



**GURU KASHI
UNIVERSITY**
PUNJAB - INDIA

Programme Syllabus Booklet

**Bachelor of Science in Agriculture
(B.Sc. Agriculture 4 year - 501)**



Session: 2016-17

**University College of Agriculture
Guru Kashi University, Talwandi Sabo**



GURU KASHI UNIVERSITY										
University College of Agriculture (Code:5)										
B. Sc. AGRICULTURE (HONS.) -4 Year (Code: 501)							Batch: 2014 onwards			
Study Scheme										
Semester: 1st										
Sr. No .	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	A501101	Introductory Agriculture	T	1	0	0	1	50	50	100
2	A501102	Principles of Agronomy and Agricultural Meteorology	T	2	0	0	2	50	50	100
3	A501104	Principles of Genetics	T	2	0	0	2	50	50	100
4	A501106	Fundamentals of Soil Science	T	2	0	0	2	50	50	100
5	A501108	Fundamentals of Soil Water Conservation and Engineering	T	2	0	0	2	50	50	100
6	A501110	Plant Pathogens and Principles of Plant Pathology	T	2	0	0	2	50	50	100
7	A501112	Fundamentals of Computer Applications	T	1	0	0	1	50	50	100
8	A501114	Comprehension and Communication Skills in	T	2	0	0	2	50	50	100



		English								
9		Elective-I	T	3	0	0	3	50	50	100
10	A501103	Lab. – Principles of Agronomy and Agricultural Meteorology	P	0	0	2	1	60	40	100
11	A501105	Lab. - Principles of Genetics	P	0	0	2	1	60	40	100
12	A501107	Lab. - Fundamentals of Soil Science	P	0	0	2	1	60	40	100
13	A501109	Lab. - Fundamentals of Soil Water Conservation and Engineering	P	0	0	2	1	60	40	100
14	A501111	Lab. - Plant Pathogens and Principles of Plant Pathology	P	0	0	2	1	60	40	100
15	A501113	Lab. - Fundamentals of Computer Applications	P	0	0	2	1	60	40	100
16	A501119	Lab.- NSS / NCC / Physical Education-I (Non Credit Course)	P	0	0	2	1 (NC)			
17		Elective-I Lab	P	0	0	2	1	60	40	100
Total No. of Credits					24 + 1 (NC)					



Elective-I (Deficiency courses. Students with non-medical background at +2 will take Botany-I and with medical background will take Mathematics-I)		
1	A501115	Botany –I / *
2	A501117	Mathematics-I*
3	A501116	Lab-Botany –I / *
4	A501118	Lab-Mathematics-I*

Semester: 2nd										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	A501201	Water Management Including Micro Irrigation	T	1	0	0	1	50	50	100
2	A501203	Principles of Seed Technology	T	2	0	0	2	50	50	100
3	A501205	Soil Chemistry, Soil Fertility and Nutrient Management	T	2	0	0	2	50	50	100
4	A501207	Fundamentals of Nematology	T	1	0	0	1	50	50	100
5	A501209	Agricultural Microbiology	T	2	0	0	2	50	50	100
6	A501211	Principles of Agricultural Economics	T	2	0	0	2	50	50	100



7	A501212	Dimensions of Agricultural Extension	T	2	0	0	2	50	50	100
8		Elective-II	T	3	0	0	3	50	50	100
9	A501202	Lab. Water management including micro irrigation	P	0	0	2	1	60	40	100
10	A501204	Lab. - Principles of Seed Technology	P	0	0	2	1	60	40	100
11	A501206	Lab- Soil Chemistry, Soil Fertility and Nutrient Management	P	0	0	2	1	60	40	100
12	A501208	Lab- Fundamentals of Nematology	P	0	0	2	1	60	40	100
13	A501210	Lab - Agricultural Microbiology	P	0	0	2	1	60	40	100
14	A501213	Lab. - Information Technology	P	0	0	2	1	60	40	100
15	A501218	Lab. NSS / NCC / Physical Education-II (Non Credit Course)	P	0	0	2	1(NC)			
16		Elective-II Lab	P	0	0	2	1	60	40	100
Total No. of Credits							22+1(NC)			



Elective-II (Deficiency courses. Students with non-medical background at +2 will take Botany-I and with medical background will take Mathematics-I)									
1	A501214	Zoology –I *							
2	A501216	Mathematics-II*							
3	A501215	Lab -Zoology –I *							
4	A501217	Lab Mathematics-II*							

Semester: 3rd										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	A501301	Field Crops-I (<i>Kharif</i>)	T	2	0	0	2	50	50	100
2	A501303	Principles of Plant Breeding	T	2	0	0	2	50	50	100
3	A501305	Insect Morphology and Systematic	T	2	0	0	2	50	50	100
4	A501307	Farm Power and Machinery	T	2	0	0	2	50	50	100
5	A501309	Production Technology of Vegetables & Flowers	T	2	0	0	2	50	50	100
6	A501311	Crop Physiology	T	2	0	0	2	50	50	100
7	A501313	Livestock Production	T	2	0	0	2	50	50	100



		and Management								
8	A501315	Agricultural Finance and Co-operation	T	2	0	0	2	50	50	100
9	A501302	Lab - Field Crops-I (<i>Kharif</i>)	P	0	0	2	1	60	40	100
10	A501304	Lab. – Principles of Plant Breeding	P	0	0	2	1	60	40	100
11	A501306	Lab. –Insect Morphology and Systematic	P	0	0	2	1	60	40	100
12	A501308	Lab. –Farm Power and Machinery	P	0	0	2	1	60	40	100
13	A501310	Lab. – Production Technology of Vegetables & Flowers	P	0	0	2	1	60	40	100
14	A501312	Lab. –Crop Physiology	P	0	0	2	1	60	40	100
15	A501314	Lab. – Livestock Production and Management	P	0	0	2	1	60	40	100
16	A501316	Lab. NSS / NCC / Physical Education-III (Non-credit course)	P	0	0	2	1(NC)			
Total No. of Credits							23+1(NC)			



Semester: 4th										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	A501401	Field crops-II (Rabi)	T	2	0	0	2	50	50	100
2	A501403	Breeding of Field / Horticultural Crops	T	2	0	0	2	50	50	100
3	A501405	Manures, Fertilizers and Agrochemicals	T	2	0	0	2	50	50	100
4	A501407	Insect Ecology & Integrated Pest Management Including Beneficial Insects	T	2	0	0	2	50	50	100
5	A501409	Agricultural Marketing, Trade and Prices	T	1	0	0	1	50	50	100
6	A501411	Protected Cultivation and Post-Harvest Technology	T	1	0	0	1	50	50	100
7	A501413	Diseases of Field Crops and their Management	T	2	0	0	2	50	50	100
8	A501415	Production Technology of Fruit Crops	T	2	0	0	2	50	50	100
9	A501402	Lab- Field	P	0	0	2	1	60	40	100



		crops-II (Rabi)								
10	A501404	Lab. – Breeding of Field / Horticultural Crops	P	0	0	2	1	60	40	100
11	A501406	Lab. –III Manures, Fertilizers and Agrochemicals	P	0	0	2	1	60	40	100
12	A501408	Lab. – Insect Ecology & Integrated Pest Management Including Beneficial Insects	P	0	0	2	1	60	40	100
13	A501410	Lab. – Agricultural Marketing, Trade and Prices	P	0	0	2	1	60	40	100
14	A501412	Lab. – Protected Cultivation and Post-harvest Technology	P	0	0	2	1	60	40	100
15	A501414	Lab. – Diseases of Field Crops and their Management	P	0	0	2	1	60	40	100
16	A501416	Lab. - Production Technology of Fruit Crops	P	0	0	2	1	60	40	100
17	A501417	Lab. NSS / NCC / Physical Education-IV (Non-credit course)	P	0	0	2	1(NC)			



Semester: 5th										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	A501501	Principles of Plant Biotechnology	T	2	0	0	2	50	50	100
2	A501503	Crop Pests and Stored Grain Pests and their Management	T	2	0	0	2	50	50	100
3	A501505	Fundamentals of Agribusiness Management	T	2	0	0	2	50	50	100
4	A501507	Disease of Horticultural Crops and their Management	T	2	0	0	2	50	50	100
5	A501509	Post-Harvest Management and Value Addition of Fruits and Vegetables	T	1	0	0	1	50	50	100
6	A501511	Production Technology of Spices, Aromatics Medicinal and Plantation crops	T	1	0	0	1	50	50	100
7	A501513	Fundamentals of Rural Sociology and Educational Psychology	T	2	0	0	2	50	50	100
8	A501514	Statistics	T	2	0	0	2	50	50	100



9	A501502	Lab. –Principles of Plant Biotechnology	P	0	0	2	1	60	40	100
10	A501504	Lab. –Crop Pests and Stored Grain Pests and Their Management	P	0	0	2	1	60	40	100
11	A501506	Lab. – Fundamentals of Agribusiness Management	P	0	0	2	1	60	40	100
12	A501508	Lab. –Disease of Horticultural Crops and Their Management	P	0	0	2	1	60	40	100
13	A501510	Lab. –Post harvest Management and Value Addition of Fruits and Vegetables	P	0	0	2	1	60	40	100
14	A501512	Lab. –Production Technology of Spices, Aromatics Medicinal and Plantation Crops	P	0	0	2	1	60	40	100
15	A501515	Lab. –Crop production-I (Kharif)	P	0	0	4	2	60	40	100
Total No. of Credits							22			

Semester: 6th										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				



1	A501601	Weed Management	T	2	0	0	2	50	50	100
2	A501603	Production Economics & Farm Management	T	2	0	0	2	50	50	100
3	A501605	Renewable Energy	T	1	0	0	1	50	50	100
4	A501607	Extension Methodologies for Transfer of Agricultural Technology	T	2	0	0	2	50	50	100
5	A501609	Entrepreneurship Development and Communication Skill	T	1	0	0	1	50	50	100
6	A501611	Biochemistry	T	2	0	0	2	50	50	100
7	A501613	Environmental Science	T	2	0	0	2	50	50	100
8	A501614	Organic Farming	T	1	0	0	1	50	50	100
9	A501602	Lab- Weed Management	P	0	0	2	1	60	40	100
10	A501604	Lab - Production Economics & Farm Management	P	0	0	2	1	60	40	100
11	A501606	Lab- Renewable Energy	P	0	0	2	1	60	40	100
12	A501608	Lab- Extension Methodologies for Transfer of Agricultural Technology	P	0	0	2	1	60	40	100
14	A501612	Lab- Biochemistry	P	0	0	2	1	60	40	100



GURU KASHI UNIVERSITY

PUNJAB - INDIA

15	A501615	Lab. –Crop production-II (Rabi)	P	0	0	4	2	60	40	100
Total No. of Credits							21			



Semester: 7th (Group-I Crop Production)										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	501701	Seed Production Technology	T	2	0	0	2	50	50	100
2	501703	Integrated Farming System and Sustainable Agriculture	T	2	0	0	2	50	50	100
3	501705	Production of Commercial Crops	T	2	0	0	2	50	50	100
4	501707	Soil Fertility and Nutrient Management	T	2	0	0	2	50	50	100
5	501709	Management of Problem Soils and Water	T	2	0	0	2	50	50	100
6	501712	Production Technology of Economic Forest Trees	T	2	0	0	2	50	50	100
7	501702	Lab-I Seed Production Technology	P	0	0	2	1	60	40	100
8	501704	Lab-II Integrated Farming System and Sustainable Agriculture	P	0	0	2	1	60	40	100
9	501706	Lab-III Production of Commercial Crops	P	0	0	2	1	60	40	100
10	501708	Lab-IV Soil Fertility and Nutrient Management	P	0	0	2	1	60	40	100
11	501710	Lab-V Management of Problem Soils and Water	P	0	0	2	1	60	40	100
12	501711	Lab-VI Analytical Techniques in Soil, Plant, Fertilizer and Water analysis	P	0	0	4	2	60	40	100
13	501713	Lab-VII Production Technology of Economic Forest Trees	P	0	0	2	1	60	40	100
Total No. of Credits				14			20			



Semester: 7th (Group-II Crop Protection)

Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	501714	Apiculture	T	1	0	0	1	50	50	100
2	501716	Biocontrol and Integrated Pest Management	T	2	0	0	2	50	50	100
3	501718	Pesticides and Plant Protection Equipment	T	2	0	0	2	50	50	100
4	501721	Biocontrol and Integrated Disease Management	T	2	0	0	2	50	50	100
5	501723	Post-Harvest Diseases and their Management	T	2	0	0	2	50	50	100
6	501715	Lab-I Apiculture	P	0	0	4	2	60	40	100
7	501717	Lab-II Biocontrol and Integrated Pest Management	P	0	0	2	1	60	40	100
8	501719	Lab-III Pesticides and Plant Protection Equipment	P	0	0	2	1	60	40	100
9	501720	Lab- Plant Disease Diagnosis	P	0	0	4	2	60	40	100
10	501722	Lab-IV Biocontrol and Integrated Disease Management	P	0	0	2	1	60	40	100
11	501724	Lab-V Post Harvest Diseases and their Management	P	0	0	2	1	60	40	100
12	501725	Lab-VI Mushroom Cultivation	P	0	0	6	3	60	40	100
Total No. of Credits							20			



Semester: 7th (Group-III Horticulture)										
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	501726	Nursery Management of Horticultural Crops	T	2	0	0	2	50	50	100
2	501728	Commercial Fruit Production	T	2	0	0	2	50	50	100
3	501730	Processing and Value Addition of Fruits and vegetables	T	3	0	0	3	50	50	100
4	501732	Commercial Vegetable Production	T	2	0	0	2	50	50	100
5	501734	Vegetable Breeding and Seed Production	T	2	0	0	2	50	50	100
6	501736	Forcing Techniques in Vegetable Production	T	1	0	0	1	50	50	100
7	501738	Commercial Floriculture and Landscaping	T	1	0	0	1	50	50	100
8	501727	Lab-I Nursery Management of Horticultural Crops	P	0	0	2	1	60	40	100
9	501729	Lab-II Commercial Fruit Production	P	0	0	2	1	60	40	100
10	501731	Lab-III Processing and Value Addition of Fruits and vegetables	P	0	0	2	1	60	40	100
11	501733	Lab-IV Commercial Vegetable Production	P	0	0	2	1	60	40	100
12	501735	Lab-V Vegetable Breeding and Seed Production	P	0	0	2	1	60	40	100
13	501737	Lab-VI Forcing Techniques in Vegetable Production	P	0	0	2	1	60	40	100
14	501739	Lab-VII Commercial Floriculture and Landscaping	P	0	0	2	1	60	40	100
Total No. of Credits							20			

Semester: 7th (Group-IV Plant Breeding and Genetics)

Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks	
				L	T	P					
1	501740	Genetics of Crop Plants	T	2	0	0	2	50	50	100	
2	501742	Cytogenetics of Crop Plants	T	2	0	0	2	50	50	100	
3	501744	Theory and Practice of Plant Breeding	T	2	0	0	2	50	50	100	
4	501746	Introduction to Breeding of Field Crops	T	3	0	0	3	50	50	100	
5	501747	Crop Experimentation	T	1	0	0	1	50	50	100	
6	501749	Principles and Procedures of Plant Tissue Culture and Transformation	T	2	0	0	2	50	50	100	
7	501751	Principles and Procedures of Molecular Biotechnology and Genomics	T	2	0	0	2	50	50	100	
8	501741	Lab-I Genetics of Crop Plants	P	0	0	2	1	60	40	100	
9	501743	Lab-II Cytogenetics of Crop Plants	P	0	0	2	1	60	40	100	
10	501745	Lab-III Theory and Practice of Plant Breeding	P	0	0	2	1	60	40	100	
11	501748	Lab-IV Crop Experimentation	P	0	0	2	1	60	40	100	
12	501750	Lab-V Principles and Procedures of Plant Tissue Culture and Transformation	P	0	0	2	1	60	40	100	
13	501752	Lab-VI Principles and Procedures of Molecular Biotechnology and Genomics	P	0	0	2	1	60	40	100	
Total No. of Credits							20				



Semester: 7th (Group-V Post Harvest Technology and Value Addition)											
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks	
				L	T	P					
1	501753	Fruit and Vegetable Technology	T	2	0	0	2	50	50	100	
2	501755	Dairy Technology	T	2	0	0	2	50	50	100	
3	501757	Cereal Technology	T	2	0	0	2	50	50	100	
4	501759	Egg and Meat Technology	T	2	0	0	2	50	50	100	
5	501761	Fundamentals of Food Biochemistry	T	2	0	0	2	50	50	100	
6	501762	Fundamentals of Food Microbiology	T	2	0	0	2	50	50	100	
7	501764	Engineering Principles in Food Processing	T	2	0	0	2	50	50	100	
8	501754	Lab-I Fruits and Vegetables Technology	P	0	0	2	1	60	40	100	
9	501756	Lab-II Dairy Technology	P	0	0	2	1	60	40	100	
10	501758	Lab-III Cereal Technology	P	0	0	2	1	60	40	100	
11	501760	Lab-IV Egg and Meat Technology	P	0	0	2	1	60	40	100	
12	501763	Lab-V Fundamentals of Food Microbiology	P	0	0	2	1	60	40	100	
13	501765	Lab-VI Engineering Principles in Food Processing	P	0	0	2	1	60	40	100	
Total No. of Credits							20				



Semester: 7th (Group-VI Agri-business and Extension Management)											
Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks	
				L	T	P					
1	501766	Financial and Project Management	T	3	0	0	3	50	50	100	
2	501768	Retailing and Supply Chain Management	T	3	0	0	3	50	50	100	
3	501769	Micro Economic Analysis	T	3	0	0	3	50	50	100	
4	501770	Macro-Economic Analysis	T	3	0	0	3	50	50	100	
5	501771	Administration of Agricultural Extension Programmes	T	2	0	0	2	50	50	100	
6	501772	Communication and extension teaching methods	T	3	0	0	3	50	50	100	
7	501773	Behavioural Skills for Human Resource Development	T	2	0	0	2	50	50	100	
8	501767	Lab-I Financial and Project Management	P	0	0	2	1	60	40	100	
Total No. of Credits							20				



Semester: 8th

Sr.	Subject Code	Subject Name	Type of Subject T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks	
				L	T	P					
1	501801	RAWEP I: Village Attachment	P	NA	NA	NA	3	50	50	100	
2	501802	ELP II. Specialized Experiential Learning Programme (On-Campus)	P	NA	NA	NA	12	50	50	100	
3	501803	ELP III. Industrial Attachment (Off-Campus)	P	NA	NA	NA	4	50	50	100	
4	501804	ELP IV. Project Documentation and Report Preparation, Presentation (On-Campus)	P	NA	NA	NA	1	50	50	100	
Total No. of Credits							20				

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 5-10 students 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	<p>ELP II. Specialized Experiential Learning Programme (On-Campus) (0+12)</p> <p>Elective-wise ‘Experimental Learning Programme (ELP)’:</p> <p>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</p> <p>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</p> <p>3. Elective: Horticulture (i) Protected cultivation of</p>	Students opting for a particular elective programme will opt for any one activity (ELP) within the elective



		<p>vegetables and nursery raising technique</p> <p>(ii) Nursery production of important ornamental plants /fruits/vegetable</p> <p>III)Moshroom production</p> <p>4. Elective: Plant Breeding, Genetics and Biotechnology</p> <p>(i) Hybrid seed production of sunflower</p> <p>(ii) Biotechnological tools in crop improvement</p> <p>5. Elective: Post Harvest Technology and Value Addition</p> <p>(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)</p> <p>(ii) Mushroom production</p> <p>6. Elective: Agri-Business and Extension Management</p> <p>(i) Designing and preparation of facilitating material and organizing activities</p> <p>(ii) Marketing of agricultural produce, preparing enterprise & financial budgets and identification of adoption gaps</p> <p>(iii) Case studies related to financial, project, retail and supply chain management, and preparation of project profile</p>	
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) -	
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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) Vermi-compost 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) Biofertilizer 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: Introductory Agriculture
Course Code: A501101
Semester: 1st

Credits: 02

L T P
2 0 0

Course Content

Art, Science and business of crop production, 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, balance sheet, liabilities; Assets and Contrasting trends (DATA), Agrl. growth, contrasting food chains, diversity in physiography, Soil groups, marine, livestock and water; Liabilities: Soil factors, weather factors, Economic ecology, dry and irrigation agriculture, Farming Systems approach, value addition, requirements in new technology; Women in Agriculture: multifaceted roles and tasks, work stress factors, Nutritional and rural life standards, role in house hold design making, drudgery reduction for farm women, women friendly agricultural technology; Empowerment of women

Suggested Readings:

1. Randhawa, M.S. 1983. *History of Agriculture in India*, ICAR, New Delhi, Vol.: I, II & III.
2. Chandra, S. 1996. *Women in Agriculture*. ICAR, PAU, Ludhiana. Vol. 3, 1996. pp 168-173
3. Jayanthi, C., Devasenapathy, P. and Vennila, C. 2008. *Farming System: Principles & Practices*. Satish Serial Publishing House. pp 275
4. Jhabhvala, R 1984. Unpaid family labour, *Social Welfare*, 31(2): 31-32.

Course Name: Principles of Agronomy and Agricultural Meteorology

Course Code: A501102
Semester: 1st

Credits: 02

L T P
2 0 0

Course Content

Meaning and scope of Agronomy: National and International Agricultural Research Institutes in India, Agro-climatic zones of India and Rajasthan. Tillage, crops stand establishment, Planting geometry and its effect on growth and yield cropping systems, Harvesting. Agricultural meteorology: Weather and climate, micro-climate, weather elements, Earths' atmosphere, Composition and structure, solar radiation, Nature, properties, depletion, solar constant and energy balance, Atmospheric, temperature, factors affecting, horizontal and vertical distribution, variations and global warming, Air Pressure variations; Wind: factors affecting, cyclones and anticyclones and general circulation, Atmospheric humidity, vapour pressure and saturation, Process of condensation, formation of dew, fog, mist, snow, rain and hail; Formation and classification of clouds, Introduction to monsoon, Basics of weather



forecasting.

Reference Books

1. Stigter, K. 2010. *Applied Agrometeorology*. Springer Berlin Heidelberg, Germany. pp. 1100
2. Prasada. R. G. (2008). *Agricultural Meteorology*. PHI Learning, India. pp. 384.
3. Palmer, S. 2016. *Agrometeorology*. : Scitus Academics LLC. pp. 264

Course Name: Principles of Genetics

Course Code: A501104

Semester: 1st

L T P

Credits: 02

2 0 0

Course Content

Mendel's laws of inheritance and exceptions to the laws Types of gene action, Multiple alleles, Pleiotropism, Penetrance and expressivity; Quantitative traits, Qualitative traits and differences between them; Multiple factor hypothesis; Cytoplasmic inheritance, it's characteristic features and difference between chromosomal and cytoplasmic inheritance; Mutation and it's characteristic features; Methods of inducing mutations and C / B technique. Gene expression and differential gene activation; Lac operon and Fine structure of Gene; Ultra structure of cell and cell organelles and their functions; Study of chromosome structure, morphology, number and types, Karyotype and Idiogram; Mitosis and meiosis, their significance and differences between them; DNA and it's structure, function, types, modes of replication and repair. RNA and its structure, function and types; Transcription, Translation, Genetic code and outline of protein synthesis; Crossing over and factors affecting it; Mechanism of crossing over and Cytological proof of crossing over; Linkage, Types of linkage and estimation of linkage; Numerical chromosomal aberrations (Polyploidy) and evolution of different crop species like Cotton, Wheat, Tobacco, Triticale and Brassicas; Structural chromosomal aberrations.

Suggested Readings:

1. Gupta, P. K. 2005. *Cell and Molecular Biology*. Rastogi publications, Meerut, India. pp. 942.
2. Gupta, P. K. 2009. *Genetics*. Rastogi publications, Meerut, India. pp. 628.
3. Singh, B.D. 2009. *Fundamentals of Genetics*. Kalyani Publishers, Ludhiana, India. pp. 825.
4. Snusted, D. P., Simmons, M. J. 2010. *Principles of Genetics*. John Wiley & Sons, New York. pp. 882.



Course Name: Fundamentals of Soil Science

Course Code: A501106

Semester: 1st

Credits: 02

**LTP
2 0 0**

Course Content

Soil: Pedological and edaphological concepts, Origin of the earth, Earth's crust; Composition: Rocks and minerals Weathering, Soil formation factors and processes Components of soils; Soil profile, Soil physical properties, Soil texture, Textural classes, Particle size analysis, Soil structure Classification, Soil aggregates, significance, Soil consistency, Soil crusting, Bulk density and particle density of soils & porosity, their significance and manipulation, Soil compaction, Soil Colour, Elementary knowledge of soil classification and soils of India; Soil water, Retention and potentials, Soil moisture constants, Movement of soil water, Infiltration, percolation, permeability, Drainage, Methods of determination of soil moisture Thermal properties of soils, Soil temperature, Soil air, Gaseous exchange, Influence of soil temperature and air on plant growth; Soil colloids, Properties, nature, types and significance; Layer silicate clays, their genesis and sources of charges, Adsorption of ions, Ion exchange, CEC & AEC Factors influencing ion exchange and its Significance. Soil organic matter, Composition, Decomposability, Humus, Fractionation of organic matter, Carbon cycle, C: N ratio. Soil biology, Biomass, Soil organisms and their beneficial and harmful roles.

