Programme Syllabus Booklet

Bachelor of Science in Agriculture

(B.Sc. Agriculture 4 year- 501)

Session: 2018-19

GURU KASHI UNIVERSITY
PUNJAB - INDIA

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Programme Name: Bachelor of Science in Agriculture

Programme Code: 501

The Programme Outcomes (POs) for the programme Bachelor of Science in Agriculture are as follows:

PO	Statement
PO1	Provide information on the productivity of agricultural systems now and under different climate impact scenarios, innovative and sustainable agricultural monitoring systems, methods and tools integrating geospatial.
PO2	Students will demonstrate the ability to communicate effectively both orally and in writing.
PO3	Students will demonstrate knowledge of the legal and ethical environment impacting agriculture organizations and exhibit an understanding and appreciation of the ethical implications of decisions
PO4	Students will demonstrate an understanding of and appreciation for the importance of the impact of globalization and diversity in modern agriculture organizations.
PO5	Students will demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems.
PO6	Students will demonstrate an ability to work effectively with others.
PO7	Students will understand and analyze the current events and issues that are occurring in agriculture and how they affect your future in agriculture.
PO8	Students will be able to recognize and examine the relationships between inputs and outputs in their agricultural field to make effective and profitable decisions.
PO9	Students will understand how all aspects of agriculture combine and are used by scientists, marketers, and producers.
PO10	Students will understand how employer characteristics and decision-making at various levels enhance the success of an agricultural enterprise.
PO11	Students will be able to demonstrate critical thinking and problem solving skills as they apply to a variety of animal and or plant production systems.
PO12	Students will demonstrate the ability to analyze data and draw appropriate statistical conclusions.

The Programme Specific Outcomes (PSOs) for the programme Bachelor of Science in Agriculture are as follows:

PSO	Statement
PSO1	Imparting detailed knowledge of Agriculture and its allied branches
PSO2	Facilitating detailed study of various principles and techniques of agriculture forestry, livestock and other allied branches required to raise the income of farmers.

Study Scheme										
Semester: 1st										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501101	Fundamentals of Genetics	T	2	0	0	2	50	50	100
2	B501103	Soil and Water Conservation Engineering	T	2	0	0	2	50	50	100
3	B501105	Fundamentals of Soil Science	T	2	0	0	2	50	50	100
4	B501107	Fundamentals of Plant Pathology	T	3	0	0	3	50	50	100
5	B501109	Comprehension & Communication Skills in English	T	1	0	0	1	50	50	100
6	B501111	Introductory Agriculture and Agricultural Heritage*	T	1	0	0	1	50	50	100
7	B501112	Introductory Agro-meteorology & Climate Change	T	2	0	0	2	50	50	100
8	B501117	Agri- Informatics	T	1	0	0	1	50	50	100
9		**Elective-I**								
10	B501102	Lab. Fundamentals of Genetics	P	0	0	2	1	60	40	100
11	B501104	Lab. Soil and Water Conservation Engineering	P	0	0	2	1	60	40	100
12	B501106	Lab. Fundamentals of Soil Science	P	0	0	2	1	60	40	100
13	B501108	Lab. Fundamentals of Plant Pathology	P	0	0	2	1	60	40	100
14	B501110	Lab. Comprehension & Communication Skills in English	P	0	0	2	1	60	40	100
15	B501113	Lab. Introductory Agro-meteorology & Climate Change	P	0	0	2	1	60	40	100
16	B501118	Lab. Agri- Informatics	P	0	0	2	1	60	40	100
17	B501119	Lab. NSS/NCC/Physical Education & Yoga Practices**	P	0	0	2	1(NC)			
Total No. of Credits							24 + 1 (NC)			

Elective-I (Students with non medical background at +2 will take Botany and with medical background will take Mathematics)

Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501116	Mathematics-I	T	3	0	0	3	50	50	100
2	B501114	Fundamentals of Botany-I	T	2	0	0	2	50	50	100
	B501115	Lab. Fundamentals of Botany-I	P	0	0	2	1	60	40	100

Semester: 2nd										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501201	Fundamentals of Plant Biochemistry and Biotechnology	T	2	0	0	2	50	50	100
2	B501203	Fundamentals of Horticulture	T	1	0	0	1	50	50	100
3	B501205	Agricultural Microbiology	T	2	0	0	2	50	50	100
4	B501210	Environmental Studies and Disaster Management	T	2	0	0	2	50	50	100
5	B501212	Fundamentals of Agricultural Economics	T	2	0	0	2	50	50	100
6	B501213	Fundamentals Of Agronomy	T	2	0	0	2	50	50	100
7	B501215	Fundamentals of Entomology-I	T	2	0	0	2	50	50	100
8	B501217	Communication Skills and Personality Development	T	1	0	0	1	50	50	100
9		**Elective-II**								
10	B501202	Lab. Fundamentals of Plant Biochemistry and Biotechnology	P	0	0	2	1	60	40	100
11	B501204	Lab. Fundamentals of Horticulture	P	0	0	2	1	60	40	100
12	B501206	Lab.- Agricultural Microbiology	P	0	0	2	1	60	40	100
13	B501211	Lab- Environmental Studies and Disaster Management	P	0	0	2	1	60	40	100
14	B501214	Lab.-Fundamentals Of Agronomy	P	0	0	2	1	60	40	100
15	B501216	Lab. Fundamentals of Entomology-I	P	0	0	2	1	60	40	100
16	B501218	Lab. Communication Skills and Personality Development	P	0	0	2	1	60	40	100
Total No. of Credits							24			

Elective-II (Students with non medical background at +2 will take Botany and with medical background will take Mathematics)

Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501209	Mathematics-II	T	3	0	0	3	50	50	100
2	B501207	Fundamentals of Zoology	T	2	0	0	2	50	50	100
	B501208	Lab- Fundamentals of Zoology	P	0	0	2	1	60	40	100

Semester: 3rd										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501301	Fundamentals of Entomology II	T	2	0	0	2	50	50	100
2	B501303	Crop Production Technology – I *(Kharif Crops)*	T	1	0	0	1	50	50	100
3	B501305	Fundamentals of Plant Breeding	T	3	0	0	3	50	50	100
4	B501307	Agricultural Finance and Cooperation	T	2	0	0	2	50	50	100
5	B501309	Farm Machinery and Power	T	2	0	0	2	50	50	100
6	B501311	Production Technology for Vegetables and Spices	T	2	0	0	2	50	50	100
7	B501313	Fundamentals of Crop Physiology	T	2	0	0	2	50	50	100
8	B501315	Livestock and Poultry Management	T	2	0	0	2	50	50	100
9	B501302	Lab. Fundamentals of Entomology II	P	0	0	2	1	60	40	100
10	B501304	Lab. Crop Production Technology – I *(Kharif Crops)*	T	0	0	2	1	60	40	100
11	B501306	Lab. Fundamentals of Plant Breeding	T	0	0	2	1	60	40	100
12	B501308	Lab. Agricultural Finance and Cooperation	T	0	0	2	1	60	40	100
13	B501310	Lab. Farm Machinery and Power	T	0	0	2	1	60	40	100

14	B501312	Lab. Production Technology for Vegetables and Spices	T	0	0	2	1	60	40	100
15	B501314	Lab. Fundamentals of Crop Physiology	P	0	0	2	1	60	40	100
16	B501316	Lab. Livestock and Poultry Management	P	0	0	2	1	60	40	100
17	B501317	Human Values & Ethics (**Non Credit**)**	P	0	0	2	1(NC)			
Total No. of Credits							24+1(NC)			

Semester: 4th										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	B501401	Crop Production Technology –II *(Rabi Crops)*	T	1	0	0	1	50	50	100
2	B501403	Production Technology for Ornamental Crops, MAP and Landscaping	T	1	0	0	1	50	50	100
3	B501405	Renewable Energy and Green Technology	T	1	0	0	1	50	50	100
4	B501407	Problematic Soils and their Management	T	2	0	0	2	50	50	100
5	B501408	Production Technology for Fruit and Plantation Crops	T	2	0	0	2	50	50	100
6	B501410	Principles of Seed Technology	T	1	0	0	1	50	50	100
7	B501412	Farming System & Sustainable Agriculture	T	1	0	0	1	50	50	100
8	B501413	Agricultural Marketing Trade & Prices	T	2	0	0	2	50	50	100
9	B501415	Introduction to Forestry	T	1	0	0	1	50	50	100
10	B501417	Fundamentals of Agricultural Extension Education	T	2	0	0	2	50	50	100
11	B501419	Intellectual Property Rights	T	1	0	0	1	50	50	100
12	B501402	Lab. Crop Production Technology –II *(Rabi Crops)*	P	0	0	2	1	60	40	100
13	B501404	Lab. Production Technology for Ornamental Crops, MAP and Landscaping	P	0	0	2	1	60	40	100
14	B501406	Lab. Renewable Energy and Green Technology	P	0	0	2	1	60	40	100
15	B501409	Lab. Production Technology for Fruit and Plantation Crops	P	0	0	2	1	60	40	100
16	B501411	Lab. Principles of Seed Technology	P	0	0	4	2	60	40	100
17	B501414	Lab. Agricultural Marketing Trade & Prices	P	0	0	2	1	60	40	100
18	B501416	Lab. Introduction to Forestry	P	0	0	2	1	60	40	100
19	B501418	Lab. Fundamentals of Agricultural Extension Education	P	0	0	2	1	60	40	100
Total No. of Credits							24			

Semester: 5th										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	B501501	Principles of Integrated Pest and Disease Management	T	2	0	0	2	50	50	100
2	B501503	Manures, Fertilizers and Soil Fertility Management	T	2	0	0	2	50	50	100
3	B501505	Pests of Crops and Stored Grain and their Management	T	2	0	0	2	50	50	100
4	B501507	Diseases of Field and Horticultural Crops and their Management -I	T	2	0	0	2	50	50	100
5	B501509	Crop Improvement-I *(Kharif Crops)*	T	2	0	0	2	50	50	100
6	B501511	Entrepreneurship Development and Business Communication	T	1	0	0	1	50	50	100
7	B501513	Geoinformatics and Nano-technology and Precision Farming	T	1	0	0	1	50	50	100
8	B501515	Statistical Methods	T	2	0	0	2	50	50	100
9	B501502	Lab. Principles of Integrated Pest and Disease Management	P	0	0	2	1	60	40	100
10	B501504	Lab. Manures, Fertilizers and Soil Fertility Management	P	0	0	2	1	60	40	100
11	B501506	Lab. Pests of Crops and Stored Grain and their Management	P	0	0	2	1	60	40	100
12	B501508	Lab. Diseases of Field and Horticultural Crops and their Management -I	P	0	0	2	1	60	40	100
13	B501510	Lab. Crop Improvement-I *(Kharif Crops)*	P	0	0	2	1	60	40	100
14	B501512	Lab. Entrepreneurship Development and Business Communication	P	0	0	2	1	60	40	100
15	B501514	Lab. Geo-informatics and Nanotechnology and Precision Farming	P	0	0	2	1	60	40	100
16	B501516	Lab. Statistical Methods	P	0	0	2	1	60	40	100
17	B501517	Lab. Practical Crop Production – I (*Kharif* crops)	P	0	0	4	2	60	40	100
Total No. of Credits							24			

Semester: 6th										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501601	Rainfed Agriculture & Watershed Management	T	1	0	0	1	50	50	100
2	B501603	Protected Cultivation and Secondary Agriculture	T	1	0	0	1	50	50	100
3	B501605	Diseases of Field and Horticultural Crops and their Management-II	T	2	0	0	2	50	50	100
4	B501607	Post-harvest Management and Value Addition of Fruits and Vegetables	T	1	0	0	1	50	50	100
5	B501609	Management of Beneficial Insects	T	1	0	0	1	50	50	100
6	B501611	Crop Improvement-II *(Rabi crops)*	T	2	0	0	2	50	50	100
7	B501614	Principles of Organic Farming	T	1	0	0	1	50	50	100
8	B501616	Farm Management, Production & Resource Economics	T	1	0	0	1	50	50	100
9	B501618	Principles of Food Science and Nutrition	T	2	0	0	2	50	50	100
10	B501619	Rural Sociology & Educational Psychology	T	1	0	0	1	50	50	100
11	B501602	Lab. Rainfed Agriculture & Watershed Management	P	0	0	2	1	60	40	100
12	B501604	Lab. Protected Cultivation and Secondary Agriculture	P	0	0	2	1	60	40	100
13	B501606	Lab. Diseases of Field and Horticultural Crops and their Management-II	P	0	0	2	1	60	40	100
14	B501608	Lab. Post-harvest Management and Value Addition of Fruits and Vegetables	P	0	0	2	1	60	40	100
15	B501610	Lab. Management of Beneficial Insects	P	0	0	2	1	60	40	100
16	B501612	Lab. Crop Improvement-II *(Rabi crops)*	P	0	0	2	1	60	40	100
17	B501613	Lab. Practical Crop Production –II (*Rabi* crops)	P	0	0	4	2	60	40	100
18	B501615	Lab. Principles of Organic Farming	P	0	0	2	1	60	40	100
19	B501617	Lab. Farm Management, Production & Resource Economics	P	0	0	2	1	60	40	100
Total No. of Credits							23			

Semester: 7th (Group-I Crop Production)										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501701	Seed Production Technology	T	2	0	0	2	50	50	100
2	B501703	Production of Commercial Crops	T	1	0	0	1	50	50	100
3	B501706	Weed Management	T	2	0	0	2	50	50	100
4	B501702	LAB- Seed Production Technology	P	0	0	2	1	60	40	100
5	B501704	LAB- Production of Commercial Crops	P	0	0	2	1	60	40	100
6	B501705	LAB- Analytical Techniques in Soil, Plant, Fertilizer and water Analysis	P	0	0	4	2	60	40	100
7	B501707	Lab-Weed Management	P	0	0	2	1	60	40	100
Total No. of Credits				10						
Modules:										
8	B501708	Soil, Plant, Water and Seed Testing	P	0	0	10	5			
9	B501709	Seed Production	P	0	0	10	5			
Total No. of Credits							10			

Semester: 7th (Group-II Crop Protection)										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501710	Bio-control and Integrated pest Management	T	2	0	0	2	50	50	100
2	B501712	Pesticides and Plant Protection Equipments	T	2	0	0	2	50	50	100
3	B501714	Bio-pesticides & Bio-fertilizers	T	2	0	0	2	50	50	100
4	B501711	LAB- Bio-control and Integrated pest Management	P	0	0	2	1	60	40	100
5	B501713	LAB-Pesticides and Plant Protection Equipments	P	0	0	2	1	60	40	100
6	B501715	Lab- Bio-pesticides &Bio-fertilizers	P	0	0	2	1	60	40	100
7	B501716	Lab- Techniques of diagnosis of plant diseases	P	0	0	4	2	60	40	100
Total No. of Credits				11						
	Modules:									
8	B501717	Commercial Beekeeping/ Commercial Sericulture	P	0	0	10	5			
9	B501718	Mushroom Cultivation	P	0	0	10	5			
Total No. of Credits							10			

Semester: 7th (Group-III Horticulture)										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501719	Commercial Fruit Production	T	1	0	0	1	50	50	100
2	B501721	Vegetable breeding and Seed Production	T	2	0	0	2	50	50	100
3	B501723	Protected Cultivation	T	2	0	0	2	50	50	100
4	B501725	Hi-tech. Horticulture	T	2	0	0	2	50	50	100
5	B501720	Lab- Commercial Fruit Production	P	0	0	2	1	60	40	100
6	B501722	LAB- Vegetable breeding and Seed Production	P	0	0	2	1	60	40	100
7	B501724	Lab- Protected Cultivation	P	0	0	2	1	60	40	100
8	B501726	Lab- Hi-tech. Horticulture	P	0	0	2	1	60	40	100
Total No. of Credits				11						
	Modules:									
9	B501727	Floriculture and Landscaping	P	0	0	10	5			
10	B501728	Food Processing and preservation	P	0	0	10	5			
Total No. of Credits							10			

Semester: 7th (Group-IV Plant Breeding and Genetics and Biotechnology)										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	B501729	Theory and Practice of Plant Breeding	T	2	0	0	2	50	50	100
2	B501731	Crop Experimentations	T	1	0	0	1	50	50	100
3	B501733	Principles and Procedure of Moleculer Biotechnology and Genomics	T	2	0	0	2	50	50	100
4	B501735	Commercial Plant Breeding	T	2	0	0	2	50	50	100
5	B501730	LAB-Theory and Practice of Plant Breeding	P	0	0	2	1	60	40	100
6	B501732	Lab- Crop Experimentaion	P	0	0	2	1	60	40	100
7	B501734	LAB- Principles and Procedure of Moleculer Biotechnology and Genomics	P	0	0	2	1	60	40	100
8	B501736	Lab- Commercial Plant Breeding	P	0	0	2	1	60	40	100
Total No. of Credits				11						

	Modules:									
9	B501737	Seed Production and Technology	P	0	0	10	5			
10	B501738	Hybrid Seed Production	P	0	0	10	5			
		Total No. of Credits					10			

Semester: 7th (Group-V Agri-Business and Extension Management)										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	B501739	Retailing and Supply Chain Management	T	2	0	0	2	50	50	100
2	B501740	Communication and Extension Teaching Methods	T	2	0	0	2	50	50	100
3	B501741	Behaviour Skills For Human Resource Development	T	2	0	0	2	50	50	100
4	B501742	Agri-business Management	T	2	0	0	2	50	50	100
5	B501744	Administration of agriculture extension programmes	T	2	0	0	2	50	50	100
6	B501743	Lab- Agri-business Management	P	0	0	2	1	60	40	100
		Total No. of Credits					11			
	Modules:									
9	B501745	Development of Entrepreneurial skills in Agribusiness	P	0	0	10	5			
10	B501746	Communication and extension teaching methods	P	0	0	10	5			
		Total No. of Credits					10			

