



K.R. MANGALAM UNIVERSITY
THE COMPLETE WORLD OF EDUCATION

SCHOOL OF AGRICULTURAL SCIENCES

Programme Handbook

(Programme Structure and Evaluation Scheme)

Bachelor of Science (Hons.) in Agriculture

Programme Code: 82

FOUR YEAR UNDERGRADUATE PROGRAMME

Approved in the 34th Meeting of Academic Council Held on 29 June 2024

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Preface

1. Introduction

School of Agricultural Sciences, K R Mangalam University welcome to the Bachelor of Science in Agriculture, four year degree programme. This handbook is designed to guide you through the academic journey ahead and provide essential information about your course structure, policies, and opportunities during your studies. Agriculture is the backbone of many economies, and with a rapidly growing global population, the demand for innovative, sustainable agricultural practices has never been greater. As a student of agriculture, you are about to embark on a program that will not only deepen your understanding of farming systems but also equip you with the skills and knowledge needed to address pressing issues such as food security, climate change, and sustainable land management. This handbook serves as a roadmap for navigating the various academic, extracurricular, and professional opportunities available throughout your degree. The B.Sc. Agriculture curriculum is designed as per ICAR Vth Dean's Committee Report and to offer a comprehensive understanding of agronomy, horticulture, animal husbandry, soil science, plant breeding, and agricultural economics, among other fields. You will also be encouraged to gain hands-on experience through practical training, internships, and fieldwork, ensuring that your education is both theoretical and practical. It outlines the degree requirements, course descriptions, important policies, and the support systems in place to assist you. We hope this handbook will help you make the most of your time in the program and prepare you to contribute meaningfully to the future of agriculture.

University Vision and Mission

Vision

K.R. Mangalam University aspires to become an internationally recognized institution of higher learning through excellence in inter-disciplinary education, research, and innovation, preparing socially responsible life-long learners contributing to nation building.

Mission

- Foster employability and entrepreneurship through futuristic curriculum and progressive
- pedagogy with cutting-edge technology
- Instill notion of lifelong learning through stimulating research, Outcomes-based education, and innovative thinking

- Integrate global needs and expectations through collaborative programs with premier universities, research centres, industries, and professional bodies.
- Enhance leadership qualities among the youth having understanding of ethical values and environmental realities.

About School

School of Agricultural Sciences at K. R. Mangalam University is fully equipped with the facilities of laboratories and agriculture farms to carry out the Teaching, Practical, and Research work. All the faculty members are well qualified (Ph.D. in their respective fields) and well experienced. The faculty remains in constant touch with various experts in the relevant fields and is willing to experiment with the latest ideas in teaching and research. The School of Agricultural Sciences imparts students' technical knowledge, enhances their practical skill and ability, motivates them to think creatively, and helps them to act independently and make decisions accordingly in all their technical pursuits and other endeavors. It strives to empower its students and faculty members to contribute to the development of society and the Nation.

School Vision and Mission

Vision

To be an internationally recognized Agri-institute for agriculture education, research innovation, and Agri-entrepreneurship.

Mission

- Interdisciplinary approach, innovative pedagogy, stimulating research to foster Agri-based employability and entrepreneurship.
- Integrate global needs and expectations through collaborative programs with premier universities, research centers, industries, and professional bodies within India and abroad for global exposure & real-life work experience.
- Practicing cutting-edge-technologies, tools, techniques, practices, and processes in the field of agriculture
- Developing leadership, ethical values, and sensitivity to the environment.

About the Programme:

School of Agricultural Sciences on inception in the year 2019 has started the undergraduate Degree programme of B.Sc. (Hons.) in Agriculture. It is designed to impart theoretical and practical knowledge and extension work. The hands-on experience helps to enrich student's skills and competence, as required by the industries and farmers today. Realizing the potential of agricultural industry, rising food demands and in lined requirement of trained human resource, the course of B.Sc. (Hons.) Agriculture has been developed. The School of Agricultural Sciences provides knowledge on a wide array of agricultural sciences and its related areas. Students will gain fundamental skills and knowledge in agriculture and related domains. The programme focuses on developing professional capabilities, skills and competence required in the field of agriculture. The Courses are composed of theory classes and practical in labs as well as on agriculture farms. The students are exposed to farmers' fields and attached with the farmers in the villages and agri-based Industries. Lab's work, site visits, seminars, workshops and educational tours in different Indian Agriculture Universities along with excursion tours are aimed to develop conceptual and analytical abilities of students as well as giving them practical and real time experience. The students are being trained in Agri- based and entrepreneurial skills like Organic farming, Herbal and Medicinal plant cultivation, Protected cultivation, Bee-keeping, Mushroom cultivation and Value-added Fruit and Vegetable Products preparation.

Programme Outline

Programme curriculum distributed under the following parameters

I Year – Basic and Fundamentals

II Year – Principles and Methods (Technology)

III Year – Production System and Best Practices (For Encouraging Talent)

IV Year – Skills and Entrepreneurship Development (Case Studies, Live Projects, Trainings, and Internship)

Program Educational Objectives (PEOs): Programme Educational Objectives of a degree programme are the statements that describe the expected achievements of graduates in their career, and what the graduates are expected to perform and achieve during the first few years after graduation.

PEO 1: Encourage personal growth among students and boost their self-confidence, giving them opportunities to be an integral part of the agro-industry.

PEO 2: Successful agricultural professionals, entrepreneurs, administrators, and agri-industry

PEO 3: Ethical in conduct, good human in respect to good character.

Program Outcomes (PO); Programme Outcomes are statements that describe what the students are expected to know and would be able to do upon the graduation. These relate to the skills, knowledge, and

behavior that students acquire through the programme.

On completion of B. Sc (Hons.) Agriculture programme, the students will be: -

PO1: Acquiring in-depth knowledge of agriculture and its allied branches to apply packages of practices for crop cultivation.

PO2: Having the ability to solve agricultural problems with creativity.

PO3: Developing abilities to work successfully in a team with all the stakeholders of agricultural sectors.

PO4: Capable of dealing with people and resolving their interpersonal relationship issues.

PO5: Recognizing and meeting emerging challenges in the agriculture of global society in the 21st century and developing leadership and strong linkages in the agro-industrial setup.

PO6: Applying ethical principles, professional ethics, and norms of scientific practices.

PO7: Employing improved scientific know-how for raising the income of farmers with forestry, horticulture, poultry, organic farming, beekeeping, mushroom cultivation, through integrated farming systems, etc. so that the farming community might be contributing to Viksit Bharat.

PO8: Having the ability to design layouts, conduct experiments, analyse and interpret data.

PO9: Having good communication skills.

PO10: To develop critical opinions and approaches to solve the most important practical problems by applying modern technologies.

Programme Specific Outcomes (PSOs): Programme Specific Outcomes define what the students should be able to do at the time of graduation and they are programme specific. There are two to four PSOs for a programme.

On completion of B. Sc (Hons.) Agriculture programme, the students will be: -

PSO1: Understanding the concepts, theories, tools, techniques, models, methods, and principles in the agricultural sciences.

PSO2: Applying concepts/methodologies, theories, tools, techniques, models, and procedures in the packages of practices for sustainable crop cultivation and higher production.

PSO3: Evaluating complex conditions specific to agricultural problems, and conceptualization of agricultural issues.

PSO4 Developing innovative practices, processes, techniques, and technologies to meet the challenges in the agricultural & farming sectors.

PSO5: Evaluating modern practices and options for agricultural problems solutions.

Career Options:

Government Jobs in the State Department of Agriculture as Agricultural Development Officer, Agriculture Inspector, Horticulture Development Officer, District Horticulture Officer, Soil Conservator, Soil Testing Officer, Plant Protection Inspector, and Plant Protection Officer. Plant Protection Quarantines, National Dairy Institutes, and Jobs in the finance sector/institutes like Banks and NABARD as Agriculture Assistant, Agriculture Development Officer, and many more.

Jobs in Corporate sectors such as Food Corporation of India, State warehouses, fertilizer companies like IFFCO, NFL, National and State, Seed Companies like National Seed Corporation, Haryana Seed Development Corporation, Central State Farms, Indo-Israeli, Precision Farming projects. • Private Seed Companies like MAHYCO and Pioneer Seed Company Pesticide Companies like BAYER, HIL, SYNGENTA, DOW, CYNAMID INDIA LTD, LUPIN and Biotech International PVT Ltd, and many more.

Self-entrepreneurships as a business in agriculture inputs like Fertilizers, Seed, Pesticides, Mushroom cultivation, and high-value fruit crops production like Strawberry cultivation, Poultry, Piggery Farms, and Organic Farming etc., Jobs in National and International Universities/Institutions after PG as Scientist or Professor, Can Appear in all National and state competitive examinations, To excel in all above positions, it requires a high-level skill and competence in respective field, high standard personal grooming and presentation.

Programme Duration:

The minimum period required for the B.Sc. (Hons.) Agriculture programme offered by the university shall extend over a period of four Academic Years, i.e., 8 semesters. The Programme will be considered completed when the candidate has earned the minimum courses and credits required by the programme curriculum.

Eligibility Criteria:

Candidate must have passed 10+2 with 50% marks in PCB/PCM/ Agriculture with English as a compulsory subject from a recognized State or Central Board or Equivalent.

Eligibility Criteria for Award of Degree:

Degree Eligibility: For successful completion of programme, the students should secure a minimum of 183 credits at the end of the final year of the program.

Student's Structured Learning Experience

➤ Education Philosophy and Purpose:

- **Learn to Earn a Living:**

At KRMU we believe in equipping students with the skills, knowledge, and qualifications necessary to succeed in the job market and achieve financial stability. All the programmes are tailored to meet industry demands, preparing students to enter specific careers and contributing to economic development.

- **Learn to Live:**

The University believes in learners' holistic development, fostering critical thinking, creativity, emotional intelligence, and a deeper understanding of the world. Our aim is to nurture well-rounded individuals who can contribute meaningfully to society, lead fulfilling lives, and engage with the complexities of human experience.

➤ University Education Objective: Focus on Employability and Entrepreneurship through Holistic Education using Bloom's Taxonomy

By targeting all levels of Bloom's Taxonomy—remembering, understanding, applying, analyzing, evaluating, and creating—students are equipped with the knowledge, skills, and attitudes necessary for the workforce and entrepreneurial success. At KRMU we emphasize on learners critical thinking, problem-solving, and innovation, ensuring application of theoretical knowledge in practical settings. This approach nurtures adaptability, creativity, and ethical decision-making, enabling graduates to excel in diverse professional environments and to innovate in entrepreneurial endeavours, contributing to economic growth and societal well-being.

➤ Importance of Structured Learning Experiences

A structured learning experience (SLE) is crucial for effective education as it provides a clear and organized framework for acquiring knowledge and skills. By following a well-defined curriculum, teaching-learning methods and assessment strategies, learners can build on prior knowledge systematically, ensuring that foundational concepts are understood before moving on to more complex topics. This approach not only enhances comprehension but also fosters critical thinking by allowing learners to connect ideas and apply them in various contexts. Moreover, a structured learning experience helps in setting clear goals and benchmarks, enabling both educators and students to track progress and make necessary adjustments. Ultimately, it creates a conducive environment for sustained intellectual growth, encouraging learners to achieve their full potential. At K.R. Mangalam University SLE is designed as rigorous activities that are integrated into the curriculum and

provide students with opportunities for learning in two parts:

- Inside classroom teaching emphasizes a student-centric learning approach that prioritizes cognitive outcomes through active learning methods. Techniques such as discussions, presentations, demonstrations, use of web resources, group work, and use of multimedia tools foster engagement and critical thinking. By integrating diverse approaches, faculty members create an interactive environment that enhances understanding and retention of knowledge, preparing students for real-world applications.
- Outside classroom teaching enhances people skills and psychomotor skills through diverse activities in industry in terms of internships and apprenticeships, community outreach and programs, and outdoor and studio activities. Engaging in hands-on experiences, collaborative projects, and studio work fosters teamwork, communication, and practical application of knowledge. This experiential learning approach prepares students for real-world challenges and cultivates essential life skills.

➤ **Educational Planning and Execution: What, when and how learning will happen**

The Bachelor of Science in Agriculture programme is designed around the educational philosophy of "Learn to Earn Living" and "Learn to Live," providing a holistic learning experience from entry to exit.

Educational planning and execution in the B.Sc. (Hons.) Agriculture program centers on the philosophies of "Learn to Earn Living" and "Learn to Live," fostering a holistic educational experience. At the beginning of each academic year, a comprehensive academic and event calendar is developed, outlining key activities and milestones for the semesters ahead. Faculty members are selected based on their expertise and alignment with course objectives, ensuring high-quality instruction. As the academic year unfolds, the planned curriculum is executed with attention to engagement and skill development. Continuous monitoring and review processes are implemented to assess student progress and the effectiveness of teaching methods. Following these evaluations, necessary corrections are identified and made, promoting adaptive learning. This iterative process of planning, execution, review, and improvement enhances both academic experience and personal growth, preparing students for the challenges of the agriculture sector while instilling lifelong learning principles.

Co-Curricular and Extra-Curricular Activities

Students actively participate in 13 clubs and societies within the university, ranging from media production to cultural expression. These clubs facilitate peer interaction, teamwork, and leadership opportunities, helping students develop a well-rounded personality. Regular industry visits, guest lectures, and workshops by industry experts ensure that students remain connected to real-world media practices, bridging the gap between academic learning and professional expectations.

Community Connect

Community connects programmes enhance students' social awareness and responsibility, allowing them to engage with various societal issues. Participation in sports and cultural activities further contributes to a balanced lifestyle, promoting teamwork and resilience.

Ethics and Values

The programme places a strong emphasis on ethics, values, and a code of conduct. Students are encouraged to embody professionalism and integrity in their work, preparing them to be responsible communicators and active citizens.

Career Counselling and Entrepreneurship

Career counselling services provide guidance on job placements, internships, and skill development, helping students navigate their career paths. Additionally, the university's incubation centre fosters entrepreneurial and leadership qualities, encouraging students to explore innovative ideas and start their ventures.

➤ Course Registration

- Core, Electives, and Allied Sciences Selection – Every student has to register at the beginning of each semester for the courses offered in the given semester. Core and allied sciences courses (as per mentioned ICAR Vth Dean's Committee Report) are registered centrally for the students. However, for elective courses the students must register by themselves through ERP.
- Internships/Projects/Dissertations/Apprenticeships – Students will use to do summer internship, duration being 4-6 weeks per internship, during the summer breaks. In the seventh and eighth semesters students will do RAWE& AIA and ELP Projects. Projects are also mapped along with the Lab/ Practical Courses and Experiential Learning Activities.
- **Co-curricular / Extracurricular activities:** The School proactively organizes numerous co-curricular activities with a 360-degree exposure to various trends, helping to build diverse viewpoints. Participative Learning is inculcated through organising various co-curricular activities such as, guest lectures, webinars, seminars, Inter and Intra University competitions. Group discussions on social, national, and global issues. The university has 13 student lead societies/clubs like E-Yantra, Computer Society of India, Investment Club, Management Society, Mediaverse, Chetna Club, Model United Nations Club, DIA, Rhetoric Club, Cultural, Entrepreneurship, Sports club and 6 Centres of Excellence. Students are encouraged to become a part of these societies. These societies organize events year-round helping in overall development of the students. The university has sports, music, dance, dramatics, street play, art, photography and sports society to name a few allowing students an opportunity to explore their potential and pursue their interest. Presentations and Guest lectures by eminent and renowned national and international speakers from academia, industry and alumni are also conducted to provide opportunity exchange innovative ideas and for fostering analytical skills.

➤ **Academic Support Services (Differential learning needs):** Academic Support Services for Agriculture students are designed to cater to diverse learning needs, ensuring that every student fairs well. These services include:

- **Personalized Tutoring:** One-on-one sessions with experienced tutors focus on specific areas such as writing, hands-on trainings, field projects, event management, photography, video production, marketing, research projects and others tailored to individual skill levels.
- **Workshops and Seminars:** Regular workshops/seminars on topics like digital storytelling, production, media ethics, other experiential learning activities and industrial connect help students enhance their practical skills and theoretical understanding.
- **Peer Mentoring Programs:** Advance learner students mentor the students by becoming team leaders, providing guidance on course components, assignments and projects, fostering a supportive system.
- **Accessible Learning Resources:** Online platforms offer access to a range of resources, including video lectures, articles, and interactive tools, accommodating different learning styles.
- **Production and Outcome based activities:** Students are encouraged to get more involved in practical and hands-on based activities to come up with productivity which is showcased and appreciated. This way it gives a boost to the students.
- **Diversity and Inclusion Initiatives:** Programs aimed at promoting inclusivity ensure that all voices are heard and valued, enriching the learning environment.
- **Feedback and Assessment:** Continuous feedback mechanisms allow students to receive constructive review of their work, facilitating growth and improvement.

➤ **Student Support Services**

- **Mentor-Mentee:** The Mentor-Mentee Program is an essential component for fostering successful careers as it acts as a bridge between faculty and students. Mentor-mentee relationships often go beyond academic and professional growth at KRMU.
- **Counselling and Wellness Services:** Counselling and Wellness Services for agriculture students are designed to support their mental health and overall well-being in a demanding academic environment. These services include confidential individual counselling sessions, where trained professionals provide guidance on stress management, time management and personal challenges. Group therapy sessions and workshops focus on topics such as resilience, coping strategies and mindfulness, promoting a sense of community and shared experiences. The school conducts sessions on mental health awareness from time to time. Wellness initiatives may include fitness programs, relaxation activities and access to health resources that promote physical and mental health. By creating a supportive environment, these services help students navigate the pressures of their studies while fostering a balanced and healthy lifestyle.

- **Career Services and Training:** The Career Development Center (CDC) at KRMU provides comprehensive career services and training for Agriculture students, focusing on creating ample placement opportunities. In addition to inviting corporate recruiters to campus, the Centre hosts various counselling and training programs aimed at enhancing students' academic and professional skills. These programs equip students with the essential tools needed to secure lucrative careers in their field. Each year, prominent companies visit the KRMU campus, offering attractive job packages to emerging talent. The faculty members and the mentors also ensure that students are well-prepared for the competitive job market.