Suggested Readings:

1. ISSS. 2009. *Fundamentals of Soil Science*. 2nd Ed. Indian Society of Soil Science, New Delhi. pp. 728.
2. Das D. K. 2011. *Introductory Soil Science*, 3rd revised and Enlarged Ed, Kalyani Publisher, Ludhiana. pp. 645.
3. Biswas, T.D. and Mukherjee, S.K.. 1995. *Text Book of Soil Science* 2nd Ed. Tata McGraw Hill Publisher, Delhi. pp. 433.
4. Dahama , A. K. *Organic farming for sustainable agriculture*. Agrobotanica, Binaker. pp. 255.

Course Name: Fundamentals of Soil Water Conservation and Engineering

Course Code: A501108

Semester: 1st

Credits: 02

**L T P
2 0 0**

Course content

Surveying: survey equipment, chain survey, cross staff survey, plotting procedure, calculations of area of regular and irregular fields. Levelling – levelling equipment, terminology, methods of calculation of reduced levels, types of levelling, contouring. Irrigation, classification of projects, flow irrigation and lift irrigation. Water source, Water lifting devices – pumps (shallow and deep well), capacity, power calculations. 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. Soil and water conservation – soil erosion, types and engineering control measures.

Suggested Readings:

1. Mohamed, A. M. O., & Paleologos, E. K. (2017). *Fundamentals of geoenvironmental engineering: understanding soil, water, and pollutant interaction and transport*. Butterworth-Heinemann.
2. Das, G. (2008). *Hydrology and Soil Conservation Engineering: Including Watershed Management*. PHI Learning Pvt. Ltd.
3. Panda, S. C. (2007). *Soil water conservation and dry farming*. Jodhpur, India: Agrobios (India).
4. Coleman, D. C., & Crossley Jr, D. A. (2003). *Fundamentals of soil ecology*. Academic press.
5. Burden, D. S. (1999). *Fundamentals of soil science as applicable to management of hazardous wastes*. Superfund Technology Center for Ground Water.

Course Name: Plant Pathogens and Principles of Plant Pathology

Course Code: A501110

Semester: 1st

L T P

Credits: 02

0 0 2

Introduction, Important plant pathogenic organisms, different groups, fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, virioids, algae, protozoa and phanerogamic parasites with examples of diseases caused by them. Prokaryotes: classification of prokaryotes according to Bergey's Manual of Systematic Bacteriology. General Characters of fungi, Definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction in fungi (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions and sub-divisions. Introduction: Definition and objectives of Plant Pathology. History of Plant Pathology. Terms and concepts in Plant Pathology. Survival and Dispersal of Plant Pathogens. Phenomenon of infection. Pathogenesis – Role of enzymes, toxins, growth regulators and polysaccharides. Defense mechanism in plants. Plant disease epidemiology. General principles of plant diseases management – Importance, general Principles – Avoidance, exclusion, protection – Plant Quarantine and Inspection – Quarantine Rules and Regulations. Cultural methods – Rouging, eradication of alternate and collateral hosts, crop rotation, manure and fertilizer management, mixed cropping, sanitation, hot weather ploughing, soil amendments, time of sowing, seed rate and plant density, irrigation and drainage. Role and mechanisms of biological control and PGPR. Physical Methods – Heat and Chemical methods – Methods of application of fungicides. Integrated plant disease management (IDM) – Concept, advantages and importance.

Suggested Readings:

1. Agrios, GN. 2010. *Plant Pathology*. Acad. Press.
2. Singh RS. 2013. *Introduction to Principles of Plant Pathology*. Oxford and IBH Pub.Co.



3. Dhingra OD & Sinclair JB. 1986. *Basic Plant Pathology Methods*. CRC Press, London, Tokyo.

Course Name: Fundamentals of Computer Applications

Course Code: A501112

Semester: 1st

L T P

3 0 0

Credits: 03

Course Content

Introduction to Computers, Anatomy of Computers, Input and Output Devices. Units of Memory, Hardware, Software and Classification of Computers. Personal Computers, Types of Processors, booting of computer, warm and cold booting. Computer Viruses, Worms and Vaccines. Disk Operating System (DOS): Some fundamental DOS Commands, FORMAT, DIR, COPY, PATH, LABEL, VOL, MD, CD and DELTREE, Rules for naming files in DOS and Types of files. Applications – MSWORD: Word, processing and units of document, features of word-processing packages. Creating, Editing, Formatting and saving a document in MSWORD; MSEXCEL: Electronic Spreadsheets, concept, packages. Creating, Editing and saving a spreadsheet with MSEXCEL

Suggested readings:

1. Salaria, R. S. 2017. *Computer Fundamentals*. Daryaganj, New Delhi. pp. 486.
2. Manish, S. and Bhatt, A. 2016. *Computers in Agriculture: Fundamentals and Applications*. New India Publishing Agency. New Delhi. pp. 190.
3. Manjunath, B.E. 2010. *Computer Basics*. Vasan Publications, Bengaluru, Karnataka. pp. 356.

Course Name: Comprehension and Communication Skills in English

Course Code: A501114

Semester: 1st

L T P

2 0 0

Credits: 02

Course Content

Comprehension: Text for comprehension, Let's Go Home & Other Stories, Edited by Meenakshi Mukerjee. Orient Longman, New Delhi. And

1. Essay (not exceeding 400 words)
2. Precis
3. Translation from Hindi into English
4. Allied Grammar: Use of idioms, correction of incorrect sentences, etc

Suggested Readings:

- 1) Krishnaswamy, N and Sriraman, T. 1995. *Current English for Colleges*. Macmillan India Ltd. Madras. pp 128



- 2) Balasubramanyam M. 1985. *Business Communication*. Vani Educational Books, New Delhi. pp 216
- 3) Naterop, Jean, B. and Rod Revell. 1997. *Telephoning in English*. Cambridge University Press, Cambridge. pp 135
- 4) Mohan Krishna and Meera Banerjee. 1990. *Developing Communication Skills*. Macmillan India Ltd. New Delhi. pp 230
- 5) Narayanaswamy V R. 1979. *Strengthen your writing*. Orient Longman, New Delhi. pp 232

Course Name: Lab. –Principles of Agronomy and Agricultural Meteorology

Course Code: A501103

Semester: 1st

Credits: 01

**L T P
0 0 2**

Course Contents

Study of tillage implements; Practice of ploughing; Practice of puddling; Study of seeding equipments and introduction of remote sensing. Different methods of sowing; Study of manures, fertilizers and green manure crops / seeds (including calculations); Study of intercultivation implements and practice; Practice of methods of fertilizer applications; Participation in ongoing field operations; Site selection for Agro met observatory; Measurement of temperature; Measurement of rainfall; Measurement of evaporation (atmospheric/soil); Measurement of atmospheric pressure; Measurement of sunshine duration and solar radiation; Measurement of wind direction and speed and relative humidity; Study of weather forecasting and synoptic charts.

Suggested readings

1. Stigter, K. 2010. *Applied Agrometeorology*. Springer Berlin Heidelberg, Germany. pp. 1100
2. Prasada. R. G. (2008). *Agricultural Meteorology*. PHI Learning, India. pp. 384.
3. Palmer, S. 2016. *Agrometeorology*. : Scitus Academics LLC. pp. 26

Course Name: Lab. - Principles of Genetics

Course Code: A501105

Semester: 1st

Credits: 01

**L T P
0 0 2**

Course Content

Microscopy (Light microscopes and electron microscopes; Preparation and use of fixatives and stains for light microscopy; Preparation of micro slides and identification of various stages of mitosis; Preparation of micro slides and identification of various stages of mitosis; Preparation of micro slides and identification of various stages of meiosis; Preparation of micro slides and identification of various stages of meiosis; Monohybrid ratio and its modifications; Dihybrid ratio and its modifications; Trihybrid ratio; Chi-square analysis and Interaction of factors; Epistatic factors, Supplementary factors and Duplicate factors;



Complementary factors, Additive factors and Inhibitory factors; Linkage – Two point test cross; Linkage – Three point test cross; Induction of polyploidy using colchicines; Induction of chromosomal aberrations using chemicals

Suggested Readings:

1. Gupta, P. K. 2005. *Cell and Molecular Biology*. Rastogi publications, Meerut, India. pp. 942.
2. Gupta, P. K. 2009. *Genetics*. Rastogi publications, Meerut, India. pp. 628.
3. Singh, B.D. 2009. *Fundamentals of Genetics*. Kalyani Publishers, Ludhiana, India. pp. 825.
4. Snusted, D. P., Simmons, M. J. 2010. *Principles of Genetics*. John Wiley & Sons, New York. pp. 882.

Course Name: Lab. Fundamentals of Soil Science

Course Code: A501107

Semester: 1st

Credits: 01

LTP

0 0 2

Course Content

Practical: Determination of bulk density and particle density, Aggregate analysis, Soil strength, Soil moisture determination, Soil moisture constants – Field capacity Infiltration rate, water holding capacity, soil texture and mechanical analysis – Soil temperature. Analytical chemistry – Basic concepts, techniques and calculations – Collection and processing of soil for analysis – Organic carbon, pH, EC, soluble cations and anions – Study of a soil profile – Identification of rocks and minerals.

Suggested Readings:

1. Somawanshi, 2012. *Laboratory Methods for Analysis of Soil, Irrigation Water and Plants..*, Department of Soil Science and Agricultural Chemistry, MPKV, Rahuri. revised Ed. pp. 307.
2. Jakson, M.L. 1973. *Soil Chemical Analysis*. Printice Hall, India, Pvt. Ltd. New Delhi. pp. 498.
3. Black, C. A. 1965. *Soil Chemical Analysis*, Part I and part II. American Soc. Agron.,Inc. and Soil Science Society of America. Madison, Wisconsin, USA. pp. 1159
4. Hesse, P. R. 1971. *A Text Book of Soil Chemical Analysis*. John Murray, London. pp. 520
5. Richards, L. A. 1968. *Diagnosis and Improvement of Saline Alkali Soils*. Oxford andIBH Publication Co. Calcutta. pp.511

Course Name: Lab. - Fundamentals of Soil Water Conservation and Engineering

Course Code: A501109

Semester: 1st

Credits: 02

L T P

2 0 0

Course content



Acquaintance with chain survey equipment; Ranging and measurement of offsets; Chain triangulation; Cross staff survey; Plotting of chain triangulation; Plotting of cross staff survey; Levelling equipment – dumpy level, levelling staff, temporary adjustments and staff reading; Differential levelling; Profile levelling; Contour survey – grid method; Plotting of contours; 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

Suggested Readings:

6. Mohamed, A. M. O., & Paleologos, E. K. (2017). *Fundamentals of geoenvironmental engineering: understanding soil, water, and pollutant interaction and transport*. Butterworth-Heinemann.
7. Das, G. (2008). *Hydrology and Soil Conservation Engineering: Including Watershed Management*. PHI Learning Pvt. Ltd.
8. Panda, S. C. (2007). *Soil water conservation and dry farming*. Jodhpur, India: Agrobios (India).
9. Coleman, D. C., & Crossley Jr, D. A. (2003). *Fundamentals of soil ecology*. Academic press.
10. Burden, D. S. (1999). *Fundamentals of soil science as applicable to management of hazardous wastes*. Superfund Technology Center for Ground Water.

Course Name: Lab. - Plant Pathogens and Principles of Plant Pathology

Course Code: A501111

Semester: 1st

L T P

Credits: 01

0 0 2

Course Content

Acquaintance to plant pathology laboratory and equipments; Preparation of culture media for fungi and bacteria; Isolation techniques, preservation of disease samples; Study of Pythium, Phytophthora and Albugo; Study of Peronospora, Plasmopara and Bremia; Study of genera Mucor and Rhizopus. Study of Oidium, Erysiphe, Phyllactinia, Uncinula and Podosphaera; Study of Puccinia (different stages), Uromyces, Hemilia; Study of Ustilago; Study of Agaricus, Pleurotus and Ganoderma; Study of Septoria, Colletotrichum, and Pyricularia; Study of Aspergillus, Penicillium, Trichoderma, and Fusarium; Study of Helminthosporium, Drechslera, Alternaria, Cercospora, Rhizoctonia and Sclerotium; Demonstration of Koch's postulates; Study of different groups of fungicides and antibiotics; Preparation of fungicides – Bordeaux mixture, Bordeaux paste, Methods of application of fungicides – seed, soil and foliar; Bio-assay of fungicides – poisoned food technique, inhibition zone technique and slide germination technique; Bio-control of plant pathogens – dual culture technique, seed treatment. Visit to quarantine station and remote sensing laboratory



Suggested Readings:

1. Agrios, GN. 2010. *Plant Pathology*. Acad. Press.
2. Singh RS. 2013. *Introduction to Principles of Plant Pathology*. Oxford and IBH Pub.Co.
3. Dhingra OD & Sinclair JB. 1986. *Basic Plant Pathology Methods*. CRC Press, London, Tokyo.

Course Name: Lab. - Fundamentals of Computer Applications

Course Code: A501113

Semester: 1st

L T P

Credits: 02

2 0 0

Course Contents

Study of Computer Components; Booting of Computer and its Shut Down; Practice of some fundamental DOS Commands, TIME, DATE, DIR, COPY, FORMAT, VOL, LABEL, PATH; MSWORD: Creating a Document, Saving and Editing; MSWORD, Use of options from Tool Bars, Format, Insert and Tools (Spelling & Grammar) Alignment of text; MSWORD, Creating a Table, Merging of Cells, Column and Row width; MSEXCEL: Creating a Spreadsheet, Alignment of rows, columns and cells using Format tool bar; MSEXCEL: Entering Expressions through the formula tool bar and use of inbuilt functions, SUM, AVERAGE, STDEV; MSEXCEL: Data Analysis using inbuilt Tool Packs, Correlation & Regression; MSEXCEL: Creating Graphs and Saving with & without data.

Suggested readings:

1. Salaria, R. S. 2017. *Computer Fundamentals*. Daryaganj, New Delhi. pp. 486.
2. Manish, S. and Bhatt, A. 2016. *Computers in Agriculture: Fundamentals and Applications*. New India Publishing Agency. New Delhi. pp. 190.
3. Manjunath, B.E. 2010. *Computer Basics*. Vasan Publications, Bengaluru, Karnataka. pp. 356.

Course Name: Lab. NSS/NCC/Physical Education & Yoga Practices**

Course Code: A501119

Semester: 1st

L T P

Credits: 01

0 0 2

Course Content

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 peacebuilding

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.
- Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self-defence.

Suggested Readings:

1. *National Service Scheme: A Report*, by Khwaja Ghulam Saiyidain. Published by



Ministry of Education, Govt. of India, 1961.

2. *Training and consultancy needs in national service scheme*, by N. F. Kaikobad, Krishan K. Kapil. Published by Tata Institute of Social Sciences, 1971.
3. *Hand Book of NCC*. (2003). Major R. D. Mishra, Pub. Kanti Prakashan Etawah (UP)
4. *Cadets Hand Book* (2007). Pub. Directorate of NCC. Govt. of India Press, New Delhi.
5. Andhra University, Dept. of Sociology & Social Work. 1971. *National Service Scheme: guide-lines to project-masters*, Published by Dept. of Sociology & Social Work, Andhra University. Pp 278

Course Name: Botany -I

Course Code: A501115

Semester: 1st

L T P

0 0 2

Credits: 02

Course content

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. Structure of leaf. Venation. phyllotaxy. Modifications and functions of leaf. Types of inflorescence. types of fruits. Types of ovules. Vegetative reproduction-natural and artificial. pollination and fertilization. Structure of monocot and dicot seed. Seed germination. Factors affecting germination and seed dormancy. types of dormancy and factors affecting it. Basic knowledge of crop growth and development. phytohormones: brief account and their use in Agriculture.

SUGGESTED READINGS:

1. Puri, P., 1980 *Bryophyta*, Atma & Sons, Delhi. pp 546
2. Sharma, O.P. 1990, *Text Book of Pteridophyta*, McMillan India Ltd. pp 416
3. Dube, H.C., 1990, *An Introduction to Fungi*. Vikas Publishing House Pvt.Ltd. Delhi. pp 340 ISBN-13978-8125914334
4. Sharma, O.P., 1992, *Text Book of Thallophytes*, McGraw Hill Publishing co. pp 416.
5. Sharma, P.D., 1991, *The Fungi*, Rastogi & Co. Meerut. pp 548
6. Vashishta B.R. and Sinha A.K. (2010 Reprint). *Botany for degree students*. pp 752



Course Name: Mathematics* - I
Course Code: A501117
Semester: 1st

L T P
3 0 0

Credits: 03

Course content

Complex numbers Geometric series. Logarithms. Binomial theorem for positive index. Trigonometric identities and allied angles, graphs of trigonometric functions, addition and subtraction formulae, sum and product formulae, multiple and sub-multiple angles.

Suggested Readings:

1. Rajput, A. K., 2017. *Text Book of Mathematics*, 11th Part-I and Part II (Publication Division). NCERT .pp:466
2. Pierpoint, A.E. 1925:*Mensuration- I* , *Digital Library of India Item*.Franklin Classics Trade Press.pp.187.
3. Chaudhari, A. A. 2017:*A text book Agricultural Mathematics*. Shri Rajlaxmi Prakashan, Aurangabad.pp:312
4. Rajput, A. K. 2012: *NCERT 12 Text Book of Mathematics*, 12th Part-I . National Council of Education Research and Training. pp.286.
5. Anwar, M. S.2012. *Mathematics Text Book, 12th Part-II*. NCERT. pp. 286.

Course Name: Botany -I
Course Code: A501116
Semester: 1st

L T P
1 0 0

Credits: 01

Course content

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. their modifications. Stem types and their modifications. Parts of leaf. Leaf types. Venation. phyllotaxy. modification of leaf. Flower structure. Insertion of floral whorls on thalamus. Floral diagrams. Racemose. Cymose and special types of inflorescence. Fruit types. structure and germination of monocot and dicot seeds

Suggested Readings:

1. A.C. Dutta .1980.*A class- book of Botany*, Publisher- Oxford University press YMCA Library Building. 1 Jai Singh Road, New Delhi 110001, India. pp.656
2. James D. Mauseth.1962. *Botany- An introduction to Plant Biology*, Publisher Continental Prakashan, Pune. pp 844
3. Ashok M. Bendre & Ashok Kumar .1996.A Text book of Practical Botany-2, Publisher- Rastogi Publications Shivaji Road, Meerut – 25002, India. pp 464



Course Name: Lab. Mathematics-I
Course Code: A501118
Semester: 1st

Credits: 01

L T P
0 0 2

Course Content

Tutorials on: complex numbers, geometric series, logarithms, binomial theorem and trigonometric problems

Suggested Readings

1. Rajput , A. K.,2017. *Text Book of Mathematics*, 11th Part-I and Part II (Publication Division). NCERT .pp:466
2. Pierpoint, A.E. 1925. *Mensuration- I* , Digital Library of India Item.Franklin Classics Trade Press.pp.187.
3. Chaudhari, A. A. 2017. *A text book Agricultural Mathematics*. Shri Rajlaxmi Prakashan, Aurangabad.pp:312
4. Rajput, A. K. 2012. *NCERT 12 Text Book of Mathematics*, 12th Part-I . National Council of Education Research and Training pp:286
5. Anwar, M. S.2012. *Mathematics Text Book*, 12th Part-II. NCERT.pp. 286.

Course Name: Water Management Including Micro Irrigation
Course Code: A501201

Semester: 2nd

Credits: 02

L T P
20 0

Course content

Irrigation: definition and objectives, water resources and irrigation development in India and Rajasthan; Soil plant water relationships; Methods of soil moisture estimation, evapotranspiration and crop water requirement; effective rainfall, scheduling of irrigation; Methods of irrigation: surface, sprinkler and drip irrigation; Irrigation efficiency and water use efficiency, conjunctive use of water, irrigation water quality and its management. Water management of different crops (rice, wheat, maize, groundnut, sugarcane, mango, banana and tomato); Agricultural drainage

Suggested readings:

1. Goyal, M. R., Chavan, V. K., & Tripathi, V. K. (Eds.). (2016). *Innovations in micro irrigation technology*. CRC Press.
2. Goyal, M. R. (Ed.). (2014). *Management, performance, and applications of micro irrigation systems*. CRC Press.



3. Singh, D. K., & Singh, R. M. (2014). Micro-irrigation for Sustainable Water Management in Agriculture. *Irrigation Resources*, 70.
4. Kettab, A., & Zella, L. (2003). Development of micro-irrigation around the World. In *Consensus to resolve irrigation and water use conflicts in the Euromediterranean Region. Proceedings ICID 20th European Regional Conference, Montpellier, France, 14-19 September 2003* (pp. 1-12). International Commission on Irrigation and Drainage (ICID).

Course Name: Principles of Seed Technology

Course Code: A501203

Semester: 2nd

L T P

0 0 2

Credits: 02

Course content

Introduction to Seed Production, Importance of Seed Production, Seed policy, Seed demand forecasting and planning for certified, foundation and breeder seed production, Deterioration of crop varieties, Factors affecting deterioration and their control; Maintenance of genetic purity during seed production, Seed quality; Definition, Characters of good quality seed, Different classes of seed, Production of nucleus & breeder's seed, Maintenance and multiplication of pre-release and newly released varieties in self and cross-pollinated crops; Seed Production, Foundation and certified seed production in maize (varieties, hybrids, synthetics and composites); Foundation and certified seed production of rice (varieties & hybrids); Foundation and certified seed production of sorghum and bajra (varieties, hybrids, synthetics and composites); Foundation and certified seed production of cotton and sunflower (varieties and hybrids); Foundation and certified seed (varieties and hybrids) production of castor, tomato, brinjal, chillies, bhendi, onion, bottle gourd and ridge gourd; Seed certification, phases of certification, procedure for seed certification, field inspection and field counts etc.; Seed Act and Seed Act enforcement, Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency, Central and State Seed Testing Laboratories; Duties and powers of seed inspectors, offences and penalties; Seed control order: Seed Control Order 1983, Seed Act 2000 and other issues related to seed quality regulation. Intellectual Property Rights, Patenting, WTO, Plant Breeders Rights, Varietal Identification through Grow-Out Test and Electrophoresis; Seed Drying: Forced air seed drying, principle, properties of air and their effect on seed drying, moisture equilibrium between seed and air, Heated air drying, building requirements, types of air distribution systems for seed drying, selection of crop dryers and systems of heated air drying, recommended temperature and depth of the seeds, management of seed drying, Planning and layout of seed processing plant; Establishment of seed processing plant. Seed processing: air screen machine and its working principle, different upgrading equipments and their use, Establishing a seed testing laboratory. Seed testing procedures for quality assessment, Seed treatment, Importance of seed treatment, types of seed treatment, equipment used for seed treatment (Slurry and Mist-O-matic treater), Seed packing and seed storage, stages of seed storage, factors affecting seed longevity during storage and conditions required for good storage, General principles of seed storage, constructional features for good seed warehouse, measures for pest and disease control, temperature control, Seed marketing, marketing



structure, marketing organization, sales generation activities, promotional media, pricing policy; Factors affecting seed marketing.

Suggested Readings

- 1) P. Singh, 2016: *Principles of Seed technology*, Kalyani publisher, New Delhi, pp: 340.
- 2) R. L. Aggarawal., 2018: *Seed technology (2nd edition)*, Oxford & IBH publishing, Tamilnadu pp: 848
- 3) Jain brothers,(2021) *Treasure of seed science and technology*,Jain publishers, Ludhiana, Pp: 160
- 4) B. L. Jana (2015) *Principles of seed technology*, Aavishkar publisher, distributors jaipur, pp: 169

Course Name: Soil Chemistry, Soil Fertility and Nutrient Management

Course Code: A501205

Semester: 2nd

Credits: 01

L T P

1 0 0

Course content

Soil as a source of plant nutrients. Soil colloids, Properties, nature, types and significance; Layer silicate clays, their genesis and sources of charges, Adsorption of ions, Ion exchange, CEC & AEC Factors influencing ion exchange and its significance. Essential and beneficial elements, criteria of essentiality, forms of nutrients in soil and transformations, mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Measures to overcome deficiencies and toxicities. Problem soils – acid, salt affected and calcareous soils, characteristics, nutrient availabilities. Reclamation – mechanical, chemical and biological methods. Fertilizer and insecticides and their effect on soil water and air. Irrigations water – Quality of irrigation water and its appraisal. Indian standards for water quality. Use of saline water for agriculture. Soil fertility – Different approaches for soil fertility evaluation. Soil test based fertilizer recommendations to crops. Factors influencing nutrient use efficiency (NUE) in respect of N, P, K, S, Fe and Zn fertilizers. Source, method and scheduling of nutrients for different soils and crops grown under rainfed and irrigated conditions..

Suggested Readings:

1. Rakshit A. 2015. *Manures Fertilizers and Pesticides* Paperback – Import. CBS Publishing; 1ST edition, pp. 266. 210
2. Zhongqi Heand Hailin Zhang. 2016. *Applied Manure and Nutrient Chemistry for Sustainable Agriculture and Environment* Paperback – Import. Springer. pp. 379.
3. Havlin, John L, Samuel L. Tisdale (Author), Werner L. Nelson (Author), James D. Beaton (2004). *Soil Fertility and Fertilizers*. Published July 23rd 2004 by Prentice Hall. pp. 528.
4. Havlin, John L. 2004. *Soil Fertility and Fertilizers: An Introduction to Nutrient Management* Published July 23rd 2004 by Prentice Hall. pp. 528.
- 5.



