organic ecosystem and their concepts; • Organic nutrient resources and its fortification;
Module 3	• Choice of crops and varieties in organic farming; • Crop rotations – need and benefits
Module 4	• Fundamentals of insect, pest, disease and weed management under organic mode of production; • Green manures- bio fertilisers – types
Module 5	• Operational structure of NPOP; • Certification process and standards of organic farming;

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;

Course Outcomes

- 1 Students develop knowledge of principles of organic farming in context of improving human health and amelioration of the environment.
- 2 Students learn government schemes and the role of NGOs in producing organic products.
- 3 Students develop skill for selection of crops and varieties for best organic produce.
- 4 Develops knowledge of certification methods of organic produce.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	1	1	-	1	2	1	-	-	-	2	1	-
CO-2	1	2	2	-	-	1	1	-	-	1	-	-	1
CO-3	1	1	1	-	2	-	1	-	-	2	-	2	1
CO-4	1	2	1	-	1	2	1	-	-	1	1	1	2
Average	1.0	1.5	1.3	-	1.3	1.6	1.0	-	-	1.3	1.5	1.0	1.3

Farm Management, Production and Resource Economics 2(1+1)

Course Objectives:

1. To provide fundamental knowledge of farm management principles, including planning, organizing, directing, and controlling farm resources for efficient agricultural production.
2. To understand the concepts of production economics, including production functions, cost analysis, profit maximization, and efficiency measurement in agricultural enterprises.
3. To impart knowledge about resource allocation and optimization, focusing on land, labor, capital, and management for sustainable farm profitability.
4. To enhance skills in farm budgeting, record-keeping, and financial analysis, including gross margin analysis, enterprise budgeting, and whole-farm planning.
5. To familiarize students with risk management strategies and decision-making tools applicable to uncertain agricultural environments.
6. To study the economics of natural resources, including land use, water management, soil conservation, and environmental sustainability in agriculture.

Theory

Module	Topic
Module 1	• **Farm management-** 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.
Module 2	• **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.

Module 3	• **Meaning and concept of cost,** types of costs and their interrelationship, importance of cost in managing farm business.
Module 4	• **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.
Module 5	• 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.
- Preparation of farm plan and budget, farm records and accounts.
- Collection and analysis of data on various resources in India.

Course Outcomes

- 1. Educates the concept of farm management, different terms, principles and laws of farm management, different types of farm, etc.
- 2. Develop understanding of various types of production function, decision making, cost, farm planning and budgeting, farm inventory, balance sheet, profit and loss accounts, etc.
- 3. Apply the different law and principles of farm management, relationship between factor and product, etc.
- 4. Evaluate the important issues in farm management etc.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	1	1	2	1	-	1	1	-	-	3	1	1	1
CO-2	1	1	-	1	-	1	2	-	-	2	1	1	1
CO-3	2	1	2	1	2	1	2	-	-	2	2	1	1
2CO-4	1	1	2	1	2	2	1	-	-	1	2	1	1
Average	1.3	1.0	1.5	1.0	1.0	1.3	1.5	-	-	2.0	1.5	1.0	1.0

Principles of Food Science and Nutrition 2(2+0)

Course Objectives:

1. To provide foundational knowledge about the principles of food science, including food composition, structure, and nutritional value of various foods.
2. To understand the basics of human nutrition, including essential nutrients, their functions, sources, digestion, absorption, metabolism, and dietary requirements.
3. To study the principles of food processing and preservation, including thermal processing, refrigeration, drying, fermentation, and packaging.
4. To promote awareness of food safety and quality standards, including hygiene, sanitation, food adulteration, and food labeling.
5. To enhance knowledge of dietary guidelines and nutrition planning, focusing on balanced diets, nutritional requirements for different age groups, and public health nutrition.
6. To familiarize students with the role of functional foods and nutraceuticals in promoting health and preventing diseases.

Theory

Module	Topic
Module 1	• Concepts of Food Science: Scope & Importance • Food, Food composition and chemistry
Module 2	• Food microbiology (definition, predominate micro organisms in food- bacteria, yeast & molds) • Food spoilage • Production of fermented foods
Module 3	• Probiotics and its applications • Food processing: principles and methods • Food preservation (use of heat, low temperature, chemicals, radiation, drying etc.) and its importance's
Module 4	• Nutrition and its classification • Nutritional disorders and Malnutrition (over and under nutrition)
Module 5	• Food Guides & Food groups, • Balanced/modified diets and Menu planning.

Course Outcomes

1. The students will be able to design storage structures for freshly harvested agricultural products in the field.
2. To gain knowledge on various management technologies on pre- harvest and post harvest of fruits and vegetables. Students are also expected to gain knowledge on conventional and modern packaging methods.
3. After completion of this course the students will be able to design and develop various equipment for preserving (use of heat, low temperature, radiation, drying etc) related to food processing.
4. The students will acquire knowledge of nutritional disorders, energy metabolism and novel technologies (HPP, ohmic heating, foam mat drying, HPLC, infrared drying) related to food science.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

Cos	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO -1	PSO -2	PSO -3	PSO -4
CO-1	1	1	2	1	-	1	1	-	-	3	1	1	1
CO-2	1	1	-	1	-	1	2	-	-	2	1	1	1
CO-3	2	1	2	1	2	1	2	-	-	2	2	1	1
2CO-4	1	1	2	1	2	2	1	-	-	1	2	1	1
Average	1.3	1.0	1.5	1.0	1.0	1.3	1.5	-	-	2.0	1.5	1.0	1.0

Agribusiness Management 3(2+1)

Course Objective:

1. Understand the Fundamentals of Agribusiness – Develop knowledge of key concepts, principles, and the economic significance of agribusiness in national and global markets.
2. Enhance Managerial and Entrepreneurial Skills – Equip students with essential business management skills, including marketing, finance, supply chain management, and risk assessment in the agricultural sector.
3. Explore Agricultural Value Chains – Analyze the role of production, processing, distribution, and retailing in the agribusiness supply chain to enhance efficiency and profitability.
4. Promote Sustainable and Technological Innovations – Understand the impact of sustainable farming practices, digital technologies, and policy frameworks on agribusiness growth and development.
5. Develop Decision-Making and Problem-Solving Abilities – Foster critical thinking and strategic planning skills to address challenges in agribusiness operations, market fluctuations, and policy changes.