➤ **Assessment and Evaluation**

- **Grading Policies and Procedures** for theory courses, practical courses, projects, Internships, Dissertation: As per university examination policy of K R Mangalam University, the Program Outcome assessments is done by aggregating both direct and indirect assessments, typically assigning 80% weightage to direct assessments and 20% to indirect assessments, to compute the final course attainment.
- **Feedback and Continuous Improvement Mechanisms:** Teaching-learning is driven by outcomes. Assessment strategies and andragogy are aligned to course outcomes. Every CO is assessed using multiple components. The attainment of COs is calculated for every course to know the gaps between the desired and actual outcomes. These gaps are analyzed to understand where does the student lags in terms of learning levels. Thereafter each student's learning levels are ascertained, if found below desirable level, and intervention strategy is affected in the following semester to make necessary corrections. To cater to the diverse learning needs of its student body, K.R. Mangalam University employs a comprehensive assessment framework to identify both slow and advanced learners. Students' learning levels are continually assessed based on their performance at various stages. If a student's performance in internal assessments falls below or equal to 55%, they are categorized as slow learners. Conversely, if a student's performance score in internal assessments is greater than or equal to 80%, they are identified as advanced learners. Such students are encouraged to participate in advanced learning activities. Through periodic evaluations and the utilization of modern management systems, the institution adeptly tracks students' performance across various courses, allowing for targeted interventions and support mechanisms.
- **Academic Integrity and Ethics:** The School of Agricultural Sciences places a strong emphasis on academic integrity and ethics, fostering a culture of honesty and responsibility among students. Clear guidelines are established to educate students about the importance of plagiarism prevention, proper citation practices, and ethical sourcing in their work. Regular Hands-on Trainings, Kisan Mela, Industrial Visit, Field Projects Extension Activities workshops and seminars are conducted to discuss case studies and real-world scenarios, encouraging critical thinking about ethical dilemmas in journalism and media. Faculty members serve as role models, promoting transparency and accountability in their interactions and evaluations. By instilling these

values, the school prepares students to uphold high ethical standards in their professional careers, emphasizing the critical role that integrity plays in the agricultural professional.

Programme Total Credits

Batch 2024-28

Semester	Courses	Credits
Semester I	11	24
Semester II	9	24
Semester III	9	23
Semester IV	10	22
Semester V	10	24
Semester VI	11	24
Semester VII	RAWE (Village attachment+ Plant Clinic) & AIA	20
Semester VIII	2 MODULES OF ELP	20
Education Tour		2
Total		183

SOAS		B.Sc. (Hons.) Agriculture, Course Structure 2024-28													
YEAR	FIRST SEMESTER							SECOND SEMESTER							
	S. No	COURSE CODE	COURSE TITLE	L	T	P	C	COURSE CODE	COURSE TITLE	L	T	P	C		
FIRST	1	ASAG101	Fundamentals of Horticulture	1	0	2	2	ASAG102	Fundamentals of Genetics	2	0	2	3		
	2	ASAG103	Fundamentals of Plant Biochemistry and Biotechnology	2	0	2	3	ASAG104	Agricultural Microbiology	1	0	2	2		
	3	ASAG105	Fundamentals of Soil Science	2	0	2	3	ASAG106	Soil and Water Conservation Engineering	1	0	2	2		
	4	ASAG107	Introduction to Forestry	1	0	2	2	ASAG108	Fundamentals of Crop Physiology	1	0	2	2		
	5	ASAG113	Comprehension & Communication Skills in English	1	0	2	2	ASAG110	Fundamentals of Agricultural Economics	2	0	0	2		
	6	ASAG115	Fundamentals of Agronomy	3	0	2	4	ASAG112	Fundamentals of Plant Pathology	3	0	2	4		
	7	ASAG109 or ASAG111	Basics Of Mathematics OR Introductory Biology (Optional)	2 1	0 0	0 2	2 2	ASAG114	Fundamentals of Entomology	3	0	2	4		
	8	ASAG117	Agricultural Heritage*	1	0	0	1	ASAG116	Fundamentals of Agricultural Extension Education	2	0	2	3		
	9	ASAG119	Rural Sociology & Educational Psychology	2	0	0	2	ASAG118	Communication Skills and Personality Development	1	0	2	2		
	10	ASAG121	Human Values & Ethics **	1	0	0	1								
	11	ASAG123	NSS/NCC/ Physical Education & Yoga Practices**	0	0	4	2								
	TOTAL			16 or 15	0	8 or 9	24	TOTAL			16	0	8	24	
SECOND	1	ASAG201	Crop Production Technology-I (<i>Kharif</i> Crops)	1	0	2	2	ASAG202	Crop Production Technology –2 (<i>Rabi</i> Crops)	1	0	1	2		
	2	ASAG203	Fundamentals of Plant Breeding	2	0	2	3	ASAG204	Production Technology for Ornamental Crops,	1	0	1	2		

								MAP and Landscaping					
3	ASAG205	Farm machinery and Power	1	0	2	2	ASAG206	Renewable Energy and Green Technology	1	0	1	2	
4	ASAG207	Production Technology for Vegetable and Spices	1	0	2	2	ASAG208	Problematic Soils and their Management	2	0	0	2	
5	ASAG209	Agricultural Finance and cooperation	2	0	2	3	ASAG210	Production Technology for Fruit and Plantation Crops	1	0	2	2	
6	ASAG211	Agri- Informatics	1	0	2	2	ASAG212	Principles of Seed Technology	1	0	4	3	
7	ASAG213	Environmental Studies and Disaster Management	2	0	2	3	ASAG214	Farming System & Sustainable Agriculture	1	0	0	1	
8	ASAG215	Statistical Methods	1	0	2	2	ASAG216	Agricultural Marketing Trade & Prices	2	0	2	3	
9	ASAG217	Livestock and Poultry Management	3	0	2	4	ASAG218	Introductory Agro-meteorology & Climate Change	1	0	2	2	
							ASAG221-ASAG232	Select One Course from the list of Elective (Table 1)	2	0	2	3	
TOTAL			14	0	9	23	TOTAL		13	0	9	22	
THIRD	1	ASAG301	Principles Of Integrated Pest And Disease Management	2	0	2	3	ASAG302	Disease Of Field And Horticultural Crops And Their Management-II	2	0	2	3
	2	ASAG303	Manures, Fertilizers And Soil Fertility Management	2	0	2	3	ASAG304	Rainfed Agriculture And Watershed Management	1	0	2	2
	3	ASAG305	Pests Of Crops And Stored Grains And Their Management	2	0	2	3	ASAG306	Post-Harvest Management And Value Addition Of Fruits And Vegetables	1	0	2	2
	4	ASAG307	Diseases Of Field & Horticultural Crops And Their Management I	2	0	2	3	ASAG308	Protected Cultivation And Secondary Agriculture	1	0	2	2

	5	ASAG309	Crop Improvement - 1 (<i>Kharif</i> Crops)	1	0	2	2	ASAG310	Management Of Beneficial Insects	1	0	2	2
	6	ASAG311	Entrepreneurship Development And Business Communication	1	0	2	2	ASAG312	Crop Improvement-Ii (Rabi Crops)	1	0	2	2
	7	ASAG313	Geo-Informatics, Nanotechnology And Precision Farming	1	0	2	2	ASAG314	Practical Crop Production-II (Rabi Crop)	0	0	4	2
	8	ASAG315	Intellectual Property Rights	1	0	0	1	ASAG316	Principle Of Organic Farming	1	0	2	2
	9	ASAG317	Practical Crop Production - I (<i>Kharif</i> Crops)	0	0	4	2	ASAG318	Farm Management, Production And Resource Economy	1	0	2	2
	10	ASAG221- ASAG232	Elective (List Attached Table-1)	2	0	2	3	ASAG320	Principles Of Food Science And Nutrition	2	0	0	2
								ASAG221- ASAG232	Select One Course from the list of Elective (Table 1)	2	0	2	3
	TOTAL			14	0	10	24	TOTAL		13	0	11	24
FOURTH	1	ASAG401	General Orientation and training by different faculties/Village attachment/Unit attachment in Univ. / College. KVK/ Research Station attachment, Component-I	0	0	-	14	ASAG402- ASAG424 (List attached Table-2)	Course I	0	0	-	14
	2	ASAG403	Agro-Industrial attachment/Plant clinic /Project report preparation, presentation and evaluation, Component- II	0	0	-	6	ASAG402- ASAG424 (List attached Table-2)		0	0	-	06
	TOTAL			0	0	0	20	TOTAL		0	0	0	20
Education Tour										0	0	2	2
TOTAL CREDITS										183			

Table-1
ELECTIVE COURSES

Elective Courses: A student can select three elective courses out of the following which will be offered during the **4th, 5th, and 6th** semesters.

Sr. No.	ASAG221	Agribusiness Management	L	T	P	C
1.	ASAG222	Agrochemicals	2	0	2	3
2.	ASAG223	Commercial Plant Breeding	2	0	2	3
3.	ASAG224	Landscaping	2	0	2	3
4.	ASAG225	Food Safety and Standards	2	0	2	3
5.	ASAG226	Bio-pesticides & Bio-fertilizers	2	0	2	3
6.	ASAG227	Protected Cultivation	2	0	2	3
7.	ASAG228	Micro-propagation Technologies	2	0	2	3
8.	ASAG229	Hi-tech. Horticulture	2	0	2	3
9.	ASAG230	Weed Management	2	0	2	3
10	ASAG231	System Simulation and Agro-advisory	2	0	2	3
11	ASAG232	Agricultural Journalism	2	0	2	3
12	ASAG221	Agribusiness Management	2	0	2	3

Table-2

Students will opt any two courses in the 8th Semester						
Sr. No.	Course Code	Course Title	L	T	P	C
1.	ASAG402	Commercial Beekeeping	0	0	20	10
2.	ASAG404	Commercial Sericulture	0	0	20	10
3.	ASAG406	Production Technology for Bio-agents And Bio-fertilizers	0	0	20	10
4.	ASAG408	Commercial Horticulture	0	0	20	10
5.	ASAG410	Floriculture And Landscaping	0	0	20	10
6.	ASAG412	Food Processing	0	0	20	10
7.	ASAG414	Mushroom Cultivation Technology	0	0	20	10
8.	ASAG416	Seed Production and Technology	0	0	20	10
9.	ASAG418	Organic Production Technology	0	0	20	10
10	ASAG420	Soil, Plant, Water and Seed Testing	0	0	20	10
11	ASAG422	Poultry Production Technology	0	0	20	10
12	ASAG424	Agriculture Waste Management	0	0	20	10

Semester-I

Course Code	Course Title	L	T	P	C
ASAG101	Fundamentals of Horticulture	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Understand the importance and scope of horticulture.

CO 2. Applying plant propagation methods.

CO 3. Analyzing the cultivation package and practices of vegetables and fruits.

CO 4. Planning, layout and management of orchard.

CO 5. Application of and bio-regulators.

Course Perspective: Fundamentals of Horticulture is a foundational course designed to provide students with essential knowledge on the basic principles and practices of horticulture. It encompasses the study of cultivating fruits, vegetables, flowers, and ornamental plants, as well as understanding plant growth, development, and care. The students shall learn about key aspects such as plant propagation, soil health, irrigation, pruning, plant nutrition, and bioregulators to improve quality and higher production of fruits and vegetables. The subject aims to equip students with the skills required to enhance the quality, yield, and sustainability of horticultural crops. It emphasizes practical applications, including the layout and design of gardens, orchards, and promotes sustainable horticultural practices to address current environmental and market demands so that students will be able to contribute to the development and management of efficient and profitable horticultural systems.

Course Contents

Unit –1

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

Unit -2

Plant propagation methods and propagating structures; Seed dormancy, Seed germination.

Unit -3

Principles of orchard establishment; Principles and methods of training and pruning, chilling requirement, bud dormancy, juvenility, flower bud differentiation, fruit development and fruit

ripening; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy.

Unit -4

Importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

Practicals:

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

Suggested Readings:

Textbooks

1. Bose, T. K., Mitra, S. K., & Sanyal, D. (2002). *Fruits: Tropical and Subtropical* (Vols. I & II). Naya Udyog.

Reference Book

2. Reiley, E. H., & Shry, C. L., Jr. (2006). *Introductory horticulture*.
3. Muthukumar, P., & Selvakumar, R. (2017). *Glaustas horticulture*. Agrobios.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG103	Fundamentals of Plant Biochemistry and Biotechnology	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Understand the chemical aspects of life at molecular life

CO 2. Learn the structure and functional aspects of important biomolecules

CO 3. Understand the mechanism of enzymatic reactions

CO 4. Analyze physiological details of carbohydrate metabolism

CO 5. Analyze biochemical nature of nucleic acids, their role in living systems

Course Perspective: : Foundational understanding of the biochemical processes in plants, including photosynthesis, respiration, and nutrient metabolism is quite important for an agriculture student for crop improvement. It also introduces students to the concepts and techniques of biotechnology, focusing on genetic engineering, tissue culture, and molecular biology. The integration of biochemistry and biotechnology in crop improvement, enhancing yield, and developing resistance to biotic and abiotic stresses is emphasized.

Course Contents

Unit –1

Importance of Biochemistry. Properties of water, pH and buffer. Carbohydrate: importance and classification. Structures of mono-saccharides, disaccharides, and polysaccharides. Lipid: importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: structural organization and classification of proteins.

Unit –2

Enzymes: general properties and classification, titration and zwitterions nature of amino acids; Michaelis & Menten and Line Weaver Burk equation; Introduction to allosteric enzymes. Nucleic acids: Importance and classification; A, B & Z DNA; RNA. Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids

Unit –3

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

Unit –4

Introduction to recombinant DNA methods: physical (gene gun method), chemical (PEG mediated) and *Agrobacterium-mediated* gene transfer methods; Transgenics and its importance in crop

improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Biotechnology regulations.

Practical

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

Suggested Readings:

Textbooks

Text Books

1. Lehinger Principles of Biochemistry by Nelson, David L.; Cox, Michael M.

Reference Book

2. Biochemistry by Satyanarayana, U ; Chakrapani, U
3. Advances in Biochemistry and Biotechnology by Balwan, Wahied Khanwar; Verma, A.K
4. Fundamentals Of Plant Biotechnology and Pathology by Saba Hussain
5. Plant Biotechnology by Pandey, Poonam
6. Introduction to Plant Biotechnology by Chawla, H.S
7. Plant Biotechnology : Textbook by Khurana, S.M.Paul

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG105	Fundamentals of Soil Science	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1 Understand the soil genesis and how the rocks are forming in the soil..

CO-2 Understand the soil structure and texture during forming with their porosity.

CO- 3 Understand the soil reaction-pH, acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids - inorganic and organic.

CO-4 Illustrate the macro and micro-organism availability in the soil and they are polluted the soils.

CO-5 Determine of soil fertility and physico-chemical analysis viz. Organic carbon, pH, EC etc.

Course Perspective: This course introduces students to the basic concepts of soil science, including the origin, formation, and classification of soils, as well as the physical, chemical, and biological properties that influence soil behavior and its role in plant nutrition. It also covers the principles of soil fertility, soil management, and the sustainable use of soil resources in agriculture. Special emphasis is placed on understanding soil's interaction with water, nutrients, and organic matter, and its importance in sustainable farming practices.

Course Contents

Unit- 1

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: Elementary knowledge of soil taxonomy classification and soils of India; soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil.

Unit- 2

Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistency and plasticity; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant

growth.

Unit- 3

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

Unit- 4

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

Practical

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

Suggested Readings:

Textbooks

1. Biswas, T.D. and Mukherjee, S.K. 2001. Text Book of Soil Science. Tata McGraw Hill Publishing Co., New Delhi

Reference Book

2. Das.D.K, 1997. Introductory Soil Science. Kalyani Publishers, New Delhi.
3. Foth, H.D. and Turk, L. M. 1972. Fundamental of Soil Science. 5th Edn. Wiley Eastern Pvt.Ltd., New Delhi
4. Gupta, P.K. 2007. Soil, Plant, Water and Fertilizer Analysis. Published by PROBIO (India), Jodpur

5. Tolanur, Shivanand, Fundamentals of Soil Science, CBS, Delhi.
6. Pal, Susanta, Kumar, Textbook of soil Science, CBS, Delhi.
7. Rao, N. S. Subba, Soil Microbiology: Soil Microorganisms and Plant growth. CBS, Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG107	Introduction to Forestry	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On course completion students will be:-

CO-1. Identify major species of trees and their characteristics

CO-2. Understand the importance of forests

CO-3. Use to handling forest mensuration instruments.

CO-4. Analyze interrelationships between trees and environmental factors

CO-5. Applying methods of height measurement of trees

Course Perspective: Introduction to Forestry is a course designed to provide foundational knowledge about the science and management of forests. It covers key concepts related to the ecology, conservation, and sustainable management of forest resources. Students will learn about forest types, tree species and the role of forests in maintaining biodiversity, regulating climate, and supporting livelihoods. The course also focuses on forest management techniques, including afforestation, reforestation, agroforestry, and silviculture practices. It highlights the importance of forests in the global economy, their contribution to rural and urban environments, and their role in mitigating environmental issues such as deforestation and soil erosion. By the end of the course, students will have a solid understanding of how to manage forests sustainably, balancing the needs for conservation, timber production, and other forest resources with environmental stewardship.

Course Contents

Unit –1

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies.

Unit –2

Forest regeneration, Natural regeneration -natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; artificial regeneration – objectives, the choice between natural and artificial regeneration, essential preliminary considerations. Crown classification.

Unit –3

Tending operations – weeding, cleaning, thinning –mechanical, ordinary, crown, and advanced thinning. Forest mensuration – objectives, 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; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

Unit –4

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

Practical:

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

Suggested Readings:

Textbooks

1. Subba Rao, N.S. 1999 .Biofertilizers in Agricultural and Agro forestry .Oxford and IBH , New Delhi.

Reference Book

2. Dwivedi; A.P., Agroforestry Principles and Practices
3. Chundawat, B.S. Gautam, S.K. Textbook of Agroforestry
4. L. De Vere Burton, Introduction to Forestry Science
5. S. R. Reddy (Introduction to Forestry

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Component s	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG113	Comprehension & Communication Skills in English	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: In building confidence and speaking confidently.

CO2: Improve communication activities in functional and situational contexts

CO3: Enhance the language skills of reading, writing,

CO4: Understanding the listening and speaking through real-life and professional situations.

Course Perspective: This course aims to enhance students' comprehension and communication abilities in English, with an emphasis on reading, writing, listening, and speaking skills. It focuses on developing proficiency in academic and professional communication, including report writing, presentations, and effective verbal and non-verbal communication. The course also encourages critical thinking, the ability to comprehend technical texts, and the development of formal writing skills essential for the agricultural sector.