Semester: 7th (Group-VI Post Harvest Technology And Value Addition)										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	B501747	Fruit and Vegetable Technology	T	2	0	0	2	50	50	100
2	B501749	Cereal Technology	T	2	0	0	2	50	50	100
3	B501751	Engineering Princilpes in Food Processing	T	2	0	0	2	50	50	100
4	B501753	Fundamentals of food microbiology	T	2	0	0	2	50	50	100
5	B501748	Lab- Fruit and Vegetable Technology	P	0	0	2	1	60	40	100
6	B501750	Lab- Cereal Technology	P	0	0	2	1	60	40	100
7	B501752	Lab- Engineering Princilpes in Food Processing	P	0	0	2	1	60	40	100
		Total No. of Credits					11			
	Modules:									
9	B501754	Food processing	P	0	0	10	5			
10	B501755	Food preservation	P	0	0	10	5			
		Total No. of Credits					10			

Semester: 8th										
Sr.	**Course Code**	**Course Name**	**Type of Course T/P**	**(Hours Per Week)**			**No. of Credits**	**Internal Marks**	**External Marks**	**Total Marks**
				L	**T**	**P**				
1	B501801	RAWEP I: Village Attachment	P	NA	NA	NA	3	50	50	100
2	B501802	ELP II. Specialized Experiential Learning Programme (On-Campus)	P	NA	NA	NA	12	50	50	100
3	B501803	ELP III. Industrial Attachment (Off-Campus)	P	NA	NA	NA	4	50	50	100
4	B501804	ELP IV. Project Documentation and Report Preparation, Presentation (On-Campus)	P	NA	NA	NA	1	50	50	100
		Total no. Of credits					20			
Modules:										

1		Module -1 (According to elective in 7th Sem)	P	NA	NA	10	5			
2		Module -I1 (According to elective in 7th Sem)	P	NA	NA	10	5			
Total No. of Credits							10			

Semester VIII. RAWE-cum-Experiential Learning Programme (20 weeks period, 20 credit hours:0+20)			
	Period	**Activity**	**Remarks**
1	3 weeks	**RAWEP I: Village Attachment (0+3)**	All final year students of B.Sc. Agri.(Hons) 4-year and 6-year programmes will be divided into groups of 5-10students each. Formulation and implementation of selected projects for study of rural situation. Planning and implementation of projects for dissemination of agricultural innovations to ameliorate site specific problems. Each group will work in a selected village
2	12 weeks	**ELP II. Specialized Experiential Learning Programme (On-Campus) (0+12)** **Elective-wise 'Experimental Learning Programme (ELP)':** **1. Elective: Crop Production** (i) Module for evaluating soil health and irrigation water quality (ii) Practical seed production (iii) Nursery production of important agro-forestry tree species **2. Elective: Crop Protection** (i) Production of bioagents against plant pathogens (ii) Production of important parasitoids and arthropod predators as bioagents against insect pests of important field crops (iii) Handling of pesticides and plat protection equipment (iv) Commercial apiculture (v) Mushroom Production **3. Elective: Horticulture** (i) Protected cultivation of vegetables and nursery raising technique (ii) Nursery production of important ornamental plants /fruits/vegetable III) Moshroom production **4. Elective: Plant Breeding, Genetics and Biotechnology** (i) Hybrid seed production of sunflower (ii) Biotechnological tools in crop improvement **5. Elective: Post Harvest Technology and Value Addition** (i) Production of value added processed food (Students opting for a particular elective programme will opt for any one activity (ELP) within the elective products) (ii) Mushroom production **6. Elective: Agri-Business and Extension Management** (i) Designing and preparation of facilitating material and organizing activities (ii) Marketing of agricultural produce, preparing enterprise & financial budgets and identification of adoption gaps (iii) Case studies related to financial, project, retail and supply chain management, and preparation of project profile	Students opting for a particular elective programme will opt for any one activity (ELP) within the elective
3	4 weeks	ELP III. Industrial Attachment (Off-Campus) (0+4)	Students will attend 4 weeks off-campus activities (elective wise). Student will opt for only one of the listed activities within his/ her elective
4	1 week	ELP IV. Project Documentation and Report Preparation, Presentation (On-Campus) (0+1) -	

Semester VIII. Elective-wise Off-campus RAWE-cum-Experiential Learning Activities (ELP *Industrial Attachment, 4 weeks period, 4 credit hours:* 0+4)		
S. No	**Elective**	**Industrial attachment**
1	Crop Production	(i) Seed production and marketing organisations (ii) Fertilizer industries in public, private and cooperative sectors (iii) Vermicompost units (iv) Mineral mines (v) Mentha distillation plants (vi) Units for production and marketing of agrochemicals (vii) Soybean processing units (viii) Plywood manufacturing industries (ix) Hi-tech industry (tree planting stock production) (x) Biofertilizers (xi) Farm School
2	Crop Protection	i) Pesticide and biopesticide industries (ii) Sericulture units (iii) Biocontrol agents production units (iv) Plant Quarantine Station (v) Potato seed production unit (vi) Commercial honey production, hive and other apicultural equipment and honey processing plants manufacturing units (vii) Mushroom production units
3	Horticulture	(i) Commercial nurseries – Fruits, flowers and vegetable crops (ii) Flower seed production and landscaping units (iii) Flower marketing firms (iv) Waxing and package house
4	Plant Breeding, Genetics and Biotechnology	(i) Biotechnological industries and tissue culture labs (ii)Seed production units, seed Farms
5	Post Harvest Technology and Value Addition	(i) Agriculture & Food processing and packaging units (ii) Mushroom production units (iii) Bio fertilizer units
6	Agri-Business and Extension Management	(i) Attachment with various public, private and cooperative organisations engaged in agricultural development. (CAO, Deputy Director(Horticulture), Soil Conservation, PAMETI, ATMA,IFFCO, KRIBHCO, MARKFED, DRDA, Zila Parishad, Refinery, Thermal plant units for sulphur marketing etc.) (ii) Agricultural Financial Institutions / branches of Commercial Banks / Co-operative Banks, Co-operative Agricultural Service Societies (CASS), market committees (iii) Agri-business industry in Public/ Private sector to study Agri-business Management practices/ processes Student will opt for only one of the above listed activities within his/her elective

Course Name: Fundamentals of Genetics
Course Code: B501101
Semester: 1st

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To understand the mendelian and non-mendelian modes of inheritance that governs pairage of genetic traits across generation.
CO2	To use this knowledge of inheritance to track alleles through generations and categorize predict genotypes and phenotypes.
CO3	To understand basic structure and functions of DNA and chromosomes, basics of the molecular processes of DNA replication, transcription and translation.
CO4	To understand the origins of the human species.

Course Contents

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosomes and their types. Chromosomal theory of inheritance, cell cycle and types of cell division. Probability and Chi-square. Dominant and recessive characters, epistatic interactions. Multiple alleles, pleio-tropism and pseudo alleles, Sex determination and sex linkage, Blood group genetics, Linkage and its estimation, crossing over mechanisms. Structural and numerical variations in chromosome and their implications, Uses of haploids, diploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene structure, function and regulation, LAC and TRP operons.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO 2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO 3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO 4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Lab. Fundamentals of Genetics
Course Code: B501102
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To understand the mendelian and non-mendelian modes of inheritance that governs pairage of genetic traits across generation.
CO2	To use this knowledge of inheritance to track alleles through generations and categorize predict genotypes and phenotypes.
CO3	To understand basic structure and functions of DNA and chromosomes, basics of the molecular processes of DNA replication, transcription and translation.
CO4	To understand the origins of the human species.

Course Contents

Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on mono-hybrid, di-hybrid, tri-hybrid, 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Soil and Water Conservation Engineering

Course Code: B501103

Semester: 1st

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Learn principles of soil-water and soil-water-plant relationships and their field applications to support useful plant life, with minimum degradation of land and water resources.
CO2	Agriculture is essential for food production and security, but it can be a large source of non-point pollution.
CO3	A good understanding and application of engineering fundamentals relating water to soil and plant can help produce food and fiber with minimum degradation of our natural resources (soil and water).
CO4	The ultimate object of survey is to prepare a map or plant using the data obtained through the survey

Course Contents

Surveying: survey equipment, chain survey, plotting procedure, calculations of area of regular and irregular fields. Levelling –types of leveling, levelling equipment, methods of calculation of reduced levels, contouring. Irrigation, classification of projects, flow irrigation and lift irrigation. Water source, Introduction to Water lifting devices. Irrigation water measurement – weirs, flumes and orifices and methods of water measurement and instruments. Water conveyance systems, open channel and underground pipeline. Irrigation methods – drip and sprinkle irrigation systems.

Introduction to Soil and Water Conservation, causes of soil erosion, water erosion and their forms. Principles of erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion control and its control measures.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	2	3	2	1	2	3	2	2	1	2	3	3
CO2	3	1	3	3	2	1	1	3	3	2	1	2	3	3
CO3	3	2	2	3	2	1	1	3	2	2	1	1	3	3
CO4	2	2	2	2	1	1	1	3	2	2	1	3	3	3

Course Name: Lab:- Soil and Water Conservation Engineering
Course Code: B501104
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Learn principles of soil-water and soil-water-plant relationships and their field applications to support useful plant life, with minimum degradation of land and water resources.
CO2	Agriculture is essential for food production and security, but it can be a large source of non-point pollution.
CO3	A good understanding and application of engineering fundamentals relating water to soil and plant can help produce food and fiber with minimum degradation of our natural resources (soil and water).
CO4	The ultimate object of survey is to prepare a map or plant using the data obtained through the survey.

Course Contents

Acquaintance with chain survey equipment; Ranging and measurement of offsets; Levelling equipment – dumpy level, levelling staff, temporary adjustments and staff reading; Study of centrifugal pumping system and irrigation water measuring devices; Study of different components of sprinkler irrigation systems; Study of different components of drip and sprinkler irrigation systems; Uniformity of water application in drip and sprinkler systems; Study of soil and water conservation measures. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	2	3	2	1	2	3	2	2	1	2	3	3
CO2	3	1	3	3	2	1	1	3	3	2	1	2	3	3
CO3	3	2	2	3	2	1	1	3	2	2	1	1	3	3
CO4	2	2	2	2	1	1	1	3	2	2	1	3	3	3

Course Name: Fundamentals of Soil Science
Course Code: B501105
Semester: 1st

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To acquire knowledge about soil formation and classification.
CO2	To understand the physical and chemical properties of soil.
CO3	To understand the soil moisture dynamics in soil, understand the thermal properties, gaseous exchange of soil.
CO4	To acquire knowledge about soil organic method and biology of soil.

COURSE CONTENTS

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy classification and soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth, 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; 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 - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	1	2	3	2	2	2	3	2	2	2	2	3	3
CO2	3	1	2	3	2	2	2	3	2	2	2	3	3	3
CO3	3	1	2	3	2	2	2	3	2	2	2	2	3	3
CO4	3	1	2	3	2	2	2	3	2	2	2	3	3	3

Course Name: Lab. Fundamentals of Soil Science
Course Code: B501106
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To acquire basic concept, techniques and calculation of analytical chemistry.
CO2	To develop skill about collection of soil sample for various purpose.
CO3	To acquire knowledge about the determination of bulk density and particle density of soil.
CO4	To understand the mechanical analysis of soil.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	1	2	3	2	2	2	3	2	2	2	2	3	3
CO2	3	1	2	3	2	2	2	3	2	2	2	3	3	3
CO3	3	1	2	3	2	2	2	3	2	2	2	2	3	3
CO4	3	1	2	3	2	2	2	3	2	2	2	3	3	3

Course Name: Fundamentals of Plant Pathology
Course Code: B501107
Semester: 1st

L T P
Credits: 03 **3 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Introduce students to the basic principles and concepts of plant pathology, familiarize students with the basic vocabulary of plant pathology and plant disease management using flash cards with images and audio files.
CO2	Introduce and illustrate the major groups of organisms that cause plant diseases, enhance student's understanding of scientific research, especially as it applies to the science of plant pathology and the study of microorganisms.
CO3	Improve the written and oral communication skills of students through class, group and individual projects; prepare students for additional classes in Plant Pathology and related disciplines.
CO4	Provide a framework that students can use in their profession to best approach palnt disease management.

Course Contents

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

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

Viruses: nature, structure, replication and transmission.

Nematodes: General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (*Heterodera, Meloidogyne, Anguina, Radopholus* etc.)

Dispersal and survival of plant pathogens.Types of parasitism and variability in plant pathogens.Pathogenesis; Role of enzymes, toxins and growth regulators in disease development. Defence mechanism in plants**.** Principles and methods of plant disease management.Chemical control; classification, mode of action and formulations of fungicides and antibiotics**.**

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	2	3	2	1	2	3	2	2	1	2	3	3
CO2	3	1	3	3	2	1	1	3	3	2	1	2	3	3
CO3	3	2	2	3	2	1	1	3	2	2	1	1	3	3
CO4	2	2	2	2	1	1	1	3	2	2	1	3	3	3

Course Name: Lab. Fundamentals of Plant Pathology
Course Code: B501108
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Introduce students to the basic principles and concepts of plant pathology, familiarize students with the basic vocabulary of plant pathology and plant disease management using flash cards with images and audio files.
CO2	Introduce and illustrate the major groups of organisms that cause plant diseases, enhance student's understanding of scientific research, especially as it applies to the science of plant pathology and the study of microorganisms.
CO3	Improve the written and oral communication skills of students through class, group and individual projects; prepare students for additional classes in Plant Pathology and related disciplines.
CO4	Provide a framework that students can use in their profession to best approach plant disease management.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	3	2	1	2	3	2	2	1	2	3	3
CO 2	3	1	3	3	2	1	1	3	3	2	1	2	3	3
CO 3	3	2	2	3	2	1	1	3	2	2	1	1	3	3
CO 4	2	2	2	2	1	1	1	3	2	2	1	3	3	3

Course Name: Comprehension & Communication Skills in English

Course Code: B501109

Semester: 1st

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understanding grammar principles and transforming sentences.
CO2	Writing CVs, letters for jobs, complaints and emails, essays on select topics
CO3	Writing research projects and preparing technical reports.
CO4	Learning phonetic symbols, using correct sound, stress and intonations, Learning do's and don'ts for interviews, Enhanced communication ability in English

Course Contents

War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English – Spoken English and broken English G.B. Shaw. Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. Exercises to help students in the enrichment of vocabulary based on TOEFL and other competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process. Translation from Hindi into English, Allied Grammar: Use of idioms, correction of incorrect sentences, etc.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	3	1	1	1	3	1	1	1	1	1	1	3	3

CO 2	1	3	1	1	1	3	1	1	1	1	1	1	2	1
CO 3	1	3	1	1	1	3	1	1	1	1	1	1	2	1
CO 4	1	3	1	1	1	3	1	1	1	1	1	1	1	1

Course Name: Lab. Comprehension & Communication Skills in English
Course Code: B501110
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understanding grammar principles and transforming sentences.
CO2	Writing CVs, letters for jobs, complaints and emails, essays on select topics
CO3	Learning phonetic symbols, using correct sound, stress and intonations. Learning do's and don'ts for interviews.
CO4	Writing research projects and preparing technical reports, Enhanced communication ability in English.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	1	3	1	1	1	3	1	1	1	1	1	1	3	3
CO2	1	3	1	1	1	3	1	1	1	1	1	1	2	1
CO3	1	3	1	1	1	3	1	1	1	1	1	1	2	1
CO4	1	3	1	1	1	3	1	1	1	1	1	1	1	1

Course Name: Introductory Agriculture and Agricultural Heritage*

Course Code: B501111

Semester: 1st

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To performing input management and follow stock management in farm business, and to implement environment-friendly programs in business,
CO2	To evaluating input, techniques and technology used in agricultural production in view of the ecosystem, natural resources and environment,
CO3	Ancient Agricultural Practices & Its relevant to modern agriculture practices.
CO4	Traditional Technical Knowledge. • Our Journey (Developments) in Agriculture and Vision for the Future

Course Contents

Basic elements of crop production; Factors affecting crop production; History of Agricultural Development; Ancient India Agriculture in Civilization Era, Chronological Agricultural Technology development in India. Indian Agriculture: growth, contrasting food chains and diversity. Soil groups, marine, livestock and water; Liabilities: Soil factors, weather factors, Farming Systems approach, value addition, requirements in new technology; Agriculture scope: Importance of agriculture and agricultural resources available in India; Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects. Indian agricultural heritage: Ancient practices, Relevance of heritage to present day agriculture. Past and present status of agriculture and farmers in society; crop production and protection through the ages. Women in Agriculture: Nutritional and rural life standards, role in house hold design making, drudgery reduction for farm women, women friendly agricultural technology; Empowerment of women.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO2	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO3	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO4	3	3	3	3	2	2	3	2	3	3	3	2	3	3

Course Name: Introductory Agro-meteorology & Climate Change
Course Code: B501112
Semester: 1st

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	By weather knowledge betterment of crops.
CO2	Understand earth atmosphere phenomena.
CO3	Measurement of weather element by different instructs.
CO4	Effect of weather elements on crop production, Crop monitoring.

Course Contents

Importance of agricultural meteorology; Earth atmosphere, Atmospheric weather variables: pressure, height; Wind, cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon- mechanism and importance in Indian agriculture, Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave. Agriculture and weather relations; Modifications of crop microclimate, climatic normals for crop and livestock production. Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	3	2	3	3	2	2	3	3	3	3	3
CO2	3	2	3	3	2	3	3	2	2	3	3	3	3	3
CO3	3	2	3	3	2	2	3	2	2	3	3	3	3	3
CO4	3	2	3	3	2	2	3	2	2	3	3	3	3	3

Course Name: Lab. Introductory Agro-meteorology & Climate Change
Course Code: B501113
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	By weather knowledge betterment of crops, Understand earth atmosphere phenomena.
CO2	Measurement of weather element by different instructs
CO3	Effect of weather elements on crop production6
CO4	Crop monitoring.

