

Study & Evaluation Scheme

of

Bachelor of Science (Agriculture)

[Applicable w.e.f. Academic Session 2017-18]



TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in



TEERHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)

Delhi Road, Bagarpur, Moradabad (U.P)

Study & Evaluation Scheme Bachelor of Science SUMMARY

Programme : B.Sc. (Agriculture)
Duration : Four-year full time (Eight Semesters)
Medium : English/Hindi
Minimum Required Attendance : 75 %
Credit

Maximum Credit :
Minimum credit required for the degree :

Assessment :	Internal	External	Total			
	40	60	100			
Internal Evaluation (Theory Papers)	Class Test I	Class Test II	Class Test III	Assignment(s)	Attendance	Total
	Best two out of three					
	10 Marks	10 Marks	10 Marks	10 Marks	10 Marks	40 Marks

Evaluation of Practical :	Internal	External	Total
	50	50	100

Evaluation of Seminar/Viva :	Internal	External	Total
	50	50	100

Duration of Examination :	External	Internal
	3 hrs.	1½ hrs

(To qualify the course a student is required to secure a minimum of 45% marks in aggregate in each course including the semester-end examination and the teacher's continuous evaluation shall be essential for passing the course and earning its assigned credits. A candidate, who secures less than 45% marks in a course, shall be deemed to have failed in that course.)

Question Paper Structure

1. The question paper shall consist of six questions. All six are compulsory. First question shall be of short answer type (not exceeding 50 words). Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 2 marks each).
2. Remaining five questions will be one from each unit with internal choice. The student has to answer one of the two in each question. The weightage of Question No. 2 to 6 shall be 10 marks each.

Usually each question in the examination should be designed to have a numerical component, where part of syllabus.

SEMESTER- I, 2017-2018
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE
Teerthanker Mahaveer University

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG 107	Fundamentals of Agronomy	3	-	-	3	40	60	100
2.	BAG 102	Fundamentals of Soil Science	2	-	-	2	40	60	100
3.	BAG 104	Fundamentals of Horticulture	1	-	-	1	40	60	100
4.	BAG 108	Introduction to Forestry	1	-	-	1	40	60	100
5.	BAG 109	Fundamentals of Plant Biochemistry and Biotechnology	2	-	-	2	40	60	100
6.	BAG 110	Rural Sociology & Educational Psychology	2	-	-	2	40	60	100
7.	BAG 111	Introductory Biology*	1	-	-	1	40	60	100
	BAG 112	Elementary Mathematics*	2	-	-	2	40	60	100
8.	BAG 113	Agricultural Heritage	1	-	-	1	40	60	100
9.	BAG 199	English Communication & Soft Skills-I	3	-	2	4	50	50	100
10.	BAG 154	Fundamentals of Agronomy Practical	-	-	2	1	50	50	100
11.	BAG 152	Fundamentals of Soil Science Practical	-	-	2	1	50	50	100
12.	BAG 153	Fundamentals of Horticulture Practical	-	-	2	1	50	50	100
13.	BAG 155	Introduction to Forestry Practical	-	-	2	1	50	50	100
14.	BAG 156	Fundamentals of Plant Biochemistry and Biotechnology Practical	-	-	2	1	50	50	100
15.	BAG 157	Introductory Biology Practical	-	-	2	1	50	50	100
		Total	18	-	14	25	710	890	1600

*** R: Remedial Courses**

Students having Biology at intermediate (10+2) will register for Elementary Mathematics (BAG108) and students having Mathematics will register for Introductory Biology (BAG107) and other students will choose any one from above two courses.