Course Contents

Unit –1

Reading Comprehension: War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond, B. Fosdick. You and Your English – Spoken English and Broken English by G.B. Shaw.

Unit –2

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

Unit –3

Functional grammar: Articles, Prepositions, Verb, Subject-verb Agreement, Transformation, Synthesis, Direct and Indirect Narration.

Unit –4

Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing.

Practical

Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice and Attitude Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Presentation Skills: Types of presentation, Strategies of Presentation, Making presentations. Mock Interviews and Group Discussion: testing initiative, team spirit, leadership, intellectual ability, Group discussion practice.

Suggested Readings:

Textbooks

1. Bhaskar, W.W.S. and Prabhu, N.S., English Through Reading, Publisher MacMillan, 1978

Reference Book

2. Business Correspondence and Report Writing” -Sharma, R.C. and Mohan K. Publisher: Tata Mc Graw Hill1994
3. Business Communication-K.K.Sinha
4. Essentials of Business Communication by Marey Ellen Guffey, Publisher: Thompson Press

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG115	Fundamentals of Agronomy	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO1 Able to define agronomy, outlines its history, and explains its significance in modern agriculture.

CO2 Analyze different crop classifications based on criteria such as life span, seed size, root depth, and water requirements, and apply this knowledge to recommend appropriate crops for specific agro-ecological conditions.

CO3 Evaluate soil health and fertility factors, assess their impact on crop productivity, and design management strategies for degraded soils.

CO4 Develop a comprehensive cropping system plan incorporating the appropriate use of manures and fertilizers, including timing and methods of application, tailored to the nutrient requirements of major crops in Haryana.

Course Perspective: This course provides a comprehensive overview of agronomy, covering its definition, history, and significance in agriculture. Students will explore crop classification based on various criteria, seed characteristics, and multiplication techniques. The curriculum emphasizes soil fertility, productivity, and management practices, alongside an analysis of cropping systems and patterns. Practical aspects such as the use of manures and fertilizers, including their nutrient content and application methods for major crops in

Haryana, are also addressed, equipping students with essential knowledge for effective crop production.

Course Contents

Unit- 1

Definition, history and importance of agronomy, meaning and scope of agronomy, Classification of crops according to agronomy, seasonal, life span, seed size, root depth, and water requirement etc. National and international agricultural research institutes in India and abroad

Unit- 2

Characteristics of good seed, its type and multiplication, crop growth rate, yield attributes factors affecting them, agronomic principal involved in crop production, tilth and tillage, its importance, objective and its requirements for major crops of Haryana

Unit 3

Soil fertility and productivity, their importance in crop production. Factors affecting soil health, management of degraded soils

Unit- 4

Cropping system, cropping pattern, farming systems, Manures and fertilizers, time and method of application, Nutrient content of different fertilizers, and fertilizer requirement estimation of major crops of Haryana

Practical:

Study of primary and secondary tillage implements, ploughing, puddling and soil preparation, seeding equipment, methods of sowing, study of inter cultivation implements, identification of crops (rabi, kharif or both), weeds and their seeds, seed test for purity, germination and moisture content, calculation of seed rate, identification of simple and complex fertilizers their nutrient composition.

Suggested Readings:

Textbooks

1. Gopal, De, Chandra. Fundamentals of Agronomy, CBSPD, Delhi.

Reference Book

2. Reddy. T.Y and Reddy, G.H.S.1995. Principles of Agronomy, Kalyani Publishers, Ludhiana.
3. Varshneya, M.C. and Balakrishna Pillai, B. 2003. Textbook of Agricultural Meteorology. ICAR, NewDelhi.
4. Upadhyay, P.K . 2022. Principles of Seed Technology, Kalyani Publishers, Ludhiana.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG109	Introductory Biology*	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Understand the characteristics of living organisms

CO 2. Understand the concept of origin of life

CO 3. Know the basis of evolution

CO 4. Learn the morphological features of plants

CO 5. Understand the distinguishing features of angiosperm families.

Course Perspective: This course introduces the fundamental concepts of biology, including the characteristics of living organisms, cell structure and function, biological diversity, genetics, evolution, and ecology. It provides students with the necessary knowledge to understand the basic processes that govern life and prepares them to apply these concepts in agricultural science.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

Morphology of flowering plants. Seed and seed germination.

Unit –4

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

Practical

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

Suggested Readings:

Textbooks:

1. A.C. Dutta: Text Book of Botany (Latest Ed.). Oxford University Press- India, 2000.

Reference Book

2. Vidyarthi: Text Book of Botany Part – I. S. Chand and Company, New Delhi, 2002.
3. Introductory Biology by Dr. Anil Kumar Chaudhary, Dr. Bhupendra Kumar Tripathi. Rama Publishing House.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG111	Elementary Mathematics	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Understanding basics of algebra, Matrices, Trigonometry and calculus

CO2: Coordinated geometry

CO3: Draw slope of a line, forms of the equation of a line,

CO4: Analyzing trigonometric ratios

Course Perspective: This course introduces basic mathematical concepts and their applications in agriculture. It covers algebraic operations, equations, functions, trigonometry, and basic calculus. The course emphasizes problem-solving techniques and their use in analyzing data, optimizing resources, and improving decision-making in agricultural practices.

Course Contents

Unit-1

Algebra: Properties of determinants up to 3rd order and their evaluation. Definition of matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order and their properties.

Unit-2

Co- ordinate geometry: Distance between two points, Slope of a line, various forms of the equation of a line, angle between two lines.

Unit 3

Trigonometry: Trigonometric ratios of five standard angles; allied angles, Addition and subtraction formulae, sum and product formulae. t-ratios of multiple and sub –multi pleangles.

Unit-4

Calculus: Differentiation of x^n , e^x , $\sin x$, $\cos x$ from first principle, Derivative of sum, difference, product and quotient of two function, Differentiation of function of function, logarithmic, substitution, inverse Trigonometric ratios of five standard angles; allied angles, integration by substitution and by parts; definite integrals properties.

Suggested Readings:

Textbooks:

1. Algebra by D. C. Kapoor and GurbaxSingh

Reference Book

2. Algebra by T. N. Nagpal and K. K.Gupta.
3. Trigonometry by Jiwan

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG117	Agricultural Heritage	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Explain the relevance of Indian agricultural heritage and its impact on present-day agriculture

CO2 Understand the journey of Indian agriculture from the past to the modern era.

CO3 Identify and assess the role of indigenous traditional knowledge in plant production and protection.

CO4 Predict future trends in Indian agriculture based on the current scenario and suggest improvements.

Course Perspective: This subject has been designed to impart knowledge regarding the rich and diverse heritage of Indian agriculture, its evolution from ancient practices to modern techniques, and the relevance of traditional knowledge in contemporary farming. The course will explore the scope of agriculture, its significance in India, and the resources crucial to its development, such as land, irrigation, labor, and capital.

Unit -1

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

Unit -2

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

Unit -3

Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India i.e. land, irrigation, labour, capital etc.

Unit -4

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

Suggested Readings:

Textbooks

1. Husain, M. 1996. Systematic Agricultural Geography. Rawat Publications, Jaipur.

Reference Book

1. Reddy, S. R. 2018. Agriculture Heritage. Kalyani Publication.
2. Giri, U. and Md, Hedayetullah. 2020. Textbook of Agricultural Heritage. Scientific Publishers.
3. M.M. Adhikary. 2019. Textbook of Agricultural Heritage. Astral Publication.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG119	Rural Sociology and Educational Psychology	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 define the concepts of sociology, rural sociology, and their significance in agricultural extension

CO2 explain the structure of rural society, including social groups, ecology, and stratification.

CO3 demonstrate the application of educational psychology in social change and development.

CO4 Analyze the role of different domains in behavior, personality development, and motivation.

Course Perspective: This course provides insights into rural social structures, social change, and the role of sociology in agricultural extension. It integrates educational psychology, focusing on behavior, personality, learning, and motivation. This knowledge equips students to design effective agricultural extension programs that address both social and psychological needs in rural communities.

Course Contents

Unit –1

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension

Unit –2

Social Ecology, Rural society, Social Groups, Social Stratification

Unit-3

Culture concept, Social Institution, Social Change & Development. Educational psychology: Meaning & its importance in agriculture extension.

Unit –4

Behavior- Cognitive, affective, psycho-motor-domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

Suggested Readings:

Textbooks

1. Desai A. R, 2003, Rural Sociology in India. Popular Parkasan,Bombay.

Reference Book

2. Mondal, S. 2017. Textbook of Rural Sociology & Educational Psychology. Kalyani Publication.
3. Bisarya, S.S. and Shreya Tiwari. Fundamentals of Rural Sociology & Educational Psychology. Notion Press Publisher.
4. Sharma, O.P. and Somani, L.L. 2019. Fundamentals of Rural Sociology & Educational Psychology. ATPA Publishers.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG121	Human Value and Ethics	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1. Define values, ethics, and human aspirations.

CO2. Explain self-exploration and selfless service for ethical success.

CO3. Understand the relationship between body, mind, soul, and human relations.

CO4. Apply ethical decision-making in professional and personal life.

Course Perspective: The Human Values and Ethics course is designed to nurture personal and professional development through a deeper understanding of values, principles, and ethics. The content is crafted to cultivate a sense of self-awareness, responsibility, and integrity, aiming to build a holistic personality that balances individual

aspirations with the welfare of society.

Course Contents

Unit-1

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Universal Human Aspirations, Fundamental Values.

Unit-2

Self-Exploration. Self-Awareness. Self -Satisfaction. Decision Making. Motivation. Sensitivity. Sensitize others particularly senior citizens and developmentally challenged, Success. Selfless Service. Case Study of Ethical Lives.

Unit-3

Rights and responsibilities. Ethics: professional, Road safety concept Team volunteering, manage anger and stress Spirituality and positive attitude.

Unit-4

Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Humans relations and family harmony

Suggested Readings:

Textbooks

1. Dhaka, B.L., Kirti. And Ojha, P.K. 2022. Human Values And Ethics. Kalyani Publication.

Reference Book

2. Madhuri Joshi. 2018. Human Values And Ethics. Kalyani Publication.

Course Code	Course Title	L	T	P	C
ASAG123	NSS/NCC/Physical Education& Yoga Practices	0	0	4	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1- Describe the role and scope of NSS/NCC/Yoga program activities

CO2- Understand the community mobilization, Social harmony and national integration

CO3- Organize various social activities

CO4- Analyze the role citizenship, constitution and human right

Course Perspective: This course aims to develop students' physical fitness, leadership qualities, and social awareness through a combination of practical activities, yoga, and community service initiatives. Students will learn about the significance of physical education, the principles of yoga, and the values of service and discipline fostered by NSS and NCC. The course encourages holistic development, promoting a healthy lifestyle and active citizenship.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

SEMESTER-II

Course Code	Course Title	L	T	P	C
ASAG102	Fundamentals of Genetics	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course outcome: On completion of course, student will be: -

CO 1. Understanding the concepts and principles of mendelian inheritance

CO 2. Analyze the chromosome structure and cell division of eukaryotic and prokaryotic organisms.

CO 3. Understanding the structure and function of genetic material.

CO 4. Use of haploids, diploids and mutation.

CO 5. Understanding of the concept of the genes, genetic disorders and their characteristics.

Course Perspective: This course covers the essential concepts of genetics, focusing on the structure, function, transmission, and variation of genetic material. It aims to provide students with a foundational understanding of both classical and molecular genetics, including the application of genetics in crop improvement and breeding programs. The course also explores modern genetic techniques and technologies used in agricultural research and practices.

Course Contents

Unit –1

Pre and Post Mendelian concepts of heredity and Mendelian principles of heredity. Architecture of chromosomes i.e. chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction, and telomere; special types of chromosomes and Chromosomal theory of inheritance.

Unit –2

Cell cycle and cell division- mitosis and meiosis. Probability and Chi-square Test. Dominance relationships and Epistatic interactions with example. Multiple alleles, pleiotropism and pseudo alleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics.

Unit –3

Linkage and its estimation, crossing-over mechanisms and chromosome mapping. Structural and numerical variations in chromosomes and their implications, Use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique and mutagenic agents. Qualitative & Quantitative traits, Polygenes and continuous variations and multiple factor hypotheses.

Unit –4

Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept:

Gene structure, function and regulation, Lac and Trp operon.

Practical

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

Suggested Readings:

	Text Books
1.	Gupta, P. K. 2007. Cytogenetics Rastogi Publishers, Meerut
	Reference Book
2.	Phundan Singh 1995, Elements of genetics Kalyani Publishers, Ludhiana
3.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
4.	Singh B. D., Genetics. Kalyani publisher, New Delhi.
5.	Winchester A M 1967 Genetics (3 rd edn)Oxford and IBH Publishing Co New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG104	Agricultural Microbiology	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understanding the microscopy and their handling techniques and staining procedures.

CO-2 Prepare the culture media and their applications and also understand various physical and chemical means of sterilization.

CO-3. Understand the role of microbes in soil fertility and crop production.

CO-4. Develop an understanding about the beneficial effect of soil microorganisms on plant community.

CO-5. Understand the nutrient sources and cycles.

Course Perspective: This course provides an understanding of the microbial world and its impact on agriculture. Students will learn about the various types of microorganisms, their functions, interactions with plants and soil, and their applications in agricultural practices. The course emphasizes the importance of microorganisms in soil health, nutrient cycling, disease suppression, and biocontrol.

Course Contents

Unit –1

Introduction to microbial world: Prokaryotic and eukaryotic microbes.

Unit –2

Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: genetic recombination transformation, conjugation and transduction, plasmids, transposon.

Unit –3

Role of microbes in soil fertility and crop production: Carbon, nitrogen, phosphorus and sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, bluegreen algae and mycorrhiza. Rhizosphere and phyllosphere.

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Pelczar MJ, Chan ECS and Kreig NR, 1998, Microbiology. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
	Reference Book
2.	Stanier RY, Ingraham, Wheelis MG and Paintor PR, 1986, The Microbiology World, Prentice Hall, New Jersey.
3.	Tauro P, Kapoor KK and Yadav KS, 1989, An Introduction to Microbiology, Wiley Publications, New Delhi.
4.	Alexander M, 1985, Introduction to Soil Microbiology, John Wiley and Sons , New York.
5.	Subba Rao, NS, 1999, Biofertilizers in Agricultural and Agroforestry, Oxford and IBH, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term	Progressive	End Term
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		Examination	Evaluation	Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG106	Soil and Water Conservation Engineering	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO-1 Analytical methods of soil, plant, water and seed testing.

CO-2 Understand the use of pH, EC, Spectrophotometer and Flame photometer etc.

CO-3 Interpretation values of soil, plant and water to standards.

CO4 Evaluate the soil health quality and irrigation water quality parameters.

CO-5 Identifying seed structure and morphology, physical characteristics of seed and biochemical tests

Course Perspective: This course introduces students to the fundamental concepts of soil and water conservation engineering, emphasizing the importance of these resources in agriculture. It covers the causes and effects of soil erosion, water management techniques, and engineering practices for sustainable land and water management. The course also includes practical applications of conservation practices in agricultural systems.

Course Contents

Unit –1

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

Unit –2

Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation, Soil loss measurement techniques.

Unit –3

Principles of erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Grassed water ways and their design. Water harvesting and

its techniques.

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Kanetkar, Kulkarni, 2005, Surveying and leveling, AVG Prakasan, 23rd edition .
	Reference Book
2.	Ojha, T.P. and A.M. Michael, 2001, Principles of Agricultural Engineering, 3rd edition, Vol.II. Jain Brothers New Delhi.
3.	Singhal, O.P., 1997, Agricultural Engineering.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG108	Fundamentals of Crop Physiology	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Understand the physiological approaches of crop plants.

CO 2. Analyze symptoms of nutrients and minerals deficiency.

CO 3. Evaluate the role of physiological growth parameters in crop productivity.

CO 4. Evaluate the physiological aspect of photosynthesis, photorespiration.

Course Perspective: This course introduces the principles of crop physiology, emphasizing the physiological processes that affect crop growth and development. Students will learn about plant metabolism, water relations, nutrient uptake, and the impact of environmental factors on crop performance. The course aims to provide a foundation for improving crop production through an understanding of physiological principles.

Course Contents

Unit –1

Introduction to crop physiology and its importance in agriculture; Plant cell: an overview; diffusion and osmosis; Absorption of water, transpiration and stomata physiology.

Unit –2

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

Unit –3

Respiration: Glycolysis, TCA cycle and electron transport chain; Fat metabolism: Fatty acid synthesis and breakdown

Unit –4

Plant growth regulators: physiological roles and agricultural uses, physiological aspects of growth and development of major crops: growth analysis, role of physiological growth parameters in crop productivity

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Lincoln Taiz and Eduardo Zeiger, 2002, Plant Physiology, 3rd ed, Sinauer Associates
	Reference Book
2.	Pessarakli M, 2003, Hand Book of Plant and Crop Physiology, Marcel Dekker, Inc., New York.
3.	Hans Mohr and Peter Schopfer, 1995, Plant physiology, Springer Publications.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG110	Fundamentals of Agricultural Economics	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

- CO1.** Understand the concept of agriculture economics and its role in Indian economy
- CO2.** They will learn about law of diminishing marginal utility, law of equip-marginal utility
- CO3.** They will be acquainted about demand, supply, law of demand, law of supply, elasticity of demand and elasticity of supply
- CO4.** They will be familiarizing about market, classification of markets, market competition.
- CO5.** Students would be able to know national income, GDP, per capita income, Net National product, public finance etc.

Course Perspective: This course provides an understanding of the economic principles that underpin agricultural practices and policies. It covers essential topics such as demand and supply, production theory, market structures, agricultural pricing, and the role of agriculture in the economy. The course aims to equip students with analytical skills to assess agricultural issues and make informed decisions.

Course Contents

Unit –1

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior.

Unit –2

Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture,

importance and its role in economic development. Agricultural planning and development in the country.

Unit –3

Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: process, creation of utility, factors of production, input output relationship. *Laws of returns:* Law of variable proportions and law of returns to scale. *Cost:* concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply.

Unit –4

National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. *Tax:* meaning, direct and indirect taxes, agricultural taxation, GST. *Economic systems:* Concepts of economy and its functions, elements of economic planning.

Suggested Readings:

Sr. No.	Textbooks
1.	Dewett, K.K. 2005. Modern Economic Theory. S. Chand, New Delhi.
	Reference Book
2.	Dewett, K.K., Verma. 2004 Elementary Economic Theory, S.Chand, New Delhi
3.	Jhingam, M. L. 2001. Micro Economic Theory. Konark publishers, New Delhi
4.	Kenneth, E.B. 1941. Economic Analysis. Harper and Row, New York.