Course Name: Fundamentals of Nematology

Course Code: A501207

Semester: 2nd

Credits: 01

L T P

1 0 0

Course content

Introduction: History of phytonematology. Economic importance. General characteristics of plant pathogenic nematodes. Nematode general morphology and biology. Classification of nematodes upto family level with emphasis on groups containing economically important genera. Classification of nematodes by habitat. Identification of economically important plant nematodes upto generic level with the help of keys and description. Symptoms caused by nematodes with examples. Interaction between plant parasitic nematodes and disease causing fungi, bacteria and viruses. Different methods of nematode management. Cultural methods (crop rotation, fallowing, soil amendments, other land management techniques), physical methods (soil solarisation, hot water treatment) Biological methods, Chemical methods (fumigants, non fumigants). Resistant varieties. IDM

Suggested Readings:

1. Upadhyay, K.D. and Dwivedi, K. 1996. *Textbook of plant nematology For B.Sc. (Ag.), M.Sc. (Ag.) and research students*. Aman Publishing House, Meerut. pp. 148
2. Reddy, P.P. 2019. *Introductory plant nematology*. Scientific Publishers Jodhpur. pp. 412.
3. Thorne, G. 1961. *Principles of Nematology*. McGraw-Hill Book Company, Inc., New York. pp. 553.
4. Walia, R.K. and Bajaj, H.K. 2013. *Text Book on Introductory Plant Nematology*. ICAR, New Delhi. pp. 227.

Course Name: Agricultural Microbiology

Course Code: A501209

Semester: 2nd

Credits: 02

L T P

2 0 0

Course content

History of Microbiology: Spontaneous generation theory, Role of microbes in fermentation, Germ theory of disease, Protection against infections, Applied areas of Microbiology Metabolism in bacteria: ATP generation, chemoautotrophy, photo autotrophy, respiration, fermentation. Bacteriophages: structure and properties of Bacterial viruses – Lytic and Lysogenic cycles: viroids, prions. Bacterial genetics; Gene expression; Genetic recombination: transformation, conjugation and transduction, genetic engineering, Plasmids, episomes, genetically modified Organisms. Soil Microbiology: Microbial groups in soil, microbial transformations of carbon, nitrogen, phosphorus and sulphur, Biological nitrogen fixation. Microflora of Rhizosphere and Phyllosphere Microflora, microbes in composting. Microbiology of Water. Microbiology of food: microbial spoilage and principles of food



preservation. Beneficial microorganisms in Agriculture: Biofertilizer (Bacterial Cyanobacterial and Fungal), microbial insecticides, Microbial agents for control of Plant diseases, Biodegradation, Biogas production, Biodegradable plastics, Plant – Microbe interactions.

Suggested readings

1. Amita jain .2018. *Manual of microbiology*. Elsevier india. pp 600
2. Naveen kango.2019.*Textbook of microbiology* .Dreamtech press.pp 436
3. Amita jain&Parul jain .2019. *Essential of microbiology*. Elsevier india. pp 384

Course Name: Principles of Agricultural Economics

Course Code: A501211

Semester: 2nd

Credits: 02

**L T P
2 0 0**

Course content

Economics: Meaning, Definition, Subject matter, Divisions of Economics, Importance of Economics; Agricultural Economics: Meaning, Definition; Basic Concepts: Goods, Service, Utility, Value, Price, Wealth, Welfare. Wants: Meaning, Characteristics, Classifications of Wants, Importance. Theory of consumption: Law of Diminishing Marginal utility, Meaning, Definition, Assumption, Limitations, Importance. Consumer's surplus: Meaning, Definition, Importance. Demand: Meaning, Definition, Kinds of Demand, Demand schedule, Demand Curve, Law of Demand, Extension and Contraction Vs Increase and Decrease in Demand. Elasticity of Demand: Types of Elasticity of Demand, Degrees of price elasticity of Demand, Methods of Measuring Elasticity, Factors influencing elasticity of Demand, Importance of Elasticity of Demand. Welfare Economics: Meaning, Pareto's optimality. National Income: Concepts, Measurement. Public Finance: Meaning, Principles. Public Resource: Meaning, Services Tax, Meaning, And Classification of Taxes: Cannons of Taxation, Public expenditure: Meaning, Principles. Inflation: Meaning, Definition, Kinds of inflation.

Suggested Readings:

1. Jhingan, M.L.1990. *Advanced Economic Theory*. Vikas Publishing House, New Delhi. Pp.1842.
2. Subba Reddy, S., Raghu Ram, P., Sastry, T.V.N. and Bhavani Devi, I. 2010. *Agricultural Economics*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. pp.697.
3. Nagpure S.C. and Patil E.R. 2014. *Principles of Agricultural Economics*. Agroment Publishers, Dharampeth, Nagpur, India. pp.334.
4. Dewett, K.K. and Chand, A. 2009. *Modern Economic Theory*. S. Chand and Co., New Delhi. Pp. 1024.



Course content

Education – Meaning, Definition, Types – Formal, Informal and Non-formal education and their Characteristics. Extension Education and Agricultural Extension – Meaning, Definition, Concepts, Objectives and Principles. Rural development – Meaning, Definition, Concepts, Objectives, Importance and Problems in rural development. Developmental programmes of pre-independence era – Sriniketan, Marthandam, Gurgaon experiment and Gandhian constructive proprogramme. Development programmes of Post independence era, Firka Development, Etawah – Pilot project and Nilokheri Experiment. Community Development Programme – Meaning, Definition, Concepts, Philosophy, Principles, Objectives, Differences between Community Development and Extension Education, National Extension service. Panchayat Raj system – Meaning of Democratic – Decentralization and Panchayat Raj, Three tiers of Panchayat Raj system, Powers, Functions and Organizational setup. Agricultural Development Programmes with reference to year of start, objectives & salient features – Intensive Agricultural District Programme (IADP), High Yielding Varieties Programme (HYVP), Institution Village Linkage Programme (IVLP), Watershed Development Programme (WDP), National Agricultural Technology Project (NATP), ATMA, ATIC. Social Justice and Poverty alleviation programmes – Integrated Tribal Development Agency (ITDA), Integrated Rural Development Programme (IRDP), Swarna Jayanthi Gram Swarojgar Yojana (SGSY), Prime Minsiter Employment Yojana (CMEY). New trends in extension, privatization. Women Development programmes – Development of Women and Children in Rural Areas (DWCRA), Rashtriya Mahila Kosh (RMK), Integrated Child Development Scheme (ICDS) and Mahila Samridi Yojana (MSY). Reorganized extension system (T&V System) – Salient features, Fortnight Meetings, Monthly workshops, Linkages, Merits and Demerits, Emergence of Broad Based Extension (BBE).

Suggested Readings:

1. Dahama, O.P. and Bhatnagar, O.P. 1980. Education and Communication for Development. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. Vol. 9, 1980. pp 168-173
2. Dudhani, C.M. Hirevenkatgoudar, L.V., Manjunath, L., Hanchinal, S.N. and Patil, S.L. 2004. *Extension Teaching Methods and Communication Technology*, UAS, Dharwad. 2004. pp 123-233
3. Reddy, A.A 2005 *Extension Education*. Sri Lakshmi Press, Bapatla. Vol. 6, 2005. pp 99-176
4. Samanta, R.K. 1990. *Development Communication for Agriculture*. BR Publishing Corporation, Delhi. pp 67-88.



Course Name: Lab. Water management including micro irrigation

Course Code: A501202

Semester: 2nd

Credits: 02

**L T P
2 0 0**

Course content

Determination of bulk density by field method; Determination of soil moisture content by gravimetric method, tensiometer, electrical resistance block and neutron moisture meter; Determination of field capacity by field method; Determination of permanent wilting point; Measurement of irrigation water through flumes and weirs; Calculation of irrigation water requirement (Problems); Determination of infiltration rate; Demonstration of furrow method of irrigation; Demonstration of check basin and basin method of irrigation; Visit to farmers field and cost estimation of drip irrigation system; Demonstration of filter cleaning, fertigation, injection and flushing of laterals; Erection and operation of sprinkler irrigation system; Measurement of emitter discharge rate, wetted diameter and calculation of emitter discharge variability; Determination of EC, pH, carbonates, bicarbonates, Ca⁺⁺ and Mg⁺⁺ in irrigation water (quality parameters)

Suggested readings:

- 1.Goyal, M. R., Chavan, V. K., & Tripathi, V. K. (Eds.). (2016). *Innovations in micro irrigation technology*. CRC Press.
- 2.Goyal, M. R. (Ed.). (2014). *Management, performance, and applications of micro irrigation systems*. CRC Press.
- 3.Singh, D. K., & Singh, R. M. (2014). Micro-irrigation for Sustainable Water Management in Agriculture. *Irrigation Resources*, 70.
- 4.Kettab, A., & Zella, L. (2003). Development of micro-irrigation around the World. In *Consensus to resolve irrigation and water use conflicts in the Euromediterranean Region. Proceedings ICID 20th European Regional Conference, Montpellier, France, 14-19 September 2003* (pp. 1-12). International Commission on Irrigation and Drainage (ICID).

Course Name: Lab. -Principles of Seed Technology

Course Code: A501204

Semester: 2nd

Credits: 01

**L T P
2 0 0**

Course content

Seed sampling principles and procedures; Physical Purity analysis of Field and Horticultural crops; Germination analysis of Field and Horticultural crops; Moisture tests of Field and Horticultural crops; Viability test of Field and Horticultural crops; Seed health test of Field and Horticultural crops; Vigour tests of Field and Horticultural crops; Seed dormancy and breaking methods; Grow out tests and electrophoresis for varietal identification; Visit to Seed production plots of Maize, Sunflower, Bajra, Rice, Sorghum, Cotton, Chillies and Vegetables.



(Add or delete crops of the region); Visit to Seed processing plants; Visit to Seed testing laboratories; Visit to Grow out testing farms; Visit to Hybrid Seed Production farms; Varietal identification in seed production plots; Planting ratios, isolation distance, roguing etc

Suggested Readings

- 1) P. Singh, 2016 :*Principles of Seed technology* , Kalyani publisher , New Delhi, pp: 340.
- 2) R. L, Aggarawal., 2018: *Seed technology (2nd edition)* , Oxford & IBH publishing, Tamilnadu pp: 848
- 3) Jain brothers,(2021) *Treasure of seed science and technology*,Jain publishers, Ludhiana , Pp: 160
- 4) B. L. Jana (2015) *Principles of seed technology*, Aavishkar publisher , distributors jaipur, pp: 169

Course Name: Lab- Soil Chemistry, Soil Fertility and Nutrient Management

Course Code: A501206

Semester: 2nd

Credits: 01

L T P

0 0 2

Courses content

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

Suggested Readings:

1. Rakshit A. 2015. *Manures Fertilizers and Pesticides* Paperback – Import. CBS Publishing; 1ST edition, pp. 266. 210
2. Somawanshi, et al. 2012. *Laboratory Methods for Analysis of Soil, Irrigation Water and Plants..*, Department of Soil Science and Agricultural Chemistry, MPKV., Rahuri. revised Ed. pp. 307.
3. Jackson, M.L. 1973. *Soil Chemical Analysis*. Printice Hall, India, Pvt. Ltd. New Delhi. pp 498.
4. Chopra, S. L. and Kanwar, S. L. and Rakshit, J. S. 2014. *Analytical Agricultural Chemistry*. Kalyani Publisher. pp. 309



Course Name: Lab- Fundamentals of Nematology

Course Code: A501208

Semester: 2nd

Credits: 01

**L T P
0 0 2**

Course content

Methods of survey – sampling methods, collection of soil and plant samples; Extraction of nematodes from soil and plant tissues following combined Cobb's decanting – sieving and Baermann funnel technique, counting and estimation of plant parasitic nematodes; Preparation of temporary and permanent mounts; Method of preparation of perineal patterns for identification of species of Meloidogyne; Study and identification of most important plant parasitic nematodes with special reference to their characteristics and symptomatology – Meloidogyne, Pratylenchus; Heterodera, Ditylenchus, Globodera, Tylenchulus, Xiphinema, Radopholus, Rotylenchulus, and Helicotylenchus. Experimental techniques used in pathogenicity studies with root knot nematode.

Suggested Readings:

1. Upadhyay, K.D. and Dwivedi, K. 1996. *Textbook of plant nematology For B.Sc. (Ag.), M.Sc. (Ag.) and research students*. Aman Publishing House, Meerut. pp. 148
2. Reddy, P.P. 2019. *Introductory plant nematology*. Scientific Publishers Jodhpur. pp. 412.
3. Thorne, G. 1961. *Principles of Nematology*. McGraw-Hill Book Company, Inc., New York. pp. 553.
4. Walia, R.K. and Bajaj, H.K. 2013. *Text Book on Introductory Plant Nematology*. ICAR, New Delhi. pp. 227.

Course Name: Lab. - Agricultural Microbiology

Course Code: A501210

Semester: 2nd

Credits: 01

**L T P
0 0 2**

Course content

General instructions, Familiarization with instruments, materials, glassware etc. in a microbiology laboratory : Practice of Aseptic methods: I –Evaluation of aseptic technique with Nutrient broth tubes. II-Evaluation of aseptic technique with a Nutrient agar plate. Methods of Sterilization and Preparation of media I-Preparation of nutrient broth, nutrient agar plates, nutrient agar slant and nutrient agar stab; II-Sterilization of glassware by Dry heating; III –Sterilization of nutrient broth by Filtration. Plating methods for Isolation and Purification of bacteria I –Isolation of bacteria by Streak plate method. II –Isolation of aerobic spore forming bacteria by Enrichment using Streak plate method. III –Checking of purity of a bacterial culture by Streak plating method. Identification of bacteria by staining methods and Biochemical tests: I– Morphological examination of bacteria by Simple and Differential staining. II – Different biochemical tests for identification of bacterial culture; Enumeration of bacteria: I –Enumeration of bacteria by Stain slide method. II-Enumeration



of bacteria by Most probable number method. III –Enumeration of bacteria by Pour plate method and Spread plate method.

Suggested readings

1. Amita jain .2018. *Manual of microbiology*. Elsevier India. Pp 600
2. Naveen kango.2019.*Textbook of microbiology* .Dreamtech press.pp 436
3. Amita jain&Parul jain .2019. *Essential of microbiology*. Elsevier India. Pp 384

Course Name: Lab. – Information Technology

Course Code: A501213

Semester: 2nd

Credits: 01

**L T P
0 0 2**

Course contents

Practicing WINDOWS Operating System, Use of Mouse, Title Bar, Minimum, Maximum and Close Buttons, Scroll Bars, Menus and Tool Bars; WINDOWS Explorer, Creating Folders, COPY and PASTE functions; MSACCESS: Creating Database, Structuring with different types of fields; MS Power Point: Preparation of slides on Power Point; Transforming the data of WORD, EXCEL and ACCESS to other formats.

Suggested Readings:

1. Rajaraman, V. 2013. *Introduction to Information Technology*. PHI Learning Books. Pp. 386.
2. Dordal, P.L. 2014. *An Introduction to Computer Networks– Second Edition*. Department of Computer Science, Loyola University of Chicago.
3. Dordal, P.L. 2021. *An Introduction to Computer Networks*, Release 2.0.5. Department of Computer Science, Loyola University Chicago. Pp. 935

Course Name: Lab. NSS / NCC / Physical Education-II (Non Credit Course

Course Code: A501218

Semester: 2nd

Credits: 01

**L T P
0 0 2**

Course content

NSS: Orientation of students in national problems, study of philosophy of NSS, fundamentals rights, directive principles of state policy, socio-economic structure of Indian society, population problems, brief of five year plan. Functional literacy, non-formal education of rural youth, eradication of social evils, awareness programmes, consumer awareness,



highlights of consumer act. Environment enrichment and conservation, health, family welfare and nutrition. NCC: Introduction to NCC, defence services, system of NCC training, foot drill, sizing, forming up in three ranks, open and close order march, dressing, getting on parade, dismissing and falling out, saluting, marching, arms drill, shoulder arm, order arm, present arm, guard of honour, ceremonial drill, weapon training – rifle bayonet, light machine gun, sten machine carbine. Introduction and characteristic stripping, assembling and cleaning, loading, unloading and firing. Field craft, visual training, targets, judging distance, fire discipline and fire control orders, battle craft, field signals, description of ground, section formation, section battle drill, scouts and patrols, ambush, field engineering, map reading, conventional signs, grid systems, use of service protractor, prismatic compass and its use, self defence, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defence, leadership and NCC song. Physical Education: Introduction to physical education. Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed. Rules regulations of important games, skill development in any one of the games, football, hockey, cricket, volleyball, badminton, throw ball, tennis. Participation in one of the indoor games, badminton, chess and table tennis. Rules and regulations of athletic events, participation in any one of the athletic events, long jump, high jump, triple jump, javelin throw, discuss throw, shot put, short and long distance running, Safety education, movement education, effective way of doing day-to-day activities. First-aid training, coaching for major games and indoor games. Asians and indigenous ways for physical fitness and curative exercises. Exercises and games for leisure time, use and experience

Suggested Readings:

1. National Service Scheme: A Report, by Khwaja Ghulam Saiyidain. Published by Ministry of Education, Govt. of India, 1961.

1. Training and consultancy needs in national service scheme, by N. F. Kaikobad, Krishan K. Kapil. Published by Tata Institute of Social Sciences, 1971.
2. Hand Book of NCC. (2003). Major R. D. Mishra, Pub. Kanti Prakashan Etawah (UP)
3. Cadets Hand Book (2007). Pub. Directorate of NCC. Govt. of India Press, New Delhi.
4. National Service Scheme: guide-lines to project-masters, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971. 278
5. National Service Scheme in Gujarat: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India. Dept. of Youth Affairs and Sports. Published by the Centre, 1987.
6. National Service Scheme in Maharashtra: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India Dept. of Youth Affairs and Sports. Published by The Centre, 1988.
7. National Service Scheme in India: A Case Study of Karnataka, by M. B. Dilshad. Published by Trust Publications, 2001



Course Name: Zoology –I *
Course Code: A501214
Semester: 2nd

Credits: 02

L T P
2 0 0

Course content

Introduction to Zoology. Structure of animal cell and its organelles. Differences between animal and plant cell. Cell division mitosis. 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, Entamoeba, 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. Origin of life and evolution.

Suggested Readings:

1. Gupta, P. K. 2005. Cell and Molecular Biology. Rastogi publications, Meerut, India. Pp.942.
2. Jordan, E.L. and Verma, P.S.2013. *Chordate Zoology*. Chand Publications, New Delhi, India.pp.1076.
3. Kotpal, R.L.2009. Modern text book of Zoology –Invertebrates. Rastogi Publication, Meerut, India. Pp.1004.
4. Rastogi, V.B.1999. *Organic Evolution*, Rastogi Publications, Meerut, India. Pp.590.

Course Name: Lab-Zoology –I
Course Code: A501215
Semester: 2nd

Credits: 01

L T P
0 0 2

Course content

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.

Suggested Readings:

1. Gupta, P. K. 2005. *Cell and Molecular Biology*. Rastogi publications, Meerut, India. Pp.942.
2. Jordan, E.L. and Verma, P.S.2013. *Chordate Zoology*. Chand Publications, New Delhi, India.pp.1076.



3. Kotpal, R.L.2009. Modern text book of Zoology –Invertebrates. Rastogi Publication, Meerut, India. Pp.1004.

4. Rastogi, V.B.1999. Organic Evolution, Rastogi Publications, Meerut, India. Pp.590.

Course Name: MATHEMATICS-II

Course Code: A501216

Semester: 2nd

Credits: 03

**L T P
3 0 0**

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.

Suggested Readings:

- 1 Rajput , A. K.,2017. *Text Book of Mathematics*, 11th Part-I and Part II (Publication Division). NCERT .pp:466
- 2 Pierpoint, A.E. 1925. *Mensuration- I* , Digital Library of India Item.Franklin Classics Trade Press.pp.187.
- 3 Chaudhari, A. A. 2017. *A text book Agricultural Mathematics*. Shri Rajlaxmi Prakashan, Aurangabad.pp:312
- 4 Rajput, A. K. 2012. *NCERT 12 Text Book of Mathematics*, 12th Part-I . National Council of Education Research and Training pp:284
- 5 Anwar, M. S.2012. *Mathematics Text Book*, 12th Part-II. NCERT.pp. 286

Course Name: Lab Mathematics-II*

Course Code: A501217

Semester: 2nd

Credits: 01

**L T P
0 0 2**

Course contents

Tutorials on: limit, continuity, differentiation, successive differentiation, indefinite integration, integration by substitution, partial fractions and their application in integration. Integration by parts.

Suggested Readings:

- 1 Rajput , A. K.,2017. *Text Book of Mathematics*, 11th Part-I and Part II (Publication Division). NCERT .pp:466



- 2 Pierpoint, A.E. 1925. *Mensuration- I* , Digital Library of India Item.Franklin Classics Trade Press.pp.187.
- 3 Chaudhari, A. A. 2017. *A text book Agricultural Mathematics*. Shri Rajlaxmi Prakashan, Aurangabad.pp:312
- 4 Rajput, A. K. 2012. *NCERT 12 Text Book of Mathematics*, 12th Part-I . National Council of Education Research and Training pp:284
- 5 Anwar, M. S.2012. *Mathematics Text Book*, 12th Part-II. NCERT.pp. 286

Course Name: Field Crops-I (Kharif)

Course Code: A501301

Semester: 3rd Semester

Credits: 02

**L T P
2 0 0**

Course content

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of **kharif crops**, Cereals – rice, maize, sorghum, pearl millet and minor millets; Pulses : pigeonpea, mungbean and urdbean; Oilseeds: groundnut, sesame and soybean; Fibre crops: cotton, jute and sunhemp; and Forage crops: sorghum, maize, cowpea, cluster bean and napier.

Suggested readings:

1. Prasad, R. 2002. *Textbook of Field Crops Production*. Directorate of Information and Publication of Agriculture, Indian Council of Agricultural Research, New Delhi. Pp. 821.
2. Singh, C. And Singh, R. 2020 *modern Techniques of Raising Field Crops*. CBS Publishers & Distributors, New Delhi. Pp. 496.
3. Reddy T. Y. And Reddy G. H. S. 2002. *Principle of agronomy*. Kalyani Publishers, Ludhiana, Punjab. Pp.527

Course Name: Lab – Field Crops-I (Kharif)

Course Code: A501302

Semester: 3rd Semester

Credits: 01

**L T P
0 0 2**

Course content

Study of tillage implements. Practice of ploughing and puddling. Seed bed preparation, sowing, fertilizer application, nursery raising and transplanting of *Kharif* crops. Calculations



of seed rate. Effect of seed size and sowing depth on germination. Identification of weeds of *Kharif* crops. Fertilizer experiments on rice, maize, sorghum and millets. Study of yield components. Study of crop varieties and important agronomic experiments. Study of forage crops

Suggested readings

1. Prasad, R. 2002. *Textbook of Field Crops Production*. Directorate of Information and Publication of Agriculture, Indian Council of Agricultural Research, New Delhi. Pp. 821.
2. Singh, C. And Singh, R. 2020 *modern Techniques of Raising Field Crops*. CBS Publishers & Distributors, New Delhi. Pp. 496.
3. Reddy T. Y. And Reddy G. H. S. 2002. *Principle of agronomy*. Kalyani Publishers, Ludhiana, Punjab. Pp.527

Course Name: Principles of Plant Breeding

Course Code: A501303

Semester: 3rd

L T P

Credits: 02

20 0

Course content

Classification of plants, Botanical description, floral biology, Emasculation and Pollination techniques in cereals, millets, pulses, oil seeds, fibers, plantation crops etc. Aims and objectives of Plant Breeding; Modes of reproduction, Sexual, Asexual, Apomixis and their classification; Significance in plant breeding; Modes of pollination, genetic consequences, differences between self and cross pollinated crops; Methods of breeding – introduction and acclimatization. Selection, Mass selection Johannson' s pure line theory, genetic basis, pure line selection; Hybridization, Aims and objectives, types of hybridization; Methods of handling of segregating generations, pedigree method, bulk method, back cross method and various modified methods; Incompatibility and male sterility and their utilization in crop improvement; Heterosis, inbreeding depression, various theories of Heterosis, exploitation of hybrid vigour development of inbred lines, single cross and double cross hybrids; Population improvement programmes, recurrent selection, synthetics and composites; Methods of breeding for vegetative propagated crops; Clonal selection; Mutation breeding; Ploidy breeding;

Suggested Readings

- 1) Singh, B.D. 2018. *Plant breeding (Principles and methods)*, Kalyani publishers, New Delhi. Pp. 918.



- 2) Singh, P. 2017. *Fundamentals of Plant breeding (Principles and methods)* , Kalyani publishers , New Delhi, pp : 327
- 3) Kumaresan, V. And Arumugam, N. 2017. *Fundamentals of Horticulture and Plant Breeding*. Saras publisher, Tamilnadu. Pp. 524.
- 4) Singh, P. And Arumugam, N. 2016. *Essential of plant breeding*. Kalyani publisher, New Delhi. Pp. 243.