Course Contents

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 vapour 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	3	3	2	3	3	2	2	3	3	3	3	3
CO2	3	2	3	3	2	3	3	2	2	3	3	3	3	3
CO3	3	2	3	3	2	2	3	2	2	3	3	3	3	3
CO4	3	2	3	3	2	2	3	2	2	3	3	3	3	3

Course Name: Fundamentals of Botany
Course Code: B501114
Semester: 1st

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understand and apply the basic principles and rules of botanical nomenclature, and use taxonomic literature. Be familiar with methods of systematics, both traditional and modern.
CO2	Apply a working vocabulary used in description of plant structures. Understand the history of classification, and recognize various systems of classifying angiosperms.
CO3	Use dichotomous keys for the identification of Pacific NW plant species. Recognize representatives of local flora; applying floral formulas and descriptions of major plant families and representative species found here in Central Oregon.
CO4	Apply proper herbarium methods - collecting, mounting, and keeping records.

Course Contents

Classification of plant kingdom with salient features of each group. Cell-structure and its types. Cell division, types of cell division. Meristematic and permanent tissues and their types. Parts of angiosperms plant. External morphology of root. Tap root and adventitious root system. Modified tap and adventitious roots. Morphology of stem. Modifications and functions of stem. Leaf structure, leaf venation, phyllotaxy, modifications and functions of leaves. Types of inflorescence, types of fruits andovules. Vegetative reproduction (natural and artificial). Pollination and fertilization. Structure of monocot and dicot seed. Seed germination. Factors affecting seed germination and seed dormancy. Types of seed dormancy and factors affecting it. Basic knowledge of crop growth and development. Brief account of phyto-hormones and their use in Agriculture.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	2	2	2	1	1	2	1	2	3	1	2	2
CO 2	2	2	2	2	2	1	1	2	1	2	3	1	3	2
CO 3	2	2	2	2	2	1	1	2	1	2	3	1	2	2
CO 4	2	2	2	2	2	1	1	2	1	2	3	3	2	2

Course Name: Lab. Fundamentals of Botany
Course Code: B501115
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understand and apply the basic principles and rules of botanical nomenclature, and use taxonomic literature. Be familiar with methods of systematics, both traditional and modern.
CO2	Apply a working vocabulary used in description of plant structures. Understand the history of classification, and recognize various systems of classifying angiosperms.
CO3	Use dichotomous keys for the identification of Pacific NW plant species. Recognize representatives of local flora; applying floral formulas and descriptions of major plant families and representative species found here in Central Oregon.
CO4	Apply proper herbarium methods - collecting, mounting, and keeping records.

Course Contents

Study of different plant parts.Description of at least two plant species from each group of plants.Preparation of slides of cell and its inclusions.Study of different types of roots and their modifications.Stem types and their modifications.Parts of leaf.Leaf types, leaf venation. Phyllotaxy and modifications of leaves. Flower structure, insertion of floral whorls on thalamus, floral diagrams, racemose, cymoseandtypes of inflorescence. Fruit types, structure and germination of monocot and dicot seeds.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2	2	2	2	1	1	2	1	2	3	1	2	2
CO2	2	2	2	2	2	1	1	2	1	2	3	1	3	2
CO3	2	2	2	2	2	1	1	2	1	2	3	1	2	2
CO4	2	2	2	2	2	1	1	2	1	2	3	3	2	2

Course Name: Mathematics* - I
Course Code: B501116
Semester: 1st

L T P
Credits: 03 **3 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Demonstrate an understanding of the foundations and history of mathematics.
CO2	Perform computations in higher mathematics, Read and understand middle-level proofs.
CO3	Write and understand basic proofs, Develop and maintain problem-solving skills.
CO4	Use mathematical ideas to model real-world problems

Course Contents

Straight lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , sin x &cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions, logarithmic differentiation, differentiation by substitution, Integral Calculus : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).

Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation**.**

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	2	1	2	1	2	1	1	2	2	1	1	2	1
CO 2	2	2	1	2	1	2	1	1	2	2	1	1	2	1
CO 3	2	3	1	2	1	2	1	1	2	2	1	1	2	2
CO 4	2	3	1	2	1	2	1	1	2	2	1	1	2	2

Course Name: Agri- Informatics
Course Code: B501117
Semester: 1st

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Making the students understand & learn basics of Computer.
CO2	Able to operate a Computer by knowing all parts & Ins. Of Computer.
CO3	Make to use Computer in our day to day Life.
CO4	Learn about DOS and its commands.

Course contents

Introduction to Computers, Operating Systems, definition and types, Applications of MSOffice for document creation & Editing, Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Concepts and components. Introduction to computer programming languages, concepts and standard input/output operations.

E-Agriculture, concepts and applications in Agriculture. Computer-controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc; 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	1	1	1	1	1	1	1	1	1	1	3	3
CO2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Course Name: Lab. Agri- Informatics
Course Code: B501118
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Able to operate a Computer by knowing all parts & Ins. Of Computer.
CO2	Making the students understand & learn basics of Computer
CO3	Make to use Computer in our day to day Life.
CO4	Learn about DOS and its commands.

Course Contents

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). Hands on Crop Simulation Models (CSM).

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	1	1	1	1	1	1	1	1	1	1	3	3
CO2	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Course Name: Lab. NSS/NCC/Physical Education & Yoga Practices**
Course Code: B501119
Semester: 1st

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Students will understand the principles of lifetime fitness and will incorporate fitness activities into a healthy and active lifestyle.
CO2	Students will acquire knowledge and demonstrate skills to safely engage in physical activity.
CO3	Students will understand the basic principles of anatomy, physiology and/or biomechanics and apply the knowledge to movement activity.
CO4	Create self interest in various sports, Take leadership.

Course Contents

Orientation: history, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

NSS programmes and activities

Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary

Understanding youth: Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change

Community mobilisation: Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

Social harmony and national integration: Indian history and culture, role of youth in nation building, conflict resolution and peace building

Volunteerism and shramdan: Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

Citizenship, constitution and human rights: Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information

Family and society: Concept of family, community (PRIs and other community based organisations) and society

Semester I: Physical Education and Yoga Practices

1. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)
2. Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit)

3. Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game
4. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation
5. Teaching of skills of Basketball – demonstration, practice of the skills, involvement in game situation
6. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game
7. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
8. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
9. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game
10. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
11. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game
12. Teaching of some of Asanas – demonstration, practice, correction and practice
13. Teaching of some more of Asanas – demonstration, practice, correction and practice
14. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
15. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
16. Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching of rule of the game
17. Teaching – Meaning, Scope and importance of Physical Education
18. Teaching – Definition, Type of Tournaments
19. Teaching – Physical Fitness and Health Education
20. Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).

National Cadet Corps Credit hours: 2(0+2) Semester I: National Cadet Corps

1. Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
2. Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
3. Sizing, numbering, forming in three ranks, open and close order march and dressing.
4. Saluting at the halt, getting on parade, dismissing and falling out.
5. Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear.
6. Turning on the march and wheeling. Saluting on the march.
7. Marking time, forward march and halt.
8. Changing step, formation of squad and squad drill.
9. Command and control, organization, badges of rank, honours and awards

10. Nation Building- cultural heritage, religions, traditions and customs of India. National integration.
11. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen.
12. Leadership traits, types of leadership. Character/personality development.
13. Civil defense organization, types of emergencies, fire fighting, protection,
14. Maintenance of essential services, disaster management, aid during development projects.
15. Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family planning.
16. Structure and function of human body, diet and exercise, hygiene and sanitation.
17. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health.
18. Adventure activities
19. Basic principles of ecology, environmental conservation, pollution and its control.
20. Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self defense.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO 2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO 3	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO 4	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Course Name: Fundamentals of Plant Biochemistry and Biotechnology
Course Code: B501201
Semester: 2nd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	This offers the possibility of producing from widely available renewable resources, substances and compounds essential of life.
CO2	This enables organism to produce a totally new product which organism does not or cannot produce normally through genetic engineer.
CO3	Waste treatment and utilization. Gametic and somatic tissue cultures are used for gametoclonal or somaclonal variation.
CO4	Biotechnology provides solution towards pro-Anther culture used for haploid production.

Course Contents

Importance of Biochemistry.Carbohydrates: Importance and classification. Monosaccharides: Structure and properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Poly saccharides. Lipids: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids. Nucleotides: DNA, RNA.

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; Somaclonal variation and its use in crop improvement; cryo-preservation.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2	2	3	2	1	2	3	3	3	2	2	3	3
CO2	2	2	2	3	2	1	2	3	3	3	3	2	3	3
CO3	2	2	2	3	2	1	2	3	3	3	3	2	2	2
CO4	2	2	2	3	2	1	2	3	3	3	3	2	2	2

Course Name: Lab. Fundamentals of Plant Biochemistry and Biotechnology
Course Code: B501202
Semester: 2nd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	This offers the possibility of producing from widely available renewable resources, substances and compounds essential of life.
CO2	This enables organism to produce a totally new product which organism does not or cannot produce normally through genetic engineer.
CO3	Waste treatment and utilization. Biotechnology provides solution towards proAnther culture used for haploid production.
CO4	Gametic and somatic tissue cultures are used for gametoclonal or somaclonal variation.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2	2	3	2	1	2	3	3	3	2	2	3	3
CO2	2	2	2	3	2	1	2	3	3	3	3	2	3	3
CO3	2	2	2	3	2	1	2	3	3	3	3	2	2	2
CO4	2	2	2	3	2	1	2	3	3	3	3	2	2	2

Course Name: Fundamentals of Horticulture
Course Code: B501203
Semester: 2nd Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Apply concepts of horticulture science to select, manage, and improve plants and their products, Describe social, spiritual, and cultural importance of plants to historical and contemporary communities of people
CO2	Demonstrate competence with laboratory and/or field-based technologies used in modern horticulture
CO3	Anticipate and recognize problems, identify causes of these problems, quantify potential impacts, analyze options, identify viable solutions, and evaluate actions and consequences of treatments and interventions
CO4	Understand how global issues including climate change, energy use, water availability, and/or food safety impact sustainability of horticultural systems locally, nationally, and globally

Course Contents

Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures; Seed dormancy, Seed germination, principles of orchard

establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	3	3	3	3	3	3	3	3	2	3	3
CO2	3	2	3	3	3	3	3	3	3	3	3	2	3	3
CO3	3	2	3	3	3	3	3	3	3	3	3	1	3	3
CO4	3	2	3	3	3	3	3	3	3	3	3	2	3	3

Course Name: Lab Fundamentals of Horticulture
Course Code: B501204
Semester: 2nd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Demonstrate competence with laboratory and/or field-based technologies used in modern horticulture.
CO2	Anticipate and recognize problems, identify causes of these problems, quantify potential impacts, analyze options, identify viable solutions, and evaluate actions and consequences of treatments and interventions
CO3	Understand how global issues including climate change, energy use, water availability, and/or food safety impact sustainability of horticultural systems locally, nationally, and globally
CO4	Identifies and applies, as appropriate, quantitative methods for defining and responding to horticultural problems.

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	3	3	3	3	3	3	3	3	3	2	3	3
CO2	3	2	3	3	3	3	3	3	3	3	3	2	3	3
CO3	3	2	3	3	3	3	3	3	3	3	3	1	3	3
CO4	3	2	3	3	3	3	3	3	3	3	3	2	3	3

Course Name: Agricultural Microbiology
Course Code: B501205
Semester: 2nd Semester

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Identify and describe the uses of basic apparatus and equipment used in a microbiology laboratory.
CO2	Carry out basics aseptic procedures used in the handling and study of microorganisms
CO3	Isolate or extract and culture microorganisms
CO4	Understand the general characteristics of different groups of microorganisms

Course contents

Introduction. Applied areas of Microbiology, Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, plasmids, transposon. Bacteriophages: structure and properties of Bacterial viruses – Lytic and Lysogenic cycles.

Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic.Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers (Bacterial Cyanobacterial and Fungal),biopesticides, biofuel production and biodegradation of agro-waste. Microbiology of food: microbial spoilage and principles of food preservation.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	2	1	2	2	2	2	3	2	3	2	2	1	3	3
CO2	2	1	2	2	2	2	3	3	3	2	2	1	3	3

CO3	2	1	2	2	2	2	2	3	2	2	2	1	3	3
CO4	2	1	2	2	2	2	2	3	2	2	2	1	3	3

Course Name: Lab. - Agricultural Microbiology
Course Code: B501206
Semester: 2nd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Identify and describe the uses of basic apparatus and equipment used in a microbiology laboratory.
CO2	Carry out basics aseptic procedures used in the handling and study of microorganisms
CO3	Isolate or extract and culture microorganisms.
CO4	Understand the general characteristics of different groups of microorganisms

Course Contents

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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	2	2	2	3	2	3	2	2	1	3	3
CO2	2	1	2	2	2	2	3	3	3	2	2	1	3	3
CO3	2	1	2	2	2	2	2	3	2	2	2	1	3	3
CO4	2	1	2	2	2	2	2	3	2	2	2	1	3	3

Course Name: Fundamentals of Zoology
Course Code: B501207
Semester: 2nd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Zoology is a basic course in B.Sc. Agri, student will become familiar with animal classification and diagnostic characteristics.
CO2	As well as developing and understanding of and ability to apply basic zoological principles.
CO3	The laboratory and lecture sections of the course are highly integrated and directed toward teaching students the principles of animal evolution, classification, form and function
CO4	To make students familiar with animal classification schemes and other applied courses as well as developing an understanding of and ability to apply basic zoological principles.

Course Contents

Origin of life and evolution. Structure of animal cell and its organelles. Differences between animal and plant cell. Mitosis cell division. Elementary knowledge of chemical constituents of living bodies- proteins, carbohydrates, lipids, nucleic acids and enzymes. Types of animal tissues. Salient features of classification of animals (non-chordates upto phylum level and chordates upto class level with examples). Binomial nomenclature. Study of external characters, habits and habitat of Amoeba, ent-amoeba, a sponge, Hydra, liverfluke, Ascaris, tape worm, earthworm, cockroach, grass-hopper, snail, starfish, fish, frog, snake, lizard, pigeon and rabbit. Study of different systems of earthworm and cockroach. Zoological parks and museums.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	2	1	1	1	1	2	2	2	2	1	2	3	2
CO2	1	2	1	1	1	1	2	2	2	2	1	2	3	2
CO3	1	2	1	1	1	1	2	2	2	2	1	2	3	3
CO4	1	2	1	1	1	1	2	2	2	2	1	2	3	3

Course Name: Lab- Fundamentals of Zoology
Course Code: B501208
Semester: 2nd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To inspire and encourage an interest in Zoology.
CO2	As well as developing and understanding of and ability to apply basic zoological principles.
CO3	To provide quality education offering skill based programs and motivate the students for self-employment in applied branches of Zoology.

CO4	To integrate the laboratory and lecture sections of the course and directed toward teaching students both in the classroom and on the field. To inculcate the value based education and entrepreneurial skills among the students

Course contents

Microscopic study of animal cell, cell division and animal tissues. General survey of animal kingdom. Study of the characteristic features of different animal types. Dissection of earthworm and cockroach. Visit to a Zoological museum/park.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	2	1	1	1	1	2	2	2	2	1	2	3	2
CO2	1	2	1	1	1	1	2	2	2	2	1	2	3	2
CO3	1	2	1	1	1	1	2	2	2	2	1	2	3	3
CO4	1	2	1	1	1	1	2	2	2	2	1	2	3	3

Course Name: MATHEMATICS-II
Course Code: B501209
Semester: 2nd Semester

L T P
Credits: 03 **3 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Demonstrate an understanding of the foundations and history of mathematics.
CO2	Perform computations in higher mathematics, Read and understand middle-level proofs
CO3	Write and understand basic proofs. Develop and maintain problem-solving skills
CO4	Use mathematical ideas to model real-world problems

Course Contents

Definition of function. Limit. Continuity. Differentiation, successive differentiation, geometrical interpretation of derivative. Indefinite integration, integration by substitution, partial fractions and their use in integration. Integration by parts. Tutorials on: limit, continuity, differentiation, successive differentiation, indefinite integration, integration by substitution, partial fractions and their application in integration. Integration by parts.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	1	1	1	1	1	2	1	1	1	1	1	2	1	1
CO 2	1	1	1	1	1	2	1	1	1	1	1	2	1	1
CO 3	1	1	1	1	1	2	1	1	1	1	1	2	1	1
CO 4	1	1	1	1	1	2	1	1	1	1	1	2	1	1

Course Name: Environmental Studies and Disaster Management
Course Code: B501210
Semester: 2nd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Study the natural resources, ecosystem environmental pollution: cause and effects various environments.
CO2	Study about protection act.
CO3	Information helps in improving environment and human health, Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO4	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Course Contents

Definition, scope and importance of environment. Natural resources and associated problems. a) Forest resources, water resources, mineral resources, food resources, food problems associated with agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies; Energy resources: growing energy needs, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Equitable use of resources for sustainable lifestyles.

Ecosystems: Concept of an ecosystem, Structure and functioning of various types of ecosystem (forests, grasslands, deserts and aquatic systems). Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains, food webs and ecological pyramids. Biodiversity, its conservation and bio-geographical classification of India. Hot-sports of biodiversity and threats to biodiversity. Conservation of biodiversity.

Environmental Pollution: definition, causes, types, effects and control measures. Nuclear hazards, Solid Wastes, prevention and management. Environmental ethics: Issues and possible solutions. Public awareness and Environment Protection Acts (Water, soil, air and wild life) and their enforcement. *Disaster Management:* Impact of various natural and man-made disasters, issues related with environment disasters. Concept of disaster management, role of NGOs, community based organizations and media.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	3	3	2	2	2	3	2	2	2	1	2	2
CO2	1	1	1	1	2	1	2	2	2	2	2	2	2	2
CO3	3	3	3	3	2	2	2	2	2	2	2	1	1	2
CO4	3	3	3	3	2	2	2	2	2	2	2	1	2	2

Course Name: Lab Environmental Studies and Disaster Management
Course Code: B501211
Semester: 2nd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Study the natural resources, ecosystem environmental pollution: cause and effects various environments.
CO2	Study about protection act.
CO3	Information helps in improving environment and human health, Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO4	Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Course Contents

Pollution case studies. Case Studies- Field work: Visits in local areas to document environmental assets river/ forest/ grassland/ hill/ mountain, visits to polluted sites - Urban/Rural/Industrial/ Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	3	3	2	2	2	3	2	2	2	1	2	2
CO2	1	1	1	1	2	1	2	2	2	2	2	2	2	2
CO3	3	3	3	3	2	2	2	2	2	2	2	1	1	2
CO4	3	3	3	3	2	2	2	2	2	2	2	1	2	2

Course Name: Fundamentals of Agricultural Economics
Course Code: B501212
Semester: 2nd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Determine and outline those conditions which give optimum use of resources in the production of crops and livestock.
CO2	Determine the extent to which the existing use of resources deviate from what is considered the optimal use level.
CO3	Analyse the forces which condition production patterns and resource use in relation to the existing opportunities
CO4	Explain the means and methods adaptable in moving from the existing levels to the optimum use of farm resources.