5.	Reddy,S., Raghuram,P., Neelakantan,T.V.,Bhavani D. I. 2004. Agricultural Economics..Oxford and IBH Publishers, New Delhi.
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Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG112	Fundamentals of Plant Pathology	3	0	2	4
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Identify the major groups of plant pathogens, including fungi, bacteria, viruses, and nematodes.

CO2: Describe the role of environmental factors in disease outbreaks and pathogen spread.

CO3: Apply diagnostic techniques to identify plant diseases in various crops.

CO4: Analyze the disease triangle (host, pathogen, environment) and its influence on the development and spread of plant diseases.

CO5: Evaluate the effectiveness of different disease management strategies, including chemical, biological, and cultural methods.

Course Perspective: This course introduces students to the fundamental concepts of plant pathology, emphasizing the identification, diagnosis, and management of plant diseases. Students will learn about various types of plant pathogens, disease cycles, symptomology, and integrated disease management strategies. The course aims to equip students with the knowledge to mitigate the impact of plant diseases on crop production.

Course Contents

Unit –1

Introduction: History, Scope and objectives of Plant Pathology with special reference to Indian work. Importance, concepts and classification of plant diseases. Terms and concepts in Plant Pathology. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due

to abiotic causes. Causes / factors affecting disease development: disease triangle and tetrahedron.

Unit –2

Fungi: Definition of fungus, general characters, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Binomial system of nomenclature, rules of nomenclature, classification of fungi. *Bacteria*: general morphological character and basic methods of classification and reproduction.

Unit –3

Viruses: Nature, structure, replication and transmission. Study of phanerogamic plant parasites. *Nematodes*: General morphology and reproduction, symptoms and nature of damage caused by plant nematodes (*Heterodera*, *Meloidogyne*, *Anguina*, *Radopholus* etc.) Liberation / dispersal and survival of plant pathogens.

Unit –4

Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants. Epidemiology: Factors affecting disease development. 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. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representative fungal genera. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Study of morphological features and identification of plant parasitic nematodes. Sampling and extraction of nematodes from soil. Study of fungicides and their formulations. Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations.

Suggested Readings:

Sr. No.	Textbooks
1.	Agrios, G.N. 2003. Plant Pathology Academy Press. New York.
	Reference Book
2.	Dasgupta, M.K. 1998. Principles of Plant Pathology. Allied Publishers Pvt. Ltd. Bangalore
3.	Walia, Raman K. and Bajaj, Harish K., 2003, Textbook on Introductory Plant Nematology, Directorate of Information and Publications of Agriculture, ICAR, New Delhi
4.	Nene, Y.L. and Thapliyal, P.N. 1998. Fungicides in Plant Disease Control. Oxford and IBH New-Delhi

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG114	Fundamentals of Entomology	3	0	2	4
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Describe the structure and function of insect along with their ecology.

CO2: Classify insects according to their morphology, anatomy and physiology.

CO3: Demonstrate the relationship of insect appendages with their habit and habitat.

CO4: Analyze the effect of climatic conditions on insect life.

CO5: Evaluate the insect behavior in relation to other organisms present in their niche and ecosystem.

Course Perspective: This course provides a comprehensive introduction to entomology, emphasizing the importance of insects in agriculture and the environment. Students will learn about insect classification, anatomy, physiology, life cycles, behavior, and their interactions with plants and other organisms. The course aims to equip students with the knowledge to manage insect populations and promote sustainable agricultural practices.

Course Contents

Unit –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. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae.

Unit –2

Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor. Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance.

Unit –3

Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of

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

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Chapman, R.F. 1988. Insects: Structure and Function. Cambridge Univ. Press, UK.
	Reference Book
2.	Mani, M. S. 1968. General Entomology. Oxford and IBH Publishing Company, New Delhi. 912 p.
3.	Richards, O.W. and Davies, R. G. 1977. Imm's General Text Book of Entomology, Vol.1 and 2, Chapman and Hill Publication, London, 1345p.
4.	Srivastava, P. D. and Singh, R. P. 1997. An Introduction to Entomology, Concept Publishing Company, New Delhi, 269p
5.	Charles A Triplehorn and Norman F. Johnson 2005 Borror and De Long's Introduction to the Study of Insects Thomson Brooks/Cole Publishing. U.S.A.

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG116	Fundamentals of Agricultural Extension Education	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1. Define key concepts and objectives of extension education.

CO2. Explain the evolution of extension systems and government agricultural programs in India.

CO3. Use extension teaching methods and communication strategies for technology transfer.

CO4. Analyze the role of rural leadership and community development in extension programs.

Course Perspective: This course provides a comprehensive understanding of the principles and practices of education and extension in agriculture. It covers the meaning, scope, and objectives of extension education, along with its historical development and major programs initiated by the government and ICAR. The course explores rural development concepts, community development, rural leadership, and the administration of extension programs. Additionally, it addresses modern trends in agriculture extension, such as cyber-extension and privatization, and emphasizes the importance of technology transfer.

Course Contents

Unit –1

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

Unit –2

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.). New trends

inagriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, *etc.*

Unit –3

Rural Development: concept, meaning, definition; various rural development programs launched by Govt. of India. Community Dev.-meaning, definition, concept & principles ,Philosophy of C.D.

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

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Dharma, O.P. and Bhatnagar, O.P 2000. Education and Communication for Development. Oxford, IBH, New Delhi

	Reference Book
2.	Desai, A.R. 2003. Rural Sociology in India. Popular Prakashan, Bombay
3.	Khana, B.S. 1991. Rural Development in South Asia-India. Deep and Deep Publication, New Delhi.
4.	Khatari, G.R. 1991. Rural Development Vo. I and II. Marak Publications Pvt. Ltd., Delhi.
5.	Mollett, S.M. 1984. Planning for Agricultural Development. Martin Press, London.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG118	Communication Skills and Personality Development	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: In building confidence and speaking confidently.

CO2: Improve communication activities in functional and situational contexts

CO3: Enhance the language skills of reading, writing,

CO4: Understanding the listening and speaking through real-life and professional situations.

Course Perspective: This course aims to develop students' communication abilities and enhance their personal and professional skills. It includes training in effective verbal and written communication, presentation skills, interpersonal skills, and personality development techniques. Students will engage in various activities designed to improve their confidence, self-awareness, and overall effectiveness in communication.

Course Contents

Unit –1

Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication;

Unit –2

Listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures.

Unit –3

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

Unit –4

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.

Suggested Readings:

Sr. No.	Textbooks
1.	Krishnaswamy N. and Sriraman, T. 1995. Current english for colleges, macmillan India Limited, Madras
	Reference Book
2.	A Dilemma: A layman looks at science raymond B. Fosdick
3.	Improve your writing, ed. V.N Arora & Laxmi Chandra, Oxford University press2001, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

SEMESTER-III

Course Code	Course Title	L	T	P	C
ASAG201	Crop Production Technology – I (<i>Kharif Crops</i>)	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understand economic importance of *Kharif* crops cultivation.

CO-2. Applying production techniques and technology for *Kharif* crops cultivation.

CO-3. Understand climatic conditions for *Kharif* crops cultivation.

CO-4. Analyze effect of seed size on germination of *Kharif* crops.

Course Perspective: This course provides a comprehensive understanding of the production technology for kharif crops, emphasizing the agronomic practices that enhance yield and quality. Students will learn about the characteristics, cultivation requirements, and management practices for major kharif crops, such as rice, maize, sorghum, pulses, and cotton. The course aims to equip students with the skills needed for efficient crop production and sustainable agricultural practices.

Course Contents

Unit –1

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

Unit –2

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops: pulses-pigeonpea, mungbean and urdbean

Unit –3

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops: oilseeds- groundnut, and soybean; fibre crops- cotton & jute;

Unit –4

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops: forage crops-sorghum, cowpea, cluster bean and napier.

Practical

Rice nursery preparation, transplanting of rice, sowing of soybean, pigeonpea and mungbean. maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharif season crops, effect of sowing depth on germination of kharif crops, identification of weeds in *kharif* season crops, study of crop varieties and important agronomic experiments at experimental farm. study of forage experiments, morphological description of kharif season crops, visit to research centres of related crops.

Suggested Readings:

Sr. No.	Textbooks
1.	Chatterjee, B.N. 1989. Forage Crop Production- Principles and Practices. Oxford and IBH . New Delhi.
	Reference Book

2.	Chidda Singh, Prem Singh and Rajbir Singh. 2003. Modern Techniques of Raising Field Crops (2nd ed.). Oxford and IBH, New Delhi.
3.	Hand Book of Agriculture, 2006, ICAR New Delhi
4.	Pal, M., Deka, J., and Rai, R.K. 1996. Fundamentals of Cereal Crop Production. Tata McGraw Hill Pub., New Delhi
5.	Prasad, R. 1999. A Text Book of Rice Agronomy, Jain Brothers, New Delhi,

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG203	Fundamentals of Plant Breeding	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understand mode of reproduction and genetic consequences of crop plants.

CO-2. Applying breeding procedures and techniques in self and cross pollinated crops.

CO-3. Applying hybridization techniques for hybrids and varieties development

CO-4. Handling of segregating generations

CO-5. Remembering the role of biotechnology in crop improvement.

Course Perspective: This course provides an overview of the fundamental concepts of plant breeding, including the genetic principles, selection methods, and modern technologies used in crop improvement. It explores the history and evolution of plant breeding and the role it plays in enhancing crop productivity, quality, and resilience. The course also emphasizes the applications of traditional and modern plant breeding techniques in addressing the challenges of food security and sustainable agriculture.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

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

Unit –4

Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding, Mutation breeding-methods and uses. Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding.

Practical

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-

pollinated and cross pollinated crops. Emasculation and hybridization techniques in self & cross pollinated crops. Study of male sterility system. Methods of calculating mean, range, variance, standard deviation, heritability. Designs used in plant breeding experiments, analysis of Randomized Block Design. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids.

Suggested Readings:

S. No.	Textbooks
1.	Allard, R.W. 1960. Principles of Plant Breeding. John Wiley and Sons INC. USA. Toppan Co. Ltd. Japan
	Reference Book
2.	Choudhari, T.C. 1982. Introduction to Plant Breeding. Oxford and IBH Publishing Co., New-Delhi
3.	Elliot. 1958. Plant Breeding and Cytogenetics. Mc Grow Hill. New York
4.	Hayward, M.D., Bosemark, N.O and Romagosa (eds) 1993 Plant breeding- principles and prospects Chapman and Hall, London
5.	Singh, B. D. Principles and Methods; Kalyani publisher, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG205	Farm Machinery and Power	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understanding the construction and functioning of CI and SI engines

CO-2. Familiarization Air cleaning, cooling, lubrication, fuel supply and hydraulic control system of a tractor

CO-3 Evaluation of tillage practices through farms machinery.

CO-4. Analyze the cost of tractor and other farm machinery equipment.

CO-5. Handling harvesting and threshing equipment.

Course Perspective: This course provides a comprehensive understanding of farm machinery and power systems used in agricultural operations. Students will learn about different types of machinery, their applications in various farming practices, and the importance of mechanization in enhancing agricultural efficiency. The course will also cover the principles of energy utilization in agriculture and the maintenance of farm machinery.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

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

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Ojha, T.P. and A.M. Michael 2001. Principles of Agricultural Engineering, Vol.I. Jain Brothers New Delhi.3rd edition
	Reference Book
2.	Sahay, Jagdiswar. 1977. Elements of Agricultural Engineering. Agro book Agencies
3.	Singhal, O.P. 1977. Agricultural Engineering,

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG207	Production Technology for Vegetables and Spices	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Understanding the importance and scope of vegetable and spices in the economy.

CO 2. Applying sowing and transplantation techniques of vegetable and spices including fertilizer application

CO 3. Analyzing the soil and climate requirement for cultivating the vegetable and spices.

CO 4. Remembering the morphological characters of vegetable and spices

Course Perspective: Production Technology for Vegetables and Spices is a course focused on the principles and practices involved in the efficient cultivation of vegetable and spice crops. It provides comprehensive knowledge on the production techniques, including varieties, soil preparation, sowing and transplanting methods, nutrient management, irrigation, and pest control. The course also emphasizes crop-specific cultivation practices for a wide range of vegetables such as tomatoes, potatoes, leafy greens, and root crops, as well as spices like ginger, turmeric, cumin, and pepper. Students will explore the role of climate, soil types, and growing conditions in optimizing yield and quality. Additionally, the course covers post-harvest handling, storage, and marketing strategies, helping students understand how to improve profitability while maintaining quality standards. By the end of the course, students will have the practical and theoretical knowledge to manage vegetable and spice production for commercial and sustainable agriculture.

Course Contents

Unit –1

Importance of vegetables & spices in human nutrition and national economy, types of vegetable gardens. Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders of vegetables: Tomato, Brinjal, Chilli, Capsicum, Tuber crops such as Potato; Leafy vegetables such as Amaranth, spinach; Perennial vegetables.

Unit –2

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of vegetables: Cucumber, Melons, Gourds Pumpkin, French bean, Peas;

Unit –3

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of vegetables: Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic; Root crops such as Carrot, Radish, beet root.

Unit –4

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders and processing of spices: Ginger, turmeric pepper, cardamom, coriander, cumin, fenugreek, clove and cinnamon

Practical

Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables &

spices. Fertilizers applications. Harvesting & preparation for market. Processing of spices, Economics of vegetables and spices cultivation.

Suggested Readings:

Sr. No.	Textbooks
1.	Chadha, K. L. 2003. Handbook of Horticulture, ICAR, New Delhi.
	Reference Book
2.	Choudhury, B.1983. Vegetables. National Book Trust, New Delhi. Das, P. C.1993. Vegetable crops in India. Kalyani Publishers
3.	Nybe, E.V, Mini Raj, N and Peter, K.V.2007. Spices. New India Publishing Agency, New Delhi.
4.	Pruthi, J. S. 2001 Minor Spices and Condiments-Crop Management and Postharvest Technology, ICAR, New Delhi, India.
5.	Thamburaj, S. and Singh, N. 2005. Vegetables, Tuber Crops and Spices. ICAR, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG209	Agricultural Finance and Cooperation	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1. Define key concepts and terminology related to agricultural finance and credit.

CO2. Explain the significance of various sources of finance and their roles in Indian agriculture.

CO3. Use financial analysis techniques to prepare and evaluate financial statements and project reports.

CO4. Assess the impact of cooperatives on credit access and marketing within the agricultural sector

Course Perspective: This course provides essential insights into the financial frameworks supporting Indian agriculture. It covers the meaning, scope, and significance of agricultural finance, emphasizing credit needs and sources, including institutional options, micro-financing, and the roles of key financial institutions like RBI and NABARD. Students will learn credit analysis, financial statement preparation, and project report guidelines using bank norms and SWOT analysis. The course also explores agricultural cooperation, highlighting its history, principles, and the importance of cooperatives in enhancing credit and marketing support in the agricultural sector.

Course Contents

Unit –1

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's and 3C's of credits.

Unit –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. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee

Unit –3

Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Unit –4

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Kahlon,A.S., Singh, Karam. Managing Agricultural Finance. Allied Publishers, New Delhi
	Reference Book
2.	Reddy,S., Raghuram,P., Neelakantan,T.V and Bhavani D.I.2004. Agricultural onomics.Oxford and IBHPublishers, New Delhi.
3.	Reddy,S., and Ram,P.R. Agricultural Finance and Management. Oxford and IBH, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG211	Agri- Informatics	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO.1 Identify and describe key concepts and components of computer systems, operating systems, and applications in MS Office relevant to agriculture.

CO2. Utilize ICT tools and smartphone applications to analyze agricultural data and provide insights for farm management and decision-making.

CO3. Evaluate the effectiveness of geospatial technologies and decision support systems in enhancing agricultural practices and crop planning.

CO.4 Develop integrated computer models and strategies for optimizing water and nutrient management in crops, leveraging advanced IT applications.

Course Perspective: This course provides a comprehensive introduction to the integration of computer technology and information systems in agriculture. It covers foundational concepts of computers and operating systems, along with practical applications of MS Office for data management and presentation. Students will explore the World Wide Web and e-agriculture, understanding how ICT tools enhance agricultural practices. The course delves into the computation of crop water and nutrient requirements, automated systems for agri-input management, and the use of smartphone apps for farm advisories. Additionally, it examines geospatial technologies and decision support systems, equipping students with skills to utilize IT tools for effective crop planning and farm management.

Course Contents

Unit –1

Introduction to Computers, Operating Systems, definition and types, Applications of MS Office for document creation & Editing, Data presentation, interpretation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, uses of DBMS in Agriculture

Unit-2

World Wide Web (WWW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations. e-Agriculture, concepts and applications, Use of ICT in Agriculture. Computer Models for understanding plant processes.

Unit-3

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

Unit-4

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

Practical

Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introduction to World

Wide Web (WWW). Introduction of programming languages. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost; Computation of water and nutrient requirements of crop using CSM and IT tools. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hands on Decision Support System. Preparation of contingent crop planning.

Suggested Readings:

Sr. No.	Textbooks
1.	Sharma K.V.S. 2001. Statistics made simple: Do it yourself on PC. Prentice Hall of India.
	Reference Book
2.	Capron.H.L. 1996. Computers – Tools for an information age – Fourth Edition. The Benjamin /Cummings Publishing Company, Inc., New York.
3.	Peter Nortons. 2001. Introduction to Computers – Fourth Edition. Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
4.	P.K. Sinha 2009. Computer Fundamentals-Third Edition. BPB publication

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG213	Environmental Studies and Disaster Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO 1 Understanding the resources of energy, renewable and non-renewable

CO 2 Analyze the water resources and try to use them in judicial manner'

CO 3 Analyze the eco system and implement use the basic requirements to preserve them,

CO 4 Solid waste management and use it in real life.

CO 5 Sustainable development and continuous improvement.

Course Perspective: This course provides a comprehensive overview of environmental studies and disaster management, emphasizing the interplay between agricultural practices and environmental sustainability. Students will learn about the fundamental principles of ecology, environmental degradation, and disaster risk reduction. The course will also cover the importance of sustainable agricultural practices in mitigating the impact of environmental disasters.