Course Name: Insect Morphology and Systematic

Course Code: A501305

Semester: 3rd

Credits: 01

**L T P
1 0 0**

Course content

History of Entomology in India. Factors for insects abundance. Classification of phylum Arthropoda upto 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 and legs. Wing venation, modifications and wing coupling apparatus. Structure male and female genitalia. Sensory organs. Metamorphosis and noll ses in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive system in insects. Types of reproduction in insects. Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders. Orthoptera, Acrididae. Dictyoptera, Mantidae, Odonata, Isoptera, Termitidae, Thysanoptera, Thripidae, Hemiptera, Pentatomidae, Coreidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Aleurodidae, Pseudococcidae, Neuroptera, Chrysopidae Lepidoptera, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Coleoptera, Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae, Hymenoptera, Tenthridinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae, Diptera, Cecidomyiidae, Trypetidae, Tachinidae, Agromyziidae.

Suggested Readings:

- 1) Srivastava. K.P. , Dhaliwal G.S. *A Text Book on Applied Entomology*.2020 Vol.I & II, Kalyani Publishers, Ludhiana.Pp 820.
- 2) Prasad , T.V. *Handbook of Entomology* ,2019. New Vishal Publications.Pp.496.
- 3) NitishShekhar *.Insect Ecology*.2012 Sonali Publications.Pp.343.

Course Name: Farm Power and Machinery

Course Code: A501307

Semester: 3rd

Credits: 01

**L T P
0 0 2**



Course content

Farm power in India: sources, I.C engines, working principles, two stroke and four stroke engines, I.C. engine terminology, different systems of I.C. engine. Tractors, Types, Selection of tractor and cost of tractor power. Tillage implements: Primary and Secondary tillage implements, Implements for intercultural operations, seed drills, paddy transplanters, plant protection equipment and harvesting equipment; Equipment for land development and soil conservation.

Suggested Reading:

1. Hunt, D. (2008). *Farm power and machinery management*. Waveland Press.
2. Singh, T. P. (2016). *Farm machinery*. PHI Learning Pvt. Ltd.
3. Krutz, G., Thompson, L., & Claar, P. (1984). *Design of agricultural machinery*. John Wiley and Sons.
4. Smith, H. P. (2020). *Farm machinery and equipment*. Read Books Ltd.
5. Culpin, C. (2013). *Farm machinery*. Read Books Ltd

Course Name: Production Technology of Vegetables & Flowers

Course Code: A501309

Semester: 3rd

Credits: 02

L T P
2 0 0

Course content

Importance of Olericulture, vegetable gardens, vegetable classification. Origin, area, production, varieties, package of practices for fruit vegetables – tomato, brinjal, chillies, and okera; Cucurbitaceous vegetables cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd and melons, Cole crops – cabbage, cauliflower and noll-khol. Bulb crops – onion and garlic. Beans and peas – French beans, cluster beans, dolichos beans, peas and cowpea. Tuber crops – potato, sweet potato, tapioca, colocasia, yams; Root crops – carrot, radish, turnip and beet root; Leafy vegetables – amaranthus, palak, gogu; Perennial vegetables – drumstick, coccinia and curry leaf. Importance of ornamental gardens. Planning of ornamental gardens. Types and styles of ornamental gardens. Use of trees, shrubs, climbers, palms, houseplants and seasonal flowers in the gardens. Package of practices for rose, jasmine, chrysanthemum, crossandra, marigold and tuberoseedling; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Suggested Readings:

- 1 Dhaliwal, M. S. 2017. *Handbook of Vegetable Crops*. Kalyani Publishers, India. Pp 358
- 2 Hazra, P. 2019. *Vegetable Science and Technology*. New India Publishing Agency, India. Pp. 630.



- 3 Arora, J. S. 2013. *Introductory Ornamental Horticulture*. India: Kalyani Publishers. Pp. 469.

Course Name: Crop Physiology

Course Code: A501311

Semester: 3rd

L T P

2 0 0

Credits: 02

Course content

Introduction and importance of crop physiology in agriculture. Seed structure. Morpho-physiological and biochemical changes during seed development. Physiological and harvestable maturity. Seed germination and seed dormancy. Growth and development. Crop water relations. Transpiration and its significance in relation to crop productivity. Water use efficiency. Significance of C₃, C₄ and CAM pathways. Photorespiration. Photosynthesis and crop productivity. Translocation of assimilates. Source and sink concept. Respiration, its types and significance. Mineral nutrition. Physiology of nutrient uptake, deficiency and toxicity symptoms and hydroponics. Photoperiodism and vernalization. Plant growth regulators- occurrence. Biosynthesis, mode of action and commercial applications. Senescence and abscission. Fruit ripening and its hormonal regulation.

Suggested Readings:

1. Galston, A.W. 1989. *Life Processes in Plants*. Scientific American Library, Springer-Verlag, New York, USA. Pp 246
2. Hopkins, W.G. 1995. *Introduction to Plant Physiology*. John Wiley & Sons, Inc., New York, USA. Pp 450
3. Lea, P.J. and Leegood, R.C. 1999. *Plant Biochemistry and Molecular Biology*. John Wiley & Sons, Chelchester, England. pp 384
4. Mohr, H. and Schopfer, P. 1995. *Plant Physiology*. Springer-Verlag, Berlin, Germany. pp 629
5. Old, R.W. and Primrose, S.B. 1989. *Principles of Gene Manipulation*, Blackwell Scientific Publishers, Oxford, UK. pp 152

Course Name: Livestock Production and Management

Course Code: A501313

Semester: 3rd

L T P

2 0 0

Credits: 02

Course content

Place of, different livestock development programmes of Govt. of India. Important exotic and Indian breeds of cattle, buffalo, sheep, goat and swine. Measures and factors affecting fertility in livestock, reproductive behaviour like oestrus, parturition, farrowing etc. Milk secretion, milking of animals and factors affecting milk yield and composition. Selection and breeding of livestock for higher milk and meat production. Feeding and management of calves, growing heifers and milch animals and other classes and types of animals, housing



principles, space requirements for different species of livestock. Disease control measures, sanitation and care, breeding, feeding and production records. Breed characteristics of poultry, their methods of rearing, breeding, feeding and management, incubation, hatching and brooding, vaccination and prevention of diseases, preservation and marketing of eggs, its economics and keeping quality. Cost of production of milk, economical units of cattle, buffalo, sheep, goat and swine.

Suggested Readings:

1. Singh, Harbans and Earl N. Moore. *Livestock and Poultry Production*, New Delhi, 1982.
2. Srivastava, J.S, and R.C, Khera, *Textbook of Animal Husbandry* Indian Council of Agriculture Research , New Delhi , 1960.
3. Sastry, N.S.R. and C.K. Thomas, *Livestock Production Management*, Kalyani Publication, New Delhi , 2017

Course Name: Agricultural Finance and Co-operation

Course Code: A501315

Semester: 3rd

Credits: 02

**L T P
0 0 2**

Course content

Agricultural finance: nature and scope. Time value of money, Compounding and Discounting. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4R' s 5C' s and 7 P' s of credit, repayment plans. History of financing agriculture in India. Commercial banks, nationalization of commercial banks. Lead bank scheme, regional rural banks, scale of finance. Higher financing agencies, RBI, NABARD, AFC, Asian Development Bank, World Bank, Insurance and Credit Guarantee Corporation of India. Assessment of crop losses, determination of compensation. Crop insurance, advantages and limitations in application, estimation of crop yields. Agricultural cooperation: philosophy and principles. History of Indian cooperative Movement, pre-independence and post independence periods, cooperation in different plan periods, cooperative credit structure: PACS, FSCS. Reorganization of cooperative credit structure in Andhra Pradesh and single window system. Successful cooperative systems in Gujarat, Maharashtra. Punjab etc.

Suggested Readings:

1. Ghosal, S.N. 1966. *Agricultural Financing in India*. Asia Publishing House, Bombay.pp.452
2. Johl, S.S. and Moore, C.V. 1970. *Essentials of Farm Financial Management*. Today and Tomorrow's Printers and Publishers, New Delhi.pp.586
3. Hampton, J. J. 1983. *Financial Decision Making: Concepts, Problems and Cases*. Prentice Hall of India, New Delhi.pp.384



4 Kenneth, D. D. 1979. *Principles of Management in Agribusiness*. Reston Publishing Company, Reston.pp.465.

5 Muniraj, R. 1987. *Farm Finance for Development*. Oxford & IBH Publishing, Company Private Ltd, New Delhi.pp.696.

Course Name : Lab Principles of Plant Breeding

Course Code: A501304

Semester: 3rd

Credits: 01

**L T P
0 0 2**

Course content

Botanical description and floral biology; Study of megasporogenesis and microsporogenesis; Fertilization and life cycle of an angiospermic plant; Plant Breeder' s kit; Hybridization techniques and precautions to be taken; Floral morphology, selfing, emasculation and crossing techniques; Study of male sterility and incomparability in field plots; Rice and Sorghum; Maize and Wheat; Bajra and ragi; Sugarcane and coconut; Groundnut, Castor, Safflower and Sesamum; Red gram, Bengal gram and Green gram; Soybean and black gram; Chillies, Brinjal and Tomato; Bhenidi, Onion, Bottle gourd and Ridge gourd; Cotton and Mesta; Jute and Sun hemp Wide hybridization, significance in crop improvement.

Suggested Readings

- 1) Singh, B.D. 2018. *Plant breeding (Principles and methods)*, Kalyani publishers, New Delhi. pp. 918.
- 2) Singh, P. 2017. *Fundamentals of Plant breeding (Principles and methods)* , Kalyani publishers , New Delhi, pp : 327
- 3) Kumaresan, V. and Arumugam, N. 2017. *Fundamentals of Horticulture and Plant Breeding*. Saras publisher, Tamilnadu. pp. 524.
- 4) Singh, P. and Arumugam, N. 2016. *Essential of plant breeding*. Kalyani publisher, New Delhi. pp. 243.

Course Name: Lab. –Insect Morphology and Systematic

Course Code: A501306

Semester: 3rd

Credits: 01

**L T P
0 0 2**

Course content

Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus Types of insect larvae and pupae;



Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance's

Suggested Readings:

- 1) Srivastava. K.P. and Dhaliwal G.S. *A Text Book on Applied Entomology*.2020 Vol.I & II, Kalyani Publishers, Ludhiana.Pp 820.
- 2) Prasad , T.V. *Handbook of Entomology* ,2019. New Vishal Publications.Pp.496.
- 3) NitishShekhar *Insect Ecology*.2012 Sonali Publications.Pp.343

Course Name: Lab. Farm Machinery and Power

Course Code: A501308

Semester: 3rd

Credits: 01

**L T P
0 0 2**

Course content

Study of different components of I.C. Engine; Study of working of four stroke engine; Study of working of two stroke engine; Study of M.B. plough, measurement of plough size, different parts, horizontal and vertical suction, determination of line of pull etc.; Study of disc plough; Study of seed–cum-fertilizer drills-furrow opener, metering mechanism, and calibration; Study, maintenance and operation of tractor; Learning of tractor driving; Study, maintenance and operation of power tiller; Study of different parts, registration, alignment and operation of mower. Study of different inter cultivation equipment in terms of efficiency, field capacity; Repairs and adjustments and operation of sprayers; Repairs and adjustments and operation of dusters; Study of paddy transplanters.

Suggested Reading:

1. Hunt, D. (2008). *Farm power and machinery management*. Waveland Press.
2. Singh, T. P. (2016). *Farm machinery*. PHI Learning Pvt. Ltd.
3. Krutz, G., Thompson, L., & Claar, P. (1984). *Design of agricultural machinery*. John Wiley and Sons.
4. Smith, H. P. (2020). *Farm machinery and equipment*. Read Books Ltd.
5. Culpin, C. (2013). *Farm machinery*. Read Books Ltd.



Credits: 01

**L T P
0 0 2**

Course content

Planning and layout of kitchen garden; Identification of important vegetable seeds and plants; Raising of vegetable nurseries; Identification of ornamental plants (trees ,shrubs,climbers,house plants, palms etc.,) and development of garden features; Transplanting of vegetable seedlings in main field; Layout of lawns and maintenance; Seed extraction in tomato and brinjal; Depotting, repotting and maintenance of house plants; Visit to commercial vegetable farms; Training and pruning of rose (standards, hybrid ‘T’ roses centered roses) and chrysanthemum (pinching and disbudding); Planning and layout of gardens and garden designs for public and private areas; Intercultural operations in vegetable plots; Seed production in vegetable crops; Harvesting indices of different vegetable crops; Grading and packing of vegetables; Prolonging the shelflife of cut flowers

Suggested Readings:

1. Dhaliwal, M. S. 2017. *Handbook of Vegetable Crops*. Kalyani Publishers, India. Pp 358
2. Hazra, P. 2019. *Vegetable Science and Technology*. New India Publishing Agency, India. pp. 630.
3. Arora, J. S. 2013. *Introductory Ornamental Horticulture. India*: Kalyani Publishers. pp. 469.

Course Name: Lab. Fundamentals of Crop Physiology

Course Code: A501312

Credits: 01

**L T P
0 0 2**

Course content

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

Suggested reading

1. Mohr, H. and Schopfer, P. 1995. *Plant Physiology*. Springer-Verlag, Berlin, Germany. Pp 629
2. Old, R.W. and Primrose, S.B. 1989. *Principles of Gene Manipulation*, Blackwell Scientific Publishers, Oxford, UK. pp 139
3. Salisbury, F.B. and Ross, C.W. 1992. *Plant Physiology* (4th Edition). Wadsworth Publishing Co., California, USA. pp 682



4. Taiz, L. and Zeiger, E. 1998. *Plant Physiology* (2nd Edition). Sinauer Associates, Inc., Publishers, Massachusetts, USA. Pp 792

5. Vasil, I.K. and Thorpe, T.A. 1994. *Plant Cell and Tissue Culture*. Kluwer Academic Publishers, The Netherlands. pp 594

Course Name: Lab – Livestock Production and Management

Course Code: A501314

Semester: 3rd

Credits: 01

**L T P
0 0 2**

Course content

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.

Suggested Readings:

1. Singh, Harbans and Earl N. Moore. *Livestock and Poultry Production*, New Delhi, 1982.

2. Srivastava, J.S, and R.C, Khera, *Textbook of Animal Husbandry* Indian Council of Agriculture Research, New Delhi, 1960.

3. Sastry, N.S.R. and C.K. Thomas, *Livestock Production Management*, Kalyani Publication, New Delhi, 2017

Course Name: Lab. NSS / NCC / Physical Education-II (Non Credit Course

Course Code: A501316

Semester: 3rd

Credits: 01

**L T P
0 0 2**

Course content

NSS: Orientation of students in national problems, study of philosophy of NSS, fundamentals rights, directive principles of state policy, socio-economic structure of Indian society, population problems, brief of five year plan. Functional literacy, non-formal education of rural youth, eradication of social evils, awareness programmes, consumer awareness, highlights of consumer act. Environment enrichment and conservation, health, family welfare and nutrition. NCC: Introduction to NCC, defence services, system of NCC training, foot drill, sizing, forming up in three ranks, open and close order march, dressing, getting on parade, dismissing and falling out, saluting, marching, arms drill, shoulder arm, order arm,



present arm, guard of honour, ceremonial drill, weapon training – rifle bayonet, light machine gun, sten machine carbine. Introduction and characteristic stripping, assembling and cleaning, loading, unloading and firing. Field craft, visual training, targets, judging distance, fire discipline and fire control orders, battle craft, field signals, description of ground, section formation, section battle drill, scouts and patrols, ambush, field engineering, map reading, conventional signs, grid systems, use of service protractor, prismatic compass and its use, self defence, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defence, leadership and NCC song. Physical Education: Introduction to physical education. Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed. Rules regulations of important games, skill development in any one of the games, football, hockey, cricket, volleyball, badminton, throw ball, tennis. Participation in one of the indoor games, badminton, chess and table tennis. Rules and regulations of athletic events, participation in any one of the athletic events, long jump, high jump, triple jump, javelin throw, discuss throw, shot put, short and long distance running, Safety education, movement education, effective way of doing day-to-day activities. First-aid training, coaching for major games and indoor games. Asians and indigenous ways for physical fitness and curative exercises. Exercises and games for leisure time, use and experience

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

Suggested Readings:

1. National Service Scheme: A Report, by Khwaja Ghulam Saiyidain. Published by Ministry of Education, Govt. of India, 1961.
2. Training and consultancy needs in national service scheme, by N. F. Kaikobad, Krishan K. Kapil. Published by Tata Institute of Social Sciences, 1971.
3. Hand Book of NCC. (2003). Major R. D. Mishra, Pub. Kanti Prakashan Etawah (UP)
4. Cadets Hand Book (2007). Pub. Directorate of NCC. Govt. of India Press, New Delhi.
5. National Service Scheme: guide-lines to project-masters, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971. 278
6. National Service Scheme in Gujarat: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India. Dept. of Youth Affairs and Sports. published by the Centre, 1987.
7. National Service Scheme in Maharashtra: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India Dept. of Youth Affairs and Sports. Published by The Centre, 1988.
8. National Service Scheme in India: A Case Study of Karnataka, by M. B. Dilshad. Published by Trust Publications, 200

Course Name: Field crops-II (Rabi Crops)

Course Code: A501401

Semester: 4th

Credits: 01

**L T P
0 0 2**

Course content

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *rabi* crops; Cereals: wheat, barley; Pulses: chickpea, lentil, peas, french bean; Oilseeds: rapeseed and mustard, sunflower, safflower and linseed; Sugar crops: sugarcane and sugarbeet, Medicinal and aromatic crops such as mentha, lemon grass, citronella, palma rosa, isabgol and posta; Commercial crops: potato and tobacco, Forage crops: berseem, lucerne and oat

Suggested Readings:

1. Chidda Singh, *Modern technique of raising field crops*. 3rd edition January 2020. Oxford & Ibh.Publishing.pp.496.
2. S.R. Reddy *Agronomy of field crop*, January 2015, Kalyani Publishers.pp.525.
3. *Hand book of Agriculture*, ICAR New Delhi.pp1617.

Course Name: Lab. Field crops-II (Rabi Crops)

Course Code: A501402

Semester: 4th

Credits: 01

**L T P
0 0 2**

Course content

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

Suggested Readings:

1. Chidda Singh, *Modern technique of raising field crops*. 3rd edition January 2020. Oxford & Ibh.Publishing. pp.496.
2. S.R. Reddy *Agronomy of field crop*, January 2015, Kalyani Publishers.pp.525.
3. *Hand book of Agriculture*, ICAR New Delhi.pp1617.



Course Name: Breeding of Field /Horticultural Crops

Course Code: A501403

Semester: 4th

Credits: 02

**L T P
2 0 0**

Course content

Breeding objectives and important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; Hardy-Weinberg Law; Study in respect of origin, distribution of species, wild relatives and forms, Cereals, (rice, wheat, maize, millets, sorghum, bajra, ragi); Pulses (redgram, greengram, blackgram, soybean); Oilseeds (Groundnut, sesame, sunflower, safflower, castor, mustard) etc. Fibers (Cotton, kenaf, roselle, jute) etc. Vegetables (Tomato, bhindi, chilli, cucumbers); Flowers crops (Chrysanthemum, rose, galardia, gerbera & marigold); Fruit crops (aonla, guava, mango, custard apple, banana, papaya); Major breeding procedures for development of hybrids / varieties of various crops; Plant Genetic Resources their conservation and utilization in crop improvement; Ideotype concept in crop improvement; Breeding for resistance to biotic and abiotic stresses variability in pathogens and pests; Mechanisms of resistance in plant to pathogens and pest; Genetic basis of adaptability to unfavourable environments; Definition of biometrics, assessment of variability i.e., additive, dominance and epistasis and their differentiation; Genotype x Environment interaction and influence on yield/performance. IPR and its related issues

Suggested Readings:

- 1) Singh B.D. 2018: *Plant breeding (Principles and methods)* , Kalyani publishers , New Delhi ,pp 918
- 2) Singh ,P . , 2017: *Fundamentals of Plant breeding (Principles and methods)* , Kalyani publishers , New Delhi, pp : 327
- 3) Kumaresan V., Arumugam N. , 2017, *Fundamentals of Horticulture and plant breeding*, Saras publisher, Tamilnadu , pp 524
- 4) Singh P., Arumugam N. , 2016 , *Essential of plant breeding*, kalyani publisher, New Delhi ,pp 24

Course Name: Lab. Breeding of Field / Horticultural Crops

Course Code: A501404

Semester: 4th

Credits: 01

**L T P
0 0 2**

Course content

Emasculation and Hybridization techniques; Handling of segregating generations, pedigree methods; Handling of segregating generations, bulk methods; Handling of segregating generations, back cross methods; Field layout of experiments; Field trials, maintenance of records and registers; Estimation of Heterosis and inbreeding depression; Estimation of



Heritability, GCA and SCA; Estimation of variability parameters; Parentage of released varieties/hybrids; Problems on Hardy, Weinberg Law; Study of quality characters; Sources of donors for different characters; Visit to seed production and certification plots; Visit to AICRP trials and programmes; Visit to grow out test plots; Visit to various research stations; Visit to other institutions

Suggested Readings:

- 1) Singh B.D. 2018: *Plant breeding (Principles and methods)* , Kalyani publishers , New Delhi ,pp 918
- 2) Singh ,P . , 2017: *Fundamentals of Plant breeding (Principles and methods)* , Kalyani publishers , New Delhi, pp : 327
- 3) Kumaresan V., Arumugam N. , 2017, *Fundamentals of Horticulture and plant breeding*, Saras publisher, Tamilnadu , pp 524
- 4) Singh P., Arumugam N. , 2016 , *Essential of plant breeding*, kalyani publisher, New Delhi ,pp 24

Course Name: Manures, Fertilizers and Agrochemicals

Course Code: A501405

Semester: 4th

L T P

10 0

Credits: 01

Course content

Introduction – Raw materials – Manures – Bulky and concentrated – FYM, Composts – Different methods, Mechanical compost plants, Vermi-composting, Green manures, Oil cakes, Sewage and sludge – Biogas plant slurry, Plant and animal refuges. Fertilizers – classifications, Manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate) phosphatic (single super phosphate, enriched super phosphate, di-ammonium phosphate, ammonium poly phosphate), potassic and complex fertilizers their fate and reactions in the soil, Secondary and micronutrients fertilizers, Amendments. Fertilizer Control Order, Fertilizer storage; Biofertilizers and their advantage, Organic chemistry as prelude to agro chemicals, Diversetypes of agrochemicals, Botanical insecticides (Neem), Pyrethrum, Synthetic pyrethroids. Synthetic organic insecticides, Major classes, Properties and uses of some important insecticides under each class. Herbicides – Major classes – Properties and uses of 2, 4-D, atrazine, glyphosate, butachlor benthocarb; Fungicides – Major classes – Properties and uses of carbendazim, carboxin, captan, tridemorph and copper oxychloride – Insecticides Act, Plant growth regulators.

Suggested Readings

1. Havlin, J. L. 2004. *Soil Fertility and Fertilizers: An Introduction to Nutrient Management*. Prentice Hall. pp. 528.
2. James F. Power, Rajendra Prasad. 1997. *Soil Fertility Management for Sustainable Agriculture*. CRC Press Taylor and Francis Group. pp. 384.
3. Rakshit A. 2015. *Manures Fertilizers and Pesticides* – Import. CBS Publishing; 1st edition. pp. 266.
4. Jakson, M.L. 1973. *Soil Chemical Analysis*. Printice Hall, India, Pvt. Ltd. New Delhi.



5. Somawanshi. 2012. *Laboratory Methods for Analysis of Soil, Irrigation Water and Plants*, Department of Soil Science and Agricultural Chemistry, MPKV, Rahuri. revised Ed. pp. 307

Course Name: Lab. Manures, Fertilizers and Agrochemicals

Course Code: A501406

Semester: 4th

Credits: 01

**L T P
0 0 2**

Course content

Total nitrogen and phosphorus in manures / composts – Ammoniacal and nitrate nitrogen – Water soluble P₂O₅, potassium, calcium, sulphur and zinc contents of fertilizers COD in organic wastes – Adulteration in fertilizer. Argentimetric and iodometric titrations – their use in the analysis of lindane metasystox, endosulfan, malathion, copper and sulphur fungicides – Compatibility of fertilizers with pesticides

Suggested Readings

- 1.Havlin, J. L. 2004. *Soil Fertility and Fertilizers: An Introduction to Nutrient Management*. Prentice Hall. pp. 528.
- 2.James F. Power, Rajendra Prasad. 1997. *Soil Fertility Management for Sustainable Agriculture*. CRC Press Taylor and Francis Group. pp. 384.
- 3.Rakshit A. 2015.*Manures Fertilizers and Pesticides – Import*. CBS Publishing; 1st edition. pp. 266.
- 4.Jakson, M.L. 1973. *Soil Chemical Analysis*. Printice Hall, India, Pvt. Ltd. New Delhi. pp. 230
- 5Somawanshi. 2012. *Laboratory Methods for Analysis of Soil, Irrigation Water and Plants*, Department of Soil Science and Agricultural Chemistry, MPKV, Rahuri. revised Ed. pp. 307

Course Name: Insect Ecology & Integrated Pest Management Including Beneficial

Insects

Course Code: A501407

Semester: 4th

Credits: 02

**L T P
2 0 0**

Course content

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.

Suggested Readings:

- 1) Atur Rahman . *Text Book on Beekeeping* . 2019 Kalyani Publishers.Pp.347
- 2) Jayashree, K.V., Tharadevi, C.S and Arumugam, N..2014 Saras Publication.Pp.352
- 3) Prasad, T.V . *Handbook of Entomology* .2019 New Vishal Publications.Pp.496.