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- II
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG 207	Fundamentals of Genetics	2	-	-	2	40	60	100
2.	BAG 208	Fundamentals of Plant Pathology and Agricultural Microbiology	3	-	-	3	40	60	100
3.	BAG 209	Soil and Water Conservation	1	-	-	1	40	60	100
4.	BAG 210	Fundamentals of Crop Physiology	1	-	-	1	40	60	100
5.	BAG 211	Fundamentals of Entomology	3	-	-	3	40	60	100
6.	BAG 212	Fundamentals of Agricultural Extension Education	3	-	-	3	40	60	100
7.	BAG 213	Fundamentals of Agricultural Economics	2	-	-	2	40	60	100
8.	BAG 231	Computer Fundamentals, Internet, MS-Office	4	-	-	4	40	60	100
9.	BAG 299	English Communication & Soft Skills-II	3	-	2	4	50	50	100
10.	BAG 253	Fundamentals of Genetics Practical	-	-	2	1	50	50	100
11.	BAG 254	Fundamentals of Plant Pathology and Agricultural Microbiology Practical	-	-	2	1	50	50	100
12.	BAG 255	Soil and Water Conservation Practical	-	-	2	1	50	50	100
13.	BAG 256	Fundamentals of Crop Physiology Practical	-	-	2	1	50	50	100
14.	BAG 257	Fundamentals of Entomology Practical	-	-	2	1	50	50	100
15.	BAG 258	Fundamentals of Agricultural Extension Education Practical	-	-	2	1	50	50	100
Total			22	-	14	29	710	890	1500

**COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- III
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University**

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG 308	Crop Production Technology – I (Kharif Crops)	1	-	-	1	40	60	100
2.	BAG 309	Fundamentals of Plant Breeding	1	-	-	1	40	60	100
3.	BAG 310	Agricultural Finance, Cooperation and Agri- Informatics	3	-	-	3	40	60	100
4.	BAG 311	Principles of Seed Technology	1	-	-	1	40	60	100
5.	BAG 312	Production Technology for Vegetables and Spices	1	-	-	1	40	60	100
6.	TMU – X01/BAG 801	Environmental Studies	4	-	-	4	40	60	100
7.	BAG 314	Statistical Methods	1	-	-	1	40	60	100
8.	BAG 315	Livestock and Poultry Management	1	-	-	1	40	60	100
9.	BAG 399	English Communication & Soft Skills-III	3	-	2	4	50	50	100
10.	BAG 358	Crop Production Technology – I (Kharif Crops) Practical	-	-	2	1	50	50	100
11	BAG 359	Fundamentals of Plant Breeding Practical	-	-	2	1	50	50	100
12	BAG 360	Agricultural Finance, Cooperation and Agri- Informatics Practical	-	-	2	1	50	50	100
13.	BAG 361	Principles of Seed Technology Practical	-	-	2	1	50	50	100
14.	BAG 362	Production Technology for Vegetables and Spices Practical	-	-	2	1	50	50	100
16.	BAG 364	Statistical Methods	-	-	2	1	50	50	100

		Practical							
17.	BAG 365	Livestock and Poultry Management Practical	-	-	2	1	50	50	100
18.	BAG 366	National Service Scheme	-	-	2	1	100	-	100
	Total		16	-	18	25	820	880	1700

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- IV
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG-410	Crop Production Technology –II (Rabi Crops)	2	-	-	2	40	60	100
2.	BAG-411	Production Technology for Ornamental Crops, Fruit crops, Plantation crops, MAP and Landscaping	3	-	-	3	40	60	100
3.	BAG-408	Farm Machinery and Power	1	-	-	1	40	60	100
4.	BAG-412	Agricultural Marketing Trade & Prices	1	-	-	1	40	60	100
5.	BAG-413	Introductory Agro-meteorology & Climate Change	1	-	-	1	40	60	100
6.	BAG-414	Farming System & Sustainable Agriculture	1	-	-	1	40	60	100
7.	BAG-499	English Communication & Soft Skills-IV	3	-	2	4	50	50	100
8.	BAG 415/BAG 8E2	Renewable Energy and Green Technology	1	-	-	1	40	60	100
9.	BAG-455	Crop Production Technology –II (Rabi Crops)	-	-	2	1	50	50	100
10.	BAG-456	Production Technology for Ornamental Crops, Fruit Plantation Crops MAPs and	-	-	2	1	50	50	100