Course Contents

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behaviour. Agricultural planning and development in the country. *Demand:* meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Laws of returns, Laws of costs and supplies. Market structure and Price determination, Distribution theory, National income. Population: Importance, Malthusian and Optimum population theories, natural and socioeconomic determinants, current policies and programmes on population control. Role of Money and Banking modern economy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. *Tax:* meaning, direct and indirect taxes, agricultural taxation, VAT.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	3	3	3	1	2	3	3	2	2	3	3	3
CO 2	3	2	3	3	2	1	2	3	3	3	2	3	2	3
CO 3	2	2	2	3	3	1	2	3	3	2	2	3	2	3
CO 4	2	2	2	3	2	1	2	3	3	2	2	2	2	3

Course Name: Fundamentals of Agronomy
Course Code: B501213
Semester: 2nd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Describe the role of physiological processes controlling plant growth and development. Understand the effect of environment and management on crop growth, rate of development, water and nutrient use efficiency. Use decision support system Yield Prophet to understand probability of achieving various levels of productivity and the influence of water and nitrogen stress of predicted crop yield.
CO2	Describe the impact of latest crop management practices on crop productivity and resource use efficiency, Undertake sampling of plants and soils for routine analysis of soil water and crop growth and development
CO3	Interpret results of research on crop growth and development, radiation interception and radiation use efficiency; crop water use and water use efficiency.
CO4	Understand the behaviour of herbicides in the environment and evolution of herbicide resistance in weeds and their management.

Course contents

Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, logging.

Weeds- importance, classification, crop-weed competition, concepts of weed management principles and methods, herbicides- classification, selectivity and resistance, allele-pathy. Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO2	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO4	3	2	3	3	3	2	3	3	3	3	3	3	3	3

Course Name: Lab.-Fundamentals of Agronomy
Course Code: B501214
Semester: 2nd Semester

Credits: 01

L T P
0 0 2

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Describe the role of physiological processes controlling plant growth and development. Understand the effect of environment and management on crop growth, rate of development, water and nutrient use efficiency. Use decision support system Yield Prophet to understand probability of achieving various levels of productivity and the influence of water and nitrogen stress of predicted crop yield.
CO2	Describe the impact of latest crop management practices on crop productivity and resource use efficiency, Undertake sampling of plants and soils for routine analysis of soil water and crop growth and development
CO3	Interpret results of research on crop growth and development, radiation interception and radiation use efficiency; crop water use and water use efficiency.
CO4	Understand the behaviour of herbicides in the environment and evolution of herbicide resistance in weeds and their management.

Courses contents

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro-climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveller, seed drill.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2

CO1	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO2	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO4	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO5	3	2	3	3	3	2	3	3	3	3	3	2	3	3

Course Name: Fundamentals of Entomology I
Course Code: B501215
Semester: 2nd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To study the various aspects of insect ecology.To study the various abiotic and biotic factor.
CO2	Understand the effect of abiotic and biotic factors on insect ecology and agro-ecosystem.
CO3	To study various factor for the out/weak of insect-pest and pest surveillance and pest forecasting.
CO4	To study the classification of insects, the identification of pests and the various aspects of integrated pest management (IDM)

Course Contents

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

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2

CO1	3	2	3	2	3	2	3	2	2	3	3	3	3	3
CO2	3	2	2	2	3	2	3	2	3	3	3	3	3	3
CO3	3	2	2	2	3	2	3	2	2	3	3	3	3	3
CO4	3	2	2	2	3	2	3	2	3	3	3	3	3	3

Course Name: Lab. Fundamentals of Entomology I
Course Code: B501216
Semester: 2nd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To study the various aspects of insect ecology and the various abiotic and biotic factor. To study the various aspects of integrated pest management (IDM).
CO2	Understand the effect of abiotic and biotic factors on insect ecology and the agro-ecosystem.
CO3	To study various factor for the out/weak of insect-pest, pest surveillance and pest forecasting.
CO4	To study the classification and identification of pests and insects.

Course Contents

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 (grass-hopper);

Visit to meteorological observatory / automatic weather reporting station; Study of terrestrial and pond ecosystems of insects; Studies on behaviour of insects and orientation; Insect surveillance and sampling techniques for the estimation of pest population and damage.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	2	3	2	3	2	3	2	2	3	3	3	3	3
CO2	3	2	2	2	3	2	3	2	3	3	3	3	3	3
CO3	3	2	2	2	3	2	3	2	2	3	3	3	3	3
CO4	3	2	2	2	3	2	3	2	3	3	3	3	3	3

Course Name: Communication Skills and Personality Development

Course Code: B501217

Semester: 2nd Semester

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understanding grammar principles and transforming sentences.
CO2	Writing research projects and preparing technical reports.
CO3	Learning phonetic symbols, using correct sound, stress and intonations. Learning do's and don'ts for interviews.
CO4	Enhanced communication ability in English.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	3	1	2	1	3	1	1	1	1	1	2	2	2
CO2	2	3	1	2	1	3	1	1	1	1	1	2	2	2
CO3	2	3	1	2	1	2	1	1	1	1	1	2	2	2
CO4	2	3	1	2	1	3	1	1	1	1	1	2	2	2

Course Name: Lab. Communication Skills and Personality Development

Course Code: B501218

Semester: 2nd Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Writing CVs, letters for jobs, complaints and emails, essays on select topics.
CO2	Writing research projects and preparing technical reports.
CO3	Learning phonetic symbols, using correct sound, stress and intonations. Learning do's and don'ts for interviews.
CO4	Enhanced communication ability in English.

Course Contents

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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	3	1	2	1	3	1	1	1	1	1	2	2	2
CO2	2	3	1	2	1	3	1	1	1	1	1	2	2	2
CO3	2	3	1	2	1	2	1	1	1	1	1	2	2	2
CO4	2	3	1	2	1	3	1	1	1	1	1	2	2	2

Course Name: Fundamentals of Entomology II
Course Code: B501301
Semester: 3rd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To study the various aspects of insect ecology and study the various abiotic and biotic factor
CO2	Understand the effect of abiotic and biotic factors on insect ecology and study the agro-ecosystem
CO3	To study various factor for the out/weak of insect-pest, to study pest surveillance and pest forecasting.
CO4	To study the classification of insects and study the identification of pests, to study the various aspects of integrated pest management (IDM)

Course contents

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insectaupto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera, Dictyoptera,Odonata,Isoptera, Thysanoptera, Hemiptera, Neuroptera, Lepidoptera, Coleoptera, Hymenoptera, Diptera.

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,

Antifeedants, hormones, attractants and gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of pesticides. Symptoms of poisoning, first aid and antidotes

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO 2	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO 3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 4	3	2	3	3	3	2	3	3	3	3	3	3	3	3

Course Name: Lab. Fundamentals of Entomology II

Course Code: B501302

Semester: 3rd Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To study the various aspects of insect ecology and study the various abiotic and biotic factor
CO2	Understand the effect of abiotic and biotic factors on insect ecology and study the agro-ecosystem
CO3	To study various factor for the out/weak of insect-pest, to study pest surveillance and pest forecasting.
CO4	To study the classification of insects and study the identification of pests, to study the various aspects of integrated pest management (IDM)

Course contents

Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance. Pesticide appliances and their maintenance. Sampling techniques for estimation of insect population and damage, Practicable IPM practices, Mechanical and physical methods, Cultural and biological methods; Chemical control, Insecticides and their formulations; Calculation of doses/concentrations of insecticides, compatibility and phyto-toxicity of pesticides.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO2	3	2	3	3	3	2	3	3	3	3	3	2	3	3
CO3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO4	3	2	3	3	3	2	3	3	3	3	3	3	3	3

Course Name: Crop Production Technology – I (Kharif Crops)
Course Code: B501303
Semester: 3rd Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To develop more efficient production systems for major cereals and pulses, fulfilling the demands of commercial firms, farmers, industrials and consumers.
CO2	To enhance the quality &productivity of crop production, implement forage crop trials: fodder maize, Sorghum, Bajra.
CO3	To introduce new technologies in crop production: fertigation & new varieties maintain tight contact with farmers.
CO4	To Understand different implements used in ploughing.

Course Contents

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops. Cereals – rice, maize, sorghum, pearl millet and finger millet, pulses-pigeonpea, mungbean and urdbean; oilseeds- groundnut, and soybean; fibre crops- cotton & jute; forage crops-sorghum, cowpea, cluster bean and Napier.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO 2	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO 3	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO 4	3	3	3	3	2	2	3	2	3	3	3	2	3	3

Course Name: Lab. Crop Production Technology – I (Kharif Crops)

Course Code: B501304

Semester: 3rd Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To develop more efficient production systems for major cereals and pulses, fulfilling the demands of commercial firms, farmers, industrials and consumers.
CO2	To enhance the quality &productivity of crop production, implement forage crop trials: fodder maize, Sorghum, Bajra.
CO3	To introduce new technologies in crop production: fertigation& new varieties maintain tight contact with farmers.
CO4	To Understand different implements used in ploughing.

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO2	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO3	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO4	3	3	3	3	2	2	3	2	3	3	3	2	3	3

Course Name: Fundamentals of Plant Breeding
Course Code: B501305
Semester: 3rd Semester

L T P
Credits: 03 **3 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Classification, description and reproduction in plant.
CO2	Emasculation, selling, pollination, heterosis and hybrid seed production.
CO3	Breeding procedures under different modes of reproduction.
CO4	Determine breeding methodology appropriate for plants with different mating systems.

Course Contents

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. Domestication, Acclimatization and Introduction; Centres of origin/ diversity, components of Genetic variation; Heritability and genetic advance; Genetic basis and breeding methods in self- pollinated crops - mass and pure line selection, hybridization techniques and handling of segregating population; Multiline concept. Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross pollinated crops, modes of selection; Population improvement Schemes- Ear to row method, Modified Ear to Row, recurrent selection schemes; Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties; Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses; Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	2	2	2	3	2	3	2	2	1	3	3
CO2	2	1	2	2	2	2	3	3	3	2	2	1	3	3
CO3	2	1	2	2	2	2	2	3	2	2	2	1	3	3
CO4	2	1	2	2	2	2	2	3	2	2	2	1	3	3

Course Name: Lab. Fundamentals of Plant Breeding

Course Code: B501306

Semester: 3rd Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Classification, description and reproduction in plant.
CO2	Emasculation, selling, pollination, heterosis and hybrid seed production.
CO3	Breeding procedures under different modes of reproduction.
CO4	Determine breeding methodology appropriate for plants with different mating systems

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	2	1	2	2	2	2	3	2	3	2	2	1	3	3
CO2	2	1	2	2	2	2	3	3	3	2	2	1	3	3
CO3	2	1	2	2	2	2	2	3	2	2	2	1	3	3
CO4	2	1	2	2	2	2	2	3	2	2	2	1	3	3

Course Name: Agricultural Finance and Cooperation
Course Code: B501307
Semester: 3rd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To impart knowledge on agricultural finance, its nature and scope, understand time value of money and its types in present view.
CO2	To impart knowledge on history of agriculture finance in India, know various rules, regulations, functions of various banks.
CO3	To study about commercial and co-operative banks in detail.
CO4	To acquaint the knowledge of higher financing agencies RBI, NABARD etc.

Course contents

Agricultural Finance, Agricultural credit, Credit analysis and sources of agricultural finance.Commercial banks, social control and nationalization of commercial banks. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, World Bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit.Preparation and analysis of financial Statements – Balance Sheet and Income Statement.Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. 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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	1	2	1	2	2	1	2	2	2	2	2	1
CO2	2	1	1	2	1	2	2	1	2	2	2	2	2	1
CO3	2	1	1	2	1	2	2	1	2	2	2	2	2	1
CO4	2	1	1	2	1	2	2	1	2	2	2	2	2	1

Course Name: Lab. Agricultural Finance and Cooperation
Course Code: B501308
Semester: 3rd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To impart knowledge on agricultural finance, its nature and scope, understand time value of money and its types in present view.
CO2	To impart knowledge on history of agriculture finance in India, know various rules, regulations, functions of various banks.
CO3	To study about commercial and co-operative banks in detail.
CO4	To acquaint the knowledge of higher financing agencies RBI, NABARD etc.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	1	2	1	2	2	1	2	2	2	2	2	1
CO2	2	1	1	2	1	2	2	1	2	2	2	2	2	1
CO3	2	1	1	2	1	2	2	1	2	2	2	2	2	1
CO4	2	1	1	2	1	2	2	1	2	2	2	2	2	1

Course Name: Farm Machinery and Power

Course Code: B501309

Semester: 3rd Semester

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	The students will be able to learn about different sources of farm power
CO2	To construction and functioning of CI and SI engines
CO3	IC engine fuels, Coolants
CO4	Anti freeze and anti corrosion materials

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	1	1	1	2	2	1	1	2	1	1	1	1	1	2
CO2	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO3	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO4	1	1	2	2	2	1	1	2	1	1	1	1	1	1

Course Name: Lab. Farm Machinery and Power
Course Code: B501310
Semester: 3rd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	The students will be able to learn about different sources of farm power
CO2	To construction and functioning of CI and SI engines
CO3	IC engine fuels, Coolants
CO4	Anti freeze and anti corrosion materials

Course Contents

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 intercultivation equipment, Familiarization with harvesting and threshing machinery.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	1	1	1	2	2	1	1	2	1	1	1	1	1	2
CO2	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO3	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO4	1	1	2	2	2	1	1	2	1	1	1	1	1	1

Course Name: Production Technology for Vegetables and Spices
Course Code: B501311
Semester: 3rd Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To introduce the students to the vegetable and flower crops of different season.
CO2	Overview, national and international scenario, status and scope of vegetable crops and flower and its classification.
CO3	The student will also understand the principles and cultivation of temperate and tropical vegetable crops and also flowers.
CO4	This will help the students to understand the production systems of vegetables and flowers.

Course Contents

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening, brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices (Tomato, Brinjal, Chilli, Capsicum, Cucumber, Melons, Gourds, Pumpkin, French bean, Peas; Cole crops such as Cabbage, Cauliflower, Knol-khol; Bulb crops such as Onion, Garlic; Root crops such as Carrot, Raddish, Beetroot; Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak. Perennial vegetables).

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO2	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO3	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO4	3	3	3	3	2	2	3	2	3	3	3	2	3	3

Course Name: Lab. Production Technology for Vegetables and Spices
Course Code: B501312
Semester: 3rd Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To introduce the students to the vegetable and flower crops of different season.
CO2	Overview, national and international scenario, status and scope of vegetable crops and flower and its classification.
CO3	The student will also understand the principles and cultivation of temperate and tropical vegetable crops and also flowers.
CO4	This will help the students to understand the production systems of vegetables and flowers

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO2	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO3	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO4	3	3	3	3	2	2	3	2	3	3	3	2	3	3

Course Name: Fundamentals of Crop Physiology

Course Code: B501313

Semester: 3rd Semester

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understanding various plant metabolic processes, namely photosynthesis, respiration and translocation of metabolites.
CO2	Studies on plant growth and development, hormones and growth regulators, Physiology of seed and fruit development in plants, including germination and dormancy in seeds.
CO3	Plant water relationships, processes of osmosis and plasmolysis, water pressure – potential, Studying factors affecting water loss from plants.
CO4	Leaning the physiological role of nutrients in plants.

Course Contents

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology; Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Photoperiodism and vernalization. Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism: Fatty acid synthesis and Breakdown; 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO2	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO3	3	3	3	3	2	2	3	2	3	3	3	2	3	3
CO4	3	3	3	3	2	2	3	2	3	3	3	2	3	3

Course Name: Lab. Fundamentals of Crop Physiology

Course Code: B501314

Semester: 3rd Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Demonstrating mechanism of photosynthesis in plants.
CO2	Experimenting processes of respiration, osmosis, Imbibition, plasmolysis, Measuring permeability of water and solutes in plants.
CO3	Conducting experiments on water transpiration, nutrient status and catalysis.
CO4	Studying impact of quality and quantity of light on seed germination and growth of plants.

Course Contents

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis: production of Oxygen and utilization of CO_2 (Moll'shalf-leaf experiment). Respiration: production of CO_2 During respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of photosynthetic CO_2 assimilation by Infra Red Gas Analyser (IRGA).

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	1	1	1	2	2	1	1	2	1	1	1	1	1	2
CO2	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO3	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO4	1	1	2	2	2	1	1	2	1	1	1	1	1	1

Course Name: Livestock and Poultry Management

Course Code: B501315

Semester: 3rd Semester

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To know about breeding and inheritance of characters for hishee milk production, the knowledge regarding milk perception mechanism, composition and factors affecting milk yield.
CO2	To be knowledgeable about the role of livestock towards national economy and become familiar about different animal breeds and their genesis, understand the reproductive behaviour and parturition process and factors affecting fertility.
CO3	To have the knowledge about nutrition, feeding and management of milch animals, familiar with housing principles and space requirement for different animals.
CO4	To understand the management, treatment and control measure to prevent various diseases, knowledge of poultry breeds, rearing, feeding and management incubation, breeding, vaccination against diseases etc.