**Course Name: Insect Ecology & Integrated Pest Management Including Beneficial
Insects**

Course Code: A501408

Semester: 4th

Credits: 02

**L T P
2 0 0**

Course content

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.

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Suggested Readings:

- 1) Atur Rahman . *Text Book on Beekeeping*. 2019 Kalyani Publishers.Pp.347
- 2) Alford .D.V. *Beneficial Insects*. 2019 CRC Press 2019.Pp.400
- 3) Prasad, T.V .*Handbook of Entomology* .2019 New Vishal Publications.Pp.496.



Course Name: Agricultural Marketing, Trade and Prices

Course Code: A501409

Semester: 4th

Credits: 02

L T P

0 0 2

Course content

Agricultural Marketing: Concepts and Definition, Scope and subject matter, Market and Marketing: Meaning, Definitions, Components of a market, Classification. Market structure, Conduct, performance. Marketing structure, Market functionaries or agencies, Producer's surplus: Meaning, Types of producers surplus, marketable surplus. Marketed surplus, importance, Factors affecting Marketable surplus. Marketing channels: Meaning, Definition, Channels for different products. Market integration, Meaning, Definition, Types of Market Integration. Marketing efficiency: Meaning, Definition, Marketing costs, Margins and price spread, Factors affecting the cost of marketing, Reasons for higher marketing costs of farm commodities, Ways of reducing marketing costs. Theories of International Trade: Domestic Trade, Free trade, International Trade, GATT, WTO, Implications of AOA. Market access, Domestic support, Export subsidies, EXIM-Policy & Ministerial conferences. Cooperative Marketing. State Trading. Ware Housing Corporation; Central and State, Objectives, Functions, Advantages. Food Corporation of India: Objectives and Functions. Quality Control, Agricultural Products, AGMARK. Price Characteristics of agricultural product process, Meaning, Need for Agricultural Price Policy. Risk in Marketing: Meaning and importance, Types of Risk in Marketing. Speculations and Hedging, Futures trading, Contract farming.

Suggested Readings:

- 1) Acharya, S.S. and Agarwal, N.L. 2006. *Agricultural Marketing in India*. Oxford & IBH Publishing Co.Pvt.Ltd. New Delhi. Vol. 4, 2006. pp 37-78
- 2) Kahlon, A.S and Tyagi.D S, 1983. *Agricultural Price Policy in India*. Allied Publishers Pvt. Ltd., New Delhi. Vol. 2, 1983. pp 367-388
- 3) Kulkarni, K R.1964. *Agricultural Marketing in India*. The Co-operators Books Depot, Mumbai. Vol. 1, 1964. pp 111-193
- 4) Mamoria, C.B. and Joshi. R L.1995. *Principles and Practices of Marketing in India*, Kitab Mahal, Allahabad. 1995. pp 167-208

Course Name: Lab. Agricultural Marketing, Trade and Prices

Course Code: A501410

Semester: 4th

Credits: 01

L T P

0 0 2

Course content

Identification of marketing channels; Study of Rythu Bazars, Regulated markets; Study of unregulated markets; Study of livestock markets; Price spread analysis; Visit to market institutions, NAFED; Study of SWC, CWC and STC; Analysis of information of daily prices;



Marketed and marketable surplus of different commodities.

Suggested Readings:

- 1) Acharya S.S and Agarwal NL, 2006, *Agricultural Marketing in India*. Oxford & IBH Publishing Co.Pvt.Ltd. New Delhi. Vol. 4, 2006. pp 167-188
- 2) Kahlon, A.S and Tyagi.D S, 1983. *Agricultural Price Policy in India*. Allied Publishers Pvt. Ltd., New Delhi. Vol. 2, 1983. pp 67-88
- 3) Kulkarni, K R.1964. *Agricultural Marketing in India*. The Co-operators Books Depot, Mumbai. 2003. pp 364-398
- 4) Mamoria, C.B. and Joshi. R L.1995. *Principles and Practices of Marketing in India*, Kitab Mahal, Allahabad. Vol. 1, 1995. pp 133-167

Course Name: Protected Cultivation and Post-Harvest Technology

Course Code: A501411

Semester: 4th

Credits: 02

**L T P
2 0 0**

Course content

Green house technology, Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of greenhouse for cooling and heating purposes. Green house equipment, 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. Choice of crops for cultivation under greenhouses, problems / constraints of greenhouse cultivation and future strategies. Growing media, soil culture, type of soil required, drainage, flooding and leaching, soil pasteurization in peat moss and mixtures, rock wool and other inert media, nutrient film technique (NFT) / hydroponics. Threshing, threshers for different crops, parts, terminology, care and maintenance. Winnowing, manual and power operated winnowers, care and maintenance. Groundnut decorticators, hand operated and power operated decorticators, principles of working, care and maintenance. Maize shellers & castor shellers. Drying, grain drying, types of drying, types of dryers. Storage, grain storage, types of storage structures. Fruits and vegetables cleaning, machinery for cleaning of fruits and vegetables, care and maintenance. Grading, methods of grading, equipment for grading of fruits and vegetables, care and maintenance. Size reduction. Equipment for size reduction care and maintenance. Evaporation, Principle, types of evaporators, quality standards – FAQ, ASTA, FPO, and FDA

Suggested Readings:

1. Warade, S.D. 2003. *Protected cultivation of Horticulture crops*. CAFT (fruits), MPKV, Rahuri. pp 306



2. Singh, B. 2005. *Protected cultivation of vegetable crops*. Kalyani publishers, New Delhi. pp 180

3. Dhaliwal, M.S. 2008. *Handbook of vegetable crops*. Kalyani publishers, Ludhiana. pp 389

Course Name: Lab. Protected Cultivation and Post harvest Technology

Course Code: A501412

Semester: 4th

Credits: 01

L T P

2 0 0

Course content

Study of different types of green houses based on shape, construction and cladding materials; Calculation of air rate exchange in an active summer winter cooling system; Calculation of rate of air exchange in an active winter cooling system; Estimation of drying rate of agricultural products inside green house; Testing of soil and water to study its suitability for growing crops in greenhouses; The study of fertigation requirements for greenhouses crops and estimation of E.C. in the fertigation solution; The study of various growing media used in raising of greenhouse crops and their preparation and pasteurization / sterilization; Visit to commercial green houses; Study of threshers, their components, operation and adjustments; Winnowers, their components, operation and adjustments; Study of different components of groundnut decorticator; Study of maize shellers; Study of castor shellers; Study of improved grain storage structure; Study of dryers; Study of cleaners & graders

Suggested Readings:

1. Warade, S.D. 2003. *Protected cultivation of Horticulture crops*. CAFT (fruits), MPKV, Rahuri. pp 306

2. Singh, B. 2005. *Protected cultivation of vegetable crops*. Kalyani publishers, New Delhi. pp 180

3. Dhaliwal, M.S. 2008. *Handbook of vegetable crops*. Kalyani publishers, Ludhiana. pp 389

Course Name: Diseases of Field Crops and their Management

Course Code: A501413

Semester: 4th

Credits: 02

L T P

2 0 0

Course content

Economic importance, symptoms, cause, epidemiology and disease cycle and integrated management of diseases of rice, sorghum, bajra, maize, wheat, sugarcane, turmeric, tobacco, groundnut, sesamum, sunflower, cotton, red gram, Bengal gram, black gram, green gram, tea, soybean.



Suggested Readings:

1. Agrios, GN. 2010. *Plant Pathology*. Acad. Press.
2. Singh RS. 2013. *Introduction to Principles of Plant Pathology*. Oxford and IBH Pub.Co.
3. Dhingra OD & Sinclair JB. 1986. *Basic Plant Pathology Methods*. CRC Press, London, Tokyo

Course Name: Lab. Diseases of Field Crops and their Management

Course Code: A501414

Semester: 4th

Credits: 01

L T P

0 0 2

Course content

Study of symptoms, etiology, host-parasite relationship and specific control measures of the following crop diseases. Preservation of disease samples survey and collection of diseases of rice, sorghum; Diseases of wheat, bajra & maize; Diseases of sugarcane, turmeric & tobacco; Diseases of groundnut, castor & sunflower; Diseases of sesamum & cotton; Diseases of red gram, green gram, black gram, Bengal gram & beans; Field visits at appropriate time during the semester.

Note: Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester

Suggested Readings:

1. Agrios, GN. 2010. *Plant Pathology*. Acad. Press.
2. Singh RS. 2013. *Introduction to Principles of Plant Pathology*. Oxford and IBH Pub.Co.
3. Dhingra OD & Sinclair JB. 1986. *Basic Plant Pathology Methods*. CRC Press, London, Tokyo

Course Name: Production Technology of Fruit Crops

Course Code: A501408

Semester: 4th Semester

Credits: 02

L T P

20 0

Course content

Definition and importance of horticulture. Divisions of horticulture. Climatic zones of horticulture crops. Area and production of different fruit crops. Selection of site, fencing, and wind break, planting systems, high density planting, planning and establishment. Propagation methods and use of rootstocks. Methods of training and pruning. Use of growth regulators in fruit production. Package of practices for the cultivation of major fruits – mango, banana, citrus, grape, guava, sapota, apple, litchi. Papaya, Minor fruits – pineapple, annonaceous fruits, pomegranate, ber, fig, phalsa, jack, pear, plum, peaches and cherry.



Course Name: Lab. –ProductionTechnology of fruit Crops

Course Code: A501409

Semester: 4th Semester

Credits: 01

**L T P
0 0 2**

Course content

Study of horticultural tools and implements and their uses; Containers, potting mixture, potting, depotting and repotting; Plant propagation, seed propagation, scarification, and stratification; Propagation by cuttings (soft wood, hard wood and semi-hardwood) layering (simple layering, Air layering, stooping in guava); Layout and planting systems (Traditional system and high density planting methods); Methods of pruning and training; Training of ber, grape and pomegranate; Pruning of ber, grape, phalsa, fig, apple, pear, peach; Description and identification of varieties of mango, guava, grape, papaya, apple and sapota; Description and identification of varieties of banana, citrus, (lime lemon, sweet orange, mandarin, grape fruit) pomegranate, ber, pear and cherries; Irrigation methods in fruit crops including drip – Micro irrigation methods of establishment of orchard; Methods of Fertiliser application methods in fruit crops including fertigation technology; Visit to local commercial orchards; Preparation of growth regulators, powder, solution and lanolin paste for propagation; Application of growth regulators for improving fruit set, fruit size, quality, delaying ripening and hastening ripening

1. Anonymous 2001. Handbook of Horticulture 10th edition. ICAR publication, Indian Council Of Agricultural Research, New Delhi. pp. 1069.
2. Bose, T. K., Mitra, S. K. and Sanyal, D. 2001. Fruits: Tropical and Subtropical, Volume 1, 3rd edition. Naya Udyog. pp. 721.
3. Katyal, S.L., Krishnamurthi, S. and Singh, Sham 1963. Fruit Culture in India. India Republic of India. Indian Council of Agricultural Research, New Delhi. pp. 451.
4. Singh, Ranjit. 1969. Fruits. National Book Trust, India. pp. 213.
5. Singh, Amar .2003. Physiology of Fruit Production 5th edition. Kalyani Publishers. pp.574.

Course Name: Lab. NSS / NCC / Physical Education-II (Non Credit Course

Course Code: A501417

Semester: 4th

Credits: 01

**L T P
0 0 2**

Course content

NSS: Orientation of students in national problems, study of philosophy of NSS, fundamentals rights, directive principles of state policy, socio-economic structure of Indian society, population problems, brief of five year plan. Functional literacy, non-formal education of rural youth, eradication of social evils, awareness programmes, consumer awareness, highlights of consumer act. Environment enrichment and conservation, health, family welfare and nutrition. NCC: Introduction to NCC, defence services, system of NCC training, foot



drill, sizing, forming up in three ranks, open and close order march, dressing, getting on parade, dismissing and falling out, saluting, marching, arms drill, shoulder arm, order arm, present arm, guard of honour, ceremonial drill, weapon training – rifle bayonet, light machine gun, sten machine carbine. Introduction and characteristic stripping, assembling and cleaning, loading, unloading and firing. Field craft, visual training, targets, judging distance, fire discipline and fire control orders, battle craft, field signals, description of ground, section formation, section battle drill, scouts and patrols, ambush, field engineering, map reading, conventional signs, grid systems, use of service protractor, prismatic compass and its use, self defence, general principles, precautions and training, attacks and counter attacks, marching and searching, first aid, hygiene and sanitation, civil defence, leadership and NCC song. Physical Education: Introduction to physical education. Posture, exercise for good posture, physical fitness exercises for agility, strength, coordination, endurance and speed. Rules regulations of important games, skill development in any one of the games, football, hockey, cricket, volleyball, badminton, throw ball, tennis. Participation in one of the indoor games, badminton, chess and table tennis. Rules and regulations of athletic events, participation in any one of the athletic events, long jump, high jump, triple jump, javelin throw, discuss throw, shot put, short and long distance running, Safety education, movement education, effective way of doing day-to-day activities. First-aid training, coaching for major games and indoor games. Asians and indigenous ways for physical fitness and curative exercises. Exercises and games for leisure time, use and experience

Suggested Readings:

1. National Service Scheme: A Report, by Khwaja Ghulam Saiyidain. Published by Ministry of Education, Govt. of India, 1961.
2. Training and consultancy needs in national service scheme, by N. F. Kaikobad, Krishan K. Kapil. Published by Tata Institute of Social Sciences, 1971.
3. Hand Book of NCC. (2003). Major R. D. Mishra, Pub. Kanti Prakashan Etawah (UP)
4. Cadets Hand Book (2007). Pub. Directorate of NCC. Govt. of India Press, New Delhi.
5. National Service Scheme: guide-lines to project-masters, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971. 278
6. National Service Scheme in Gujarat: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India. Dept. of Youth Affairs and Sports. published by the Centre, 1987.
7. National Service Scheme in Maharashtra: An Evaluation Report for the Year 1986-87, by Tata Institute of Social Sciences Training Orientation & Research Centre (NSS), India, India Dept. of Youth Affairs and Sports. Published by The Centre, 1988.
8. National Service Scheme in India: A Case Study of Karnataka, by M. B. Dilshad. Published by Trust Publications, 2001



Course Name: Principles of Plant Biotechnology

Course Code: A501501

Semester: 5th

Credits: 02

**L T P
2 0 0**

Course content

Concepts of Plant Biotechnology: History of Plant Tissue Culture and Plant Genetic Engineering; Scope and importance in Crop Improvement: Totipotency and Morphogenesis, Nutritional requirements of *in-vitro* cultures; Techniques of In-vitro cultures, Micro propagation, Anther culture, Pollen culture, Ovule culture, Embryo culture, Test tube fertilization, Endosperm culture, Factors affecting above *in-vitro* culture; Applications and Achievements; Somaclonal variation, Types, Reasons: Somatic embryogenesis and synthetic seed production technology; Protoplast isolation, Culture, Manipulation and Fusion; Products of somatic hybrids and cybrids, Applications in crop improvement. Genetic engineering; Restriction enzymes; Vectors for gene transfer – Gene cloning – Direct and indirect method of gene transfer – Transgenic plants and their applications. Blotting techniques – DNA finger printing – DNA based markers – RFLP, AFLP, RAPD, SSR and DNA Probes – Mapping QTL – Future prospects. MAS, and its application in crop improvement.

Suggested Readings:

- 1) Chawla, H.S. 2009. *Introduction to Plant Exegetics* Ltd Biotechnology. 3rd Edition. Science Publishers, Enfield, NH, USA. pp. 698.
- 2) E.F. George and P.D. Sherrington, 1984: *Plant Propagation by Tissue Culture: Handbook and Directory of Commercial Laboratories..*, Eversley, UK.
- 3) M. Ziv, 1991: *Micropropagation: Technology and Application*. Edited by PC Debergh and RH Zimmerman. Kluwer Academic Publishers, Dordrecht, The Netherlands, Pp:45–70.
- 4) T. Murashige and F. Skoog, 1962: *A revised medium for rapid growth and bioassays with tobacco tissue cultures*. *Physiologia Plantarum*.15:473-497

Course Name: Lab- Principles of Plant Biotechnology

Course Code: A501502

Semester: 5th

Credits: 01

**L T P
0 0 2**

Course content

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.

Suggested Readings:

1. Chawla, H.S. 2009. Introduction to Plant Exegetics Ltd Biotechnology. 3rd Edition. Science Publishers, Enfield, NH, USA. pp. 698.
2. E.F. George and P.D. Sherrington,1984: *Plant Propagation by Tissue Culture:Handbook and Directory of Commercial Laboratories...*, Eversley, UK.
3. M. Ziv, 1991: *Micropropagation: Technology and Application*. Edited by PC Deberghn and RH Zimmerman. Kluwer Academic Publishers, Dordrecht, The Netherlands, Pp:45–70.
4. T. Murashige and F. Skoog,1962: *A revised medium for rapid growth and bioassays with tobacco tissue cultures*. *Physiologia Plantarum*.15:473-497.

Course Name: Crop Pests and Stored Grain Pests and their Management

Course Code: A501503

Semester: 5th

Credits: 01

**L T P
0 0 2**

Course content

Stored grain pests: Coleopteran and Lepidopteran pests, their biology and damage, preventive and curative methods. Distribution, biology, nature and symptoms of damage, and management strategies of insect and non insect pests of rice, sorghum, maize, ragi (*Eleusine coracana*), wheat, sugarcane, cotton, mesta, sunhemp, pulses, groundnut, castor, gingerly, safflower, sunflower, mustard, brinjal, bhendi, tomato, cruciferous and cucurbitaceous vegetables, potato, sweet potato, colacasia, moringa, amaranthus, chillies, mango, citrus, grapevine, cashew, banana, pomegranate, guava, sapota, ber, apple, coconut, tobacco, coffee, tea, turmeric, betelvine, onion, coriander, garlic, curry leaf, pepper, ginger and ornamental plants

Suggested Readings

- 1) Atwal, A.S. and Dhaliwal, G.S. :*Agricultural Pests of South Asia and their*



Management.2015 Kalyani Publishers.pp.616.

2) David, B.V. and Rammurthy, V.V.: *Elements of Economic Entomology*.2016 Brillion Publishing.pp.412.

3) Manishekharan and Sudarrajan :*Pest Management in Field Crops*.2018.Agrobios (India).pp.450

4) Prasad, T.V.*Handbook of Entomology* .2019 New Vishal Publications.pp.496

Course Name: lab-Crop Pests and Stored Grain Pests and Their Management

Course Code: A501504

Semester: 5th

Credits: 02

L T P

0 0 2

Course content

Identification of pests, their damage symptoms and management of rice, sorghum, maize, wheat, sugarcane, cotton, pulses, Solanaceous and Malvaceous vegetables, cruciferous and cucurbitaceous vegetables, chilli, mango, carbon, citrus and sapota

Suggested readings

1) Atwal, A.S. and Dhaliwal, G.S. :*Agricultural Pests of South Asia and their Management*.2015 Kalyani Publishers.pp.616.

2) David, B.V. and Rammurthy, V.V.: *Elements of Economic Entomology*.2016 Brillion Publishing.pp.412.

3) Manishekharan and Sudarrajan :*Pest Management in Field Crops*.2018.Agrobios (India).pp.450

4) Prasad, T.V .*Handbook of Entomology* .2019 New Vishal Publications.pp.496.

Course Name: Fundamentals of Agribusiness Management

Course Code: A501505

Semester: 5th

Credits: 02

L T P

2 0 0

Course content

Agribusiness: Meaning, Definition, Structure of Agribusiness, (Input, Farm, Product Sectors). Importance of Agribusiness in the Indian Economy, Agricultural Policy. Agribusiness Management, Distinctive features, Importance of Good Management, Definitions of Management. Management Functions, Planning, Meaning, Definition, Types of Plans (Purpose or Mission, Goals or Objectives, Strategies, Polices, Procedures, rules, programmes, Budget) characteristics of sound plan, Steps in planning, Organization, Staffing, Directing, Motivation, Ordering, Leading, Supervision, Communication, control. Capital Management. Financial Management of Agribusiness: Importance of. Agro-based Industries: Importance and Need, Classification of Industries, Types of Agro-based Industries, Institutional arrangement, Procedure to set up agro-based industries, Constraints in establishing agro-



based industries. Marketing Management: Meaning, Definitions, Marketing Mix, 4Ps of Marketing. Mix, Market segmentation, Methods of Market, Product life cycle. Pricing policy, Meaning, pricing method. Prices at various stages of Marketing. Project, definitions, project cycle, Identification, Formulation, Appraisal, Implementation, Monitoring and evaluation, Appraisal and Evaluation techniques, NPW, BCR, IRR, N/K ratio, sensitivity analysis, characteristics of agricultural projects: preparation of project reports for various activities in agriculture and allied sectors: Dairying, poultry, fisheries, agro-industries etc.

Suggested Readings:

1. Nagpure, S. and Deshmukh, R.G. 2004. *Agribusiness Management*. AGROMET Publishers, Nagpur.pp.481.
2. Diwase, S. 2017. *Indian Agriculture & Agri-Business Management*. Scientific Publishers, Jodhpur.pp.208.
3. Reddy, S.S. and Ram, P.R. 1996. *Agricultural Finance and Management by Agricultural Finance & Management*. Oxford IBH Publishing Co. Pvt. Ltd., New Delhi.pp.279.
4. Amarnath, J.S. and Samvel, A.P.V. 2010. *Agri-Business Management*. Satish Serial Publishing House, Delhi.pp.416

Course Name: Lab. –Fundamentals of Agribusiness Management

Course Code: A501506

Semester: 5th

Credits: 01

**L T P
0 0 2**

Course content

Study of input markets: seed, fertilizers, pesticides. Study of output markets, grains, fruits, vegetables, flowers. Study of product markets, retail trade commodity trading, and value added products. Study of financing institutions cooperatives commercial banks, RRBs, Agribusiness Finance Limited, NABARD; Preparations of projects, Feasibility reports; Project appraisal techniques; Case study of agro-based industries

Suggested Readings:

1. Nagpure, S. and Deshmukh, R.G. 2004. *Agribusiness Management*. AGROMET Publishers, Nagpur.pp.481.
2. Diwase, S. 2017. *Indian Agriculture & Agri-Business Management*. Scientific Publishers, Jodhpur.pp.208.
3. Reddy, S.S. and Ram, P.R. 1996. *Agricultural Finance and Management by Agricultural Finance & Management*. Oxford IBH Publishing Co. Pvt. Ltd., New Delhi.pp.279.
4. Amarnath, J.S. and Samvel, A.P.V. 2010. *Agri-Business Management*. Satish Serial Publishing House, Delhi.pp.416



Credits: 01

**L T P
0 0 2**

Course content

Economic Importance, symptoms, cause, disease cycle and integrated management of diseases of: citrus, mango, banana, grapevine, pomegranate, papaya, guava, sapota, apple, chilli, brinjal, bhendi, potato, crucifers, cucurbits, tomato, beans, onion, coconut, oil palm, betelvine, mulberry, coffee, tea, rose, chrysanthemum and jasmine.

Suggested Readings

- 1) Agrios, GN. 2010. *Plant Pathology*. Acad. Press
- 2) Verma L.R and Sharma R.c .1999.*Diseases of Horticultural Crops fruits*, Indus Publishing company, New Delhi
- 3) V.N.Pathak .1986.Diseases of fruit crops, Oxford & IBH publication, New Delhi
- 4) R.S.Singh .1986.Diseases of fruit crops, Oxford & IBH publication, New Delhi

Course Name: Lab. –Disease of Horticultural Crops and Their Management

Course Code: A501508

Semester: 5th

Credits: 01

**L T P
0 0 2**

Course content

Diseases of beans, citrus, guava, & sapota; Diseases of papaya, banana, pomegranate & ber; Diseases of mango, grapes & apple; Diseases of chilli, brinjal & bhendi; Diseases of potato, tomato & crucifers; Diseases of cucurbits, onion & betelvine; Diseases of oil palm, coconut, tea, coffee & mulberry; Diseases of rose, chrysanthemum and jasmine. Field visits at appropriate time during the semester.

Note: Students should submit 50 pressed, well mounted diseased specimens in three installments during the semester.

Suggested Readings

- 1) Agrios, GN. 2010. *Plant Pathology*. Acad. Press
- 2) Verma L.R and Sharma R.c .1999.*Diseases of Horticultural Crops fruits*, Indus Publishing company, New Delhi
- 3) V.N.Pathak .1986.Diseases of fruit crops, Oxford & IBH publication, New Delhi
- 4) R.S.Singh .1986.Diseases of fruit crops, Oxford & IBH publication, New Delhi



Course Name: Post Harvest Management and Value Addition Fruits and Vegetables

Course Code: A501509

Semester: 5th

Credits: 01

**L T P
0 0 2**

Course content

Importance of post harvest technology in horticultural crops. Maturity indices, harvesting and post harvest handling of fruits and vegetables. Maturity and ripening process. Factors affecting ripening of fruits, and vegetables. Pre harvest factors affecting quality on post harvest shelf life of fruits and vegetables. Factors responsible for deterioration of harvested fruits and vegetables. Chemicals used for hastening and delaying ripening of fruits and vegetables. Methods of storage – precooling, prestorage treatments, low temperature storage, controlled atmospheric storage, hypobaric storage, irradiation and low cost storage structures. Various methods of packing, packaging materials and transport. Packing technology for export. Fabrication of types of containers, cushioning material, vacuum packing, poly shrink packing, specific packing for export of mango, banana, grapes kinnow, sweet orange, and mandarin etc. Importance and scope of fruit and vegetable preservation in India. Principles of preservation by heat, low temperature, chemicals and fermentation. Unit layout – selection of site and precautions for hygienic conditions of the unit. Preservation through canning, bottling, freezing, dehydration, drying, ultraviolet and ionizing radiations. Preparation of jams, jellies, marmalades, candies, crystallized and glazed fruits, preserves, chutneys, pickles, ketchup, sauce, puree, syrups, juices, squashes and cordials Spoilage of canned products, biochemical, enzymatic and microbial spoilage. Preservatives, Colours permitted and prohibited in India.