		Landscaping Practical							
11.	BAG-457	Farm Machinery and Power Practical	-	-	2	1	50	50	100
12.	BAG-458	Agricultural Marketing Trade & Prices Practical	-	-	2	1	50	50	100
13.	BAG-459	Introductory Agro-meteorology & Climate Change Practical	-	-	2	1	50	50	100
14.	BAG-460	Renewable Energy and Green Technology Practical	-	-	2	1	50	50	100
Elective Courses									
1	BAGE401	Agribusiness Management	1	-	-	1	40	60	100
2	BAGE402	Agrochemicals	1	-	-	1	40	60	100
3	BAGE403	Commercial Plant Breeding	1	-	-	1	40	60	100
4	BAGE404	Landscaping	1	-	-	1	40	60	100
5	BAGE451	Agribusiness Management Practical	-	-	2	1	50	50	100
6	BAGE452	Agrochemicals Practical	-	-	2	1	50	50	100
7	BAGE453	Commercial Plant Breeding Practical	-	-	2	1	50	50	100
8	BAGE454	Landscaping Practical	-	-	2	1	50	50	100
	Total		16	-	20	26	900	1100	2000

A student has to register 3 elective courses in the IV semester

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- V
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG-509	Principles of Integrated Pest and Disease Management	1	-	-	1	40	60	100
2.	BAG-510	Manures, Fertilizers and Soil Fertility Management	1	-	-	1	40	60	100
3.	BAG-511	Pests of Crops and Stored Grain and their Management and Management of Beneficial insects	2	-	-	2	40	60	100
4.	BAG-512	Diseases of Field and Horticultural Crops and their Management -I	1	-	-	1	40	60	100
5.	BAG-513	Crop Improvement-I (<i>Kharif Crops</i>)	1	-	-	1	40	60	100
6.	BAG-514	Entrepreneurship Development and Business Communication	1	-	-	1	40	60	100
7.	BAG-515	Geoinformatics and Nano-technology and Precision Farming	1	-	-	1	40	60	100
8.	BAG-516	Intellectual Property Rights	1	-	-	1	40	60	100
9.	BAG-555	Principles of Integrated Pest and Disease Management Practical	-	-	2	1	50	50	100
10.	BAG-556	Manures, Fertilizers and Soil Fertility Management Practical	-	-	2	1	50	50	100
11.	BAG-557	Pests of Crops and Stored Grain and their Management and Management of	-	-	2	1	50	50	100

		Beneficial insects Practical							
12.	BAG-558	Diseases of Field and Horticultural Crops and their Management –I Practical	-	-	2	1	50	50	100
13.	BAG-559	Crop Improvement-I (<i>Kharif Crops</i>) Practical	-	-	2	1	50	50	100
14.	BAG-560	Entrepreneurship Development and Business Communication Practical	-	-	2	1	50	50	100
15.	BAG-561	Geoinformatics and Nano-technology and Precision Farming Practical	-	-	2	1	50	50	100
16.	BAG-562	Practical Crop Production – I (<i>Kharif</i> crops)	-	-	2	1	50	50	100
17.	BAG-563	Physical Education and Yoga Practices-I	-	-	2	1	100	-	100
Elective Courses									
1	BAGE 501	Food Safety and Standards	1	-	-	1	40	60	100
2	BAGE 502	Biopesticides and Biofertilizers	1	-	-	1	40	60	100
3	BAGE 503	Protected Cultivation	1	-	-	1	40	60	100
4	BAGE 504	Micro propagation and Technologies	1	-	-	1	40	60	100
5	BAGE 551	Food Safety and Standards Practical	-	-	2	1	50	50	100
6	BAGE 552	Biopesticides and Biofertilizers Practical	-	-	2	1	50	50	100
7	BAGE 553	Protected Cultivation Practical	-	-	2	1	50	50	100
8	BAGE 554	Micro propagation and Technologies Practical	-	-	2	1	50	50	100
		Total Credit	12	-	24	24	1090	1210	2300