Course Contents

Unit –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. Use and over-exploitation. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit –2

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit –3

Biodiversity and its conservation: Introduction, definition, genetic, species & ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega- diversity nation. Hot spots of biodiversity. Threats to biodiversity: habitat loss, endangered and endemic species of India. Conservation of biodiversity: *in-situ* and *ex-situ* conservation of biodiversity. Environmental pollution: definition, cause, effects and control measures of a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in the Environment and human health.

Unit –4

Disaster Management: meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, volcanic eruptions, heat and cold waves. Climatic change: global warming, sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste-water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management: effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management and national disaster management framework. Financial management; role of NGOs, community – based organizations and media. Central, state, district and local administration; Armed forces in

disaster response; Disaster response; Police and other organizations.

Practical

Pollution case studies: field work - visit to a local area to document environmental assets river/forest/grassland/hill/mountain; visit to a local polluted site-urban/rural/industrial/agricultural.

Impact of pollution on agriculture. Study of simple ecosystems-pond, river, hill slopes etc.

Suggested Readings:

Sr. No.	Textbooks
1.	Erach Bharucha, 2015. Environmental Studies, 2 nd edn, Universities Press India P Ltd-Chennai
	Reference Book
2.	Benny Joseph, 2008. Environmental Studies, 2 nd edn, Tata McGraw-Hill Education Pvt. Ltd.
3.	Eugene Odum, 2017, Fundamentals of Ecology 5 th edn, Cengage India.
4.	Gupta SR and Singh JS, 2015, Ecology Environmental Science and Conservation, S.Chand Publisher.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG215	Statistical Methods	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Understanding of fundamentals of statistics

CO2: Analyze and handling the data

CO3: Design field layouts

CO4: Understand methods and principles of statistics

Course Perspective: This course provides an introduction to statistical methods and their applications in agricultural research. Students will learn about data collection, analysis, interpretation, and presentation of results using statistical techniques. The course emphasizes practical applications of statistics in solving agricultural problems and making data-driven decisions.

Course Contents

Unit 1

Definition uses, and limitations of Statistics, concept of population and sample, the concept of data types- nominal, ordinal, discrete, and continuous data, Graphical presentation of data. Frequency distribution, frequency curve, frequency polygon, and ogives. Measures of central tendency (Arithmetic Mean, Median, and Mode), Measures of dispersion (Range, Mean deviation, Standard deviation, and Coefficient of variation). Measures of skewness and kurtosis

Unit 2

Concept of bivariate data, correlation, and their types, scatter diagram, Karl Pearson correlation coefficient, Spearman rank correlation coefficient, Simple linear regression analysis

Unit 3

Basic concept of probability, Simple Problems Based on Probability, Normal distribution and its properties, Concept of parameter, statistics and statistical hypothesis, null and alternative hypothesis, level of significance, type-I and type-II errors, and degrees of freedom. Tests for single mean and comparison of two means, F-test and applications, Chi-square test in 2X2 contingency table, Yates correction for continuity

Unit 4

Principle of experimental design, layout, model, and analysis of completely randomized design (CRD), randomized block design (RBD), and Latin square design (LSD)

Suggested Readings:

Sr. No.	Textbooks
1.	Gupta, S.C. and Kapoor, V.K. (1997): Fundamentals of Mathematical Statistics. Sultan Chand and Sons Publisher, New Delhi.
	Reference Book
2.	Chakravorthi, S.R. and Giri, N. (2002): Basic Statistics. South Asian Publishers, New Delhi-110014.
3.	Rangaswamy, R. (2002): A text book of Agricultural Statistics. John Wiley and Sons.
4.	Balakrishnan, N. (2002): Statistical Methods and Practice. Prentice Hall of India.
5.	Ferrold, H. Zar. (2005): Biostatistical Analysis: Fourth Edition, Pearson Education, India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG217	Livestock and Poultry Management	3	0	2	4
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1 Identify the nutrient requirement for growth, maintenance, reproduction and lactation.

CO-2 Understand the concepts related to herd health, vaccination in livestock and poultry production.

CO-3 Analyzing the animal and poultry and their management.

CO-4 Create ration formulation for a specify period of animals and poultry

Course Perspective: This course provides a comprehensive understanding of livestock and poultry management, emphasizing the importance of animal production in agriculture. Students will learn about the various types of livestock and poultry, their husbandry practices, and the economic implications of livestock production. The course aims to equip students with the knowledge and skills necessary for effective management of livestock and poultry enterprises.

Course Contents

Unit –1

Role of livestock in the national economy. Present status and future prospectus of various livestock programme. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry.

Unit –2

Management of calves, growing heifers, and milch animals. Management of sheep, goats and swine. Incubation, hatching, and brooding. Management of growers and layers.

Unit –3

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine, and poultry. Improvement of farm animals and poultry. Digestion in livestock and poultry. Classification of feedstuffs. Proximate principles of feed.

Unit –4

Feeding and management of calves, growing heifers and milch animals, etc. Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Banerjee, G.C. 2018. A Text Book of Animal Husbandry. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
	Reference Book
2.	Dairy India Year Book 2001. A-25, Priyadarshini Vihar, DELHI.
3.	Handbook of Animal husbandry-Indian Council of Agricultural Research Publication, New Delhi, Third Edition, 2002
4.	Sastry, N.S.R & Thomas C.K, 2018 : Livestock Production and Management, Kalyani Publishers, India
5.	Harbans Singh & Moore, E.N., 1982: Livestock and Poultry Production, Prentice-Hall of India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

SEMESTER-IV

Course Code	Course Title	L	T	P	C
ASAG202	Crop Production Technology –II (<i>Rabi</i> Crops)	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO1: Identify the origin, geographical distribution, and economic importance of major Rabi crops, including cereals and pulses.

CO2: Explain the soil and climatic requirements, as well as cultural practices, for optimal cultivation of Rabi crops like wheat, chickpea, and mustard.

CO3: Analyze the yield potential of various Rabi crops by applying knowledge of their varieties and agricultural practices in different regions.

CO4: Develop a comprehensive management plan integrating soil health, crop selection, and cultural practices for sustainable production of Rabi crops, including forage and oilseeds.

Course Perspective: This course provides a comprehensive understanding of Rabi crops, focusing on their origin, distribution, and economic significance. Students will explore the specific soil and climatic requirements for cereals, pulses, oilseeds, and forage crops, gaining insights into their cultivation practices and yield optimization. By examining various varieties and cultural techniques, learners will develop the skills necessary to implement sustainable agricultural practices. Ultimately, the course aims to equip students with the knowledge to contribute to enhanced food security and agricultural productivity in Rabi cropping systems.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices, and yield of *Rabi* crops: oilseeds-rapeseed, mustard, and sunflower; sugar crops-sugarcane;

Unit –4

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices, and yield of *Rabi* crops: Forage crops-berseem, lucerne, and oats.

Practical

Sowing methods of wheat and sugarcane, identification of weeds in *rabiseason* crops, the study of morphological characteristics of *rabi* crops, the study of yield contributing characters of *rabi* season crops, yield and juice quality analysis of sugarcane, the study of important agronomic experiments of *rabi* crops at experimental farms. Study of *rabiforage* experiments, visits to research stations of related crops.

Suggested Readings:

Sr. No.	Textbooks
1.	Chatterjee, B.N. 1989. Forage Crop Production- Principles and Practices. Oxford and IBH . New Delhi.
	Reference Book
2.	Chidda Singh, Prem Singh and Rajbir Singh. 2003. Modern Techniques of Raising Field Crops (2nd ed.). Oxford and IBH, New Delhi.
3.	ICAR [Indian Council of Agricultural Research].2006. Hand Book of Agriculture. ICAR, New Delhi
4.	Pal, M., Deka, J., and Rai, R.K. 1996. Fundamentals of Cereal Crop Production. Tata McGraw Hill Pub., New Delhi
5.	Prasad, R. (ed.). 1999. A Text Book of Rice Agronomy, Jain Brothers, New Delhi,

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG204	Production Technology for Ornamental Crops, MAP and Landscaping	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Identify different ornamental plants, medicinal and aromatic plants

CO-2. Understand about formal and informal garden

CO-3. Applying production technology of different flowers, medicinal and aromatic plants

CO-4. Prepare layout designs for gardens and other ornamental plants

Course Perspective: Production Technology for Ornamental Crops, Medicinal and Aromatic Plants (MAP), and Landscaping is a specialized course designed to provide in-depth knowledge about the cultivation and management of ornamental plants, medicinal and aromatic plants, and landscape design. This course focuses on production techniques, propagation methods, and maintenance practices tailored to a wide range of ornamental plants such as flowering plants, shrubs, and trees, as well as medicinal and aromatic species used in pharmaceuticals, cosmetics, and perfumery. Students will learn about the growing requirements for these plants, including soil preparation, irrigation, fertilization, pest and disease management, and post-harvest handling. The course also introduces key principles of landscape design, helping students to plan and develop gardens, parks, and urban green spaces that are aesthetically

pleasing and environmentally sustainable. Additionally, it covers the economic importance of these crops in the floriculture and MAP industries, with a focus on market trends, value addition, and sustainable practices. By the end of the course, students will have the knowledge and skills to cultivate ornamental and MAP species and apply landscaping techniques to enhance the visual appeal and functional utility of outdoor spaces.

Course Contents

Unit –1

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

Unit –2

Production technology of important cut flowers like rose, gerbera, carnation, Liliun, and orchids under protected conditions and gladiolus, tuberose, and chrysanthemum under open conditions. Package of practices for loose flowers like marigolds and jasmine under open conditions.

Unit –3

Production technology of important medicinal plants like ashwagandha, asparagus, aloe, coleus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.

Unit –4

Processing and value addition in ornamental crops and MAPs produce.

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Chadha, K.L.2001. Hand Book of Horticulture, ICAR, New Delhi
	Reference Book
2.	Kirthikar.K.R. and Basu.B.D. 1993. Indian Medicinal Plants, Vol. 1-4. Lalit Mohan
3.	Kurian, A and Sankar, M.A.2007. Medicinal Plants. New India Publishing Agency, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG206	Renewable Energy and Green Technology	1	0	2	2
Pre-requisites/Exposure	None				

Co-requisites	--
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Course Outcomes: On completion of course, student will be: -

CO-1 Familiarization with biomass utilization for biofuel production and their application.

CO-2 Handling of bioenergy resources and their utilization.

CO-3 Creating wastes recycling and renewable energy based efficient technologies.

CO-4 Applying techniques of waste and waste management

Course Perspective: This course provides an in-depth understanding of renewable energy sources, their technologies, and their applications in agriculture. Students will learn about the various forms of renewable energy, such as solar, wind, biomass, and hydroelectric power, and how these can be utilized to improve energy efficiency and sustainability in agricultural practices.

Course Contents

Unit –1

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

Unit –2

Familiarization with types of biogas plants and gasifiers, biogas, bio-alcohol, biodiesel and bio-oil production and their utilization as bioenergy resource.

Unit –3

Introduction of solar energy, collection, and their application. Familiarization with solar energy gadgets: solar cooker, solar water heater.

Unit –4

Application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application, introduction of wind energy and their application.

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Jeremy Shere, 2013, Renewable: The World-Changing Power of Alternative Energy, St. Martin's Press
	Reference Book
2.	Robert Ehrlich, 2013, Renewable Energy: A First Course, CRC Press
3.	David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, 2014, Renewable Energy Systems, Pearson Publisher

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
SAG208	Problematic Soils and their Management	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1 Identify problematic soils and associated problems.

CO 2 Analyze soil physical and chemical properties and the factors affecting them.

CO 3 Applying efficient use of treated wastewater for prevention of soil degradation.

O 4 Identify hazards associated with irrigation water including salinity, sodicity and toxicity hazards

Course Perspective: This course provides an in-depth study of problematic soils, including saline, sodic, acidic, and waterlogged soils. Students will learn about the properties of these soils, their effects on plant growth, and the techniques for improving their condition and productivity through appropriate management practices.

Course Contents

Unit –1

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

Unit- 2

Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Compacted soils, Flooded/ Waterlogged soils.

Unit- 3

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

Unit- 4

Multipurpose tree species, bioremediation through MPTs of soils, land capability and classification, landsuitability classification. Problematic soils under different Agro-ecosystems.

Suggested Readings:

Sr. No.	Textbooks
1.	Adams, F., 1984. Soil Acidity and Liming. 2nd Edn, American Society of Agronomy, Madison, U.S.A.
	Reference Book
2.	Biswas, T.D. and S.K. Mukherjee .1995.Text book of Soil Science. Tata McGraw-Hill Publishing Company Limited, New Delhi.
3.	Das, D.K. 1997. Introductory Soil Science. Kalyani Publishers,
4.	Brady, N.C. and R.R. Well. 2007. The Nature and Properties of soil. 13th edition. Dorling Kindersley (India) Pvt. Ltd., New Delhi – 110092
5.	Das.D.K, 1997. Introductory Soil Science. Kalyani Publishers, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG210	Production Technology of Fruit and Plantation Crops	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1 Identify the different fruits and plantation crops.

CO-2 Applying production technology of different fruits and plantation crops

CO-3 Understanding the nutritional and economic value of fruits and plantation crops

CO-4 Use propagation methods for fruit and plantation crops.

CO-5 Preparation of plant bio regulators and their uses in insect & disease management

Course Perspective: Production Technology of Fruit and Plantation Crops is a course designed to provide cultivation technologies of fruit and plantation crops. This course covers the principles of orchard establishment, crop propagation, soil and water management, nutrient requirements, and pest and disease control for major fruit crops such as mango, banana, citrus, apple, and plantation crops like coconut, oil palm, coffee, and tea.

Students will explore climate and soil requirements for these crops, along with advanced cultivation methods like high-density planting, canopy management, and crop regulation. The course also emphasizes post-harvest handling, storage, processing, and marketing strategies to ensure profitability and sustainability in fruit and plantation crop production.

By the end of the course, students will be equipped with the practical and theoretical skills necessary to manage fruit orchards and plantation crops efficiently, ensuring high productivity and quality while addressing environmental and market demands.

Course Contents

Unit –1

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

Unit –2

Production technologies for the cultivation of tropical and sub-tropical fruits- mango, banana, citrus, grape, guava, litchi, papaya, sapota.

Unit –3

Production technologies for the cultivation of temperate fruits: apple, pear, peach, walnut, almond, strawberry and; minor fruits- date, *ber*, pineapple, pomegranate, jackfruit.

Unit –4

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

Practical

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruits. Preparation of plant bio regulators and their uses, Important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

Suggested Readings:

Sr. No.	Textbooks
1.	Amar Singh, 1986. Fruit Physiology and Production. Kalyani Publishers, Delhi.
	Reference Book
2.	Bose, T.K, Mitra, S.K. and Sanyal, D. 2002. Fruits: Tropical and Subtropical. Vol. I and II, Nayaprakash Publications, Calcutta.
3.	Chadha, K.L.2001. Hand Book of Horticulture, ICAR, New Delhi.
4.	CPCRI, 2003. Coffee Guide, Central Coffee Research Institute, Coffee Board, Chickamangalur, Karnataka.
5.	Kumar.N, Abdul Khader.J.B.M. Rangaswami.P. and Irulappan., 1993. Introduction to Spices – Plantation Crops, Medicinal and Aromatic Plants, Rajalekshmi Pub, Nagercoil.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG212	Principles of Seed Technology	1	0	4	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Apply knowledge for production of quality seeds.

CO-2. Analyzing different methods of seed production and processing.

CO-3. Examine quality seed by using different seed testing methods.

CO-4. Evaluate present status of India for seed production.

Course Perspective: This course provides an in-depth understanding of seed technology, emphasizing the role of seeds in agriculture and their significance in crop production. Students will learn about various aspects of seed technology, including seed development, breeding, production, quality control, and seed marketing.

Course Contents

Unit –1

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

Unit –2

Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seed certification, phases and procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983. Varietal Identification through Grow Out Test and Electrophoresis - Molecular and Biochemical test.

Unit –3

Detection of genetically modified crops, Transgene contamination in non-GM crops, and organic seed production. Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage.

Unit –4

Seed Processing plant and Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Practical

Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi. Seed production in major pulses: Urd, Mung, Pigeon pea, Lentil, Gram, Field bean, pea. Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production in important vegetable crops. Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Visit to seed production farms, seed testing laboratories and seed processing plant.

Suggested Readings:

Sr. No.	Textbooks
1.	Agrawal, P.K. 1994. Principles of Seed Technology, Kalyani Publishers, Ludhiana
	Reference Book
2.	Agrawal, R.L. 1990. Seed Technology Kalyani Publishers, Ludhiana
3.	Agrawal, P.K. and N. Dadlani 1995. Techniques in Seed Science and Technology
4.	Neal C. Stoskopf, Dwight T. Tomes and B.R. Christie. 2006. Plant Breeding Theory and Practice. Scientific Publishers (India), Jodhpur.
5.	Dahiya, B.S.; Rai, K.N. 1995 Seed Technology, Kalyani Publishers, Ludhiana

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG214	Farming System & Sustainable Agriculture	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Define the key concepts of farming systems, including their types, components, and factors affecting their implementation.

CO2: Describe the principles of sustainable agriculture and the challenges it poses, as well as strategies for adaptation and mitigation.

CO3: Application: Evaluate various cropping systems and allied enterprises to determine their efficiencies and contributions to sustainable agriculture.

CO4: Design a site-specific integrated farming system model tailored to different agro-climatic zones, optimizing resource use and promoting environmental sustainability.

Course Perspective: This course delves into the complexities of modern agriculture, addressing both the challenges and opportunities within current farming systems. Students will explore the concept of farming systems, including their components and the factors influencing their effectiveness. Emphasis will be placed on sustainable agricultural practices, integrated farming systems, and resource optimization techniques. Through hands-on learning experiences and evaluations of cropping patterns and allied enterprises, participants will gain insights into the sustainable development of agricultural resources and the importance of environmental stewardship. Ultimately, the course aims to equip students with the skills needed to foster resilient agricultural practices in diverse agro-climatic zones.

Course Contents

Unit –1

Problems and prospects of present-day agriculture. Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance,

Unit –2

Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and

efficiencies in cropping and farming system; Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability,

Unit –3

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

Unit –4

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

Suggested Readings:

Sr. No.	Textbooks
1.	Dahama,A.K. 2007. Organic Farming for Sustainable Agriculture. 2nd Edn. Published by AGROBIOS (India) Jodhpur
	Reference Book
2.	Gupta, P.K. 2006. Vermi-composting for Sustainable Agriculture. Published by AGROBIOS (India) Jodhpur
3.	Sharma, A.K. 2006. A Hand Book of Organic Farming. Published by AGROBIOS (India) Jodhpur
4.	Sharma, A.K. 2005. Biofertilizers for Sustainable Agriculture. Published by AGROBIOS (India) Jodhpur

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG216	Agricultural Marketing Trade & Prices	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Define key concepts in agricultural marketing

CO2 Explain demand and supply dynamics in agricultural markets.