Theory

Module	Topic
Module 1	• 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
Module 2	• 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. Constraints in establishing agro-based industries.
Module 3	• Agri-value chain. Understanding primary and support activities and their linkages. • Business environment: PEST & SWOT analysis.
Module 4	• Management functions: Roles & activities, Organization culture. • Planning, meaning, definition, types of plans. • Components of a business plan, Steps in planning and implementation.

Module 5	• Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. • Sales & Distribution Management. Pricing policy, various pricing methods.

Practical

- Study of agri-input markets: Seed, fertilizers, pesticides.
- Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD.
- Preparations of projects and Feasibility reports for agribusiness entrepreneur.

Course Outcomes

1. Comprehensive Understanding of Agribusiness Operations – Students will gain knowledge of the structure, functions, and management practices in the agribusiness sector.
2. Application of Business Strategies in Agriculture – Students will develop skills in marketing, financial management, and supply chain optimization for agribusiness enterprises.
3. Ability to Analyze and Solve Agribusiness Challenges – Students will be able to assess risks, market trends, and policy impacts to make informed business decisions in agriculture.
4. Entrepreneurial and Career Development Opportunities – Students will explore potential career paths and entrepreneurial ventures in agribusiness, including farm management, agro-processing, and agritech innovations.

Mapping of Course Outcomes, Program Outcome and Program Specific Outcome

COs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1	1	1	-	1	2	1	-	-	-	2	1	-
CO-2	1	2	2	-	-	1	1	-	-	1	-	-	1
CO-3	1	1	1	-	2	-	1	-	-	2	-	2	1
CO-4	1	2	1	-	1	2	1	-	-	1	1	1	2
Average	1.0	1.5	1.3	-	1.3	1.6	1.0	-	-	1.3	1.5	1.0	1.3

B.Sc. (Hons.) Agriculture

Semester-VII

S. No	Subject Code	Subject	Credit				Examination Marks Detail				
							External Exam	Internal Exam		Practical	Total
			L	T	P	Total		Internal Exam	Assignments		
1	RAWE & AIA	General orientation training by different faculties	0	0	14	14	-	-	-	800	800
		Village attachment/Unit attachment in Univ./ College. KVK/ Research Station Attachment									
		Agro-Industrial Attachment	0	0	6	6	-	-	-	200	200
		Project Report Preparation, Presentation Evaluation									
		Total	0	0	20	**20**	-	-	-	1000	**1000**

Rural Awareness Works Experience (RAWE) and Agro-Industrial Attachment (AIA)

It will consist of general orientation training by different faculties followed by village attachment/unit attachment in University/College/KVK or a Research station. The students will be attached with the agro-industries to get an experience of the industrial environment and working. Weightage in terms of credit hours/ Marks will be given depending upon the duration of stay of students in villages/agro-industries. At the end of RAWE/AIA, the students will be given one week for project report preparation, presentation and evaluation. The students would be required to record their observations and will prepare their project report based on these observations.

Subject Code	Subject Name
RAWE & AIA	General orientation training by different faculties
	Village attachment/Unit attachment in Univ./ College. KVK/ Research Station Attachment, Agro-Industrial Attachment
	Project Report Preparation, Presentation and Evaluation

B.Sc. (Hons.) Agriculture
Semester-VIII

S. No	Subject Code	Subject	Credit				Examination Marks Detail				
							External Exam	Internal Exam		Practical	Total
			L	T	P	Total		Internal Exam	Assignments		
1	AELP	Experiential Learning Programme (AELP-801-812)	0	0	10	10	-	-	-	400	400
		Viva Voice of ELP-1								100	100
		Experiential Learning Programme (AELP-801-812)	0	0	10	10	-	-	-	400	400
		Viva Voice of ELP-2					-	-	-	100	100
		Total	0	0	20	**20**	-	-	-	1000	**1000**

Experiential Learning Programme (ELP) will be undertaken by the students preferably during the VIII semester with a weightage of 0+20 credit hours. The students will register for **any of two modules (of 0+10 credit each) listed below**:

Subject Code	Topic	Credits			
		L	T	P	Total
AELP-801	Production Technology for Bio-agents and Bio-fertilizers	0	0	10	**10**
AELP-802	Seed Production and Technology	0	0	10	**10**
AELP-803	Mushroom Cultivation Technology	0	0	10	**10**
AELP-804	Soil, Plant, Water and Seed Testing	0	0	10	**10**
AELP-805	Poultry Production Technology	0	0	10	**10**
AELP-806	Hybrid Seed Production Technologies	0	0	10	**10**
AELP-807	Floriculture and Landscaping	0	0	10	**10**
AELP-808	Food Processing	0	0	10	**10**
AELP-809	Commercial Horticulture	0	0	10	**10**
AELP-810	Agriculture Waste Management	0	0	10	**10**
AELP-811	Organic Production Technology	0	0	10	**10**
AELP-812	Commercial Sericulture	0	0	10	**10**