A student has to register 3 elective courses in the V semester

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- VI
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG-607	Rainfed Agriculture, Watershed Management and Organic Farming	1	-	-	1	40	60	100
2.	BAG-608	Protected Cultivation and Secondary Agriculture	1	-	-	1	40	60	100
3.	BAG-609	Diseases of Field and Horticultural Crops and their Management-II	2	-	-	2	40	60	100
4.	BAG-610	Post-harvest Management and Value Addition of Fruits and Vegetables	1	-	-	1	40	60	100
5.	BAG-611	Crop Improvement-II (<i>Rabi crops</i>)	1	-	-	1	40	60	100
6.	BAG-612	Farm Management, Production & Resource Economics	1	-	-	1	40	60	100
7.	BAG-613	Problematic Soils and their Management	2	-	-	1	40	60	100
8.	BAG-614	Principles of Food Science and Nutrition	1	-	-	1	40	60	100
9.	BAG-657	Rainfed Agriculture and Watershed Management and Organic Farming Practical	-	-	2	1	50	50	100
10.	BAG-658	Protected Cultivation and Secondary Agriculture Practical	-	-	2	1	50	50	100

11.	BAG-659	Diseases of Field and Horticultural Crops and their Management-II Practical	-	-	2	1	50	50	100
12.	BAG-660	Post-harvest Management and Value Addition of Fruits and Vegetables Practical	-	-	2	1	50	50	100
13.	BAG-661	Crop Improvement-II (<i>Rabi crops</i>) Practical	-	-	2	1	50	50	100
14.	BAG-662	Farm Management, Production & Resource Economics Practical	-	-	2	1	50	50	100
15	BAG-663	Practical Crop Production –II (<i>Rabi crops</i>)	-	-	2	1	50	50	100
16	BAG-664	Educational Tour	-	-	2	1	100	-	100
Elective Courses									
1	BAGE 601	Hi-tech. Horticulture	1	-	-	1	40	60	100
2	BAGE 602	Weed Management	1	-	-	1	40	60	100
3	BAGE 603	System Simulation and Agro-advisory	1	-	-	1	40	60	100
4	BAGE 604	Agricultural Journalism	1	-	-	1	40	60	100
5	BAGE 651	Hi-tech. Horticulture Practical	-	-	2	1	50	50	100
6	BAGE 652	Weed Management Practical	-	-	2	1	50	50	100
7	BAGE 653	System Simulation and Agro-advisory Practical	-	-	2	1	50	50	100
8	BAGE 654	Agricultural Journalism Practical	-	-	2	1	50	50	100
	Total		13	-	22	24	1040	1160	2200

A student has to register 3 elective courses in the VI semester

**COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- VII
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University**

VII Semester			
Sr.No.	Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE &AIA)-BAG-754		
	Activities	No. of weeks	Credit Hours
1	General orientation & On campus training by different faculties	1	14
2	Village attachment	8	
	Unit attachment in Univ./ College. KVK/ Research Station Attachment	5	
3	Plant clinic	2	02
	Agro-Industrial Attachment	3	04
4	Project Report Preparation, Presentation and Evaluation	1	
Total weeks for RAWE & AIA		20	20

- **Agro- Industrial Attachment:** The students would be attached with the agro-industries for a period of 3 weeks to get an experience of the industrial environment and working.

RAWE Component-I

Village Attachment Training Programme

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

RAWE Component –II
Agro Industrial Attachment

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

Activities and Tasks during Agro-Industrial Attachment Programme

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

Evaluation

Internal Evaluation (100 marks)

The above mentioned RAWE programme conducted under the supervision of concerned faculty members and would be evaluated by the 3 internal faculty members on a 8 point scale as mentioned below.

Plant Health Clinic	Field Visits	Unit attachment in Univ./ College. KVK/ Research Station Attachment	Agro-industrial Attachment	Village Attachment	Report/Presentation	Viva	Attendance	Total Internal
10 marks	10 marks	10 marks	10 marks	30 marks	10 marks	10 marks	10 marks	100 marks