CO3 Use marketing strategies to enhance agricultural product marketability.

CO4 Assess government policies and their impact on agricultural marketing and trade.

Course Perspective: This course offers an in-depth exploration of marketing concepts within the agricultural sector. It covers definitions and classifications of agricultural markets, demand and supply dynamics. Students will learn about the product life cycle, competitive strategies, and effective pricing and promotion tactics. The course also examines the marketing process, including key functions like storage and transport, as well as marketing channels and the roles of various market functionaries. Additionally, it addresses the government's role in agricultural marketing, risks, agricultural pricing policies, and the implications of international trade frameworks such as GATT and WTO.

Course Contents

Unit –1

Agricultural Marketing: Concepts and definitions of the market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply, and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products.

Unit –2

Producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketablesurplus of agri-commodities; product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost-based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions.

Unit –3

Marketing process-concentration, dispersion, and equalization; exchange functions – buying and selling; physical functions – storage, transport, and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); 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 the cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs

Unit –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; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Acharya, S.S., Agarwal, N.L.1987. Agricultural Marketing in India. Oxford and IBH, New Delhi.
	Reference Book
2.	Acharya, S.S., Agarwal, N.L.1994. Agricultural Prices and Policy. Oxford and IBH, New Delhi.
3.	Philip, K. 2004. Principles of Marketing. Prentice Hall, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG218	Introductory Agro-meteorology & Climate Change	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Define key terms and concepts in agricultural meteorology

CO2: Explain the impact of weather patterns and climate variability on agricultural productivity.

CO3: Analyze weather data to assess climatic impacts on crops and livestock.

CO4: Evaluate adaptation strategies to mitigate the effects of climate change on agricultural systems.

Course Perspective: This course provides a foundational understanding of how weather and climate impact agricultural practices. It covers essential concepts such as weather patterns, climate variability, and their effects on crop production and livestock management. Students will explore agro-meteorological principles, the challenges of climate change, and adaptation strategies. Through practical examples, learners will develop skills to analyze weather data and assess climate-related

risks, aiming for sustainable agricultural practices.

Course Contents

Unit –1

Meaning and scope of agricultural meteorology; Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze;

Unit –2

Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth;

Unit –3

Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. 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.

Unit –4

Agriculture and weather relations; Modifications of crop microclimate, climatic normal for crop and livestock production. Introduction to remote sensing and GIS. 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 radiation, and its estimation using Planck's intensity law. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS. Measurement of maximum and minimum air

temperatures, its tabulation, trend, and variation analysis. Measurement of soil temperature and computation of soil heat flux. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions. Measurement of wind speed and wind direction, preparation of wind rose. Measurement, tabulation and analysis of rain. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

Suggested Readings:

Sr. No.	Textbooks
1.	Khadekar, S.R. 2001. Meteorology. Agromet publishers, Nagpur
	Reference Book
2.	Prasada Rao, G.S.L.H.V. 2005. Agricultural Meteorology. Second Edition. Keral Agricultural University, Thrissur.
3.	Varshneya, M.C. and Balakrishna Pillai, B. 2003. Textbook of Agricultural Meteorology. ICAR, New Delhi.
4.	Dash, S.K. and Rathore, L.S., 2011.Challenges and Opportunities in Agrometeorology

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

SEMESTER-V

Course Code	Course Title	L	T	P	C
ASAG301	Principles of Integrated Pest and Disease Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO1: Identify major pest and disease problems in different crops and ecosystems.

CO2: Describe the various tools and techniques used in pest and disease management.

CO3: Implement biological control techniques and cultural practices in an IPDM framework.

CO4: Analyze the relationship between pests, diseases, and environmental factors in crop production systems.

CO5: Assess the risks and benefits of chemical, biological, and cultural control methods within the IPDM approach.

CO6: Develop innovative solutions for complex pest and disease management challenges using an integrated approach.

Course Perspective: This course provides comprehensive knowledge about the various pests that affect crops and stored grains, their life cycles, damage potential, and management strategies. Students will learn to identify common pests, assess pest damage, and implement effective management techniques to reduce pest populations while minimizing environmental impact.

Course Contents

Unit –1

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

Unit –2

Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological,

and chemical control. Ecological management of crop environment.

Unit –3

Introduction to conventional pesticides for disease management. Survey surveillance and forecasting of diseases. Development and validation of IPM module.

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Agrios, G.N. 2003. Plant Pathology Academy Press. New York.
	Reference Book
2.	Dasgupta, M.K. 1998. Principles of Plant Pathology. Allied Publishers Pvt. Ltd. Bangalore
3.	Maloy. O.C. 1993. Plant Disease Control. Principles and Practice. John Wiley and Sons.Inc. New York
4.	Nene,Y.L. and Thapliyal,P.N. 1998. Fungicides in Plant Disease Control. Oxford and IBH New Delhi
5.	Singh. R.S 2002. Introduction to Principles of Plant Pathology. Oxford and IBH Publishing, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG303	Manures, Fertilizers and Soil Fertility Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1: Understanding the importance of organic manures and Integrated nutrient management (INM).

CO-2: Applying appropriate fertilizer dose to the field.

CO-3: Evaluating soil fertility and plant nutrition deficiency in soil.

CO-4: Understanding soil chemistry and critical levels of different soil nutrients.

CO-5: Application of nutrients under rainfed and irrigated conditions.

Course Perspective: This course provides an in-depth understanding of soil fertility management, emphasizing the importance of manures and fertilizers in enhancing crop productivity. Students will learn about the chemistry and biology of soil, nutrient requirements of crops, and the application of different soil fertility management practices to optimize crop yields sustainably.

Course Contents

Unit –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.

Unit –2

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

Unit –3

Soil fertility and productivity, 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.

Unit –4

Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Fertilizers Indicator plants (crop). Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Burges, A, and Raw, F. 1967. Soil Biology. Acad. Press, New York
	Reference Book
2.	Donahu, L. R., Miller, W. R. and Shickuluna, 1977. Soils. Prentice Hall of India Pvt. Ltd.,

	New Delhi
3.	Mengel, K.J. and Kirkby, A. 1978. Principles of Plant Nutrition. International Potash Institute,Switzerland
4.	Nyle.C. Brady 1995. The Nature and Properties of Soils. 10th Edn. Printice Hall India Pvt.. Ltd. NewDelhi
5.	Raymond W Miller and Roy L. Donahue. 1992. Soils and Introduction to Soils and Plant Growth. 6th edn. Printice Hall India pvt. Ltd. New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG305	Pests of Crops and Stored Grain and their Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Familiarized with identification of different insect pest of field, horticulture, ornamentals, vegetables and stored grains at the field level.

CO2: Understand identification of nature of damage and symptoms caused by the pest

CO3: Apply suitable technique for pest management for sustainable agriculture.

CO4: Analyze the manipulation in populations of beneficial and destructive species in agro ecosystem

CO 5: Evaluate the environmental impact on pest population.

CO6: Critically think new alternatives for insect pest management sustainably.

Course Perspective: This course provides comprehensive knowledge about the various pests that affect crops and stored grains, their life cycles, damage potential, and management strategies. Students will learn to identify common pests, assess pest damage, and implement effective management techniques to reduce pest populations while minimizing environmental impact.

Course Contents

Unit –1

General account of nature and type of damage by different arthropod pests. Classification, host range, distribution, biology and bionomics, nature of damage, and management of major insect pests of field crops, vegetable, fruit, and plantation crops

Unit –2

Classification, host range, distribution, biology and bionomics, nature of damage, and

management of major insect pests of vegetable and fruit crops

Unit –3

Classification, host range, distribution, biology and bionomics, nature of damage, and management of major insect pests of plantation, ornamental, spices, and condiment crops.

Unit –4

Insect pests, mites, rodents, birds, and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage.

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.

Practical

Identification of various insect pests and their nature of damage on Field, Vegetable, Fruit, Plantation, spice crops & condiments. Identification and study of life cycle and seasonal history. Pesticide application techniques. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Identification of insect pests and Mites, rodents, birds associated with stored grains and their management, assessment of losses due to insect pests. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur, Visit to nearby silos/ FCI godowns.

Suggested Readings:

Sr. No.	Textbooks
1.	Atwal, A. S. 1991. Agricultural Pests of India and South–East Asia. Kalyani Publishers, New Delhi. 529p.
	Reference Book
2.	David, B. V. 2001. Elements of Economic Entomology. Popular Book Depot, Madras,

	536p.
3.	Ghosh, S. K. Dubey, S. L. 2003. Integrated Management of Stored Grain Pests. International Book Distributing Company. 263p.
4.	Nair, M. R. G. K. 1986. Insects and Mites of Crops in India. Indian Council of Agricultural Research, New Delhi. 267p.
5.	Pradhan, S. 1983. Agricultural Entomology and Pest Control. Indian Council of Agricultural Research, New Delhi. 267p.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG307	Diseases of Field and Horticultural Crops and their Management- I	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Identify the causal organisms (fungi, bacteria, viruses, nematodes) of key diseases in field and horticultural crops.

CO2: Describe the environmental factors that influence the occurrence and severity of diseases in crops.

CO3: Apply appropriate diagnostic methods for the identification of diseases in field and horticultural crops.

CO4: Analyze the interactions between crop, pathogen, and environment (disease triangle) in relation to disease development.

CO5: Assess the impact of emerging plant diseases on food security and crop production.

CO6: Develop innovative, environmentally sustainable solutions to manage crop diseases using advanced technology and research findings.

Course Perspective: This course provides an in-depth understanding of the various diseases that affect field and horticultural crops, emphasizing their identification, lifecycle, and management. Students will learn about the pathogens responsible for these diseases, their effects on crop yield and quality, and effective management practices to control them.

Course Contents

Unit –1

Symptoms, etiology, disease cycle and management of major diseases of Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra (pearl millet): downy mildew, powdery mildew and ergot; Groundnut: Tikka and wilt.

Unit –2

Symptoms, etiology, disease cycle and management of major diseases of Soybean: *Rhizoctonia* blight, bacterial spot, and mosaic; Pigeonpea: *Phytophthora* blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: *Cercospora* leaf spot and anthracnose, web blight and yellow mosaic.

Unit –3

Symptoms, etiology, disease cycle and management of major diseases of Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, *Sigatoka* and bunchy top;

Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: *Alternaria* leaf spot and black rot; Brinjal: *Phomopsis* blight and fruit rot and *Sclerotinia* blight.

Unit –4

Symptoms, etiology, disease cycle and management of major diseases of Tomato: damping off, wilt, early and late blight, leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: *Phytophthora* blight; Tea: blister blight; Coffee: rust

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Singh, R.S 2001. Plant Disease Management, Oxford and IBH Publishing Co N. Delhi.
	Reference Book
2.	Mehrotra. R. S. Plant Pathology. TATA Mechgrow Hill Pub. Co. N. Delhi.
3.	Ramakrishnan, T. S. 1971. Diseases of Millets. ICAR.
4.	Sharma, P. D. 2001. Plant Pathology, Rastogi Publications, Shivaji Road, Meerut.
5.	Singh, R. S. 1995. Diseases of Vegetables Crops. Oxford and IBH Publishing Co.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG309	Crop Improvement-I (<i>Kharif</i> Crops)	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Students will have knowledge on Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibers; fodders and cash crops; vegetable and horticultural crops grown during kharif season.

CO 2. Students will be able to know about plant genetic resources, its utilization and conservation

CO 3. Students will be able to know important concepts of breeding self-pollinated, cross-pollinated and vegetative-propagated crops of kharif season.

CO 4. Students will know about major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids.

CO 5. Students will have adequate practical knowledge on emasculation and hybridization techniques in self & cross pollinated crops of kharif season.

Course Perspective: This course provides comprehensive knowledge on the breeding techniques, varietal development, and genetic improvement of Kharif crops such as rice, maize, sorghum, pearl millet, groundnut, cotton, and pigeon pea. The focus is on improving the productivity, disease resistance, and stress tolerance of these crops, which are crucial to food security and agricultural sustainability in tropical and subtropical regions. The course also covers the role of biotechnology and advanced breeding tools in Kharif crop improvement.

Course Contents

Unit –1

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

Unit –2

Plant genetic resources, their utilization and conservation, study of genetics of qualitative and quantitative characters.

Unit –3

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

Unit –4

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

Practical

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urd bean, Mungbean, Soybean, Groundnut, Sesame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different *Kharif* crops. 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.

Suggested Readings:

S. No.	Textbooks
1.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
	Reference Book
2.	B.D.Singh 2015 Plant Breeding. Principles & Methods. Kalyani Publishers. 10 th Edition.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG311	Entrepreneurship Development and Business Communication	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO1. Define key concepts and characteristics of entrepreneurs and relevant government policies.

CO2. Explain the impact of economic reforms on agribusiness and entrepreneurship development.

CO3. Use organizational and managerial skills for effective business leadership in agriculture.

CO4. Analyze project planning and financing strategies to identify agri-entrepreneurship opportunities.

Course Perspective: This course provides an in-depth understanding of entrepreneurship concepts, characteristics, and the role of government policies in promoting entrepreneurial growth, especially in agribusiness. It explores the impact of economic reforms on agricultural enterprises and focuses on essential business leadership and managerial skills. Students will engage in project planning, financial management, and identify opportunities for agri-entrepreneurship and rural enterprise development.

Course Contents

Unit –1

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development.

Unit –2

Impact of economic reforms on Agribusiness/ Agri-enterprises, Entrepreneurial Development Process; Business Leadership Skills.

Unit –3

Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication,

direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management.

Unit –4

Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri- entrepreneurship and rural enterprise.

Practical

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

Suggested Readings:

Sr. No.	Books
1.	Downey, W.D., Troche, J.K. 1981. Agribusiness Management. Mc Graw Hill Inc., New Delhi
	Reference Book
2.	Gittinger, J.P. 1982. Economic Analysis of Agricultural Projects. The Johns Hopkins University Press, Baltimore
3.	Alagumani, T., Chinnaiyan, P., Elangovan, S. 1998. Agricultural Management. Publishers K9 International, Madurai.
4.	Philip, K. 2004. Marketing Management. Prentice Hall, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG313	Geo-informatics and Nanotechnology and Precision Farming	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO. 1 Define and describe key concepts in precision agriculture, geoinformatics, and their applications in Indian agriculture.

CO2. Apply geospatial technologies and remote sensing techniques to soil mapping, crop discrimination, and yield monitoring.

CO3. Analyze the impact of nanotechnology on agricultural productivity through the use of nano-pesticides, nano-fertilizers, and nano-sensors.

CO4. Design effective land use plans by evaluating soil suitability and land capability for various crops, integrating precision agriculture techniques.

Course Perspective: This course explores the principles and applications of precision agriculture, focusing on innovative techniques and geoinformatics to enhance agricultural practices in India. Students will learn about crop discrimination, yield monitoring, and soil mapping using geospatial technologies and remote sensing. The course also covers the use of crop simulation models and the STCR approach for optimizing agricultural inputs, along with the role of nanotechnology in improving farm productivity through advanced materials. Additionally, it emphasizes land use planning, evaluating soil suitability, and understanding land capability classification to inform effective agricultural decision-making.

Course Contents

Unit –1

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

Unit –2

Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using

geospatial technologies; Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Basic concepts of remote sensing and GIS; Global positioning system (GPS), components and its functions.

Unit –3

Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; 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.

Unit –4

Land use planning: concept, techniques and factors governing present land use; land evaluation methods and soil suitability evaluation for different crops; land capability classification and constraints in application.

Practical

Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Use of aerial photographs, RS imagery, toposheets and other maps; ground truth study using GPS and visual markings; supervised and unsupervised classification of digital image; Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming

Suggested Readings:

Sr. No.	Textbooks
1.	John V. S. (2005). Precision Agriculture.
	Reference Book
2.	Pedersen, S. M and Martin, K. (2017). Precision Agriculture: Technology and Economic Perspectives.

3.	Srinivasan, A. (2006). Handbook of Precision Agriculture: Principles and Applications
4.	Rattan Lal, B.A. Stewar (2015). Soil-Specific Farming: Precision Agriculture
5.	National Academy Press, Washington, D.C. (1997). Precision Agriculture in the 21st Century: Geospatial and Information Technologies. National Academies

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG315	Intellectual Property Rights	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course student will be:-

CO 1. Knowledge on meaning of intellectual property, GATT, WTO, TRIPs and WIPO, Treaties for IPR protection.

CO 2. Understand the types of Intellectual Property and legislations covering IPR in India viz., Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets.

CO 3. Patent Cooperation Treaty, Patent search and patent database.

CO 4. Students CBD, ITPGRFA and Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Course Perspective: This course provides a foundational understanding of intellectual property rights with a specific focus on agriculture. It addresses the different types of IPR, including patents, trademarks, plant variety protection, and geographical indications, and their significance in the agricultural sector. The course emphasizes how IPR encourages innovation and commercialization of new agricultural technologies, plant varieties, and products.

Course Contents

Unit –1

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, *etc.*

Unit –2

Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, compulsory

licensing, Patent Cooperation Treaty, Patent search and patent database.

Unit –3

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

Unit –4

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

Suggested Readings:

S. No.	Textbooks
1.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
	Reference Book
2.	B. D. Singh 2015 Plant Breeding. Principles & Methods. Kalyani Publishers.10 th Edition.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG317	Practical Crop Production – I (<i>Kharif</i> crops)	0	0	4	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. The student gains a thorough knowledge on basic production technology of kharif crop production.

CO-2. To acquaint the students with modern technologies right from field preparation to marketing by allotting specific crop to each student.

CO-3. Familiarize on basic techniques of field production of kharif crops.

CO-4. Students will be able to apply different field techniques for the production of kharif crops.

CO-5. Students will be able to apply their knowledge to solve problems related to plant growth, crop production and natural resource management of kharif crops

CO-6. Practical knowledge on management of kharif crops.

Course Perspective: The Practical Crop Production – I (Kharif Crops) course focuses on the hands-on experience and practical skills necessary for the successful cultivation of Kharif crops. This course emphasizes the application of theoretical knowledge gained in lectures and other related courses, enabling students to gain practical insights into crop production practices specific to the Kharif season.