Suggested Readings:

1. Sethi, V. and Sethi, S. 2006. *Processing of fruits and Vegetables for value addition*. Indus Publication. pp 176.
2. Rahman, M.S. 1999. *Handbook of Food Preservation, Food science and technology*. CRC Press, Florida, US. pp 809.
3. Rajarathnam, S. 2011. *Advances in Preservation and Processing Technologies of Fruits and Vegetables*. New Indian Publishing Agency-NIPA, Ahemdabad, Gujarat. pp 758.

Course Name: Lab -Post Harvest Management and Value Addition of Fruits and Vegetables

Course Code: A501510

Semester: 5th

Credits: 02

**L T P
0 0 2**

Course content



Practice in judging the maturity of various fruits and vegetables. Conservation of zero energy cool chambers for on farm storage. 3& 4. Determination of physiological loss in weight (PLW), total soluble solids (TSS), total sugars, acidity and ascorbic and content in fruits and vegetables. Packing methods and types of packing and importance of ventilation. Pre cooling packing methods for export or international trade. Methods of prolonging storage life. Effect of ethylene on ripening of banana, sapota, mango, sapota. Identification of equipment and machinery used is preservation of fruits and vegetables. Preservation by drying and dehydration. Preparation of jam, jelly and marmalades. Preparation of squash, cordials and syrups. Preparation of chutneys, pickles sauces and ketchup. Visit to local processing units. Visit to local market yards and cold storage units. Visit to local market and packing industries

Suggested Readings:

- 1.Sethi, V. and Sethi, S. 2006. *Processing of fruits and Vegetables for value addition*. Indus Publication. pp 176.
- 2.Rahman, M.S. 1999. *Handbook of Food Preservation, Food science and technology*. CRC Press, Florida, US. pp 809.
- 3.Rajarathnam, S. 2011. *Advances in Preservation and Processing Technologies of Fruits and Vegetables*. New Indian PublishingAgency-NIPA, Ahemdabad, Gujarat. pp 758.

Course Name: Production Technology of Spices, Aromatic, Medicinal and Plantation Crops

Course Code: A501511

Semester: 5th

Credits: 01

**L T P
0 0 2**

Course content

Importance and cultivation technology of Spices – ginger, turmeric, pepper, cardamom, coriander, cumin, fenugreek; Aromatic crops – lemon grass, citronella, palmarose, vetiver, geranium, dawana; Plantation crops – coconut, arecanut, betelvine, cashew, cocoa, coffee, oilpalm; Medicinal plants – diascoria, rauwolfia, opium, ocimum, perwinkle, aloe, guggul, belladonna, nuxvomica, Solanum khasiamum , aonla,senna, plantago, stevia,coleus and Acorus.

Suggested readings:

1. Bose, T. K., Som, M. G. and Kabir, J. 1999. *Vegetable Crops*. Naya Prokash, Kolkata, India. pp 959.
2. Thamburaj, S. 2014. *Vegetable, Tuber and Spices*. ICAR publishers, New Delhi, India. pp 490.
3. Singh, S. P. 2013. *Production technology of vegetable crops*. Universal publication centre, Karnal, India. pp 380.



**Course Name: Lab. - Production Technology of Spices, Aromatic, Medicinal and
Plantation Crops**

Course Code: A501512

Semester: 5th

Credits: 01

**L T P
0 0 2**

Course content

Botanical description and identification of aromatic plants; Identification of varieties in spices and plantation crops; Identification of medicinal plants; Propagation techniques in aromatic and spice crops; Selection of mother palm, and seed nuts in coconut and oil palm; Study of identification of aromatic plants; Distillation procedures for aromatic crops; Propagation methods in plantation crops; Propagation and planting methods in turmeric; Propagation and planting techniques in ginger; Harvesting procedures in aromatic plants; Processing and curing of spices (ginger, turmeric and black pepper); Training methods in betel vine; Rejuvenation practices in cashew nut; Products – byproducts of spices and plantation crops; Procedures for oleoresin extraction; Visit to local commercial plantations. Aromatic & medicinal plant nurseries and seed spices field

Suggested readings:

1. Bose, T. K., Som, M. G. and Kabir, J. 1999. *Vegetable Crops*. Naya Prokash, Kolkata, India. pp 959.
2. Thamburaj, S. 2014. *Vegetable, Tuber and Spices*. ICAR publishers, New Delhi, India. pp 490
3. Singh, S. P. 2013. *Production technology of vegetable crops*. Universal publication centre, Karnal, India. pp 380

Course Name: Fundamentals of Rural Sociology and Educational Psychology

Course Code: A501513

Semester: 5th

Credits: 01

**L T P
1 0 0**

Course content

Extension Education and Agricultural Extension – Meaning, Definition, Scope and Importance. Sociology and Rural Sociology, Meaning, Definition, Scope, Importance of Rural Sociology in Agricultural Extension and Interrelationship between Rural Sociology & Agricultural Extension. Indian Rural Society, Important characteristics, Differences and Relationship between Rural and Urban societies. Social Groups – Meaning, Definition, Classification, Factors considered in formation and organization of groups, Motivation in group formation and Role of Social groups in Agricultural Extension. Social Stratification –



Meaning, Definition, Functions, Basis for stratification, Forms of Social stratification – Characteristics and – Differences between Class & Caste System. Cultural concepts – Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions – Meaning, Definition and their Role in Agricultural Extension. Social Values and Attitudes – Meaning, Definition, Types and Role of Social Values and Attitudes in Agricultural Extension. Social Institutions – Meaning, Definition, Major institutions in Rural society, Functions and their Role in Agricultural Extension. Social Organizations – Meaning, Definition, Types of organizations and Role of Social organizations in Agricultural Extension. Social Control – Meaning, Definition, Need of social control and Means of Social control. Social change – Meaning, Definition, Nature of Social change, Dimensions of social change and factors of social change. Leadership – Meaning, Definition, Classification, Roles of a leader, Different methods of Selection of Professional and Lay leaders. Training of Leaders – Meaning, Definition, Methods of training, Advantages and Limitations in use of local leaders in Agricultural Extension. Psychology and Educational Psychology – Meaning, Definition, Scope and Importance of Educational Psychology in Agricultural Extension. Intelligence – Meaning, Definition, Types, Factors affecting intelligence and Importance of intelligence in Agricultural Extension. Personality – Meaning, Definition, Types, Factors influencing the Personality and Role of personality in Agricultural Extension. Teaching – Learning process – Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics. Principles of learning and their implication for teaching.

Suggested readings:

- 1) Ray, G.L. 2003. *Extension Communication and Management*. Kalyani Publishers. Fifth revised and enlarged edition. Vol. 5, 2003. pp 67-88
- 2) Dahama, O.P. and Bhatnagar, O.P. 2003. *Education and Communication for Development*. Oxford and IBH Publishing Co. Pvt. Ltd. Vol. 2, 2003. pp 77-110
- 3) Sandhu, A.S. 1993. *Textbook on Agricultural Communication: Process and Methods*. Oxford and IBH Publishing Co. Pvt. Ltd. Vol. 1, 1993. pp 256-290
- 4) Desai, A.R. 1978. *Rural sociology in India*. Bombay, Popular Prakashan, 5th Rev. ed. Vol. 5, 1978. pp 267-288

Course Name: STATISTICS

Course Code: A501514

Semester: 5th

Credits: 01

**L T P
1 0 0**

Course content

Introduction: Definition of Statistics and its use and limitations; Frequency Distribution and Frequency Curves; Measures of Central Tendency: Characteristics of Ideal Average, Arithmetic Mean; Median, Mode, Merits and Demerits of Arithmetic Mean; Measures of Dispersion: Standard Deviation, Variance and Coefficient of Variation; Probability: Definition and concept of probability; Normal Distribution and its properties; Introduction to Sampling: Random Sampling; the concept of Standard Error; Tests of Significance-Types of Errors, Null Hypothesis, Level of Significance and Degrees of Freedom, Steps involved in



testing of hypothesis; Large Sample Test-SND test for Means, Single Sample and Two Samples (all types); Small Sample Test for Means, Student's t-test for Single Sample, Two Samples and Paired t test. F test; Chi-Square Test in 2x2 Contingency Table, Yates' Correction for continuity; Correlation: Types of Correlation and identification through Scatter Diagram, Computation of Correlation Coefficient 'r' and its testing. Linear Regression: of Y on X and X on Y. Inter-relation between 'r' and the regression coefficients, fitting of regression equations. Experimental Designs: Basic Designs, Completely Randomized Design (CRD), Layout and analysis with equal and unequal number of observations, Randomized Block Design (RBD), Layout and analysis, Latin Square Design (LSD), Layout and analysis.

Suggested Readings:

- 1) Panse, V.G. and Sukhatme, P.V. 1967. *Statistical methods for Agricultural workers*. Indian Council of Agricultural Research, New Delhi. pp. 361.
- 2) Gupta, S.C. and Kapoor, V.K. 2019. *Mathematical statistics*. Sultan Chand & Sons. pp. 1303.
- 3) Snedocor, G. W. and Cochran, W. G. 1967: *Statistical Methods 8th edition*. Iowa State University Press. pp. 524.
- 4) Gupta, S.C. and Kapoor, V.K. 2007. *Fundamentals of Applied Statistics*. Sultan Chand & Sons. pp.1303.
- 5) Cochran, G.W. and, Cox, G.W. 1986: *Experimental Designs 2nd edition*. John Wiley & Sons, New York. pp.617.

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

Course Code: A501515

Semester: 5th

Credits: 02

**L T P
0 0 4**

Course content

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.

Suggested readings:

1. Prasad, R. 2002. *Textbook of Field Crops Production*. Directorate of Information and



2. Singh, C. and Singh, R. 2020 *modern Techniques of Raising Field Crops*. CBS Publishers & Distributors, New Delhi. pp. 496.
3. Reddy T. Y. and Reddy G. H. S. 2002. *Principle of agronomy*. Kalyani Publishers, Ludhiana, Punjab. pp.527

Course Name: WEED MANAGEMENT

Course Code: A501601

Semester: 6th

Credits: 02

**L T P
2 0 0**

Course content

Weeds: Introduction, harmful and beneficial effects, classification, propagation and dissemination; Weed biology and ecology, crop weed association, crop weed competition and allelopathy Concepts of weed prevention, control and eradication; Methods of weed control: physical, cultural, chemical and biological methods. Integrated weed management; Herbicides: advantages and limitation of herbicide usage in India, Herbicide classification, formulations, methods of application; Introduction to Adjuvant and their use in herbicides; Introduction to selectivity of herbicides; Compatibility of herbicides with other agro chemicals; Weed management in major field and horticultural crops, shift of weed flora in cropping systems, aquatic and problematic weeds and their control.

Suggested Readings:

- 1) Aldrich, R.J. and Kramer R.J. (1997), *Principles in Weed Management*.pp.472.
- 2) Gupta O.P. (2007), *Weed management Principles and Practices*. Publisher: BIO-GREEN BOOKS.pp.336.
- 3) Gupta, O.P. (2008), *Modern Weed Management*. Publisher: BIO-GREEN BOOKS.pp.637.
- 4) Rao V.S. (2006), *Principles of Weed Science*. CRC Press; 2nd edition.Pp.566

Course Name: LAB -WEED MANAGEMENT

Course Code: A501602

Semester: 6th

Credits: 01

**L T P
0 0 2**

Course content

Identification of weeds; Survey of weeds in crop fields and other habitats; Preparation of herbarium of weeds; Calculations on weed control efficiency and weed index; Herbicide label information; Computation of herbicide doses; Study of herbicide application equipment and calibration; Demonstration of methods of herbicide application; Preparation of list of commonly available herbicides; Study of phytotoxicity symptoms of herbicides in different



crops; Biology of nut sedge, bermuda grass, parthenium and celosia; Economics of weed control practices; Tours and visits of problem areas

Suggested Readings:

- 1) Aldrich, R.J. and Kramer R.J. (1997), *Principles in Weed Management*.pp.472.
- 2) Gupta O.P. (2007), *Weed management Principles and Practices*. Publisher: BIO-GREEN BOOKS.pp.336.
- 3) Gupta, O.P. (2008), *Modern Weed Management*. Publisher: BIO-GREEN BOOKS.pp.637.
- 4) Rao V.S. (2006), *Principles of Weed Science*. CRC Press; 2nd edition.Pp.566.

Course Name: Production Economics and Farm Management

Course Code: A501603

Semester: 6th

Credits: 01

**L T P
1 0 0**

Course content

Production Economics: Meaning, Definition, Nature and Scope of Agricultural Production Economics. Basic concepts and terms. Concepts of Production. Production Functions: Meaning, Definition, Types. Laws of returns: Increasing, Constant and decreasing. Factor Product Relationship. Determination of optimum input and output. Factor relationship. Product relationship. Types of enterprise relationships. Returns to scale: Meaning, Definition, Importance. Farm Management. Economic principles applied to the Organizations of farm business. Types and systems of farming. Farm planning and budgeting. Risk and uncertainty. Farm budgeting. Linear programming: Assumptions, Advantages and Limitations of Linear programming

Suggested Readings:

1. Heady, E. O. 1964. *Economics of Agricultural Production and Resource Use*. Prentice Hall of India, Private Limited, New Delhi.pp.431.
2. Bishop, C.E. and Toussaint, W.D. 1958. *Introduction to Agricultural Economic Analysis*. John Wiley and Sons, Inc., London.pp.258.
3. Johl, S.S. and Kapur, J.R. *Fundamentals of Farm Business Management*. Kalyani Publishers, New Delhi.pp.452.
4. Subba Reddy, S., Raghuram, P., Neelakanta Sastry, T.V. and Bhavani Devi, I. 2006. *Agricultural Economics*. Oxford and IBH Publishing Company, Private Limited, New Delhi.pp.588.
5. Heady, E.O. and Jenson, H.R. 1954. *Farm Management Economics*. Prentice Hall, New Delhi. Pp.645.

Course Name: Lab - Production Economics and Farm Management

Course Code: A501604

Semester: 6th

Credits: 01

**L T P
0 0 2**

Course content



Computation of cost concepts; Methods of computation of depreciation; Analysis of Net worth statement; Farm inventory analysis; Preparation of farm plans and budgets; Types of farm records and accounts; Preparation of profit and loss account; Break, Even analysis; Economics analysis of different crop and livestock enterprises; Application of Farm Management Principles.

Suggested Readings:

1. Heady, E. O. 1964. *Economics of Agricultural Production and Resource Use*. Prentice Hall of India, Private Limited, New Delhi.pp.431.
2. Bishop, C.E. and Toussaint, W.D. 1958. *Introduction to Agricultural Economic Analysis*. John Wiley and Sons, Inc., London.pp.258.
3. Johl, S.S. and Kapur, J.R. *Fundamentals of Farm Business Management*. Kalyani Publishers, New Delhi.pp.452.
4. Subba Reddy, S., Raghuram, P., Neelakanta Sastry, T.V. and Bhavani Devi, I. 2006. *Agricultural Economics*. Oxford and IBH Publishing Company, Private Limited, New Delhi.pp.588.
5. Heady, E.O. and Jenson, H.R. 1954. *Farm Management Economics*. Prentice Hall, New Delhi. Pp.645.

Course Name: Renewable Energy

Course Code: A501605

Semester: 6th

Credits: 02

**L T P
2 0 0**

Course content

Energy sources, Introduction, Classification, Energy from Biomass, Types of biogas plants, constructional details, Biogas production and its utilization, Agricultural wastes, Principles of combustion, pyrolysis and gasification, Types of gasifiers, Producer gas and its utilization. Briquettes, Types of Briquetting machines, uses of Briquettes, Shredders. Solar energy, Solar flat plate and focusing plate collectors, Solar air heaters, Solar space heating and cooling, Solar energy applications / Solar energy gadgets, Solar cookers, Solar water heating systems, solar grain dryers, Solar Refrigeration system, Solar ponds, Solar photo voltaic systems, solar lantern, Solar street lights, solar fencing, Solar pumping systems. Wind energy, Types of wind mills, Constructional details & application of windmills. Liquid Bio fuels, Bio diesel and Ethanol from agricultural produce, its production & uses.

Suggested readings:

1. Twidell, J., & Weir, T. (2015). *Renewable energy resources*. Routledge.
2. Kaltschmitt, M., Streicher, W., & Wiese, A. (Eds.). (2007). *Renewable energy: technology, economics and environment*. Springer Science & Business Media.
3. Quaschnig, V. (2016). *Understanding renewable energy systems*. Routledge.
4. Nelson, V. C. (2011). *Introduction to renewable energy*. CRC press.
5. Da Rosa, A. V., & Ordonez, J. C. (2021). *Fundamentals of renewable energy processes*. Academic Press.



Course Name: Lab -Renewable Energy
Course Code: A501606
Semester: 6th

Credits: 01

L T P
0 0 2

Course content

Constructional details of KVIC & Janatha type biogas plants; Constructional details of Deen Bandu type biogas plants; Field visit to biogas plants; Constructional details of different types of gasifiers; Testing of gasifiers; Briquette preparation from biomass; To study and find the efficiency of solar cooker; To study and find the performance of a solar still; To study and find the performance of a solar dryers; Study and working of solar photovoltaic pumping system; Study and performance evaluation of domestic solar water heater; Study and performance evaluation of solar lantern; Study and performance evaluation of solar street light; To study the performance of different types of wind mills; Field visit to wind mills; To study the processing of Bio-diesel production from Jatropha

Suggested readings:

1. Twidell, J., & Weir, T. (2015). *Renewable energy resources*. Routledge.
2. Kaltschmitt, M., Streicher, W., & Wiese, A. (Eds.). (2007). *Renewable energy: technology, economics and environment*. Springer Science & Business Media.
3. Quaschnig, V. (2016). *Understanding renewable energy systems*. Routledge.
4. Nelson, V. C. (2011). *Introduction to renewable energy*. CRC press.
5. Da Rosa, A. V., & Ordonez, J. C. (2021). *Fundamentals of renewable energy processes*. Academic Press.

Course Name: Extension Methodologies for Transfer of Agricultural Technology
Course Code: A501607
Semester: 6th

Credits: 02

L T P
2 0 0

Course content

Communication – Meaning, Definition, Models, Elements and their Characteristics, Types and Barriers in communication. Extension Programme Planning – Meaning, Definitions of Planning, Programme, Project, Importance, Principles and Steps in Programme Development Process, Monitoring and Evaluation of Extension Programmes. Extension Teaching methods – Meaning, Definition, Functions and Classification. Individual contact methods – Farm and Home visit, Result Demonstration, Field trials – Meaning, Objectives, Steps, Merits and Demerits. Group contact methods – Group discussion, Method demonstration, Field Trips – Meaning, Objectives, Steps, Merits and Demerits. Small group discussion techniques – Lecture, Symposium, Panel, Debate, Forum, Buzz group, Workshop, Brain Storming, Seminar and Conference. Mass contact Methods – Campaign, Exhibition, Kisan Mela, Radio & Television – Meaning, Importance, Steps, Merits & Demerits. Factors influencing in selection of Extension Teaching Methods and Combination (Media Mix) of Teaching methods. Innovative Information sources – Internet, Cyber Cafes, Video and Tele



conferences, Kisan call centers, Consultancy clinics. Agricultural Journalism – Meaning, Scope and Importance, Sources of news, Types, Merits and Limitations. Diffusion and Adoption of Innovations – Meaning, Definition, Models of adoption Process, Innovation – Decision Process – Elements, Adopter categories and their characteristics, Factors influencing adoption process. Capacity building of Extension Personnel and Farmers – Meaning, Definition, Types of training, Training to farmers, farm women and Rural youth – FTC and KVK.

Suggested Readings

- 1) Dahama, O.P. and Bhatnagar, O.P. 1980. *Education and Communication for Development*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 1980. pp 17-40
- 2) Dudhani, C.M.; Hirevenkatgoudar, L.V., Manjunath, L.; Hanchinal, S.N. and Patil, S.L. 2004. *Extension Teaching Methods and Communication Technology*, UAS, Dharwad. Vol. 1, 2004. pp 73-113
- 3) Kamat, M.G. 1985. *Writing for Farm Families*. Allied Publishers, New Delhi. Vol. 2, 1985. pp 54-79
- 4) Kelsey, L.D. and Hearne, G.C. 1963. *Cooperative Extension Work*, Comstar Publishing Associate, New York. 1963. pp 98-128

Course Name: Lab -Extension Methodologies for Transfer of Agricultural Technology

Course Code: A501608

Semester: 6th

Credits: 01

L T P

0 0 2

Course content

Simulated exercises on communication. Identifying the Problems, Fixing the Priorities and selecting a most important problem for preparation of a project. Developing a project based on identified problems in a selected village. Organization of Group discussion and Method demonstration. Visit to KVK / FTC. Planning and Writing of scripts for Radio and Television. Audio Visual aids – Meaning, Importance and Classification. Selection, Planning, Preparation, Evaluation and Presentation of visual aids. Planning & Preparation of visual aids – Charts, Posters, Over Head Projector, (OHP) Transparencies, Power Point Slides. Planning and Preparation of Agricultural Information materials – Leaflet, Folder, Pamphlet, News Stories, Success Stories. Handling of Public Address Equipment (PAE) System, Still camera, Video Camera and Liquid Crystal Display (LCD) Projector.

Suggested Readings

- 1) Dahama, O.P. and Bhatnagar, O.P. 1980. *Education and Communication for Development*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 1980. pp 17-40
- 2) Dudhani, C.M.; Hirevenkatgoudar, L.V., Manjunath, L.; Hanchinal, S.N. and Patil, S.L. 2004. *Extension Teaching Methods and Communication Technology*, UAS, Dharwad. Vol. 1, 2004. pp 73-113
- 3) Kamat, M.G. 1985. *Writing for Farm Families*. Allied Publishers, New Delhi. Vol. 2, 1985. pp 54-79



4) Kelsey, L.D. and Hearne, G.C. 1963. *Cooperative Extension Work*, Comstar Publishing Associate, New York. 1963. pp 98-128

Course Name: Entrepreneurship Development and Communication Skills

Course Code: A501609

Semester: 6th

Credits: 01

L T P

1 0 0

Course content

Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Globalisation and the emerging business / entrepreneurial environment. Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs; SWOT analysis, Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs. Export and Import Policies relevant to agriculture sector. Venture capital. Contract farming and joint ventures, public-private partnerships. Overview of agri inputs industry. Characteristics of Indian agricultural processing and export industry. Social Responsibility of Business. Communication Skills: Structural and functional grammar; meaning and process of communication, verbal and non-verbal 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, précis writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organizing seminars and conferences.

Suggested Readings

1. M.M.P. Akhouri, S.P. Mishra and Sengupta, Rita, 1989: *Trainers Manual on Developing Entrepreneurial Motivation*, NIESBUD, New Delhi.Pp:1-453
2. Mancuso and Joseph, 1974: *The Entrepreneurs Handbook, Vol.I& II*, Artech House Inc. USA.Pp:1-278
- 3.A.K. Singh, R. Lakhan Singh, and Roy Berman, 2006: *Dimensions of Agricultural Extension*, Aman Publishing House, Meerut.Pp:1-456
4. MondalSagar and G.L..Ray,2009: *Text Book of Entrepreneurship and Rural Development*. Kalyani Publishers, Ludhiana. ISBN 978-81-272-5599-2
5. C. B. Gupta and S.S. Khanka, 2010: *Entrepreneurship and Small Business Management*, 4th edition, New Delhi: Sultan Chand & Sons.Pp:1-332

Course Name : Lab -Entrepreneurship Development and Communication Skills



Course Code: A501610
Semester: 6th

Credits: 01

L T P
0 0 2

Course content

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, précis writing, summarizing, abstracting; individual and group presentations

Suggested Readings

1. M.M.P. Akhouri, S.P. Mishra and Sengupta, Rita, 1989: *Trainers Manual on Developing Entrepreneurial Motivation*, NIESBUD, New Delhi.Pp:1-453
2. Mancuso and Joseph, 1974: *The Entrepreneurs Handbook, Vol.I& II*, Artech House Inc. USA.Pp:1-278
- 3.A.K. Singh, R. Lakhan Singh, and Roy Berman, 2006: *Dimensions of Agricultural Extension*, Aman Publishing House, Meerut.Pp:1-456
4. MondalSagar and G.L..Ray,2009: *Text Book of Entrepreneurship and Rural Development*. Kalyani Publishers, Ludhiana. ISBN 978-81-272-5599-2
5. C. B. Gupta and S.S. Khanka, 2010: *Entrepreneurship and Small Business Management, 4th edition*, New Delhi: Sultan Chand & Sons.Pp:1-332

Course Name: Biochemistry
Course Code: A501611
Semester: 6th

Credits: 02

L T P
2 0 0

Course content

Biochemistry – Introduction and importance. Plant cell, cell wall and its role in live stock, food and paper industries. Bio-molecules – Structure, properties & applications: Amino acids, peptides and proteins –Plant proteins and their quality. Enzymes –Factors affecting the activity, classification, Immobilisation and other industrial applications. Lipids –Acyl lipids, Their industrial application in soaps, detergents, paints, Varnishes, lubricants, adhesives, plastics, nylon, Bio-diesel, Biodegradable plastics etc. Carbohydrates; Nucleotides and Nucleic acids. Metabolic energy and its generation – Metabolism – Basic concepts, Glycolysis, Citric acid Cycle, Pentose phosphate pathway, oxidative phosphorylation, Fatty acid oxidation. General reactions of amino acid degradation. Biosynthesis – carbohydrates, Lipids, Proteins and Nucleic acids. Metabolic regulation. Secondary metabolites, Terpenoids, Alkaloids, Phenolics and their applications in food and pharmaceutical industries.