Course Contents

Role of livestock in the national economy. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry. Management of calves, growing heifers and milch animals. Management of sheep, goat and swine. Incubation, hatching and brooding. Management of growers and layers.

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry. Improvement of farm animals and poultry.

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

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	1	1	1	2	2	1	1	2	1	1	1	1	1	2
CO2	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO3	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO4	1	1	2	2	2	1	1	2	1	1	1	1	1	1

Course Name: Lab - Livestock and Poultry Management

Course Code: B501316

Semester: 3rd Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To know about breeding and inheritance of characters for hishee milk production, the knowledge regarding milk perception mechanism, composition and factors affecting milk yield.
CO2	To be knowledgeable about the role of livestock towards national economy and become familiar about different animal breeds and their genesis, understand the reproductive behaviour and parturition process and factors affecting fertility.
CO3	To have the knowledge about nutrition, feeding and management of milch animals, familiar with housing principles and space requirement for different animals.
CO4	To understand the management, treatment and control measure to prevent various diseases, knowledge of poultry breeds, rearing, feeding and management incubation, breeding, vaccination against diseases etc.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	2	2	1	1	2	1	1	1	1	1	2
CO 2	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO 3	1	1	2	2	2	1	1	2	1	1	1	1	1	2
CO 4	1	1	2	2	2	1	1	2	1	1	1	1	1	1

Course Name: Human Values & Ethics (non credit) **

Course Code: B501317

Semester: 3rd Semester

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understand the role of deliberation and debate in framing such values
CO2	Understand the ideas of values, ethics, and morality in a multicultural context
CO3	Understand and discuss the idea of moral relativism and the challenges it poses to universal values
CO4	Understand how universal values can be uncovered by different means, including scientific investigation, historical research, or public debate and deliberation (what some philosophers call a dialectic method)

Course Contents

Values and Ethics-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation.Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	1	1	1	1	2	1	1	1	1	1	1	1	1	1
CO2	1	1	2	1	2	1	1	1	1	1	1	1	1	1
CO3	1	1	2	1	2	1	1	1	1	1	1	1	1	1
CO4	1	1	2	1	2	1	1	1	1	1	1	1	1	1
CO5														

Course Name: Crop Production Technology –II (Rabi Crops)
Course Code: B501401
Semester: 4th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To develop more efficient production systems for major field crops: wheat, gram, rapeseed & mustard, oat, barley.
CO2	To fulfilling the demands of commercial firms, farmers, industrials and consumers.
CO3	To enhance the quality & productivity of crop production.
CO4	To maintain tight contact with farmers, Understand different implements used in ploughing

Course contents

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Rabi* crops; cereals –wheat and barley, pulses-chickpea, lentil, peas, oilseeds-rapeseed, mustard and sunflower; sugar crops-sugarcane; medicinal and aromatic crops-Mentha, lemon grass and Citronella, Forage crops- Barseem, Lucerne and oats.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO2	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO3	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO4	3	3	3	3	3	2	3	3	2	3	3	2	3	3

Course Name: Lab. Crop Production Technology –II (Rabi Crops)
Course Code: B501402
Semester: 4th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To develop more efficient production systems for major field crops: wheat, gram, rapeseed & mustard, oat, barley.
CO2	To fulfilling the demands of commercial firms, farmers, industrials and consumers, enhance the quality & productivity of crop production.
CO3	To implement forage crop trials: fodder maize, oat, introduce new technologies in crop production: fertigation& new varieties.
CO4	To maintain tight contact with farmers

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO2	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO3	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO4	3	3	3	3	3	2	3	3	2	3	3	2	3	3

Course Name: Production Technology for Ornamental Crops, MAP and Landscaping
Course Code: B501403
Semester: 4th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To enhance knowledge on the cultivation practices of various ornamental crops beautification.
CO2	To impart knowledge about importance of Ornamentals in Landscaping and
CO3	To impart technical skills through practical approach required
CO4	To raise and manage ornamental crops

Course Contents

Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping.Principles of landscaping.Landscape uses of trees, shrubs and climbers. Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions. Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver. Processing and value addition in ornamental crops and MAPs produce.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	3	2	3	2	3	2	3	3	3	2	2	3	2
CO2	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO3	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO4	2	3	2	3	2	3	2	3	3	3	2	2	3	2

Course Name: Lab. Production Technology for Ornamental Crops, MAP and Landscaping

Course Code: B501404

Semester: 4th Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To enhance knowledge on the cultivation practices of various ornamental crops.
CO2	To impart knowledge about importance of Ornamentals in Landscaping and beautification.
CO3	To impart technical skills through practical approach required.
CO4	To raise and manage ornamental crops.

Course contents

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.Visits to commercial flower/MAP units.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	3	2	3	2	3	2	3	3	3	2	2	3	2
CO 2	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO 3	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO 4	2	3	2	3	2	3	2	3	3	3	2	2	3	2

Course Name: Renewable Energy and Green Technology
Course Code: B501405
Semester: 4th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course, are described. Consult
CO2	Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area.
CO3	Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning.
CO4	Guidelines for writing Learning Outcomes

Course Contents

Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application, Familiarization with types of biogas plants and gasifiers, biogas, bio-alcohol, biodiesel and biooil production and their utilization as bioenergy resource, introduction of solar energy, collection and their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application, introduction of wind energy and their application.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Lab. Renewable Energy and Green Technology
Course Code: B501406
Semester: 4th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course, are described. Consult.
CO2	Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area.
CO3	Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning.
CO4	Guidelines for writing Learning Outcomes

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Problematic Soils and their Management
Course Code: B501407
Semester: 4th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To understand the concept of problem soil.
CO2	To understand the diagnosis and reclamation of salt affected soils, acquire knowledge about the problems of salt affected soil
CO3	To understand the problems, diagnosis and reclamation of acidic soils, understand the criteria for quality of irrigation water.
CO4	To acquire knowledge about the rational use of poor quality irrigation water.

Course contents

Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties. Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Eroded and Compacted soils, Flooded soils, Polluted soils.

Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.Multipurpose tree species, bio remediation through MPTs of soils, land capability and classification, land suitability classification. Problematic soils under different Agro-ecosystems.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	3	2	3	2	3	2	3	3	3	2	2	3	2
CO 2	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO 3	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO 4	2	3	2	3	2	3	2	3	3	3	2	2	3	2

Course Name: Production Technology for Fruit and Plantation Crops
Course Code: B501408
Semester: 4th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To develop skill for diagnosis of saline, sodic, saline sodic and acid soils.
CO2	To develop skill for estimation of lime requirement of acidic soil.
CO3	To develop skill for estimation of gypsum requirement of sodic soils.
CO4	To develop skill for analysis of poor quality irrigation water.

Course contents

Importance and scope of fruit and plantation crop industry in India; Importance of rootstocks; Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, litchi, papaya, sapota, apple, pear, peach, walnut, almond, several minor fruits and plantation crops, like coconut, are canut, cashew, tea, coffee & rubber.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO2	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO3	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO4	3	3	3	3	3	2	3	3	2	3	3	2	3	3

Course Name: Lab Production Technology for Fruit and Plantation Crops

Course Code: B501409

Semester: 4th Semester

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To have a knowledge of classification of plants and the peculiar requirements of desert, tropical, sub-tropical and temperate. To Managing all task related land scoping projects doing all the design and executing landscaping projects.
CO2	To Profound knowledge of all irrigation system, planting, maintaining, water schedules and fertilizers, Propagated, cultivated, fertilized, purned, arranged, displayed transplanted various plant materials.
CO3	To Good knowledge of methods, techniques and procedures used in physical and chemical analysis of soil plant life and methods and materials used in proper planting care and maintenance of plants; types of plants best suited for specific area and projects.
CO4	To Operates all equipments used on a golf course.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Principles of Seed Technology
Course Code: B501410
Semester: 4th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To introduce the basic principles of quality seed production.
CO2	To learn various conventional and non-conventional Hybrid Seed Production technologies.
CO3	To learn about the concepts and significance of seed quality control.
CO4	To know about various aspects related to seed certification

Course Contents

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. Foundation and certified seeds. Seed production, seed certification procedure, Seed Act and Seed Act enforcement. Seeds Control Order 1983. Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production.

Seed drying, seed testing for quality assessment, seed treatment, seed packing and Seed storage. Measures for pest and disease control during storage. Seed marketing, Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO2	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO3	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO4	3	3	3	3	3	2	3	3	2	3	3	2	3	3

Course Name: Lab. Principles of Seed Technology
Course Code: B501411
Semester: 4th Semester

L T P
Credits: 02 **0 0 4**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To learn about the important testing methods with regards to physical purity, germination percentage, moisture content, vigour in seed.
CO2	To provide a comprehensive knowledge on all aspects of seed quality
CO3	To evaluation and their relevance to crop performance.
CO4	To acquire knowledge on seed legislation and trading

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO2	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO3	3	3	3	3	3	2	3	3	2	3	3	2	3	3
CO4	3	3	3	3	3	2	3	3	2	3	3	2	3	3

Course Name: Farming System & Sustainable Agriculture

Course Code: B501412

Semester: 4th Semester

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Alternative Farming Movements in the Tropics 4
CO2	Tropical Agriculture and Food Security
CO3	Transforming the Rural Tropics: Property, Markets, Cooperatives, and Technological Change
CO4	Social Organization and Sustainability of Small Farm Agriculture in the Tropics

Course Contents

Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, Cropping system and pattern, multiple cropping system, 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, 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, Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	3	2	3	2	3	2	3	3	3	2	2	3	2
CO2	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO3	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO4	2	3	2	3	2	3	2	3	3	3	2	2	3	2

Course Name: Agricultural Marketing Trade & Prices
Course Code: B501413
Semester: 4th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To familiarize the students with the concepts and theories and strategies of marketing.
CO2	To focus on the application of these concepts to various marketing contexts.
CO3	To understand the dynamic nature of environment where marketing decisions are made.
CO4	To effectively manage the marketing mix, focus on the emerging areas of marketing.

Course Contents

Agricultural Marketing: Concepts, 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. Product life cycle (PLC) and competitive strategies. Pricing and promotion strategies and their merits & demerits. Exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labelling (Agmark). 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Lab. Agricultural Marketing Trade & Prices
Course Code: B501414
Semester: 4th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To familiarize the students with the concepts and theories and strategies of marketing.
CO2	To focus on the application of these concepts to various marketing contexts.
CO3	To understand the dynamic nature of environment where marketing decisions are made.
CO4	To focus on the emerging areas of marketing, effectively manage the marketing mix.

Course contents

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 behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Introduction to Forestry
Course Code: B501415
Semester: 4th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Familiar with concept of Agro forestry.
CO2	Models and design of agro forestry along with crops.
CO3	Merits of different type of mantation.
CO4	Dinferisation and sustainable type of farming

Course Contents

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance 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. Agroforestry – definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	2	3	2	3	2	3	2	3	3	3	2	2	3	2
CO2	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO3	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO4	2	3	2	3	2	3	2	3	3	3	2	2	3	2

Course Name: Lab. Introduction to Forestry
Course Code: B501416
Semester: 4th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Familiar with concept of Agro forestry.
CO2	Models and design of agro forestry along with crops.
CO3	Merits of different type of mantation.
CO4	Dinferisation and sustainable type of farming

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO1	2	3	2	3	2	3	2	3	3	3	2	2	3	2
CO2	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO3	2	3	3	3	2	3	3	3	3	3	2	2	3	3
CO4	2	3	2	3	2	3	2	3	3	3	2	2	3	2

Course Name: Fundamentals of Agricultural Extension Education

Course Code: B501417

Semester: 4th Semester

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	List the theories and explain the practice of agricultural extension management: y Describe the basic concepts of extension programme management; and y Describe the theories, principles, process and functions of a good manager.
CO2	Differentiate between approaches to management strategies or extension organisations: y Describe the various extension approaches and elaborate on the implications for organisational management.
CO3	Explain what leadership is; y List the qualities of good leadership; y Explain how to motivate employees within your organisation, the groups dynamics to improve performance standards; y Explain how to reduce conflicts within a group;
CO4	Explain how establish guidelines and consensus to improve teamwork, Explain the concept and relevance of leadership, motivation, and group dynamics in management

Course Contents

Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning in India. New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	2
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	2
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	2

Course Name: Lab. Fundamentals of Agricultural Extension Education
Course Code: B501418
Semester: 4th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	List the theories and explain the practice of agricultural extension management: y Describe the basic concepts of extension programme management; and y Describe the theories, principles, process and functions of a good manager.
CO2	Differentiate between approaches to management strategies or extension organisations: y Describe the various extension approaches and elaborate on the implications for organisational management.
CO3	Explain what leadership is; y List the qualities of good leadership; y Explain how to motivate employees within your organisation, the groups dynamics to improve performance standards; y Explain how to reduce conflicts within a group;
CO4	Explain how establish guidelines and consensus to improve teamwork, Explain the concept and relevance of leadership, motivation, and group dynamics in management

Course Contents

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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	3	3	2	2	2	3	2	2	3	2	2
CO2	2	1	2	3	2	2	2	2	3	2	2	3	3	3
CO3	1	1	2	3	3	1	2	2	3	2	2	3	3	3
CO4	1	1	2	3	3	1	2	2	1	2	2	3	3	3

Course Name: Intellectual Property Rights
Course Code: B501419
Semester: 4th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
CO2	To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act.
CO3	Further teacher will have to demonstrate with products and ask the student to identify the different types of IPR's.
CO4	Analyse ethical and professional issues which arise in the intellectual property law context

Course contents

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection. 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 procedure. Patent Cooperation Treaty, Patent search and patent database. 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. 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	2	1	2	2	3	2	2	2	2	2	2	2	2	2
CO2	2	1	2	2	2	2	2	2	2	2	2	2	2	2
CO3	1	1	2	2	3	1	2	2	2	2	2	2	2	2
CO4	1	1	2	2	3	1	2	2	1	2	2	2	2	2

Course Name: Principles of Integrated Pest and Disease Management
Course Code: B501501
Semester: 5th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study the various aspects of insect ecology.
CO2	2. To study the various abiotic and biotic factor.
CO3	3. Understand the effect of abiotic and biotic factors on insect ecology.
CO4	4. To study the agro-ecosystem.

Course contents

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 pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module. Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programmes. Case histories of important IPM programmes.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	1	1	1	1	2	1	1	2	1	2	1	1	2	3
CO2	1	1	1	1	2	1	1	2	1	1	1	1	1	2
CO3	1	1	2	1	1	1	1	1	1	1	2	1	2	2
CO4	1	2	2	1	1	1	1	1	1	1	1	1	1	1

Course Name: Lab. Principles of Integrated Pest and Disease Management
Course Code: B501502
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study various factor for the out/weak of insect-pest
CO2	2. To study pest surveillance and pest forecasting.
CO3	3. To study the classification of insects.
CO4	4. To study the identification of pests.

Course Contents

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 bio-control agents, different predators and natural enemies. Mass multiplication of *Trichoderma, Pseudomona*s, *Trichogramma*, NPV etc.Identification and nature of damage of important insect pests and diseases and their management.Crop (agro-ecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. Crop monitoring attacked by insect, pest and diseases. Awareness campaign at farmers' fields.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	1	3	1	1	3	1	1	1	1	1	1	1	2	2
CO2	1	3	1	1	1	1	1	1	1	1	2	1	1	2
CO3	2	1	1	1	3	1	2	1	1	1	1	1	3	1
CO4	1	1	2	2	2	3	1	2	1	1	2	1	1	3

Course Name: Manures, Fertilizers and Soil Fertility Management
Course Code: B501503
Semester: 5th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study various factor for the out/weak of insect-pest
CO2	2. To understand manufacturing processes and properties of chemical fertilizers.
CO3	3. To acquire knowledge about fertilizer control order and fertilizer storage.
CO4	4. To understand about the chemicals for weed and pest management.

Course Contents

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

History of soil fertility and plant nutrition.criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	3	1	2	2	2	2	1	1	2	1	3
CO 2	1	3	1	1	2	2	1	1	2	1	1	1	2	1
CO 3	1	3	1	1	1	1	1	1	1	1	1	1	2	2
CO 4	1	3	1	1	1	1	1	1	2	1	2	1	1	1

Course Name: Lab. Manures, Fertilizers and Soil Fertility Management
Course Code: B501504
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study various factor for the out/weak of insect-pest
CO2	2. To acquire knowledge about adulteration of fertilizer
CO3	3. To acquire knowledge about the compatibility between various fertilizer and pesticides.
CO4	4. To understand about the chemicals for weed and pest management.

Course contents

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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	1	2	1	1	1	2	1	1	1	1	1	2	2
CO 2	3	1	1	1	1	1	2	1	2	2	1	1	2	3
CO 3	3	3	2	1	1	2	1	2	1	1	2	3	1	1
CO 4	1	1	1	1	3	1	2	1	1	2	2	2	3	2

Course Name: Pests of Crops and Stored Grain and their Management
Course Code: B501505
Semester: 5th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To differentiate insects and pests along with examples
CO2	2. Study of different insect pests of field crops, horticultural and vegetable crop
CO3	3. Diagnosing symptoms of damage by major insect pests of crops
CO4	4. Studying the role various biotic and abiotic factors of environment on pest incidence

Course contents

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crop, fruit crop, plantation crops, ornamental crops, spices and condiments. Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	2
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	1
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	1	3
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	3	2

Course Name: Lab. Pests of Crops and Stored Grain and their Management
Course Code: B501506
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Collection and identification of major insect pests of field crops, horticultural and vegetable crops
CO2	2. Diagnosing symptoms of damage by major insect pests of crops
CO3	3. To study extent of pest losses in kharif and rabi crops
CO4	4. Fumigation of stores to protect food grains and their products

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	1	2	1	1	1	1	1	1	1	1	2	2	2
CO 2	1	1	3	1	1	1	1	2	1	2	1	1	2	1
CO 3	3	1	2	1	2	1	1	1	1	2	1	2	1	3
CO 4	1	1	2	1	1	2	1	2	2	1	1	3	2	1

Course Name: Diseases of Field and Horticultural Crops and their Management -I
Course Code: B501507
Semester: 5th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study the Economic Importance of diseases of Horticultural Crops.
CO2	2. To study the symptoms of diseases of Horticultural Crops.
CO3	3. Understand the causes of diseases of Horticultural Crop
CO4	4. To study and Understand the disease cycle of Horticultural Crops.