Practical

Crop planning, raising field crops in multiple cropping systems; field preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect pests and diseases of crops; harvesting, threshing, drying, winnowing, storage and marketing of produce; 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 a group of students of 8-10 students.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

SEMESTER-VI

Course Code	Course Title	L	T	P	C
ASAG302	Diseases of Field and Horticultural Crops and their Management-II	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Identify the causal organisms (fungi, bacteria, viruses, nematodes) of key diseases in field and horticultural crops.

CO2: Describe the environmental factors that influence the occurrence and severity of diseases in crops.

CO3: Apply appropriate diagnostic methods for the identification of diseases in field and horticultural crops.

CO4: Analyze the interactions between crop, pathogen, and environment (disease triangle) in relation to disease development.

CO5: Assess the impact of emerging plant diseases on food security and crop production.

CO6: Develop innovative, environmentally sustainable solutions to manage crop diseases using advanced technology and research findings.

Course Perspective: The Diseases of Field and Horticultural Crops and Their Management - II course focuses on advanced concepts in plant pathology, emphasizing the identification, biology, and management of diseases affecting field and horticultural crops. Building on the foundational knowledge gained in the first part of the course, this module explores additional disease types, their control methods, and emerging trends in disease management.

Course Contents

Unit –1

Symptoms, etiology, disease cycle and management of diseases of Field Crops: Wheat: rusts, loose smut, Karnal bunt, powdery mildew, *Alternaria* blight, and ear cockle/*molya disease*; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt.

Unit –2

Symptoms, etiology, disease cycle and management of diseases of Sunflower: Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; chickpea: wilt, grey mould and Ascochyta blight; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.

Unit –3

Symptoms, etiology, disease cycle and management of diseases of Horticultural Crops: Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl. Strawberry: leaf spot Potato: early and late blight, leaf roll, and mosaic.

Unit –4

Symptoms, etiology, disease cycle and management of diseases of Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot, Rose: dieback, powdery mildew and black leafspot. Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot.

Practical

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

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

Suggested Readings:

Sr. No.	Textbooks
1.	Singh, R.S 2001. Plant Disease Management, Oxford and IBH Publishing Co. N. Delhi.
	Reference Book
2.	Mehrotra. R. S. Plant Pathology. TATA Mechgrow Hill Pub. Co. N. Delhi.
3.	Ramakrishnan, T. S. 1971. Diseases of Millets. ICAR.
4.	Sharma, P. D. 2001. Plant Pathology, Rastogi Publications, Shivaji Road, Meerut.
5.	Singh, R. S. 1995. Diseases of Vegetables Crops. Oxford and IBH Publishing Co.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG304	Rainfed Agriculture & Watershed Management	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1 The time concept relates to increasing the intensity of cropping under assured irrigated conditions.

CO -2 Effectively managing water to meet food and Environmental conditions.

CO- 3 The vast potential of rainfed agriculture through knowledge based management of natural resources.

CO -4 To Efficient and sustainable use of natural resources.

CO -5 Low-cost and environment-friendly soil and water conservation measures throughout the top sequence for more equitable benefits to a large number of farmers.

CO- 6 Income-generating activities for the landless and women.

Course Perspective: The Rainfed Agriculture & Watershed Management course focuses on the principles and practices of managing rainfed farming systems and watershed areas. It aims to equip students with the knowledge and skills needed to enhance productivity and sustainability in rainfed agricultural systems while effectively managing water resources and soil health.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

Management strategies of rainfed crops; critical stages of life saving irrigations. Water harvesting: importance, its techniques, efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas.

Unit –4

Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management. Study of mulches and anti-transpiration; water harvesting and moisture conservation; principles of intercropping, cropping systems/intercropping in rainfed agriculture.

Practical

Studies on climate classification, studies on rainfall patterns in rainfed areas of the country, and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed areas on map of India. Interpretation of meteorological

data and scheduling of supplemental irrigation on the basis of evapotranspiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed.

Suggested Readings:

Sr. No.	Textbooks
1.	Gurmel Singh, C. Venkataraman, G., Sastry, B. and Joshi, P. 1990. Manual of Soil and Water Conservation Practices. Oxford and IBH Publishing Co., New Delhi.
	Reference Book
2.	Hansen, V.E., Israelsen, O.W., and Stringham, G.E. 1979. Irrigation Principles and Practices (4th ed.). John Wiley and Sons, New York
3.	IARI [Indian Agricultural Research Institute]. 1977. Water Requirement and Irrigation Management of Crops in India, IARI Monograph No.4, Water Technology Centre, IARI, New-Delhi.
4.	Lenka, D. 2001. Irrigation and Drainage. Kalyani Publishers, New-Delhi.
5.	Mal, B. C. 2002. Introduction to Soil and Water Conservation Engineering, Kalyani Publishers, New-Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG306	Post-harvest Management and Value Addition of Fruits and Vegetables	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO-1. Understanding of post-harvest management of fruits and vegetables.

CO-2. Understand value added product fruits and vegetables

CO-3. Students will know about maturity indices of different fruits and vegetables

CO-4. Students will able to know about the preparation of jam, jelly etc

CO-5. Students will able to know about preservation of different fruits and vegetables and also able to know about different methods of preservation

CO-6. Students will able to know about the different storage and packaging methods of fruits and vegetables

Course Perspective: Post-Harvest Management and Value Addition of Fruits and Vegetables is a course focused on the techniques and practices used to minimize post-harvest losses and enhance the value of fruits and vegetables. It covers various aspects of handling, storage, and transportation to maintain the quality, freshness, and nutritional value of produce after harvest. Students will learn about the physiological changes that occur post-harvest, as well as the factors affecting shelf life, including temperature, humidity, and microbial spoilage. The course also emphasizes value addition techniques, such as processing, preservation, packaging, and marketing, to extend the usability and profitability of fruits and vegetables. It introduces modern technologies like cold storage, controlled atmosphere storage, and minimally processed foods, along with the principles of food safety and quality control. By the end of the course, students will be equipped with the knowledge and skills to implement effective post-harvest management strategies and develop value-added products that meet consumer demands while reducing food wastage and increasing economic returns.

Course Contents

Unit –1

Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post

harvest losses

Unit –2

Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; Respiration and factors affecting respiration rate;

Unit –3

Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept

Unit –4

Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards; Fermented and non-fermented beverages. Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning- Concepts and Standards, packaging of products.

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Wills, R. B. H. 1998. Postharvest, UNSW Press.
	Reference Book
2.	Shewfelt, R. L. and Stanley, P. E. 1992. Post Harvest Handling: A Systems Approach, Academic Press Inc.
3.	Prusky, D. and Gullino, M. L. 2010. Postharvest Pathology, Springer.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG308	Protected Cultivation and Secondary Agriculture	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the concepts of protected cultivation.

CO -2. Creating a design improved protected cultivation measures.

CO-3. Applying techniques of secondary agriculture.

CO- 4. Analyzing the constructional methods and economy of poly house and greenhouse

CO 5. Space utilization pertains to building up of vertical dimension through multi-tier cropping and farming system approach.

Course Perspective: Protected Cultivation and Secondary Agriculture is a course designed to provide students with an understanding of advanced agricultural practices that enhance crop production through controlled environments. This course focuses on protected cultivation techniques such as greenhouses, shade houses, and net houses, which enable the growth of high-value crops in a regulated setting. Students will learn about the design, construction, and management of these structures, along with environmental control systems, irrigation techniques, and pest management strategies. Additionally, the course explores the concept of secondary agriculture, which includes value-added activities such as processing, packaging, and marketing of agricultural products. Students will gain insights into the economic potential of secondary agriculture and the importance of integrating these practices into the overall agricultural system to maximize profitability and sustainability. By the end of the course, students will be equipped with the knowledge and skills to implement protected cultivation methods and engage in secondary agricultural practices, contributing to increased production efficiency and enhanced marketability of crops.

Course Contents

Unit –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.

Unit –2

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

Unit –3

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

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Balraj Singh. 2005. Protected Cultivation Of Vegetable Crops, Kalyani Publishers
	Reference Book
2.	Brahma Singh. 2015. Advances in Protected Cultivation, New India Publishing Agency.
3.	Dahiya, B.S.; Rai, K.N. 1995 Seed Technology, Kalyani Publishers, Ludhiana

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
AGAG310	Management of Beneficial Insects	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Familiarize with the importance of beneficial insects

CO2 Understand and identify the different species and their utilization for different purposes

CO3 Apply different rearing techniques to multiply the beneficial insects

CO4 Analyze the effect of pathogenic diseases and natural enemies on beneficial insects

CO5 Evaluate the quality of produce by different breeds of silkworm and different crops of lac insect from different season.

Course Perspective: The Management of Beneficial Insects course focuses on the identification, biology, and management of beneficial insects that play a crucial role in agriculture. It emphasizes the importance of these insects in promoting sustainable agricultural practices, enhancing crop yields, and managing pest populations through biological control.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

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

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	David, B.V. and Kumaraswami, T. 1996 Elements of Economic Entomology. Popular Book Depot, Madras. 536 p.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG312	Crop Improvement-II (<i>Rabi</i> crops)	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Analyzing distribution of species, wild relatives of cereals; pulses; oilseeds; fibers; fodders and cash crops; vegetable and horticultural crops.

CO 2. Identification plant genetic resources, its utilization and conservation

CO3. Handling hybridization techniques for self-pollinated, cross pollinated and vegetative propagated crops including conventional and modern innovative approaches for Rabi season.

CO 4. Applying emasculation and pollination techniques in self & cross pollinated crops.

Course Perspective: This course covers the genetic principles and breeding techniques used in the improvement of major Rabi crops. It focuses on the development of varieties with improved yield, disease resistance, and stress tolerance (frost, drought, and salinity) to ensure stable crop production in winter season agriculture. The role of modern plant breeding technologies, including molecular breeding and biotechnology, in improving Rabi crops is also emphasized.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

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

Unit –4

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

Practical

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

Suggested Readings:

S. No.	Textbooks
1.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
	Reference Book
2.	B.D.Singh, 2015, Plant Breeding. Principles & Methods, 10 th edition, Kalyani Publishers, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG314	Practical Crop Production –II (<i>Rabi</i> crops)	0	0	4	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Applying package, practices, and technology of *Rabi* crops cultivation.

CO-2. Creating a layout for crop cultivation

CO-3. Analyze the soil and climate condition for selection a variety for cultivation

CO-4. Calculate the seed rate and fertilizer doses and prepare a balance sheet for economics

Course Perspective: The Practical Crop Production – II (*Rabi* Crops) course focuses on hands-on experience and practical skills necessary for the successful cultivation of *Rabi* crops. This course builds on the theoretical knowledge acquired in previous courses, allowing students to gain practical insights into crop production practices specific to the *Rabi* season.

Practical

Crop planning, raising field crops in multiple cropping systems; field preparation, seed treatment, sowing, nursery raising, nutrient management, water management, weed management and management of insect pests and 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 a group of students.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG316	Principles of Organic Farming	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understanding the concept of organic farming for India

CO-2. Identifying the resources of organic farming

CO-3. Applying the organic component in organic cultivation

CO -4. Understanding the certification process of organic farming

Course Perspective: “Principles of Organic Farming” The course "Principles of Organic Farming" provides a comprehensive understanding of organic farming practices and their significance in the current agricultural landscape. It emphasizes the principles and relevance of organic farming, especially within the context of India, and explores its potential for sustainable agriculture. By the end of the course, students will be well-versed in the principles of organic farming, equipped with practical knowledge to implement sustainable farming practices, and prepared to contribute to the growth and development of organic agriculture in India and beyond.

Course Contents

Unit –1

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

Unit –2

Organic ecosystem and their concepts; Organic nutrient resources and their fortification; Restrictions to nutrient use in organic farming; vermicomposting, green manuring, recycling of organic residues, bio- fertilizers.

Unit –3

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

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	Wishwall, R. The Organic Farmer's Business Handbook
	Reference Book
2.	Sapna E. Thottathi. India's Organic Farming Revolution: What It Means for Our Global Food System
3.	Tripathy, P. and Thapa, U. Organic Farming In India
4.	Balasubramanian, R., Balakrishnan, K. and Sivasubr, K. Principles & Practices of Organic Farming

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG318	Farm Management, Production & Resource Economics	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the concept of farm management, objectives and relationship with other sciences.

CO -2. Evaluate the farm income.

CO -3. Analyzing loss and profit of farm production

CO 4. Understanding the importance of natural resources economics.

Course Perspective: The Farm Management, Production & Resource Economics course provides an in-depth understanding of the principles and practices of farm management and the economic factors influencing agricultural production. The course emphasizes decision-making processes, resource allocation, and financial planning necessary for efficient farm operations.

Course Contents

Unit –1

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

Unit –2

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

Unit –3

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

Unit –4

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

Practical

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

Suggested Readings:

Sr. No.	Textbooks
1.	S. Subha Reddy, P. Raghu Ram, V. Neela Kanta Sasgtri, I. Bhavani Devi. Agricultural

	Economics.
	Reference Book
2.	Agrawal, A. N. Indian Agricultural Problems, Progress and Prospects. Vikas Publishing House Pvt. Ltd.
3.	S S. Johl and C.V. Moore. Essentials of Farm Management.
4.	E.O. Heedy and J.L. Dillon. Agricultural Production Functions. Kalyani Publishers.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG320	Principles of Food Science and Nutrition	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the concept of food science.

CO -2. Identify food compositions and chemistry.

CO -3. Preparing processed and fermented food.

CO -4. Identify nutritional disorders

Course Perspective: The Principles of Food Science and Nutrition course provides an interdisciplinary understanding of the science behind food production, processing, preservation, and its nutritional significance. The course emphasizes the importance of food science in ensuring food safety, quality, and nutritional value, enabling students to apply this knowledge in agricultural and food-related fields.

Course Contents

Unit –1

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

Unit –2

Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bio-actives, important reactions); Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, production of fermented foods)

Unit –3

Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.)

Unit –4

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

Suggested Readings:

Sr. No.	Textbooks
1.	Janet D. Ward and Larry Ward. 2015. Principles of Food Science
	Reference Book
2.	John Wiley & Sons. 2017. Food Science and Technology
3.	Potter, Norman N.; Hotchkiss, Joseph H. 1998. Food Science. Food science texts series (5th ed.). Springer.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Semester-VII
Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA)

Credits: 20 (0+20)

Course Code	Course Title	L	T	P	C
ASAG401	RAWE Component-I	0	0	-	14
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Code	Course Title	L	T	P	C
ASAG403	RAWE Component-II	0	0	-	6
Pre-requisites/Exposure	None				
Co-requisites	--				

No.	Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE &AIA)			
	Activities	Code	No. of weeks	Credits
1.	General orientation & on-campus training by different faculties	ASAG401	1	14
2.	Village attachment		8	
3.	Unit attachment in Univ./ College. KVK/ Research Station attachment		5	
4.	Plant clinic	ASAG403	2	6
5.	Agro-industrial attachment		3	
6.	Project report preparation, presentation and evaluation		1	
Total weeks for RAWE & AIA			20	20

- Agro- Industrial Attachment: The students would be attached with the agro-industries for a period of 3weeks to get an experience of the industrial environment and working.

RAWE & AIA Component-I

Village Attachment Training Programme

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

RAWE & AIA Component –II

Agro-Industrial Attachment

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

Activities and Tasks during the Agro-Industrial Attachment Programme

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

Course Perspective: The Rural Agricultural Work Experience and Agro-Industrial Attachment (RAWE & AIA) course is designed to provide students with practical exposure to rural agricultural practices and agro-industrial operations. This course combines fieldwork and industrial attachment to bridge the gap between theoretical knowledge and real-world agricultural applications, enhancing students' skills and understanding of the agricultural sector.

Modules for Skill Development and Entrepreneurship

Course Code	Course Title	L	T	P	C
ASAG402-ASAG424	Course-I	0	0	20	10
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Code	Course Title	L	T	P	C
ASAG402-ASAG424	Course-II	0	0	20	10
Pre-requisites/Exposure	None				
Co-requisites	--				

A student has to register 20 credits opting for two courses of (0+10) credits each (a total of 20 credits) from the package of modules.

Paper Code	Title of the module	Credits
11010801	Production Technology for Bioagents and Biofertilizers	0+10
11010802	Seed Production and Technology	0+10
11010803	Mushroom Cultivation Technology	0+10
11010804	Soil, Plant, Water and Seed Testing	0+10
11010805	Commercial Beekeeping	0+10
11010806	Poultry Production Technology	0+10
11010807	Commercial Horticulture	0+10
11010808	Floriculture and Landscaping	0+10
11010809	Food Processing	0+10
11010810	Agriculture Waste Management	0+10
11010811	Organic Production Technology	0+10
11010812	Commercial Sericulture	0+10

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

Evaluation of Experiential Learning Programme (ELP):

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

Course Perspective: The Modules for Skill Development and Entrepreneurship course is designed to equip students with the essential skills, knowledge, and mindset necessary for successful entrepreneurship in the agricultural sector. This course focuses on practical skill development, innovative thinking, and the application of entrepreneurial principles to create and manage agricultural ventures effectively.

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

COURSES

A student can select three elective courses out of the following and offered during the 4th, 5th, and 6th semesters.

Course Code	Course Title	L	T	P	C
ASAG221	Agri-business Management	2	0	2	3
Pre-requisites/Exposure	-				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understanding the importance of agribusiness in the Indian economy

CO-2. Understanding the business environment and form the budget accordingly

CO-3. Analyzing the financial components of agribusiness

CO-4. Applying the marketing skills.

Course Perspective: The Agri-Business Management course provides students with a comprehensive understanding of the principles and practices involved in managing agricultural businesses. It focuses on the integration of agricultural production with business management concepts, enabling students to effectively navigate the complexities of the agri-food industry.

Course Contents

Unit-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: 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.

Unit-2

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

Unit-3

Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial

management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning.

Unit-4

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

Practical

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

Suggested Readings: Textbooks

1. Subba rao reddy, S. and P. Raghav Rao. Agriculture finance and management. Oxford and IBH Publication company Ltd. New Delhi

Reference Book

2. Dwivedi, D.N. Managerial Economics. Vikas Publishing House. New Delhi
3. Dhingra, I.C, Indian economic problems. Sultan chand and sons, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG222	Agrochemicals	2	0	2	3
Pre-requisites/Exposure	Fundamentals of Agronomy				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Understanding the role of agrochemicals in agriculture and its effect on environment

CO2 Imparting knowledge on herbicides, fungicides, insecticides and its applications

CO3 Emphasizing the use of right dose of agrochemicals for sustainable agriculture

CO4 Analyze fertilizers application related to crop growth

Course Perspective: The Agrochemicals course provides students with a comprehensive understanding of the various chemical substances used in agriculture to enhance crop production, manage pests, and improve soil fertility. The course focuses on the classification, application, safety, and environmental impacts of agrochemicals, equipping students with the knowledge necessary for responsible and effective use in agricultural practices.