Suggested Readings:

- 1) E.E. Com & P.K. Stumpf, 2010: *Outlines of Biochemistry*.5th Ed. John Wiley Publications.Pp:693
- 1) J.L. Jain, 2005: *Fundamentals of Biochemistry*, S. Chand & Company Ltd. New



2)S.C. Rastogi, 2003 :*Biochemistry*Tata McGraw-Hill Education, New Delhi.Pp:711

3)T. Jayaram ,1981: Laboratory manual in biochemistry, Wiley Estern Ltd. New Delhi.Pp:1-178

4)D. Plummer , 1988: *An Introduction to Practical Biochemistry*. 3rd ed. Tata McGraw Hill, New Delhi.Pp:1-369

Course Name: Lab – Biochemistry

Course Code: A501612

Semester: 6th

Credits: 01

L T P

0 0 2

Course content

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.

Suggested Readings:

1) E.E. Com & P.K. Stumpf , 2010:*Outlines of Biochemistry*.5th Ed. John Wiley Publications.Pp:693

1) J.L. Jain, 2005: *Fundamentals of Biochemistry*, S. Chand & Company Ltd. New Delhi.Pp:1-1248

2)S.C. Rastogi, 2003 :*Biochemistry*Tata McGraw-Hill Education, New Delhi.Pp:711

3)T. Jayaram ,1981: Laboratory manual in biochemistry, Wiley Estern Ltd. New Delhi.Pp:1-178

4)D. Plummer , 1988: *An Introduction to Practical Biochemistry*. 3rd ed. Tata McGraw Hill, New Delhi.Pp:1-369

Course Name: Environmental Science



Course Code: A501613
Semester: 6th

Credits: 02

L T P
2 0 0

Course content

Scope and importance of environmental studies. Natural resources: Renewable and non-renewable resources. Forest, Water, Food, energy and land resources. Ecosystems: Definition, concept, structure and functions. Producers, consumers and decomposers of an ecosystem. Energy flow in the ecosystem. Types of ecosystems. Bio-diversity: Definition, classification, threats to biodiversity and its conservation. Environmental pollution: Causes, effects and control of air, water, soil, thermal, noise and marine pollution. Causes, effects and management of soil nuclear hazards and industrial wastes. Disaster management, Floods, earthquakes, cyclones and land slides. Social issues and the environment, unsustainable to sustainable development. The Environment Protection Act, The Air Act, The water Act, The Wildlife Protection Act and Forest Conservation Act. Woman and child welfare, HIV/AIDS and Role of information technology on environment and human health.

Suggested Readings:

- 1 Erach Bharucha .2012.*Text book of Environmental Studies for undergraduate* courses by University Grants Commission, New Delhi.pp 288
- 2 P.D. Sharma .2004. *Ecology and Environment* by Rastogi Publication. Meerut.pp280
- 3 S.S. Purohit, Q.J. Shammi and A.K. Agrawal.2006. *Environmental Sciences* by Student Edition, Jodhpur.pp 370
- 4 M.Prasanthrajan and P.P. Mahendran. 2005. *A text book on Ecology and Environmental Science* by Agrotch Publishing Academy, Udaipur-313002.pp370

Course Name: Organic Farming
Course Code: A501614
Semester: 6th

Credits: 01

L T P
1 0 0

Course content

Introduction, concept, relevance in present context; Organic production requirements; Biological intensive nutrient management-organic manures, vermicomposting, green manuring, recycling of organic residues, biofertilizers; Soil improvement and amendments; Integrated diseases and pest management – use of biocontrol agents, biopesticides pheromones, trap crops, bird perches; Weed management; Quality considerations, certification, labeling and accreditation processors, marketing, exports

Suggested Readings:

- 1) Dahama A. K .2010.*Organic Farming for Sustainable Agriculture*. Agrobios Publication. pp 430
- 2) Ranjan Kumar Biswas.2014.*Organic Farming in India*. N D Publisher. pp400
- 3) Bansal M .2020. *Basics of Organic Farming* .CBS .pp 230
- 4) Peter V. Fossel .2007.*Organic Farming: Everything You Need to Know*. Voyageur Press.pp 380



Course Name: Lab-Crop Production II (Rabi)

Course Code: A501615

Semester: 6th

Credits: 01

**L T P
0 0 2**

Course content

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed treatment, nursery raising, sowing, nutrient management, water management, weed management and management of insect-pests and diseases of crops harvesting, threshing, drying, winnowing, storage and marketing of produce. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of a group of students.

Suggested readings:

1. Prasad, R. 2002. *Textbook of Field Crops Production*. Directorate of Information and Publication of Agriculture, Indian Council of Agricultural Research, New Delhi. pp. 821.
2. Singh, C. and Singh, R. 2020 *modern Techniques of Raising Field Crops*. CBS Publishers & Distributors, New Delhi. pp. 496.
3. Reddy T. Y. and Reddy G. H. S. 2002. *Principle of agronomy*. Kalyani Publishers, Ludhiana, Punjab. pp.527

(Crop Production – Group I)

Course Name: Seed Production Technology

Course Code: A501701

Semester: 7th

Credits: 02

**L T P
2 0 0**

Course content

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.

Suggested Readings



1. HariHar Ram .2010 .*Crop Breeding and Biotechnology*Kalyani Publication New Delhi.pp 284
2. D. A. Sleper J.M .2009.*Breeding of Asian Field crops*. Poehlman Blackwell Publishers pp400
3. G. S. Chahal S. S. Gosla Narosa .2007.*Principle and Procedures of Plant Breeding Biotechnological and Conventional Approach* Publishers House. New Delhi.pp 450
4. .*Plant Breeding Principle and Methods*. 1997.Kalyani Publication New Delhi.pp600

Course Name: Lab. Seed Production Technology

Course Code: A501702

Semester: 7th

Credits: 01

**L T P
0 0 2**

Course content

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.

Suggested Readings:

1. HariHar Ram .2010 .*Crop Breeding and Biotechnology*Kalyani Publication New Delhi.pp 284
2. D. A. Sleper J.M .2009.*Breeding of Asian Field crops*. Poehlman Blackwell Publishers pp400
3. G. S. Chahal S. S. Gosla Narosa .2007.*Principle and Procedures of Plant Breeding Biotechnological and Conventional Approach* Publishers House. New Delhi.pp 450
4. .*Plant Breeding Principle and Methods*. 1997.Kalyani Publication New Delhi.pp600

Course Name: Integrated Farming System and Sustainable Agriculture

Course Code: 501703

Semester: 7th

Credits: 01

**L T P
2 0 0**

Course content

Farming systems, definition, principles and components. Farming System models for irrigated,dryland situations and modules for marginal, small and large farmers. Farming systems of theworld-arable, pastoral, lay farming, shifting cultivation, ranching and agro-forestry systems.Energy and fuel wood plantations. Specialized and diversified farming, family co-operative andcollective farming: their occurrence, adaptations and weaknesses. Factors affecting choice offarming systems. Cropping systems, their characteristics and



management. Cropping patterns. Agro-ecosystem and agro-ecological zones of India. Efficient food producing systems. Sustainable agriculture- Introduction, definition, goal and current concepts, factors affecting ecological balance and ameliorative measures, land degradation and conservation of natural resources.

Suggested Readings:

1. *Sustainable Agriculture: Advances in Technological Interventions*. 2020. Apple Academic Press, United States. pp 580.
2. Clark, S., 2016. *Sustainable Agriculture-Beyond Organic Farming*. MDPI AG, Switzerland. pp. 356
3. Anonymous. 2017. *Farming System and Sustainable Agriculture: As Per New ICAR Syllabus*. India: Kalyani Publishers. pp. 118
4. Nanwal, R. K. 2019. *Farming System and Sustainable Agriculture*. India: New India Publishing Agency. pp. 224

Course Name: Lab- Integrated Farming System and Sustainable Agriculture

Course Code:501704

Semester: 7th

L T P

Credits: 01

0 0 2

Course content

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

Suggested Readings:

1. *Sustainable Agriculture: Advances in Technological Interventions*. 2020. Apple Academic Press, United States. pp 580.
2. Clark, S., 2016. *Sustainable Agriculture-Beyond Organic Farming*. MDPI AG, Switzerland. pp. 356
3. Anonymous. 2017. *Farming System and Sustainable Agriculture: As Per New ICAR Syllabus*. India: Kalyani Publishers. pp. 118
4. Nanwal, R. K. 2019. *Farming System and Sustainable Agriculture*. India: New India Publishing Agency. pp. 224



Course Name: Production of Commercial Crops

Course Code: A501705

Semester: 7th

L T P

Credits: 02

2 0 0

Course content

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.

Suggested Readings

- 1) Prasad, R., 2000. *Textbook of Field Crops Production*. India: Directorate of Information and Publication of Agriculture, Indian Council of Agricultural Research. pp 821.
- 2) Kurian, A. 2007. *Commercial Crops Technology*. India: New India Publishing Agency. pp. 490.
- 3) Matla, U., 2012. *Production Responses of Commercial Crops*. Germany: Lap Lambert Academic Publishing Gmb HKG. pp. 128.

Course Name: Lab -Production ofCommercial Crops

Course Code: A501706

Semester: 7th

L T P

Credits: 01

0 0 2

Course content

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.

Suggested Readings



- 1) Prasad, R., 2000. *Textbook of Field Crops Production*. India: Directorate of Information and Publication of Agriculture, Indian Council of Agricultural Research. pp 821.
- 2) Kurian, A. 2007. *Commercial Crops Technology*. India: New India Publishing Agency. pp. 490.
- 3) Matla, U., 2012. *Production Responses of Commercial Crops*. Germany: Lap Lambert Academic Publishing Gmb HKG. pp. 128.

Course Name: Soil Fertility and Nutrient Management

Course Code: A501707

Semester: 7th

L T P

Credits: 02

0 0 2

Crop response to fertilizer-effect on germination, growth and nutrient removal. Problems of supply and availability of nutrients, relation between nutrient supply and crop growth. Integrated nutrient management. Preparation and use of farmyard manure, compost, green manures, vermi-compost, bio-fertilizers and other organic concentrates their composition, availability and crop responses, recycling of organic wastes and residue management. Commercial fertilizers, composition, relative fertilizer value and cost. Crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades. Nutrient interactions. Time and methods of manures and fertilizers application. Foliar fertilizer application and its concept. Relative performance of organic and inorganic manures. Economics of fertilizer use. Site specific nutrient management. Effect of fertilizers on environment, Nutrient cycling integrated farming systems, Long effects of fertilizers use on crop yield and soil productivity

Suggested Readings:

1. Rakshit A. 2015. *Manures Fertilizers and Pesticides* Paperback – Import. CBS Publishing; 1ST edition, pp. 266. 210
1. Zhongqi He and Hailin Zhang. 2016. *Applied Manure and Nutrient Chemistry for Sustainable Agriculture and Environment* Paperback – Import. Springer. pp. 379.
2. Havlin, John L, Samuel L. Tisdale (Author), Werner L. Nelson (Author), James D. Beaton (2004). *Soil Fertility and Fertilizers* (8th Edition). Published Prentice Hall. pp. 528.
3. Havlin, John L. 2004. *Soil Fertility and Fertilizers: An Introduction to Nutrient Management* Published July 23rd 2004 by Prentice Hall. pp. 528.



Course content

Principles of analytical instruments and their calibration and applications, Colorimetry and flame photometry Soil, plant, manure and fertilizer analysis for macro and micro nutrients

Suggested Readings:

1. Rakshit A. 2015. *Manures Fertilizers and Pesticides* Paperback – Import. CBS Publishing; 1ST edition, pp. 266. 210
2. Somawanshi, et al. 2012. *Laboratory Methods for Analysis of Soil, Irrigation Water and Plants.*, Department of Soil Science and Agricultural Chemistry, MPKV., Rahuri. revised Ed. pp. 307.
3. Jackson, M.L. 1973. *Soil Chemical Analysis*. Printice Hall, India, Pvt. Ltd. New Delhi. pp 498.
4. Chopra, S. L. and Kanwar, S. L. and Rakshit, J. S. 2014. *Analytical Agricultural Chemistry*. Kalyani Publisher. pp. 309

Course Name: Management of Problem Soils and Water

Course Code:501709

Semester: 7th

L T P

Credits: 02

0 0 2

Course content

Course Area, distribution, origin and basic concepts of problematic soils. Morphological features and characterization of salt-affected soils. Management of salt- affected soils. Salt tolerance of crops -mechanism and ratings. Monitoring of soil salinity in the field. Management principles for sandy, clayey, red lateritic and dry land soils. Acid soils – nature, sources and management. Effect on plant growth. Lime requirement of acid soils. Biological sickness of soils and its management. Quality of irrigation water, management of brackish water. Salt balance under irrigation. characterization of brackish waters, area and extent.



Agronomic practices in relation to problematic soils. Cropping pattern for utilizing poor quality ground waters.

Suggested readings:

1. Das, D. K. (2015). *Introductory Soil Science*. India: Kalyani Publishers. pp.879.
2. Reddy T. Y. and Reddy G. H. S. 2002. *Principle of agronomy*. Kalyani Publishers, Ludhiyana, Punjab. pp.527.
3. Reddy, S. R. 2007. *Principles of Agronomy*. Kalyani Publishers, Ludhiana. India. pp.611.

Course Name: Lab- Management of Problem Soils And Water

Course Code: 501710

Semester: 7th

L T P

Credits: 01

0 0 2

Course content

Characterization of acid, acid sulphate, salt- affected and calcareous soils. Determination of cations (Na⁺, K⁺, Ca⁺, and Mg⁺⁺) in ground water and soil samples. Determination of anions (Cl⁻, SO₄²⁻, CO₃²⁻ and HCO₃⁻) in ground waters and soil samples. Lime and gypsum requirement of acid and sodic soil.

Suggested readings:

1. Das, D. K. 2015. *Introductory Soil Science*. India: Kalyani Publishers. Pp.879.
2. Reddy, T. Y. and Reddy, G. H. S. 2002. *Principle of agronomy*. Kalyani Publishers, Ludhiana, Punjab. Pp.527.
3. Reddy, S. R. 2007. *Principles of Agronomy*. Kalyani Publishers, Ludhiana. India. Pp.611

Course Name: Lab-Analytical Techniques in Soil, Plant, Fertilizer and Water analysis

Course Code: A501711

Semester: 7th

L T P

Credits: 02

0 0 4

Course content

Colorimetric and flame photometric methods. Atomic absorption spectrophotometry. Cation and Anion exchange phenomenon and their importance. Ion adsorption, desorption and fixation in soils. 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.

Reference:

1. MB Russel, *Soil Conditions and Plant Growth*, Published by English Language Book Society/Longman. P.p. 496.
1. Brady. *Nature and Properties of Soils*, 14th Edition, p.p 1046.
3. Ghildyal & Tripathi, *Soil Physics*, Published by Wiley and Eastern LTD, New Delhi. P.p. 656.

Course Name: Production Technology of Economic Forest Trees

Course Code: 501712

Semester: 7th

L T P

Credits: 01

0 0 1

Course content

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

Suggested Readings

1. Bridger Blakeney. 2012. *Handbook of Forestry*. Agrotech Press. Pp. 300.
2. L.S.Khanna. 2015. *Principles and Practice of Silviculture*. Agrotech Press. Pp. 484.
3. S.P.Singh. 2020. *Handbook of Agroforestry*. Agrotech Publication. Pp. 207.
4. A.P. Dwivedi. 2019. *Agroforestry principle and practice*. Oxford & Ibh publication Co.Pvt.Ltd. pp. 380.
5. Namkoong et.al.1988. *Tree breeding: principle and strategies*. Sprieger.pp. 180.



Course content

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

Suggested Readings

1. L.S.Khanna. 2015. *Principles and Practice of Silviculture*. Agrotech Press. pp. 484.
2. S.P.Singh. 2020. *Handbook of Agroforestry*. Agrotech Publication. pp. 207.
3. A.P. Dwivedi. 2019. *Agroforestry principle and practice*. Oxford & Ibh publication Co.Pvt.Ltd. pp. 380.
4. Namkoong et.al.1988. *Tree breeding: principle and strategies*. Springerpp. 180.

(Crop protection - Group II)

Course Name: Apiculture

Course Code: 501714

Semester: 7th

Course contents

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

Suggested Readings:

- 1)AturRahman . *Text Book on Beekeeping* . 2019 KalyaniPublishers.pp.347
- 2)Jayashree, K.V.,Tharadevi,C.S and Arumugam, N..2014 *Text Book on Beekeeping* .SarasPublication.pp.352
- 3) Prasad, T.V .2019 .*Handbook of Entomology* . New Vishal Publications.pp.496



Course Name: Lab- Apiculture
Course Code:501715
Semester: 7th

L T P

Credits: 02

0 0 2

Course contents

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

Suggested Readings:

- 1)AturRahman . *Text Book on Beekeeping*. 2019 KalyaniPublishers.pp.347
- 2)Jayashree, K.V.,Tharadevi,C.S and Arumugam, N..2014 *Saras Text Book on Beekeeping* Publication.pp.352
- 3) Prasad, T.V .2019 .*Handbook of Entomology* . New Vishal Publications.pp.496.

Course Name: Biocontrol and Integrated pest Management
Course Code: 501716
Semester: 7th

L T P

Credits: 02

2 0 0

Course contents

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

.Suggested Readings:



1. [Arshad A.](#) 2021. *Biopesticides and Bioagents Novel Tools for Pest Management*. Apple Academic Press. Pp. 11 Color & 4 B/W Illustrations
2. Santhakumari, & Vijayasree 2012. *Biological control of crop pests in india*. Kalyani Publishers. Pp: 140.
3. Bhagat, D.V. 2010. *Encyclopaedia of Biological Control of Insect and Pest*. Pp:1-332

Course Name: Lab. Bio-control and Integrated pest Management

Course Code: 501717

Semester: 7th

L T P

Credits: 01

0 0 2

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.

Suggested Readings:

1. [Arshad A.](#) 2021. *Biopesticides and Bioagents Novel Tools for Pest Management*. Apple Academic Press. Pp. 11 Color & 4 B/W Illustrations
2. Santhakumari, & Vijayasree 2012. *Biological control of crop pests in india*. Kalyani Publishers. Pp: 140.
3. Bhagat, D.V. 2010. *Encyclopaedia of Biological Control of Insect and Pest*. Pp:1-332.

Course Name: Pesticides and Plant Protection Equipments

Course Code: 501718

Semester: 7th

L T P

Credits: 02

2 0 0

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.

Suggested Readings:

- 1) Prasad , T.V. *Handbook of Entomology* ,2019. New Vishal Publications.pp.496.
- 2) Srivastava, R.P and Saxena,R.C. *A Textbook of Insect Toxicology*. 2000Himanshu Publications, New Delhi.pp.166.
- 3) Gupta,R.C . *Pesticides*.2012 APH Publishing Corporation. New Delhi.pp.369

Course Name: Lab. Pesticides and Plant Protection Equipments

Course Code:501719

Semester: 7th

L T P

Credits: 01

0 0 2

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

Suggested Readings:

- 1) Prasad , T.V. *Handbook of Entomology* ,2019. New Vishal Publications.pp.496.
- 2) Srivastava, R.P and Saxena,R.C. *A Textbook of Insect Toxicology*. 2000 Himanshu Publications, New Delhi.pp.166.
- 3) Gupta,R.C . *Pesticides*.2012 APH Publishing Corporation. New Delhi.pp.369.

Course Name: Lab. Bio-control and Integrated pest Management

Course Code: 501717

Semester: 7th

L T P

Credits: 01

0 0 2

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 mechanicalcontrol measures of different pests. Use of pheromones, colour, sticky and light traps formonitoring and surveillance of pests. Study of IPM module in cotton, rice, sugarcane,maize, fruits and vegetables.



Suggested Readings:

1. [Arshad A.](#) 2021. *Biopesticides and Bioagents Novel Tools for Pest Management*. Apple Academic Press. Pp. 11 Color & 4 B/W Illustrations
2. Santhakumari, & Vijayasree 2012. *Biological control of crop pests in india*. Kalyani Publishers. Pp: 140.
3. Bhagat, D.V. 2010. *Encyclopaedia of Biological Control of Insect and Pest*. Pp:1-332.

Course Name: Pesticides and Plant Protection Equipments
Course Code: 501718
Semester: 7th

L T P

Credits: 02

2 0 0

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.

Suggested Readings:

- 1) Prasad , T.V. *Handbook of Entomology* ,2019. New Vishal Publications.pp.496.
- 2) Srivastava, R.P and Saxena,R.C. *A Textbook of Insect Toxicology*. 2000Himanshu Publications, New Delhi.pp.166.
- 3) Gupta,R.C . *Pesticides*.2012 APH Publishing Corporation. New Delhi.pp.369

Course Name: Lab. Pesticides and Plant Protection Equipments
Course Code:501719
Semester: 7th

L T P

Credits: 01

0 0 2

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



Suggested Readings:

- 1) Prasad , T.V. *Handbook of Entomology* ,2019. New Vishal Publications.pp.496.
- 2) Srivastava, R.P and Saxena,R.C. *A Textbook of Insect Toxicology*. 2000 Himanshu Publications, New Delhi.pp.166.
- 3) Gupta,R.C . *Pesticides*.2012 APH Publishing Corporation. New Delhi.pp.369.

Course Name: Lab- Biocontrol and Integrated Disease Management

Course Code: 501722

Semester: 7th

Credits: 01

L T P

0 0 2

Course Contents

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

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Suggested Readings

- 1.Tarr SAJ. 1964. *The Principles of Plant Pathology*. McMillan, London. pp 340
2. Vander Plank, JE. 1975. *Principles of Plant Infection*. Acad. Press. pp 280
- 3, Verma JP, Varma A & Kumar D. (Eds). 1995. *Detection of Plant Pathogens and their Management*. Angkor Publ., New Delhi. pp270
4. Mehrotra RS & Aggarwal A. 2003. *Plant Pathology*. 2nd Ed. Oxford & IBH. Pp370
5. Dhingra OD & Sinclair JB. 1986. *Basic Plant Pathology Methods*. CRC Press. Pp260

Course Name: Lab- Post Harvest Diseases and Their Management

Course Code: 501724

Semester: 7th

Credits: 01

L T P

0 0 2

Course contents

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



Suggested Readings:

1. Barkai-Golan, R. 2001. *Postharvest Diseases of Fruits and Vegetables* 1st Edition. Elsevier Science. pp. 442.
2. Vashishta, B.R., Sinha, A.K. and Kumar, A. 2012. *Botany for degree students: Fungi*. S Chand and Company Limited, New Delhi. pp. 794.
3. Narayanasamy, P. 2005. *Postharvest Pathogens and Disease Management*. John Wiley and Sons, Inc., Hoboken, New Jersey. pp. 563.
4. Singh, R.S. 2002. *Introduction to Principles of Plant Pathology*. Oxford & IBH, New Delhi. pp.416.

Course Name: Lab- Mushroom Production

Course Code: **501725**

Semester: 7th

L T P

Credits: 03

0 0 6

Course contents

Introduction to mushrooms and mushroom growing. Characteristics of mushrooms and their identification. Cultivation techniques of *Agaricus bisporus*, *Pleurotus* spp. *Volvariella* spp. and *Calocybe* spp. Processing of raw materials and compost methodology, spawn production and spawning, casing materials, their treatment and use. Crop management practices including control of pathogens. Designing a mushroom house. Project report formulation at farm level.

Suggested Readings:

1. Marimuthu, T. et al. (1991). *Oyster Mushroom*. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.
2. Nita Bhal. (2000). *Handbook on Mushrooms*. 2nd ed. Vol. I and II. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
3. Pandey R.K, S. K Ghosh, 1996. *A Hand Book on Mushroom Cultivation*. Emkey Publications.
4. Pathak, V. N. and Yadav, N. (1998). *Mushroom Production and Processing Technology*. Agrobios, Jodhpur.