Course contents

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

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

Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Pigeonpea: Phytophthora blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Castor: Phytophthorablight;Tobacco: black shank, black root rot and mosaic. Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top;Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	2	2	1	1	1	1	2	1	1	3	2	2
CO 2	1	1	1	2	2	1	1	2	1	3	2	2	3	2
CO 3	1	1	1	1	3	1	2	2	2	2	2	1	1	1
CO 4	1	1	1	1	1	1	2	2	2	2	3	3	3	3

Course Name: Lab. Diseases of Field and Horticultural Crops and their Management -I
Course Code: B501508
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates s will be able to:
CO1	1. To study the Economic Importance of diseases of Horticultural Crops.
CO2	2. To study the symptoms of diseases of Horticultural Crops.
CO3	3. Understand the causes of diseases of Horticultural Crops.
CO4	4. To study the integrated management of diseases of Horticultural Crops.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	1	1	1	1	1	1	2	2	2	1	1	2	2
CO 2	1	2	2	1	1	1	1	2	2	1	2	2	1	1
CO 3	1	1	2	2	2	1	1	1	1	1	2	2	3	3
CO 4	1	1	1	1	1	2	1	2	3	2	1	3	2	2

Course Name: Crop Improvement-I (Kharif Crops)
Course Code: B501509
Semester: 5th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To develop more efficient production systems for major cereals and pulses.
CO2	2. To fulfilling the demands of commercial firms, farmers, industrials and consumers.
CO3	3. To enhance the quality & productivity of crop production.
CO4	4. To implement forage crop trials: fodder maize, Sorghum, Bajra.

Course contents

Centres of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibres; fodders and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters; Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; 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); Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for future.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	2	1	2	2	2	2	2	2	2	3	2	2
CO 2	1	1	1	2	1	2	2	2	3	2	2	2	1	1
CO 3	1	1	1	2	3	1	2	2	2	2	3	1	3	3
CO 4	1	1	1	1	2	1	2	1	3	1	1	1	2	1

Course Name: Lab. Crop Improvement-I (Kharif Crops)
Course Code: B501510
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To introduce new technologies in crop production: fertigation& new varieties.
CO2	2. To maintain tight contact with farmers.
CO3	3. To Understand different implements used in ploughing
CO4	4. Compare the different methods used in irrigation

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	2
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	3
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	3	1
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	1	2

Course Name: Entrepreneurship Development and Business Communication
Course Code: B501511
Semester: 5th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Acquire knowledge about entrepreneurship development in business environment of Indian economy.
CO2	2. To know the overview of Indian systems in decision making of entrepreneurs.
CO3	3. To know how to globalize entrepreneur business environment.
CO4	4. To know entrepreneur (activities in) managing and motivation of activities in development.

Course Contents

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agri-business/ Agri-enterprises, Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management, Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	2	2	2	1	3	2	1	1	1	1	1	2	3
CO 2	1	2	3	2	2	2	1	1	1	2	1	1	1	2
CO 3	2	1	3	2	2	2	2	1	1	2	1	1	2	1
CO 4	3	1	1	1	2	2	1	1	2	2	1	1	3	2

Course Name: Lab. Entrepreneurship Development and Business Communication
Course Code: B501512
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To learn about various Govt. schemes and incentives for promotion of ED.
CO2	2. Understand the detail view of contract farming, joint ventures, PPP
CO3	3. To develop various communication skills like reading, writing, listening.
CO4	4. To know entrepreneur (activities in) managing and motivation of activities in development.

Course contents

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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	1	2	1	1	2	2	2	1	1	1	3	2	2
CO 2	2	1	1	2	1	2	2	2	2	2	2	2	3	1
CO 3	1	2	1	2	2	1	2	2	2	2	3	1	1	3
CO 4	1	1	1	1	2	1	2	1	3	1	1	1	2	1

Course Name: Geo-informatics and Nanotechnology and Precision Farming
Course Code: B501513
Semester: 5th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To develop an agriculture web map service
CO2	2. Associate and apply tools and techniques of geoinformatics farming.
CO3	3. Extend and apply tools and techniques of geoinformatics in nanotechnology.
CO4	4. Evaluate the role of geoinformatics in agriculture.

Course Contents

Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. 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; Image processing and interpretation; Global positioning system (GPS), components and its functions; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; 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.

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture;

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	1	1	1	2	2	3	1	1	1	1	2	2	2
CO 2	2	2	1	1	1	1	1	2	2	2	3	1	1	2
CO 3	1	1	1	1	1	2	1	2	2	2	2	1	3	2
CO 4	2	2	1	2	1	1	1	1	1	2	2	1	1	1

Course Name: Lab. Geo-informatics and Nanotechnology and Precision Farming
Course Code: B501514
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To develop an agriculture web map service
CO2	2. Associate and apply tools and techniques of geoinformatics farming.
CO3	3. Extend and apply tools and techniques of geoinformatics in nanotechnology.
CO4	4. Evaluate the role of geoinformatics in agriculture.

Course contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	2	1	2	1	21	1	1	1	2	2	2
CO 2	2	2	1	1	1	1	1	1	1	1	2	1	1	1
CO 3	3	1	1	3	1	1	1	2	1	3	1	1	2	2
CO 4	2	1	1	1	2	2	2	2	2	2	1	2	3	1

Course Name: Statistical Methods
Course Code: B501515
Semester: 5th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Statistical principles apply in all the areas of experimental work and they have a very important role in agriculture.
CO2	2.. It is required at the national level and farm level for agriculture policy making, decision making, agriculture development and estimates agriculture and national income.
CO3	3. Statistics in agriculture are great importance in variety of area. One of the most important is to acertain the volume of crop that needs to be produced based on output and demand of previous year.
CO4	4. It is helpful in land utilization and irrigation including the net area sown gross cultivated area, current follow, cultivable waste.

Course Contents

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency & Dispersion, Definition of Probability, Addition and

Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial & Poisson Distributions, Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations. Introduction to Test of Significance, One sample & two sample test t for Means, Chi-Square Test of Independence of Attributes in 2 ×2 Contingency Table. Introduction to Analysis of Variance, Analysis of One Way Classification. Introduction to Sampling Methods, Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement, Use of Random Number Tables for selection of Simple Random Sample.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	1	2	3	1	1	1	1	1	2	3	3
CO 2	3	1	1	1	1	1	2	1	2	1	2	1	1	1
CO 3	3	1	1	3	1	1	1	2	1	3	1	1	2	2
CO 4	2	1	1	1	2	2	2	2	2	2	1	2	3	1

Course Name: Lab. Statistical Methods
Course Code: B501516
Semester: 5th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Statistical principles apply in all the areas of experimental work and they have a very important role in agriculture.
CO2	2.. It is required at the national level and farm level for agriculture policy making, decision making, agriculture development and estimates agriculture and national income.
CO3	3. Statistics in agriculture are great importance in variety of area. One of the most important is to ascertain the volume of crop that needs to be produced based on output and demand of previous year.
CO4	4. It is helpful in land utilization and irrigation including the net area sown gross cultivated area, current follow, cultivable waste.

Course Contents

Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles& Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles& Percentiles. Measures of Dispersion (Ungrouped Data).

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	1	1	1	1	2	2	3	1	1	1	1	2	1	3
CO 2	2	2	1	1	1	1	1	2	2	2	3	1	2	1
CO 3	1	1	1	1	1	2	1	2	2	2	2	1	1	2
CO 4	2	2	1	2	1	1	1	1	1	2	2	1	2	3

Course Name: Lab. Practical Crop Production – I (Kharif crops)
Course Code: B501517
Semester: 5th Semester

L T P
Credits: 02 **0 0 4**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To discuss about crop planning and raising field crops in multiple cropping systems.
CO2	2. To provide knowledge about cultivation practices of rabi crop as well as threshing, drying, winnowing, storage and marketing value of concern crops.
CO3	3. Preparation of balance sheet including cost of cultivation.
CO4	4. Elaborate to main winter crop which are provide more outcome.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	1	2	1	1	1	2	1	1	1	1	1	1	3
CO 2	3	1	1	1	1	1	2	1	2	2	1	1	1	2
CO 3	3	3	2	1	1	2	1	2	1	1	2	3	1	2
CO 4	1	1	1	1	3	1	2	1	1	2	2	2	2	1

Course Name: Rainfed Agriculture & Watershed Management
Course Code: B501601
Semester: 6th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To acquire knowledge about the concept of dry farming.
CO2	2. To acquire knowledge about the constraints limiting crop production in dry land areas
CO3	3. To acquire knowledge about the types of the drought.
CO4	4. To acquire knowledge about the stress physiology and registrants to drought

Course Contents

Rain-fed agriculture: Introduction, types, History of rain-fed agriculture and watershed in India; Problems and prospects of rain-fed agriculture in India ; Soil and climatic conditions prevalent in rain-fed 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; Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas, Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	1	1	1	1	1	1	1	1	2	2	1	2
CO 2	3	3	2	1	1	2	1	2	1	1	2	3	1	2
CO 3	1	1	1	1	3	1	2	1	1	2	2	2	2	3
CO 4	2	2	1	1	1	2	2	1	1	1	1	1	3	1

Course Name: Lab. Rainfed Agriculture & Watershed Management
Course Code: B501602
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Skill development seed treatment.
CO2	2. Skill development seed germination and crop establishment in relation to soil moisture contents.
CO3	3. Skill development estimation of moisture index, aridity index, spray of anti-transparent and their effect on crops.
CO4	4. Skill development collection and interpretation of data for water balance equation water use efficiency and preparation of crop plans.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	1	2	1	1	1	2	1	1	1	1	1	3	2
CO 2	3	1	1	1	1	1	2	1	2	2	1	1	2	1
CO 3	3	3	2	1	1	2	1	2	1	1	2	3	1	3
CO 4	1	1	1	1	3	1	2	1	1	2	2	2	2	2

Course Name: Protected Cultivation and Secondary Agriculture
Course Code: B501603
Semester: 6th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates s will be able to:
CO1	1. Planning and designing criteria of different protected structures like green house, shrdevets etc.
CO2	2. Knowledge regarding choice of crops suitable for greenhouse cultivation.
CO3	3. Will get the idea about the need and requirement of growing crops under protected structure and scope of protected cultivation.
CO4	4. We get the knowledge and maintenance of thresher winnowing and other field machines.

Course contents

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

Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation. 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, circulatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	2	1	1	1	1	1	1	1	1	2	2	2	2
CO 2	3	3	2	1	1	2	1	2	1	1	2	3	1	1
CO 3	1	1	1	1	3	1	2	1	1	2	2	2	3	2
CO 4	2	2	1	1	1	2	2	1	1	1	1	1	1	1

Course Name: Lab. Protected Cultivation and Secondary Agriculture
Course Code: B501604
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Planning and designing criteria of different protected structures like green house.
CO2	2. Knowledge regarding choice of crops suitable for greenhouse cultivation.
CO3	3. Will get the idea about the need and requirement of growing crops under protected structure and scope of protected cultivation.
CO4	4. We get the knowledge and maintenance of thresher winnowing and other field machines.

Course contents

Study of different type of green houses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of greenhouse equipment. 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	1	2	1	1	1	2	2	1	1	1	1	1	2	3
CO 2	2	1	1	2	2	1	1	1	2	3	1	1	1	2
CO 3	1	2	2	2	1	2	1	1	1	2	1	1	3	1
CO 4	1	1	2	1	2	3	1	1	3	2	1	1	1	2

Course Name: Diseases of Field and Horticultural Crops and their Management-II
Course Code: B501605
Semester: 6th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study the Economic Importance of diseases of Horticultural Crops.
CO2	2. To study the symptoms of diseases of Horticultural Crops.
CO3	3. Understand the causes of diseases of Horticultural Crops.
CO4	4. To study and Understand the disease cycle of Horticultural Crops.

Course contents

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

Field Crops:

Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and PokkahBoeng;

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

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, black scurf, leaf roll, and mosaic;

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	2	2	2	1	2	1	1	1	2	1	1	2	2
CO 2	1	1	2	1	2	3	1	1	3	2	1	1	1	1
CO 3	1	1	1	1	2	1	1	1	1	2	1	2	3	3
CO 4	1	1	2	1	2	3	1	1	3	2	1	1	2	1

Course Name: Lab. Diseases of Field and Horticultural Crops and their Management-II
Course Code: B501606
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study economic importance of various field crops.
CO2	2. To study the identification of symptom and sign of field crops in field and lab.
CO3	3. To study the various pathogens cause the diseases of field crops.
CO4	4. Understand the nature of different pathogens to cause various types of field crop diseases.

Course contents

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

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	3
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	2
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	2	1
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	1	1

Course Name: Post-harvest Management and Value Addition of Fruits and Vegetables II

Course Code: B501607

Semester: 6th Semester

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Proper handling, packaging, transportation and storage reduces the post harvest losses of fruit and vegetables for every.
CO2	2. Processing and preservation technology helps to save excess fruit and vegetables during the gleet season (off season).
CO3	3. The technology has become a necessity to improve the food safety and strengthen nations food security.
CO4	4. The technology helps to boost export of agricultural commodities in the form of preserved and value added products

Course contents

Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post harvest losses; Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; Respiration and factors affecting respiration rate; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept; 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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	1	1
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	1
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	1	1
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	1	1

Course Name: Lab. Post-harvest Management and Value Addition of Fruits and Vegetables II
Course Code: B501608
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Proper handling, packaging, transportation and storage reduces the post harvest losses of fruit and vegetables for every.
CO2	2. Processing and preservation technology helps to save excess fruit and vegetables during the gleet season (off season).
CO3	3. The technology has become a necessity to improve the food safety and strengthen nations food security.
CO4	4. The technology helps to boost export of agricultural commodities in the form of preserved and value added products

Course Contents

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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	1	3	1	1	1	1	1	1	1	1	2	3
CO 2	2	1	1	2	1	1	1	2	2	2	2	2	1	1
CO 3	1	1	1	1	1	1	2	2	2	2	1	1	2	2
CO 4	1	1	2	3	1	1	3	1	1	1	1	2	1	2

Course Name: Management of Beneficial Insects
Course Code: B501609
Semester: 6th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study the various aspects of insect ecology.
CO2	2. To study the various abiotic and biotic factor.
CO3	3. Understand the effect of abiotic and biotic factors on insect ecology.
CO4	4. To study the agro-ecosystem.

Course Contents

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

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.

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.

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.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	3
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	2
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	2	1
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	1	1

Course Name: Lab. Management of Beneficial Insects
Course Code: B501610
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To study pest surveillance and pest forecasting.
CO2	2. To study the classification of insects.
CO3	3. To study the identification of pests.
CO4	4. To study the various aspects of integrated pest management (IDM)

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	2
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	1
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	3	3
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	2	2

Course Name: Crop Improvement-II (Rabi crops)
Course Code: B501611
Semester: 6th Semester

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1.Higher Yield
CO2	2. Improved Quality
CO3	3.Maturity Duration
CO4	4. Photo and Thermo Insensitivity

Course Contents

Centres of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops; Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters; 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); Hybrid seed production technology of *rabi* crops. Ideotype concept and climate resilient crop varieties for future.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	1	1	1	1	1	1	1	1	2	2	2	2
CO 2	3	3	2	1	1	2	1	2	1	1	2	3	1	3
CO 3	1	1	1	1	3	1	2	1	1	2	2	2	2	2
CO 4	2	2	1	1	1	2	2	1	1	1	1	1	3	1

Course Name: Lab. Crop Improvement-II (Rabi crops)
Course Code: B501612
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Disease and Pest Resistance
CO2	2. Varieties for a New Season
CO3	3. Dormancy
CO4	4. Photo and Thermo Insensitivity

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	2	1	1	3	1	2	1	1	2	2	2	3	2
CO 2	1	1	1	1	1	2	2	1	1	1	1	1	2	1
CO 3	1	1	2	1	1	2	1	3	2	1	1	2	1	2
CO 4	1	1	2	3	3	1	1	1	1	2	2	2	2	1

Course Name: Lab. Practical Crop Production –II (Rabi crops)
Course Code: B501613
Semester: 6th Semester

L T P
Credits: 02 **0 0 4**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To discuss about crop planning and raising field crops in multiple cropping systems.
CO2	2. To provide knowledge about cultivation practices of rabi crop as well as threshing, drying, winnowing, storage and marketing value of concern crops.
CO3	3. Preparation of balance sheet including cost of cultivation..
CO4	4. Elaborate to main winter crop which are provide more outcome.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	3
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	2
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	2	1
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	1	2

Course Name: Principles of Organic Farming
Course Code: B501614
Semester: 6th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To teach the principles and practices of organic farming for sustainable crop production.
CO2	2. To develop an alternative strategy over chemical farming which would be guideline for the working of biological process in natural eco system.
CO3	3. To make responsible use of energy and natural resources such as organic matter in soil for the increase of soil fertility.
CO4	4. To provide basic and applied knowledge of weed science to students.

Course contents

Organic farming, principles and its scope in India; Initiatives taken by Government (central/ state), NGOs and other organizations for promotion of organic agriculture; Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP; Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	1	2
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	2
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	2	1
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	3	2

Course Name: Lab. Principles of Organic Farming
Course Code: B501615
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To teach the principles and practices of organic farming for sustainable crop production.
CO2	2. To develop an alternative strategy over chemical farming which would be guideline for the working of biological process in natural eco system.
CO3	3. To make responsible use of energy and natural resources such as organic matter in soil for the increase of soil fertility.
CO4	4. To provide basic and applied knowledge of weed science to students.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	2
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	1
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	3	3
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	2	1

Course Name: Farm Management, Production & Resource Economics
Course Code: B501616
Semester: 6th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Determine and outline those conditions which give optimum use of resources in the production of crops and livestock.
CO2	2. Determine the extent to which the existing use of resources deviate from what is considered the optimal use level.
CO3	3. Analyse the forces which condition production patterns and resource use in relation to the existing opportunities.
CO4	4. Explain the means and methods adaptable in moving from the existing levels to theoptimum use of farm resources.