Course Contents

Unit-1

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, and management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides. Fate of herbicides.

Unit-2

Fungicides - Classification –Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action- Bordeaux mixture and copper oxychloride. Organic fungicides- Mode of action- Characteristics, preparation and use of Zineb and maneb. Systemic fungicides- Benomyl, carboxin, oxy-carboxin, Metalaxyl, Carbendazim, characteristics and use.

Unit-3

Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

Unit-4

Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow-release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate. Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitro-phosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Practical

Sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticide appliances. Quick tests for identification of common fertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used. To study and identify various formulations of insecticide available in market. Estimation of nitrogen in Urea. Estimation of P_2O_5 Report of the ICAR Fifth Deans' Committee water soluble P_2O_5 and citrate soluble P_2O_5 in single super phosphate. Estimation of potassium in Muriate of Potash/ Sulphate of Potash by flame photometer. Determination of copper content in copper oxychloride. Determination of sulphur content in sulphur fungicide. Determination of thiram. Determination of ziram content.

Suggested Readings:

Textbooks

1. Rao, V S. 2003. Principles of weed science, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

Reference Book

2. Gupta, O P. 1998. Weed management: principles and practices, Agro botanica, Bikaner
3. Saraswat, V N. 2003. Weed management, ICAR, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG223	Commercial Plant Breeding	1	0	2	3
Pre-requisites/Exposure	Fundamentals of Plant Breeding				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

- CO 1.** Understanding the methods and techniques of line maintenance for variety and hybrid development.
- CO 2.** Applying techniques in quality seed production of field and horticultural crops
- CO 3.** Applying methods and techniques of biotechnology for seed production and improvement.
- CO 4.** Analyzing the requirements for new variety release notification and certification process under PPV & FR Act.

Course Perspective: This course provides an overview of the fundamental concepts of plant breeding, including the genetic principles, selection methods, and modern technologies used in crop improvement. It explores the history and evolution of plant breeding and the role it plays in enhancing crop productivity, quality, and resilience. The course also emphasizes the applications of traditional and modern plant breeding techniques in addressing the challenges of food security and sustainable agriculture.

Course Contents

Unit- 1

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

Unit-2

Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeonpea, Brassica etc. Quality seed production of vegetable crops under open and protected environment.

Unit-3

Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools. IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act.

Unit-4

Variety testing, release and notification systems in India. Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Practical

Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production

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

Suggested Reading:

Textbooks

1. Singhal, N.C. (Ed.), 2020, Hybrid Seed Production in Field Crops: Principles and Practices, Kalyani Publications

Reference Book

2. Singh, H.G., 1994, Crop Breeding In India, IBDCO, New Delhi
3. Khurana, S.M. Paul, 2022, Plant Biotechnology, Scientifics Publication, New Delhi
4. Agrawal, Rattan, Lal., 2017, Fundamentals of Plant Breeding and Hybrid Seed Production, CBS, New Delhi.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG224	Landscaping	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Understand the importance and principles of landscaping and planning

CO2 Development of bonsai and their management

CO3 Creating designs of cultivating propagated materials

CO4 Developing methods for gardens and lawns in rural and in urban areas

Course Perspective: Landscaping is a course designed to introduce students to the fundamental concepts and practices involved in landscape design and management. The course emphasizes the importance of landscaping in enhancing both aesthetic and functional aspects of the environment. Students will explore key principles of landscape planning, including site analysis, plant selection, and sustainable design practices. The curriculum covers the development and management of bonsai, providing students with hands-on experience in this specialized form of horticulture. Additionally, students will learn how to create effective designs for cultivating propagated materials and apply these concepts in practical settings. By the end of the course, students will be equipped with the skills to develop landscaping methods suitable for both rural and urban gardens and lawns. This course will prepare them to contribute to environmental beautification, landscape restoration, and sustainable practices in various settings.

Course Contents

Unit-1

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

Unit-2

Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting

Unit-3

Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management. Bio-aesthetic planning: definition, need, planning.

Unit-4

Landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai:

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

Practical

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

Suggested Readings:

Textbooks

1. Floriculture, Landscaping and Turf Management" by Alagarsamy Nithya Devi and Alagarsamy Ramesh Kumar

Reference Book

2. Floriculture and Landscaping-Vol.1" by Naya Udyog and T K Bose
3. Landscaping Irrigation and Floriculture Terminology" by Neeraj Pratap Singh
4. Nursery Crops and Landscape Designs for Agribusiness Studies" by George Scott Williams

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG225	Food Safety and Standards	2	0	2	3
Pre-requisites/Exposure	-				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Understand the Importance, Scope and Factors affecting Food Safety.

CO2 Applying management of hazards Food storage,

CO3 Analysis, Surface Sanitation and Personal Hygiene

CO4 Remembering the Indian and International Standards for food products.

Course Perspective: The Food Safety and Standards course provides students with a comprehensive understanding of the principles and practices essential for ensuring food safety and quality. This course covers regulatory frameworks, safety management systems, and standards that govern the production, processing, and distribution of food products, equipping students with the knowledge necessary to contribute to food safety and quality assurance in the agricultural sector.

Course Contents

Unit-1

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

Unit-2

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

Unit-3

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

Unit-4

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

Indian and International Standards for food products.

Practical

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

Suggested Readings:

Textbooks

1. Commercial's The Food Safety and Standards Act 2006 by Virag Gupta (Two Vols) – 16th Edition.

Reference Book

2. Commentary on the Food Safety and Standards Act, 2006 by Seth & Capoor – 11th Edition 2023.
3. Manual of Methods of Analysis of Foods (as per FSSAI) (Set of 4 Vols.) – 8th Edition 2024

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG226	Biopesticides and Biofertilizers	2	0	2	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Understanding the concept of bio-pesticides and bio-fertilizers

CO2 Applying mass production technology of bio-pesticides and bio-fertilizers

CO3 Analyzing structure and characteristics features of bio-pesticides and bio-fertilizers

CO4 Understanding the Storage, shelf life, quality control and marketing of bio-pesticides and bio-fertilizers

Course Perspective: The Biopesticides and Biofertilizers course provides students with an in-depth understanding of biological alternatives to chemical pesticides and fertilizers in sustainable agriculture. This course emphasizes the importance of using biopesticides and biofertilizers to enhance crop productivity, protect the environment, and promote ecological balance in agricultural practices.

Course Contents

Unit-1

History and concept of bio-pesticides. Importance, scope and potential of bio-pesticide. Definitions, concepts and classification of bio-pesticides viz. pathogen, botanical pesticides, and bio-rationales. Botanicals and their uses.

Unit-2

Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomo-pathogenic pathogens and nematodes. Methods of application of bio-pesticides. Methods of quality control and Techniques of bio-pesticides. Impediments and limitation in production and use of bio-pesticide.

Unit-3

Bio-fertilizers - Introduction, status and scope. Structure and characteristic features of bacterial bio-fertilizers- *Azospirillum*, *Azotobacter*, *Bacillus*, *Pseudomonas*, *Rhizobium*. *Frankia*; Cyanobacterial biofertilizers- *Anabaena*, *Nostoc*, *Hapalosiphon* and fungal bio-fertilizers- AM mycorrhiza and ectomycorrhiza.

Unit-4

Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K-solubilization. Production Report of the ICAR Fifth Deans' Committee technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid bio-fertilizers. FCO specifications and quality control of bio-fertilizers. Application technology for seeds, seedlings, tubers, sets etc. Bio-fertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of bio-fertilizers.

Practical

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

Suggested Readings:

Textbooks

1. Bio-Fertilizers in Agriculture and Forestry by Subba Rao, N.S.

Reference Book

2. Handbook of Microbial Biofertilizers by Rai ,M.K.
3. Biopesticides in Environment and Food Security: Issues and Strategies by Koul, Opendar ; Dhaliwal, G.S ; Khokhar, Sucheta ; Ram Singh
4. Botanical Pesticides for Pest Management by Dodia, D.A ; Rabari,P.H ; Zala, M.B ; Patel, G.M

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG227	Protected Cultivation	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1. Understanding protected cultivation of vegetables, fruits, and flowers

CO2. Understanding irrigation system used in protected cultivation

CO3. Creating layout and construction for traditional and low cost green houses

CO4. Applying off-season cultivation and economic important of vegetables, fruits, and flowers

Course Perspective: Protected Cultivation is a comprehensive course designed to provide students with essential knowledge and skills in modern agricultural practices that enhance the production of vegetables, fruits, and flowers through controlled environments. This course covers the principles and techniques of protected cultivation, including greenhouses, shade houses, and other structures that create optimal growing conditions.

Students will explore various aspects of protected cultivation, focusing on the importance of maintaining environmental factors such as temperature, humidity, and light. The course also emphasizes the different irrigation systems utilized in protected environments to ensure efficient water management. In addition, students will learn to design and construct layouts for traditional and low-cost greenhouses, fostering innovation in resource-

constrained settings. The course will cover off-season cultivation techniques that enable year-round production of high-value crops and explore the economic significance of cultivating vegetables, fruits, and flowers in protected environments. By the end of the course, students will be well-equipped to implement protected cultivation practices that maximize yield, quality, and profitability while addressing the challenges of modern agriculture.

Course Contents

Unit-1

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

Unit-2

Automation. Soil preparation and management, Substrate management. Types of benches and containers. Irrigation and fertigation management.

Unit-3

Propagation and production of quality planting material of horticultural crops. Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lily, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc.

Unit-4

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

Practical

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

Suggested Readings:

Textbooks

1 S. Prasad and U. Kumar. 2015. Greenhouse Management for Horticultural Crop Production, Agrobios,

Reference Book

- 2 Singh,DK.and K V Peter. 2014. Protected Cultivation of Horticultural Crops, NewIndia Publishing Agency, New Delhi
- 3 Balraj,Singh.2014.AdvancesinProtectedCultivation,NewIndiaPublishing Agency, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG228	Micro propagation Technologies	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO- 1. Understanding plant growth processes in the tissue culture environment

CO -2. Applying the techniques of micro propagation

CO- 3. Evaluating the clonal fidelity and polymorphism of the tissue cultured plants

CO -4. Designing and develop the protocols for enhanced production of bioactive compounds in cell suspension culture.

CO- 5. Formulate protocol for development of genetically engineered crops for novel traits.

Course Perspective: Micro propagation Technologies introduces students to the fundamental principles and applications of plant tissue culture, with a focus on micro propagation techniques. The course covers the history, advantages, and limitations of micro propagation, along with various types of culture systems such as seed, embryo, organ, callus, and cell cultures. Students will explore key processes like axillary bud roliferation, organogenesis, and somatic embryogenesis. Advanced topics include the production of secondary metabolites, somaclonal variation, and cryopreservation techniques. In the practical component, students will gain hands-on experience in tissue culture laboratory techniques, including equipment use, media composition, sterilization methods, and explant culturing. The practical will involve callus induction, somatic embryo regeneration, and hardening procedures to prepare plants for successful growth outside the laboratory.

Course Contents

Unit-1

Introduction, History, Advantages, and Limitations of micro-propagation techniques.

Unit-2

Types of cultures (seed, embryo, organ, callus, cell), Stages of micro-propagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture)

Unit-3

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

Unit-4

Production of secondary metabolites, Soma clonal variation, Cryopreservation.

Practical

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

Suggested Reading:

Textbooks

1. Chhatwal, G.R. 1995. Textbook of biotechnology, Anmol publications, New-Delhi

Reference Book

2. Chadha, K L. 2000. Biotechnology in Horticultural and plantation Crops, MalhotraPublishing House, New-Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG229	Hi-Tech. Horticulture	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1. Understanding the nursery management.

CO2. Applying micro-propagation and protected cultivation techniques in horticultural crops.

CO3. Applying modern methods of farming

CO4. Handling precision farming tools

Course Perspective: Hi-Tech Horticulture is a specialized course designed to equip students with advanced knowledge and practical skills in modern horticultural practices that leverage technology for enhanced productivity and sustainability. The course covers a wide range of topics, including precision farming, automation in cultivation, controlled environment agriculture (CEA), and the use of innovative techniques such as hydroponics, aeroponics, and vertical farming.

Students will learn about the integration of information technology in horticulture, including the use of sensors, data analytics, and remote monitoring systems to optimize growing conditions and improve crop management. The course emphasizes sustainable practices, resource efficiency, and minimizing environmental impact while maximizing yield and quality.

In addition to theoretical concepts, the course includes hands-on training in the application of hi-tech tools and equipment, enabling students to design and implement modern horticultural systems. By the end of the course, students will be prepared to contribute to the development of sustainable horticulture practices that meet the growing global demand for food while addressing challenges such as climate change, resource scarcity, and food security.

Course Contents

Unit-1

Introduction & importance of high-tech horticulture. Nursery management and mechanization; micro-propagation of horticultural crops.

Unit-2

Modern field preparation and planting methods, Protected cultivation: advantages, controlled conditions, method, and techniques. Hydroponics, Aeroponics, and Aquaponics.

Unit-3

Micro irrigation systems and its components; EC, pH-based fertilizer scheduling, canopy management, high

density orcharding, Components of precision farming.

Unit-4

Remote sensing, Geographical Information System(GIS), Differential Geo-positioning System(DGPS), Variable Rate applicator(VRA), application of precision farming in horticultural crops (fruits, vegetables, and ornamental crops); mechanized harvesting of produce.

Practical

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

Suggested Readings:

Textbooks

1. Floriculture, Landscaping and Turf Management" by Alagarsamy Nithya Devi and Alagarsamy Ramesh Kumar

Reference Book

2. Floriculture and Landscaping-Vol.1" by Naya Udyog and T K Bose
3. Landscaping Irrigation and Floriculture Terminology" by Neeraj Pratap Singh
4. Nursery Crops and Landscape Designs for Agribusiness Studies" by George Scott Williams

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG230	Weed Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Identifying the harmful and beneficial effects of weeds.

CO-2. Understanding the methods of propagation and dissemination of weeds

CO-3. Identifying the different weeds which harmful for crops.

CO-4. Analyzing weed competition with main crops for nutrients, moisture, light, space and losses caused by weeds

Course Perspective: The Weed Management course provides students with a comprehensive understanding of the principles and practices involved in managing weeds in agricultural systems. This course emphasizes the importance of effective weed management strategies to enhance crop productivity, minimize competition, and promote sustainable agricultural practices.

Course Contents

Unit-1

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

Unit-2

Herbicide classification, the concept of adjuvant, surfactant, herbicide formulation, and their use. Introduction to Mode of action of Herbicides and selectivity

Unit-3

Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture.

Unit-4

Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agrochemicals and their application. Integration of herbicides with non-chemical methods of weed management. Herbicide Resistance and its management.

Practical

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixtures. Herbicide and agrochemicals study. Shift of weed flora study in long-term experiments. Methods of herbicide application, spraying equipment. Calculations of herbicide doses weed

control efficiency and weed index.

Suggested Reading:

Textbooks

1. Rao, V S. 2003. Principles of weed science, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

Reference Book

2. Gupta, O P. 1998. Weed management: principles and practices, Agro botanica, Bikaner
3. Saraswat, V N. 2003. Weed management, ICAR, New Delhi

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG231	System Simulation and Agro advisory	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the crop models, concept and techniques.

CO -2. Analyzing the crop responses to weather conditions

CO -3. Analyzing of crop growth models

CO -4. Applying of IT application and different IT tools in Agriculture.

Course Perspective: The System Simulation and Agro Advisory course provides students with a comprehensive understanding of simulation modeling techniques and their application in agricultural decision-making and advisory systems. This course emphasizes the use of computational tools and models to analyze agricultural systems, assess management practices, and provide informed recommendations to enhance productivity and sustainability.

Course Contents

Unit-1

System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques.

Unit-2

Types of crop models, data requirements, relational diagrams. Report of the ICAR Fifth Deans' Committee Evaluation of crop responses to weather elements.

Unit-3

Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modeling techniques for their estimation. Crop production in moisture and nutrients limited conditions, components of soil water and nutrients balance.

Unit-4

Weather forecasting, types, methods, tools & techniques, forecast verification. Value added weather forecast, ITK for weather forecast and its validity; Crop- Weather Calendars. Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Practical

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various

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

Suggested Reading:

Textbooks

1. Mahi, G.S. and P.K. Kingra. 2018. Fundamentals of agrometeorology and climate change. Kalayani Publishers, India.

Reference Book

2. Daniel. W, David. M, James W.J and Francois. B. 2014. Working with Dynamic Crop Models: Methods, Tools and Examples for Agriculture and Environment. 3rd edition, Academic press's.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50

Course Code	Course Title	L	T	P	C
ASAG232	Agricultural Journalism	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the conceptual and theoretical knowledge of Journalism and Mass Communication.

CO -2. Identifying, formulate, review literature, and analyze research problems related to the subject.

CO -3. Applying research- based knowledge and research methods including research design, survey analysis and interpretation of data.

CO -4. Applying conceptual knowledge and the knowledge gained through research to assess.

Course Perspective: The Agricultural Journalism course provides students with an understanding of the principles and practices of journalism, specifically focused on agricultural topics. This course emphasizes the importance of effective communication in the agricultural sector, covering various forms of media and the skills required to inform and educate the public, farmers, and policymakers about agricultural issues, innovations, and practices.

Course Contents

Unit-1

Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist. How agricultural journalism is similar to and different from other types of journalism. Newspapers and magazines as communication media.

Unit-2

Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines. Style and language of newspapers and magazines, parts of newspapers and magazines. The agricultural story.

Unit-3

Types of agricultural stories, the subject matter of the agricultural story, Structure of the agricultural story. Gathering agricultural information.

Unit-4

Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, and other agricultural news sources. Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, and readability measures. Illustrating agricultural stories. Use of

photographs, use of artwork (graphs, charts, maps, etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay-outing.

Practical

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

Suggested Reading:

Textbook

1 Singh, A K. 2014. Agricultural Extension and Farm Journalism, Agrobios, India.

Reference Book

3. Bhaskaran C. 2008. Farm Journalism and Media Management, Agrotech Publishing Academy, India.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Assignment	Mid Term Examination	Progressive Evaluation	End Term Examination
Weightage (%)	20	20	10	50