Course Name: NURSERY MANAGEMENT OF HORTICULTURAL CROPS

Course Code: **501726**

Semester: 7th

L T P

Credits: 02

2 0 0

Course Contents

Principles of plant propagation. Seed dormancy and germination. Selection of rootstock and



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

Course Name: LAB- NURSERY MANAGEMENT OF HORTICULTURAL CROPS

Course Code: 501727

Semester: 7th

Credits: 01

**L T P
0 0 2**

Course Contents

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

1. *Yawalkar, K.S, Kawthalkar, M.P, Deshmukh P.P & Kunte, Y. N.* 2014. Principles of Horticulture and fruit growing 11th edition. Agri Horticultural Pub House, Nagpur. pp.405.
2. *K.G. Shanmugvelu.* 1987. Production Technology of Fruit Crops. SBA Publications, Calcutta. pp. 539.
3. *Singh, K.S & Kumar, Abhinav* 2021. Plant propagation and Nursery Management 1st edition. Bhavya Books (BET)TM, New Delhi. pp. 218

Course Name: Commercial Fruit Production

Course Code: 501728

Semester: 7th

Credits: 02

**L T P
2 0 0**

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 as citrus, 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.

Course Name: Lab. Commercial Fruit Production

Course Code: 501729

Semester: 7th

Credits: 01

**L T P
0 0 2**

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.



1. Anonymous 2001. Handbook of Horticulture 10th edition. ICAR publication, Indian Council Of Agricultural Research, New Delhi. pp. 1069.
2. Bose, T. K., Mitra, S. K. and Sanyal, D. 2001. Fruits: Tropical and Subtropical, Volume 1, 3rd edition. Naya Udyog. pp. 721.
3. Katyal, S.L., Krishnamurthi, S. and Singh, Sham 1963. Fruit Culture in India. India Republic of India. Indian Council of Agricultural Research, New Delhi. pp. 451.
4. Singh, Ranjit. 1969. Fruits. National Book Trust, India. pp. 213.

Course Name: Processing and Value Addition of Fruits and Vegetables

Course Code: 501730

Semester: 7th

Credits: 01

L T P

2 0 0

Course Contents

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

Suggested Readings:

1. Sethi, V. and Sethi, S. 2006. *Processing of fruits and Vegetables for value addition.* Indus Publication. pp 176.
2. Rahman, M.S. 1999. *Handbook of Food Preservation, Food science and technology.* CRC Press, Florida, US. pp 809.
3. Rajarathnam, S. 2011. *Advances in Preservation and Processing Technologies of Fruits and Vegetables.* New Indian Publishing Agency-NIPA, Ahemdabad, Gujarat. pp 758.

Course Name: Lab-Processing and Value Addition of Fruits and Vegetables

Course Code: 501731

Semester: 7th

Credits: 01

L T P

0 0 2

Course Contents

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

Suggested Readings:

- 1Sethi, V. and Sethi, S. 2006. Processing of fruits and Vegetables for value addition. Indus Publication. pp 176.
- 2.Rahman, M.S. 1999. *Handbook of Food Preservation, Food science and technology.* CRC Press, Florida, US. pp 809.
- 3Rajarathnam, S. 2011. *Advances in Preservation and Processing Technologies of Fruits and Vegetables.* New Indian Publishing Agency-NIPA, Ahemdabad, Gujarat. pp 758.



Course Name: Commercial Vegetable Production

Course Code: 501732

Semester: 7th

Credits: 02

**L T P
2 0 0**

Course Content

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

Suggested readings:

1. Bose, T. K., Som, M. G. and Kabir, J. 1999. *Vegetable Crops*. Naya Prokash, Kolkata, India. pp 959.
2. Thamburaj, S. 2014. *Vegetable, Tuber and Spices*. ICAR publishers, New Delhi, India. pp 490.
3. Singh, S. P. 2013. *Production technology of vegetable crops*. Universal publication centre, Karnal, India. pp 380.

Course Name: Lab-Commercial vegetable Production

Course Code: 501733

Semester: 7th

Credits: 01

**L T P
0 0 2**

Course Contents

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

Suggested readings :

1. Bose, T. K., Som, M. G. and Kabir, J. 1999. *Vegetable Crops*. Naya Prokash, Kolkata, India. Pp 959.
2. Thamburaj, S. 2014. *Vegetable, Tuber and Spices*. ICAR publishers, New Delhi, India. pp 490.
3. Singh, S. P. 2013. *Production technology of vegetable crops*. Universal publication centre, Karnal, India. pp 380

Course Name: Vegetable breeding and Seed Production

Course Code: 501734

Semester: 7th

Credits: 02

**L T P
2 0 0**



Course Content

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

Suggested readings-

1. Swarup, V. 2006. *Vegetable Science and Technology in India*. Kalyani Publishers, India. pp. 656.
2. Singh, N. E. and Thamburaj, S. E. 2003. *Vegetables, Tuber Crops and Spices*. Directorate of Information and Publications of Agriculture, India. pp. 469.
3. Hazra, P. 2019. *Vegetable Science and Technology*.: New India Publishing Agency, India. pp. 630.

Course Name: Lab. Vegetable breeding and Seed Production

Course Code: 501735

Semester: 7th

Credits: 01

L T P
0 0 2

Course contents

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

Suggested readings-

1. Swarup, V. 2006. *Vegetable Science and Technology in India*. Kalyani Publishers, India. pp. 656.
2. Singh, N. E. and Thamburaj, S. E. 2003. *Vegetables, Tuber Crops and Spices*. Directorate of Information and Publications of Agriculture, India. pp. 469.
3. Hazra, P. 2019. *Vegetable Science and Technology*.: New India Publishing Agency, India. pp. 630.

Course Name: Forcing Techniques in Vegetable Production

Course Code: 501736

Semester: 7th

Credits: 02

L T P
2 0 0



Course Contents

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

Suggested readings

1. Taft, L. 2006. *Greenhouse Management: Forcing of Flowers Vegetables and Fruits*. Biotech Books, India. pp. 382
2. Peter, K. V. 2013. *Protected Cultivation of Horticultural Crops*. NIPA, India. pp. 466
3. Singh, B. 2015. *Advances in Protected Cultivation*. New India Publishing Agency, India. pp. 252.

Course Name: Lab- Forcing Techniques in Vegetable Production

Course Code: 501737

Semester: 7th

Credits: 01

L T P

0 0 2

Course Content

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

Suggested readings:

1. Taft, L. 2006. *Greenhouse Management: Forcing of Flowers Vegetables and Fruits*. Biotech Books, India. pp. 382
2. Peter, K. V. 2013. *Protected Cultivation of Horticultural Crops*. NIPA, India. pp. 466
3. Singh, B. 2015. *Advances in Protected Cultivation*. New India Publishing Agency, India. pp. 252.

Course Name: Commercial Floriculture and Landscaping

Course Code: 501738

Semester: 7th

Credits: 02

L T P

2 0 0

Course contents

Scope, importance and export potential of floriculture, environment factors influencing plant growth and flower production in cut flowers. Production technology including varieties, propagation, soil, nutrition, disease and pests of important cut flowers. Post harvest handling, grading and packing cut flowers, pot and bedding plants. Flower seed production. History of gardening, characteristics of Hindu, Mughal, Japanese and English gardens. Principle groups of plants like trees, shrubs, climbers, shade loving plants, ground covers, their analysis and use in landscape composition. Principles of art



and landscaping. Preparation of landscape plans for homes, farm complexes, small parks and institutions. Development and maintenance of rock,water and terrace gardens. Bonsai and dish gardens, project formulation and evaluation.

Suggested Readings:

1. Bose, T.K., Maiti, R.G, Dhua, R.S. and Das P. 2002. *Floriculture and Landscaping*, Vol.1. Naya Udyog Publication, Kolkata. pp 508.
2. Singh, A. K. and Sisodia, A. *Textbook of Floriculture and Landscaping*. 2017. NIPA. pp 446.
3. Singh, R. and Singh, B. K. 2020. *Introductory Ornamental Horticulture and Landscape gardening*. Daya Publication. pp 229.

Course Name: Lab- Commercial Floriculture and Landscaping

Course Code: 501739

Semester: 7th

Credits: 01

L T P

0 0 2

Course Contents

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

Suggested Readings:

1. Bose, T.K., Maiti, R.G, Dhua, R.S. and Das P. 2002. *Floriculture and Landscaping*, Vol.1. Naya Udyog Publication, Kolkata. pp 508.
2. Singh, A. K. and Sisodia, A *Textbook of Floriculture and Landscaping*. 2017. NIPA. pp 446.
3. Singh, R. and Singh, B. K. 2020. *Introductory Ornamental Horticulture and Landscape gardening*. Daya Publication. pp 229.

(Plant breeding and genetics – Group IV)

Course Name: Genetics of Crop Plants

Course Code: 501740

Semester: 7th

Credits: 02

L T P

2 0 0

Course Content

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

Suggested Readings:



- 1) Chhidda Singh, *Modern techniques of raising field corps*. Oxford and IBH Publishing Co. Ltd., Bangalore.
- 2) Gopal Chandra De. 1980., *Fundamentals of Agronomy*. Oxford and IBH Publishing Co. Ltd., Bangalore.
- 3) Palaniappan, S.P., *Cropping Systems in the tropics – Principles and Practices*. Willey Eastern Ltd., New Delhi.
- 4) Panda, S.C., 2006. *Agronomy* Agribios Publication, New Delhi.

Course Name: Lab- Genetics of Crop Plants

Course Code: 501741

Semester: 7th

L T P

Credits: 02

0 0 2

Course Content

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

Suggested Readings:

- 1) Chhidda Singh, *Modern techniques of raising field crops*. Oxford and IBH Publishing Co. Ltd., Bangalore.
- 2) Gopal Chandra De. 1980., *Fundamentals of Agronomy*. Oxford and IBH Publishing Co. Ltd., Bangalore.
- 3) Palaniappan, S.P., *Cropping Systems in the tropics – Principles and Practices*. Willey Eastern Ltd., New Delhi.
- 4) Panda, S.C., 2006. *Agronomy* Agribios Publication, New Delhi.

Course Name: Cytogenetics of Crop Plants

Course Code: 501742

Semester: 7th

L T P

Credits: 02

2 0 0

Course content

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



Suggested Readings:

1. Cuadrado A, Golczyk H, Jouve N. 2009. *A novel, simple and rapid nondenaturing FISH (ND-FISH) technique for the detection of plant telomeres. Potential used and possible target structures detected.* Chromosome Res. 17(6):755–762.10.1007/s10577-009-9060-z
2. Chu, E. H. Y. (in press). *Abnormalities of sex Chromosomes. In Symposium on mammalian tissue culture and cytology.* Sao Paulo, Bra/.il. October ZZ-Zb, 1962.
3. Chu, E. H. Y., and M. A Bender. 1961. *Chromosome cytology and evolution in Primates.* Science 133:1399-1405.

Course Name: Lab- Cytogenetics of Crop Plants

Course Code: 501743

Semester: 7th

L T P

Credits: 02

0 0 2

Course content

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

Suggested Readings:

1. Cuadrado A, Golczyk H, Jouve N. 2009. *A novel, simple and rapid nondenaturing FISH (ND-FISH) technique for the detection of plant telomeres. Potential used and possible target structures detected.* Chromosome Res. 17(6):755–762.10.1007/s10577-009-9060-z
2. Chu, E. H. Y. (in press). *Abnormalities of sex Chromosomes. In Symposium on mammalian tissue culture and cytology.* Sao Paulo, Bra/.il. October ZZ-Zb, 1962.
3. Chu, E. H. Y., and M. A Bender. 1961. *Chromosome cytology and evolution in Primates.* Science 133:1399-1405.

Course Name: Theory and Practice of Plant Breeding

Course Code: 501744

Semester: 7th

L T P

Credits: 02

2 0 0

Course content

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



new varieties. Plant breeding for sustainable agriculture. Plant Variety Protection and Breeders Rights.

Suggested Readings:

1. B. D. Singh 1997 *Plant Breeding Principles and Methods* Kalyani Publication New Delhi. pp 380
2. P. Singh 2001 *Essentials of Plant Breeding* Kalyani Publication New Delhi pp430
3. J. R. Sharma 2004 *Principles and Practices Plant Breeding* McGraw Hill Publishing company Limited , New Delhi. pp 400
4. V. L. Chopra 2000. *Plant Breeding Theory and Practices* Oxford and IBH. Publishing Company , New Delhi. pp700

Course Name: Lab. Theory and Practice of Plant Breeding

Course Code: 501745

Semester: 7th

Credits: 01

L T P

0 0 2

Course content

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.

Suggested Readings:

1. B. D. Singh 1997 *Plant Breeding Principles and Methods* Kalyani Publication New Delhi. pp 380
2. P. Singh 2001 *Essentials of Plant Breeding* Kalyani Publication New Delhi pp430
3. J. R. Sharma 2004 *Principles and Practices Plant Breeding* McGraw Hill Publishing company Limited , New Delhi. pp 400
4. V. L. Chopra 2000. *Plant Breeding Theory and Practices* Oxford and IBH. Publishing Company , New Delhi. pp700

Course Name: Introduction to Breeding of Field Crops

Course Code: 501746

Semester: 7th

Credits: 02

L T P

2 0 0

Course content

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



Suggested Readings:

1. B. D. Singh 1997 *Plant Breeding Principles and Methods* Kalyani Publication New Delhi. pp 380
2. P. Singh 2001 *Essentials of Plant Breeding* Kalyani Publication New Delhi pp430
3. J. R. Sharma 2004 *Principles and Practices Plant Breeding* McGraw Hill Publishing company Limited , New Delhi. pp 400
4. V. L. Chopra 2000. *Plant Breeding Theory and Practices* Oxford and IBH. Publishing Company , New Delhi. pp700

Course Name: Crop Experimentation

Course Code: 501747

Semester: 7th

Credits: 01

**L T P
0 0 2**

Course content

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.

Suggested readings:

1. Hotelling, Harold (1944). *"Some Improvements in Weighing and Other Experimental Techniques"*. Annals of Mathematical Statistics. 297-306. doi:10.1214/aoms/1177731236.
2. Giri, Narayan C.; Das, M. N. (1979). *Design and Analysis of Experiments*. New York, N.Y: Wiley. pp. 350–359. ISBN 9780852269145.
3. Jack Sifri 2014. *"How to Use Design of Experiments to Create Robust Designs With High Yield"*. Pp 360

Course Name: Lab. Crop Experimentation

Course Code: 501748

Semester: 7th

Credits: 01

**L T P
0 0 2**

Course content

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.



Suggested readings:

1. Hotelling, Harold (1944). "Some Improvements in Weighing and Other Experimental Techniques". *Annals of Mathematical Statistics*. 297-306. doi:10.1214/aoms/1177731236.
2. Giri, Narayan C.; Das, M. N. (1979). *Design and Analysis of Experiments*. New York, N.Y: Wiley. pp. 350–359. ISBN 9780852269145.
3. Jack Sifri 2014. "How to Use Design of Experiments to Create Robust Designs With High Yield". Pp 360

Course Name: Principles and Procedures of Plant Tissue Culture and Transformation

Course Code: 501749

Semester: 7th

Credits: 02

L T P
2 0 0

Course content

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

Suggested readings:

- 1) Lydiane Kyte, John Kleyn, Holly Scoggins and Mark Bridgen .2010. *Plants from Test Tubes: An introduction to Micropropagation* (Fourth Edition) – (Timber Press) pp 450
- 2) M. K. Razdan .1999. *Introduction to Plant Tissue Culture-* (Science Publisher) pp 590
- 3) M.C. Gayatri and R. Kavyashree.2007. *Plant Tissue Culture- Protocols in Plant Biotechnology -* (Narosa Publishing)pp 700

Course Name: Lab- Principles and Procedures of Plant Tissue Culture and Transformation

Course Code: 501750

Semester: 7th

Credits: 01

L T P
0 0 2

Course content

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



Suggested readings:

- 1) Lydiane Kyte, John Kleyn, Holly Scoggins and Mark Bridgen .2010.*Plants from Test Tubes: An introduction to Micropropagation* (Fourth Edition) – (Timber Press) pp 450
- 2) M. K. Razdan .1999.Introduction top Plant Tissue Culture- (Science Publisher) pp 590
- 3) M.C. Gayatri and R. Kavyashree.2007. Plant Tissue Culture- Protocols in Plant Biotechnology - (Narosa Publishing)pp 700

Course Name: Principles and Procedures of Molecular Biotechnology and Genomics

Course Code: 501751

Semester: 7th

Credits: 02

L T P

2 0 0

Course content

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.

Suggested readings:

1. H. Ram, 2019: *Crop Breeding and Biotechnology*. Kalyani Publication, New Delhi.Pp:483
2. D. A. Sleper and J.M. Poehlman,2006: *Breeding of Asian Field crops*. Blackwell Publishers.Pp:493
3. G. S. Chahal and S. S. Gosla, 2006: *Principle and Procedures of Plant Breeding: Biotechnological and Conventional Approach*. Narosa Publishers House, New Delhi.Pp:597
4. B.D. Singh,1990:*Plant Breeding Principle and Methods*. Kalyani Publication, New Delhi.Pp:654

Course Name: Lab. Principles and Procedures of Molecular Biotechnology and Genomics

Course Code:501752

Semester: 7th

Credits: 01

L T P

0 0 2

Course content

Isolation, purification and fractionation of DNA and proteins. Isolation and purification of plasmids. Measurement of protein and nucleic acid concentration using photo spectrometer.



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.

Suggested readings:

1. H. Ram, 2019: *Crop Breeding and Biotechnology*. Kalyani Publication, New Delhi.Pp:483
2. D. A. Sleper and J.M. Poehlman,2006: *Breeding of Asian Field crops*. Blackwell Publishers.Pp:493
3. G. S. Chahal and S. S. Gosla, 2006: *Principle and Procedures of Plant Breeding: Biotechnological and Conventional Approach*. Narosa Publishers House, New Delhi.Pp:597
4. B.D. Singh, 1990:*Plant Breeding Principle and Methods*. Kalyani Publication, New Delhi.Pp:654

Course Name: RAWEP I: Village Attachment

Course Code: A501801

Semester: 8th

Credits: 3

**L T P
NA**

Course content

After the completion of course work, the students of B.Sc. Agri. (Hons.) will receive training under the compulsory RAWEP 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.

RAWEP 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-processingvalue 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

Course Name: ELP II. Specialized Experiential Learning Programme (On-Campus)

Course Code: A501802

Semester: 8th

Credits:12

**L T P
NA**

Course Name: ELP III. Industrial Attachment (Off-Campus)

Course Code: A501803



Semester: 8th

Credits: 04

**L T P
NA**

Course Name: Project Documentation and Report Preparation, Presentation (On-Campus)

Course Code: A501804

Semester: 8th

Credits: 01

**L T P
NA**

(Agribusiness and extension Management-Group VI)

Course Name: Financial and Project Management

Course Code: 501766

Semester: 7th

Credits: 02

**L T P
0 0 2**

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

Course content

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

Suggested Readings:

1. Ghosal, S.N. 1966. *Agricultural Financing in India*. Asia Publishing House, Bombay.pp.452
2. Johl, S.S. and Moore, C.V. 1970. *Essentials of Farm Financial Management*. Today and Tomorrow's Printers and Publishers, New Delhi.pp.586
3. Hampton, J. J. 1983. *Financial Decision Making: Concepts, Problems and Cases*. Prentice Hall of India, New Delhi.pp.384
- 4 Kenneth, D. D. 1979. *Principles of Management in Agribusiness*. Reston Publishing Company, Reston.pp.465.

Course Name: Lab- Financial and Project Management



Course Code: 501767
Semester: 7th

Credits: 01

L T P
0 0 2

Course Content

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

Suggested Readings:

1. Ghosal, S.N. 1966. *Agricultural Financing in India*. Asia Publishing House, Bombay.pp.452
2. Johl, S.S. and Moore, C.V. 1970. *Essentials of Farm Financial Management*. Today and Tomorrow's Printers and Publishers, New Delhi.pp.586
3. Hampton, J. J. 1983. *Financial Decision Making: Concepts, Problems and Cases*. Prentice Hall of India, New Delhi.pp.384
- 4 Kenneth, D. D. 1979. *Principles of Management in Agribusiness*. Reston Publishing Company, Reston.pp.465.

Course Name: Retailing and Supply Chain Management
Course Code: 501768
Semester: 7th

Credits: 02

L T P
2 0 0

Course content

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.

Suggested Readings:

1. Dewett, K.K. and Chand, A. 2009. *Modern Economic Theory*. S. Chand and Co., New Delhi. Pp. 1024.
2. Jhingan, M.L.1990. *Advanced Economic Theory*. Vikas Publishing House, New Delhi. Pp.1842.



3. Subba Reddy, S., Raghu Ram, P., Sastry, T.V.N. and Bhavani Devi, I. 2010. *Agricultural Economics*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. pp.697.
4. Nagpure S.C. and Patil E.R. 2014. *Principles of Agricultural Economics*. Agroment Publishers, Dharampeth, Nagpur, India. pp.334.

Course Name: Micro Economic Analysis

Course Code: 501769

Semester: 7th

Credits: 02

L T P

2 0 0

Course content

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

Suggested Readings:

1. Jhingan, M.L.1990. *Advanced Economic Theory*. Vikas Publishing House, New Delhi. Pp.1842.
2. Subba Reddy, S., Raghu Ram, P., Sastry, T.V.N. and Bhavani Devi, I. 2010. *Agricultural Economics*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. pp.697.
3. .Dewett, K.K. and Chand, A. 2009. *Modern Economic Theory*. S. Chand and Co., New Delhi. Pp. 1024.
4. Nagpure S.C. and Patil E.R. 2014. *Principles of Agricultural Economics*. Agroment Publishers, Dharampeth, Nagpur, India. pp.334.

Course Name: Macro Economic Analysis



Course Code:501770
Semester: 7th

Credits: 02

L T P
0 0 2

Course content

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

Suggested Readings:

- 1 Subba Reddy, S., Raghu Ram, P., Sastry, T.V.N. and Bhavani Devi, I. 2010. *Agricultural Economics*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. pp.697.
- 2.Dewett, K.K. and Chand, A. 2009. *Modern Economic Theory*. S. Chand and Co., New Delhi. Pp. 1024.
- 3 Nagpure S.C. and Patil E.R. 2014. *Principles of Agricultural Economics*. Agroment Publishers, Dharampeth, Nagpur, India. pp.334.

Course Name: Administration of agriculture extension programmes

Course Code: 501771

Semester: 7th

Credits: 02

L T P
2 0 0

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.



Suggested Readings:

1. Dahama, O.P. and O.P Bhatnagar. 1980. *Education and Communication for Development*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. Pp.116.
2. Dudhani, C.M., Hirevenkatgoudar, L.V., Manjunath, L., Hanchinal, S.N. and Patil, S.L. 2004. *Extension Teaching Methods and Communication Technology*, UAS, Dharwad. Pp.654.
3. Kamat, M.G. 1985. *Writing for Farm Families*. Allied Publishers, New Delhi. pp.196.
4. Kelsey, L.D. and Hearne, G.C. 1963. *Cooperative Extension Work*. Comstar Publishing Associate, New York. pp. 453.
5. Mehta, D.S. 1981. *Mass Communication and Journalism in India*. Vikas Publication, New Delhi. Pp.424.

Course Name: Communication and Extension Teaching Methods

Course Code: 501772

Semester: 7th

Credits: 02

L T P

2 0 0

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.

Suggested Readings:

1. Dahama, O.P. and O.P Bhatnagar. 1980. *Education and Communication for Development*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. Pp.116.
2. Dudhani, C.M., Hirevenkatgoudar, L.V., Manjunath, L., Hanchinal, S.N. and Patil, S.L. 2004. *Extension Teaching Methods and Communication Technology*, UAS, Dharwad. Pp.654.
3. Kamat, M.G. 1985. *Writing for Farm Families*. Allied Publishers, New Delhi. pp.196.
4. Kelsey, L.D. and Hearne, G.C. 1963. *Cooperative Extension Work*. Comstar Publishing Associate, New York. pp. 453.
5. Mehta, D.S. 1981. *Mass Communication and Journalism in India*. Vikas Publication, New Delhi. Pp.424.

Course Name: Behavioural Skills for Human Resource Development



Course Code: 501773
Semester: 7th

Credits: 02

L T P
2 0 0

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 perceptual 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.

Suggested Readings:

1. Subba Reddy, S., Raghu Ram, P., Sastry, T.V.N. and Bhavani Devi, I. 2010. *Agricultural Economics*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. pp.697.
2. Dewett, K.K. and Chand, A. 2009. *Modern Economic Theory*. S. Chand and Co., New Delhi. Pp. 1024.
3. Nagpure S.C. and Patil E.R. 2014. *Principles of Agricultural Economics*. Agroment Publishers, Dharampeth, Nagpur, India. pp.334.

Course Name: RAWEP I: Village Attachment
Course Code: A501801
Semester: 8th

Credits: 3

L T P
NA

Course contents

After the completion of course work, the students of B.Sc. Agri. (Hons.) will receive training under the compulsory RAWEP 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

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

Activities and Tasks during Agro-Industrial Attachment Programme

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

Course Name: ELP II. Specialized Experiential Learning Programme (On-Campus)

Course Code: A501802

Semester: 8th

Credits:12

**L T P
NA**

Course Name: ELP III. Industrial Attachment (Off-Campus)

Course Code: A501803



Semester: 8th

Credits: 04

**L T P
NA**

Course Name: Project Documentation and Report Preparation, Presentation (On-Campus)

**Course Code: A501804
Semester: 8th**

Credits: 01

**L T P
NA**

Total Number of Course	160
Number of Theory Course	81
Number of Practical Course	79
Total Number of Credits	



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.