Course contents

Meaning and concept of farm management, objectives and relationship with other sciences. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage. Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labour income and farm business income. Farm business analysis, Meaning and importance of farm planning and budgeting, appraisal of farm resources, selection of crops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation. Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources.Positive and negative externalities in agriculture.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	2	1	1	1	1	1	1	1	1	2	2	2	3
CO 2	3	3	2	1	1	2	1	2	1	1	2	3	1	1
CO 3	1	1	1	1	3	1	2	1	1	2	2	2	3	1
CO 4	2	2	1	1	1	2	2	1	1	1	1	1	2	2

Course Name: Lab. Farm Management, Production & Resource Economics
Course Code: B501617
Semester: 6th Semester

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. Determine and outline those conditions which give optimum use of resources in the production of crops and livestock.
CO2	2. Determine the extent to which the existing use of resources deviate from what is considered the optimal use level.
CO3	3. Analyse the forces which condition production patterns and resource use in relation to the existing opportunities.
CO4	4. Explain the means and methods adaptable in moving from the existing levels to theoptimum use of farm resources.

Course Contents

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

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	2	2
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	1	3
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	2	2
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	1	3

Course Name: Principles of Food Science and Nutrition
Course Code: B501618
Semester: 6th Semester

L T P
Credits: 02 **2 0 0**

B501618: Principles of Food Science and Nutrition

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To supply wholesome, safe, nutrition's and acceptable food to consumers throughout the year.
CO2	2. Generate both urban and rural employment.
CO3	3. Develop new value added products.
CO4	4. Reduce fruit and vegetable losses.

Course contents

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.); Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions); Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.); Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	1	1	1	1	1	1	1	3	1	1	1	3	3
CO 2	1	1	1	1	3	1	1	3	2	1	1	3	2	2
CO 3	1	1	1	1	2	1	1	2	2	1	3	3	1	1
CO 4	1	1	1	1	1	2	1	1	3	1	2	1	2	1

Course Name: Rural Sociology & Educational Psychology
Course Code: B501619
Semester: 6th Semester

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Agricultural graduates will be able to:
CO1	1. To supply wholesome, safe, nutrition's and acceptable food to consumers throughout the year.
CO2	2. Generate both urban and rural employment.
CO3	3. Develop new value added products.
CO4	4. Reduce fruit and vegetable losses.

Course contents

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology, Rural society, Social Groups, Social Stratification, Culture concept, Social Institution, Social Change & Development. Educational psychology: Meaning & its importance in agriculture extension. Behaviour: Cognitive, affective, psychomotor domain, Personality, Learning, Motivation, Theories of Motivation, Intelligence.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	2	1	1	1	1	1	1	1	1	2	2	2	3
CO 2	3	3	2	1	1	2	1	2	1	1	2	3	2	3
CO 3	1	1	1	1	3	1	2	1	1	2	2	2	1	2
CO 4	2	2	1	1	1	2	2	1	1	1	1	1	2	1

Course Name: Seed Production Technology
Course Code: B501701
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Seed production technologies develop an understanding of seed development, germination, vigour, deterioration.
CO2	It also provides information about laboratory test for seed vigour and viability, varietal identification etc.
CO3	Provide good techniques and methods of hybrid seed production in self and cross pollinated crops and generation systems of seed.
CO4	Monitoring and evaluate the methods of seed storage, and cleaning packing and labelling which is important for graduate students of Agronomy.

Course Contents

Introduction, importance, impact of seed production technology on production and productivity of crops. Definition of seed, seed technology and quality parameters of seed. Different classes of seed and its production. Seed certification, state seed certification agency, inspection. Seed viability, seed vigour seed dormancy, and breaking of dormancy. Varietal identification through grow-out tests and electrophoresis. Seed production of commercial and different classes of seed varietal and hybrid seed production of major self and cross pollinated crops. Seed processing including drying, cleaning, grading, testing, packing and labeling.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Lab. Seed Production Technology
Course Code: B501702
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Seed production technologies develop an understanding of seed development, germination, vigour, deterioration.
CO2	It also provides information about laboratory test for seed vigour and viability, varietal identification etc.
CO3	Provide good techniques and methods of hybrid seed production in self and cross pollinated crops and generation systems of seed.
CO4	Monitoring and evaluate the methods of seed storage, and cleaning packing and labelling which is important for graduate students of Agronomy.

Course Contents

Seed treatment and equipment used for seed treatment (Slurry and Mist-o-Matic-Treater). Seed packing and storage methods. Factors affecting seed longevity during storage and conditions required for storage. Tests of seed vigour and viability. Pest and disease control, temperature control. Seed marketing. Grow out tests. Seed germination tests.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Production of Commercial Crops
Course Code: B501703
Semester: 7th

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Effective communication. Students will achieve mastery in written and oral communications. In public settings, students will engage audiences and convey positions in an effective, organized manner. Student compositions will convey clear, thoughtful arguments.
CO2	Critical Thinking. Students will assess situations from a multi-positional awareness. They will critically evaluated positions for benefits and costs. They will actively identify problems, understand underlying dynamics and evaluated solutions.
CO3	Leading Agricultural Public Discourse. Students will understand the roles local, state, federal and international policies play in agricultural production.
CO4	They foresee changes in agricultural production through shifts in public opinion and will lead effective change.

Course contents

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield and processing of commercial crops, cotton, maize,, jute , sunhemp, soybean, sugarcane, sugarbeet, potato ginger, turmeric, mentha etc.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Lab. Production of Commercial Crops
Course Code: B501704
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Effective communication. Students will achieve mastery in written and oral communications. In public settings, students will engage audiences and convey positions in an effective, organized manner. Student compositions will convey clear, thoughtful arguments.
CO2	Critical Thinking. Students will assess situations from a multi-positional awareness. They will critically evaluated positions for benefits and costs. They will actively identify problems, understand underlying dynamics and evaluated solutions.
CO3	Leading Agricultural Public Discourse. Students will understand the roles local, state, federal and international policies play in agricultural production.
CO4	They foresee changes in agricultural production through shifts in public opinion and will lead effective change.

Course Contents

Cultural practices for commercial crops. Effect of seed size and sowing depth on germination. Morphological characteristics of commercial crops. Identification of weeds of commercial crops. Identification propagation, seed selection, seed treatment, processing and distillation techniques for different medicinal, aromatic and spice crops.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Lab-Analytical Techniques in Soil, Plant, Fertilizer and Water analysis
Course Code: B501705
Semester: 7th

L T P
Credits: 02 **0 0 4**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Demonstrate insight into how to tackle practical analytical chemical problems, demonstrate understanding of the basic theory and relevant parameters in analytical chemistry.
CO2	Apply methods of instrumental chemical analysis to natural materials and (eco) systems & demonstrate awareness of the limitations of the various methods.
CO3	Report about experimental chemical analytical results and draw correct conclusions.
CO4	Discuss chemical analytical aspects relevant for the selection of proper analytical techniques for real-life problem situations

Course Contents

Colorimetric and flame photometric methods. Atomic absorption spectrophotometry. Cation and Anion exchange phenomenon and their importance. Ion adsorption, desorption and fixation insoils. Fertilizer control order. Planning and formulation of project on establishment of soil water and plant testing laboratory. Preparation of standard solutions. Collection and analysis of soil, water, plant and fertilizer samples. Soil, water and fertilizer analysis reports for recommendation purposes. Analysis of forms of nitrogen, phosphorous, potassium and sulphur in soils. Determination of DTPA extractable micronutrients. Plant analysis for total N, P, K and micro-nutrients.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Weed Management
Course Code: B501706
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Be able to define a weed and its four stages of development, understand the difference between annual, biennial and perennial weeds.
CO2	Be able to give examples of cultural weed controls.
CO3	Know the advantages and disadvantages of the various method of herbicides applications.
CO4	Understand herbicide carryover and how to prevent it.

Course Contents

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds. Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity. Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agro-chemicals and their application. Integration of herbicides with non chemical methods of weed management. Herbicide Resistance and its management.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Lab. Weed Management

Course Code: B501707

Semester: 7th

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Identification of different weeds.
CO2	Identification of different Herbicides.
CO3	Known about the method of weed control.
CO4	Preserve weed plants in lab and herbarium.

Course Contents

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixture of herbicide. Herbicide and agrochemicals study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments. Calculations of herbicide doses and weed control efficiency and weed index.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Soil, plant, water and seed testing (non credit)**
Course Code: B501708
Semester: 7th

L T P
Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	After completion of the course students are able to: - demonstrate insight into how to tackle practical analytical chemical problems, apply methods of instrumental chemical analysis to natural materials and (eco)systems.
CO2	Demonstrate understanding of the basic theory and relevant parameters in analytical chemistry.
CO3	Demonstrate awareness of the limitations of the various methods, report about experimental chemical analytical results and draw correct conclusions. –
CO4	Discuss chemical analytical aspects relevant for the selection of proper analytical techniques for real-life problem situations

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Organic Production Technology (non credit)**

Course Code: B501709

Semester: 7th

L T P

Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understand the concept and the importance of organic farming (OF) in Portugal, in India and in the world; distinguish the different streams of Sustainable Agriculture (SA) and meet the obligations associated with each difference.
CO2	Maintain and preserve existing ecosystems and promote the maintenance of the balance of the recommended farming system.
CO3	Have relevant knowledge of agricultural technology for the fertilization of the land mobilization and composting.
CO4	Have relevant knowledge of agricultural technology for crop protection in organic farming (OF). Know legislation rules on livestock in OF and the specific technologies of different species as well as preventive and curative therapies recommended in OF.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Biocontrol and Integrated pest Management
Course Code: B501710
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To differentiate pests, predators and parasitoids of insect pests in agriculture
CO2	Studying classical biological control scenarios in agricultural pest management
CO3	Understanding economic importance of different categories of beneficial insects
CO4	Studying potential of useful insects in agricultural pest management

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

Course Name: Lab. Bio-control and Integrated pest Management
Course Code: B501711
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Identification of important groups parasitoids, predators and microbial control agents
CO2	Culturing of important predators and parasitoids of insect pests in agriculture
CO3	Demonstrating role of natural enemies of pests in field and lab conditions
CO4	Utilization of pheromones, sticky traps and other innovative approaches for monitoring and surveillance of crop pests

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 3	3	3	2	3	3	3	3	3	3	3	3	3	3	2
CO 4	3	3	2	3	3	3	3	3	3	3	3	3	3	2

]

Course Name: Pesticides and Plant Protection Equipments
Course Code: B501712
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Describe the nature of economics as a science that deals with solving the problems of scarcity.
CO2	Using analysis of supply and demand to analyze economic developments in the market.
CO3	Assess the factors affecting the production and costs.
CO4	Analyze business of enterprises in different market structures.

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 2	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 3	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 4	2	2	3	3	3	3	2	2	2	3	3	2	2	2

Course Name: Lab. Pesticides and Plant Protection Equipments
Course Code: B501713
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Explain how market factors of production are functioning.
CO2	Analyze business cycle using aggregate demands and aggregate supplies.
CO3	Recognize how economics laws affect the market of agricultural and food products market
CO4	Evaluate and argument how to use knowledge about economics categories applied in daily work of agricultural subjects.

Course contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 2	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 3	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 4	2	2	3	3	3	3	2	2	2	3	3	2	2	2

Course Name: Bio pesticides and Bio fertilizers
Course Code: B501714
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To differentiate pests, predators and parasitism of insect pests in agriculture and studying classical biological control scenarios in agricultural pest management
CO2	Understanding economic importance of different categories of beneficial insects and useful insects in agricultural pest management.
CO3	Evaluating efficacy of various bio pest control agents, mass production of natural enemies of pest insects To understand about organic manures, their preparation and application.
CO4	To understand manufacturing processes and properties of chemical fertilizers. To acquire knowledge about fertilizer control order and fertilizer storage and chemicals for weed and pest management.

Course Contents

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

Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia*; Cynobacterialbiofertilizers- *Anabaena, Nostoc,* Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorhiza. Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilisation and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertilizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 2	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 3	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 4	2	2	3	3	3	3	2	2	2	3	3	2	2	2

Course Name: Lab. Bio pesticides and Bio fertilizers
Course Code: B501715
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To differentiate pests, predators and parasitism of insect pests in agriculture and studying classical biological control scenarios in agricultural pest management
CO2	Understanding economic importance of different categories of beneficial insects and useful insects in agricultural pest management.
CO3	Evaluating efficacy of various bio pest control agents, mass production of natural enemies of pest insects To understand about organic manures, their preparation and application.
CO4	To understand manufacturing processes and properties of chemical fertilizers. To acquire knowledge about fertilizer control order and fertilizer storage and chemicals for weed and pest management.

Course Contents

Isolation and purification of important bio-pesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium* etc. and its production. Identification of important botanicals. Visit to bio-pesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomo-pathogenic entities in field condition. Quality control of bio-pesticides.

Isolation and purification of *Azospirillum ,Azotobacter, Rhizobium*, P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of bio-fertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 2	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 3	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 4	2	2	3	3	3	3	2	2	2	3	3	2	2	2

Course Name: Lab. Techniques of diagnosis of plant diseases
Course Code: B501716
Semester: 7th

L T P
Credits: 02 **0 0 4**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Students to identify the knowledge, skills, attitudes and personal attributes expected of them to successfully complete their program of studies.
CO2	Facilitate to develop learning goals and objectives in their courses and programs, in prioritizing and focusing the learning experiences, and in the selection of appropriate assessment tools and.
CO3	Potential students and outside agencies to assess the quality of our academic programs.
CO4	These learning outcomes areas include: Scholar, Content and technical expertise, Social accountability, Communicator, and Professional

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	3	2	2	2	2	2	3
CO 2	2	2	2	2	2	2	2	3	2	2	2	2	2	3
CO 3	2	2	2	2	2	2	2	3	2	2	2	2	2	3
CO 4	2	2	2	2	2	2	2	2	2	2	2	2	2	3

Course Name: Commercial Beekeeping/Commercial Sericulture (non credit)**
Course Code: B501717
Semester: 7th

L T P
Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Explain what they need in order to get started in beekeeping Describe the laws around beekeeping in Vancouver
CO2	Discuss the responsibilities of urban beekeepers
CO3	Identify where to purchase equipment and demonstrate how to assemble it
CO4	Name and identify major parts of the honeybee such as the stinger or mandibular parts

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 2	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 3	2	2	3	3	3	3	2	2	2	3	3	2	2	2
CO 4	2	2	3	3	3	3	2	2	2	3	3	2	2	2

Course Name: Production Technology for Bioagents for Pest Control (non credit)**
Course Code: B501718
Semester: 7th

L T P
Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Identification of important groups parasitoids, predators and microbial control agents.
CO2	Culturing of important predators and parasitoids of insect pests in agriculture
CO3	Demonstrating role of natural enemies of pests in field and lab conditions
CO4	Utilization of pheromones, sticky traps and other innovative approaches for monitoring and surveillance of crop pests

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO 2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Course Name: Commercial Fruit Production
Course Code: B501719
Semester: 7th

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To impart knowledge of classification of plants and the peculiar requirement of desert and tropical, sub-tropical and temperate plants.
CO2	Profound knowledge of plant taxonomy, pathology, histology and anatomy.
CO3	Affected pest control by pruning and spraying insecticides, fungicides, herbicides and applied growth regulators.
CO4	Knowledge of current fruit production practices and modern techniques, materials and equipments.

Course Contents

Importance and uses, botany, flowering and fruiting, climate and soil, promising varieties, horticultural techniques, production, plant protection measures and special problems in fruits such ascitrus, mango, guava, apple, pear, peach, plum, ber, litchi, grapes, pomegranate, papaya, pineapple, phalsa, banana and sapota. Identification of species and fruit varieties, training and pruning, maturity standards, harvesting, handling, grading and packing of fruits. Project formulation and valuation of orchard management.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	2	3	3	3	3	3	3	3	3	3	3

Course Name: Lab. Commercial Fruit Production
Course Code: B501720
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Skilled in identification of species and fruit varieties.
CO2	Profound knowledge in training and preening of fruit crops.
CO3	Excellent knowledge of maturity standards, harvesting, handling, grading, packaging of fruit crops.
CO4	Developed and conduct education displays, tours and projects formulation and valuations of orchard managements.

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	2	3	3	3	3	3	3	3	3	3	3

Course Name: Vegetable breeding and Seed Production
Course Code: B501721
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To make the students familiar with vegetable seed production technology.
CO2	To make students familiar to floral biology and breeding systems followed in vegetable breeding
CO3	To make students familiar about breeding methods followed in cross pollinated and self pollinated vegetable crops
CO4	To make students familiar with Methods to produce breeder seed, foundation seed and certified seed

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	2	3	3	3	3	3	3	3	3	3	3

Course Name: Lab. Vegetable breeding and Seed Production
Course Code: B501722
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To impart knowledge about inflorescence and flower structure of various vegetable crops
CO2	To impart knowledge about different emasculation and pollination in vegetable crops
CO3	To make students familiar with different seed testing parameters
CO4	To make students familiar about breeding methods followed in cross pollinated and self pollinated vegetable crops

Course contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	2	3	3	3	3	3	3	3	3	3	3

Course Name: Protected Cultivation
Course Code: B501723
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Planning and designing criteria of different protected structures like green house, shrdevets etc.
CO2	Knowledge regarding choice of crops suitable for greenhouse cultivation.
CO3	Will get the idea about the need and requirement of growing crops under protected structure and scope of protected cultivation.
CO4	We get the knowledge and maintenance of thresher winnowing and other field machines.

Course Contents

Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly house. Greenhouse design, environment control, artificial lights, Automation. Soil preparation and management, Substrate management. Types of benches and containers. Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops. Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc. Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	2	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	2	3	3	3	3	3	3	3	3	3	3

Course Name: Lab. Protected Cultivation
Course Code: B501724
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Planning and designing criteria of different protected structures like green house, shrdevets etc.
CO2	Knowledge regarding choice of crops suitable for greenhouse cultivation.
CO3	Will get the idea about the need and requirement of growing crops under protected structure and scope of protected cultivation.
CO4	We get the knowledge and maintenance of thresher winnowing and other field machines.

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 2	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 3	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 4	2	2	3	3	3	3	3	3	2	3	3	3	3	2

Course Name: Hi-tech. Horticulture
Course Code: B501725
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Apply concepts of horticulture science to select, manage, and improve plants and their products, demonstrate competence with laboratory and/or field-based technologies used in modern horticulture
CO2	Anticipate and recognize problems, identify causes of these problems, quantify potential impacts, analyze options, identify viable solutions, and evaluate actions and consequences of treatments and interventions Describe social, spiritual, and cultural importance of plants to historical and contemporary communities of people
CO3	Identifies and applies, as appropriate, quantitative methods for defining and responding to horticultural problems. . Use multiple sources, including current and older literature, to find, evaluate, organize, and manage information related to horticultural systems
CO4	Understand how global issues including climate change, energy use, water availability, and/or food safety impact sustainability of horticultural systems locally, nationally, and globally

Course contents

Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods, Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling, canopy management, high density orcharding, Components of precision farming: 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.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 2	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 3	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 4	2	2	3	3	3	3	3	3	2	3	3	3	3	2

Course Name: Lab. Hi-tech.Horticulture
Course Code: B501726
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Apply concepts of horticulture science to select, manage, and improve plants and their products, demonstrate competence with laboratory and/or field-based technologies used in modern horticulture
CO2	Anticipate and recognize problems, identify causes of these problems, quantify potential impacts, analyze options, identify viable solutions, and evaluate actions and consequences of treatments and interventions Describe social, spiritual, and cultural importance of plants to historical and contemporary communities of people
CO3	Identifies and applies, as appropriate, quantitative methods for defining and responding to horticultural problems. . Use multiple sources, including current and older literature, to find, evaluate, organize, and manage information related to horticultural systems
CO4	Understand how global issues including climate change, energy use, water availability, and/or food safety impact sustainability of horticultural systems locally, nationally, and globally

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 2	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 3	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 4	2	2	3	3	3	3	3	3	2	3	3	3	3	2

Course Name: Floriculture and Landscaping (non credit)**
Course Code: B501727
Semester: 7th

L T P

Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Study of importance and export potential in floriculture.
CO2	Practicing various techniques of plant propagation, disease and pest of cut flowers.
CO3	Principles and practice of landscaping e.g. home gardens , small parks etc.
CO4	Raising nursery plants for commercial floriculture.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 2	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 3	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 4	2	2	3	3	3	3	3	3	2	3	3	3	3	2

Course Name: Food Processing and preservation (non credit)**
Course Code: B501728
Semester: 7th

L T P
Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To supply wholesome, safe, nutrition's and acceptable food to consumers throughout the year.
CO2	Generate both urban and rural employment
CO3	Develop new value added products and reduce fruit and vegetable losses.
CO4	How the prevent the fruits Frome spoilage, decay at the time of harvesting, transportation and storage.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 2	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 3	2	2	3	3	3	3	3	3	2	3	3	3	3	2
CO 4	2	2	3	3	3	3	3	3	2	3	3	3	3	2

Course Name: Theory and Practice of Plant Breeding
Course Code: B501729
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Breeding systems and breeding methods in self-pollinated, cross-pollinated vegetatively propagated crops.
CO2	Centres of origin, heterosis, male- sterility, self – incompatibility, mutation, hybridization and polyploidy.
CO3	Analysis of quality traits, abiotic and biotic stress.
CO4	Awareness about sustainable agriculture and the release of new varieties.

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 2	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 3	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 4	3	2	2	2	2	3	2	2	2	2	2	2	2	2

Course Name: Lab. Theory and Practice of Plant Breeding
Course Code: B501730
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Breeding systems and breeding methods in self-pollinated, cross-pollinated vegetative propagated crops.
CO2	Centres of origin, heterosis, male- sterility, self – incompatibility, mutation, hybridization and polyploidy.
CO3	Analysis of quality traits, abiotic and biotic stress.
CO4	Awareness about sustainable agriculture and the release of new varieties.

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 2	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 3	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 4	3	2	2	2	2	3	2	2	2	2	2	2	2	2

Course Name: Crop Experimentation
Course Code: B501731
Semester: 7th

L T P
Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Explanation of experimental designs used in plant breeding- Principles and local central.
CO2	Analyse and interpret the results.
CO3	Estimation of genetic components of variance
CO4	Determination of co-variance

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 2	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 3	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 4	3	2	2	2	2	3	2	2	2	2	2	2	2	2

Course Name: Lab. Crop Experimentation
Course Code: B501732
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Explanation of experimental designs used in plant breeding- Principles and local central.
CO2	Analyse and interpret the results.
CO3	Estimation of genetic components of variance
CO4	Determination of co-variance

Course contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 2	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 3	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 4	3	2	2	2	2	3	2	2	2	2	2	2	2	2

Course Name: Principles and Procedures of Molecular Biotechnology and Genomics
Course Code: B501733
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To impart knowledge on the various techniques of DNA and proteins and recombinant DNA technology at molecular level.
CO2	Understand the construction and uses of genomic and CDNA libraries and acquaint with the technique of PCR, PCR markets and it applications.
CO3	To acquaint with the applications of biotechnology in crop improvement and the genomic organisation of prokaryotes and eukaryotes.
CO4	Study in detail of functional genomics, proteomics and bioinformatics and generate the linkage maps and mapping of qualitative genes, the bioinformatics role in genomics. Measure protein and nucleic acid concentration using photo spectrometer

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 2	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 3	3	2	2	2	2	3	2	2	2	2	2	2	2	2
CO 4	3	2	2	2	2	3	2	2	2	2	2	2	2	2

Course Name: Lab. Principles and Procedures of Molecular Biotechnology and Genomics

Course Code: B501734

Semester: 7th

L T P

Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To impart knowledge on the various techniques of DNA and proteins.
CO2	To study recombinant DNA technology at molecular level, Understand the construction and uses of genomic and DNA libraries
CO3	To generate the linkage maps and mapping of qualitative genes.
CO4	To know about the bio information role in genomics.

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO 2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Course Name: Commercial Plant Breeding
Course Code: B501735
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Breeding systems and breeding methods in self-pollinated, cross-pollinated vegetative propagated crops.
CO2	Centres of origin, heterosis, male- sterility, self – incompatibility, mutation, hybridization and polyploidy.
CO3	Analysis of quality traits, abiotic and biotic stress.
CO4	Awareness about sustainable agriculture and the release of new varities.

Course contents

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. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc. Quality seed production of vegetable crops under open and protected environment. Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools. IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 2	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 3	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 4	3	3	2	2	3	2	3	3	2	3	3	2	3	3

Course Name: Lab. Commercial Plant Breeding
Course Code: B501736
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Demonstration of emasculation, crossing and selfing.
CO2	Analyse the variability, male sterility, self- incompatibility and quality test crops
CO3	Estimation of screening test for disease resistance in various crops.
CO4	Analysis of quality traits, abiotic and biotic stress

Course Contents

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.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 2	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 3	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 4	3	3	2	2	3	2	3	3	2	3	3	2	3	3

Course Name: Seed Production and Technology (non credit)**

Course Code: B501737

Semester: 7th

L T P

Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	To introduce the basic principles of quality seed production.
CO2	To learn various conventional and non-conventional Hybrid Seed Production technologies.
CO3	To learn about the concepts and significance of seed quality control.
CO4	To know about various aspects related to seed certification

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 2	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 3	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 4	3	3	2	2	3	2	3	3	2	3	3	2	3	3

Course Name: Hybrid Seed Production (non credit)**
Course Code: B501738
Semester: 7th

L T P
Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Application of genetics, cytogenetics and biotechnological techniques in breeding in crops (Wheat, rice, maize, bajra, barley, sorghum, cotton, pulses and oil seeds).
CO2	Origin and germplasm sources of crops.
CO3	Problems and present status of crop improvement in India.
CO4	National and International centres of crop improvements.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 2	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 3	3	3	2	2	3	2	3	3	2	3	3	2	3	3
CO 4	3	3	2	2	3	2	3	3	2	3	3	2	3	3

Course Name: Retailing and Supply Chain Management
Course Code: B501739
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understand the concept of customer relationship management.
CO2	Helpful in retailing management. Acquiring knowledge about information technology in supply chain management.
CO3	Understand the concept of changing food consumption patterns in India.
CO4	To understand the types of promoting store.

Course Contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	2	2	2	2	2	2	3	2	2	2	2	2
CO 2	2	2	2	2	2	2	2	3	3	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	3	3	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	3	2	2	2	2	2

Course Name: Communication and Extension Teaching Methods
Course Code: B501740
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understanding of the concept of communication.
CO2	Understanding of the process of communication
CO3	Helpful in learning the individual, group and mass contact methods
CO4	Understanding of the role of computer in production and presentation of audio, video and audio-visual aids.

Course Contents

Communication - Concept and importance in Agricultural Extension Elements of Communication process - Sender, Message, Channel, message treatment and receiver and their role in improvement of communication fidelity / effectiveness. Teaching - learning process as applicable in agricultural extension individual group and mass contact extension teaching methods - their choice and use under different field situations. Role of application of computer in production and presentation of audio, visual and audio-visual aids. Cyber extension its role and application.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	2	2	2	2	2	2	2	2	3	2	2	2	2	2
CO 2	2	2	2	2	2	2	2	3	3	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	3	3	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	3	2	2	2	2	2

Course Name: Behavioural Skills for Human Resource Development
Course Code: B501741
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understand the concept of human resource development and the quality of group behaviour.
CO2	Helpful in decision making process, acquiring knowledge about human needs.
CO3	Understand the concept of social behaviour.
CO4	Helpful in problem solving skills.

Course contents

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	3	2	2	2	2	2
CO 2	2	2	2	2	2	2	2	3	3	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	3	3	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	3	2	2	2	2	2

Course Name: Agri-business Management
Course Code: B501742
Semester: 7th

	L	T	P
Credits: 02	**2**	**0**	**0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Acquire knowledge about entrepreneurship development in business environment of Indian economy.
CO2	To know the overview of Indian systems in decision making of entrepreneurs and how to globalize entrepreneur business environment.
CO3	To know entrepreneur (activities in) managing and motivation of activities in development.
CO4	To learn about various Govt. schemes and incentives for promotion of ED. Understand the detail view of contract farming, joint

Course Contents

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. Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial Statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. 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.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 2	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 3	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 4	3	2	2	3	2	2	3	3	3	3	3	3	3	3

Course Name: Lab. Agri-business Management
Course Code: B501743
Semester: 7th

L T P
Credits: 01 **0 0 2**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Acquire knowledge about entrepreneurship development in business environment of Indian economy.
CO2	To know the overview of Indian systems in decision making of entrepreneurs and how to globalize entrepreneur business environment.
CO3	To know entrepreneur (activities in) managing and motivation of activities in development.
CO4	To learn about various Govt. schemes and incentives for promotion of ED. Understand the detail view of contract farming, joint.

Course Contents

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.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 2	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 3	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 4	3	2	2	3	2	2	3	3	3	3	3	3	3	3

Course Name: Administration of agriculture extension programmes
Course Code: B501744
Semester: 7th

L T P
Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	List the theories and explain the practice of agricultural extension management: y Describe the basic concepts of extension programme management; and y Describe the theories, principles, process and functions of a good manager.
CO2	Differentiate between approaches to management strategies or extension organisations: y Describe the various extension approaches and elaborate on the implications for organisational management.
CO3	Explain the concept and relevance of leadership, motivation, and group dynamics in management. Explain how to motivate employees within organisation
CO4	Describe group dynamics to improve performance standards. Explain how to reduce conflicts within a group and how establish guidelines and consensus to improve teamwork.

Course Contents

Contributors to agricultural development - Scientific technology and its dissemination; inputs, finance, marketing, processing of farm produce and conductive policies. Leadership - types and theories Identification and role of key - communicators opinion leaders in dissemination of scientific technology among farmers. Qualities of a good extension worker. Planning and implementation of agricultural extension projects.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 2	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 3	3	2	2	3	2	2	3	3	3	3	3	3	3	3
CO 4	3	2	2	3	2	2	3	3	3	3	3	3	3	3

Course Name: Development of Entrepreneurial skills in agribusiness (non credit)**

Course Code: B501745

Semester: 7th

L T P

Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Acquire knowledge about entrepreneurship development in business environment of Indian economy.
CO2	To know the overview of Indian systems in decision making of entrepreneurs and how to globalize entrepreneur business environment.
CO3	To know entrepreneur (activities in) managing and motivation of activities in development.
CO4	To learn about various Govt. schemes and incentives for promotion of ED. Understand the detail view of contract farming, joint ventures, PPP.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 2	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 4	3	2	3	3	3	2	3	3	3	3	3	3	3	3

Course Name: Communication and Extension teaching methods (non credit)**
Course Code: B501746
Semester: 7th

L T P
Credits: 05 **0 0 1**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Acquire knowledge about entrepreneurship development in business environment of Indian economy.
CO2	To know the overview of Indian systems in decision making of entrepreneurs and how to globalize entrepreneur business environment.
CO3	To know entrepreneur (activities in) managing and motivation of activities in development.
CO4	To learn about various Govt. schemes and incentives for promotion of ED. Understand the detail view of contract farming, joint ventures, PPP.

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 2	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 4	3	2	3	3	3	2	3	3	3	3	3	3	3	3

Course Name: RAWEP I: Village Attachment
Course Code: B501801
Semester: 8th

L T P
Credits: 3 **NA**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Field experience, understanding real-life.
CO2	Understanding the gap between the rural and urban people
CO3	Ability to plan out strategy
CO4	Understanding the mundane work & problems

Course contents

After the completion of course work, the students of B.Sc. Agri. (Hons.) will receive training under the compulsory RAWE programme for 20 weeks. The students will attend the one day orientation each in electives: (a) Crop production; (b) Crop Protection. (c) Horticulture; (d) Plant Breeding, and Genetics (e) Post Harvest Technology and Value addition (f)Agri-business Management. The students will attend three weeks Village Attachment Training. Further, they will undergo 12 weeks on-campus training in: (a) Bee-keeping; (b) Mushroom cultivation; (c)Plant Clinic Activities(d) Seed/Nursery Production; (e) Food Processing & Preservation; and (f)Biotechnological Tools in Crop Improvement (g) Soil Testing . Students will also attend 4-week off-campus training in different elective-wise activities. During the last week of the training, the students will submit the report whose evaluation will be done by the concerned teachers on the basis of their performance in orientation, village attachment, on and off-campus training.

RAWE Component-I

Village Attachment Training Programme

Sl. 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	
7	Animal Production Interventions	1 week
8	Extension and Transfer of Technology activities	1 week

RAWE Component –II Agro

Industrial Attachment

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

Activities and Tasks during Agro-Industrial Attachment Programme

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

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Course Name: ELP II. Specialized Experiential Learning Programme (On-Campus)
Course Code: B501802
Semester: 8th

L T P
Credits:12 **NA**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understanding of the RAWE programme, development of team work.
CO2	Changed attitude towards learning Handling practical work and solving management problems.
CO3	Building confidence as an individual, building competence
CO4	Knowledge of research experimental techniques, disclosure of recent advancement in training and research, Knowledge of collection, compilation and analysis of experimental data

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 2	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 3	3	2	3	3	3	2	3	3	3	3	3	3	3	3
CO 4	3	2	3	3	3	2	3	3	3	3	3	3	3	3

Course Name: ELP III. Industrial Attachment (Off-Campus)
Course Code: B501803
Semester: 8th

L T P
Credits: 04 **NA**

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Knowledge of administration & management and experience of commitment to the cause, disclosure of recent advancement in training and research
CO2	Law cost management, personnel management and involving people to participate.
CO3	Understanding local institutions and their need, knowledge of starting an NGO Knowledge of working methodology and revelation of administration and management.
CO4	Handling practical work, solving management problems, building confidence as an individual and knowledge of research experimental techniques and collection, compilation and analysis of experimental data

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO 2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Course Name: Project Documentation and Report Preparation, Presentation (On-Campus)

Course Code: B501804
Semester: 8th

L T P
NA

Credits:01

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Assessment of level of Knowledge after RAWE
CO2	Assessment of level of skill
CO3	Assessment of problem-solving ability
CO4	Assessment of use of commonsense

Correlation between the COs and Program Outcomes (POs) & Program Specific Outcomes PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO 2	3	2	2	2	2	3	3	3	3	3	3	3	3	3
CO 3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO 4	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Annexure-4

ACADEMIC INSTURCTIONS

Attendance Requirements

A student shall have to attend 75% of the scheduled periods in each course in a semester; otherwise he / she shall not be allowed to appear in that course in the University examination and shall be detained in the course(s). The University may condone attendance shortage in special circumstances (as specified by the Guru Kashi University authorities). A student detained in the course(s) would be allowed to appear in the subsequent university examination(s) only on having completed the attendance in the program, when the program is offered in a regular semester(s) or otherwise as per the rules.

Assessment of a course

Each course shall be assessed out of 100 marks. The distribution of these 100 marks is given in subsequent sub sections (as applicable).

For Theory

	Internal (50)						**External (50)**	**Total**
Components	**Attendance**	**Assignment**			**MST 1**	**MST2**	**ETE**	
		A1	A2	A3				
Weightage	10	10	10	10	30	30	50	
Average Weightage	10	10			30		50	100

For Practical

	Internal (50)				**External (50)**	**Total**
Components	**Lab Performance**	**Lab Record**	**Attendance**	**Viva**	**ETE**	
Weightage	30	10	10	10	40	
Average Weightage	30	10	10	10	40	100

Passing Criteria

The students have to pass both in internal and external examinations. The minimum passing marks to clear in examination is 40% of the total marks.