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- VIII
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG-852	Production Technology for Bioagents and Biofertilizer	-	-	20	10	100	-	100
2.	BAG-853	Seed Production and Technology	-	-	20	10	100	-	100
3.	BAG-854	Mushroom Cultivation Technology	-	-	20	10	100	-	100
4.	BAG-855	Soil, Plant, Water and Seed Testing	-	-	20	10	100	-	100
5.	BAG-856	Commercial Beekeeping	-	-	20	10	100	-	100
6	BAG-857	Poultry Production Technology	-	-	20	10	100	-	100
7	BAG-858	Commercial Horticulture	-	-	20	10	100	-	100
8	BAG-859	Floriculture and Landscaping	-	-	20	10	100	-	100
9	BAG-860	Food Processing	-	-	20	10	100	-	100
10	BAG-861	Agriculture Waste Management	-	-	20	10	100	-	100
11	BAG-862	Organic Production Technology	-	-	20	10	100	-	100
12	BAG-863	Commercial Sericulture	-	-	20	10	100	-	100
		Total	-	-	40	20	200	-	200

A student has to register 20 credits opting for two modules of 10 credits each (total 20 credits) from the package of modules in the VIII semester

Evaluation

Internal Evaluation (100 marks)

The above courses be conducted under the supervision of 4 faculty members and by the attached unit and would be evaluated on a 7 point scale as mentioned below.

Evaluation

Sr. No.	Description	Marks
Pre Final Examination		
1	Business Planning and Designing	05
2	Planning for Production	05
3	Organization of production, quality and schedule adherence	15
4	Written Examination	20
5	Student performance (class assessment, regularity etc.)	05
	Sub Total A	50
Final Examination		
6	Report writing and records	20
7	Oral examination or Power point presentation	30
	Sub Total B	50
	Total (A+B)	100

Fundamentals of Agronomy

L T P C
3 0 0 3

Course Code: BAG 107

Objective: Aims at obtaining maximum production at minimum cost. Exploits the knowledge developed by basic and allied sciences for higher crop production. Agronomy is a dynamic discipline. With the advancement of knowledge and better understanding of plant and environment, agricultural practices are modified or new practices developed for high productivity.

Unit 1 (8 Hours)

Agronomy and its scope, seeds and sowing, tillage and tith, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil-plant-water relationship,

Unit II (8 Hours)

Crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, water logging.

Unit III (8 Hours)

Weeds- importance, classification, crop weed competition, concepts of weed management- principles and methods

Unit IV (8 Hours)

Herbicides- classification, selectivity and resistance, allelopathy. Growth and development of crops, factors affecting growth and development, plant ideotypes, principles, adaptation and distribution of crops,

Unit V (8 Hours)

Crop rotation and its crop management technologies in problematic areas, harvesting and threshing of crops.

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.
2. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
3. Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy- Kalyani Publisher

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.

Fundamentals of Soil Science

L T P C
2 0 0 2

Course Code: BAG 102

Objective: Soil science studies how soil is formed and how it functions and interacts with the biosphere and what role it plays in the development of natural and cultural landscapes.

Course Contents:

Unit 1 (4 Hours)

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile

Unit 2 (4 Hours)

Components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy. classification and Soils of India

Unit 3 (4 Hours)

Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth, Soil temperature; source, amount and flow of heat in soil; effect on plant growth

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text Books:

1. Introductory Soil Science- D.K. Das. Kalyani Publisher.
2. Fundamentals of Soil science-Indian Society of Soil Science.
3. Textbook of Soil Science- T. Biswas , S. Mukherjee Tata McGraw - Hill Publishing Company Limited.

Reference Books:

1. Soil Fertility and Fertilizer Use- Samuel L. Tisdale and Werner L. Nelson Macmillan Coll Div.
2. Nature and Property of Soil-N. C. Braby. Macmillan Publishing Company Incorporated
3. Soil Science- Mangat Rai Anmol Publications Pvt. Ltd.

Fundamentals of Horticulture

L T P C
1 0 0 1

Course Code: BAG 104

Objective: Horticulturists apply their knowledge, skills, and technologies used to grow intensively produced plants for human food and non-food uses and for social needs.

Unit 1 (4 Hours)

Scope and importance, classification of horticultural crops and nutritive value, area and production, exports and imports, fruit and vegetable zones of India and of different states, nursery techniques and their management, soil and climate.

Unit 2 (4 Hours)

Vegetable gardens, nutrition and kitchen garden and other types of gardens – principles, planning and layout, management of orchards, planting systems and planting densities.

Unit 3 (4 Hours)

Principles objectives, types and methods of pruning and training of fruit crops, types and use of growth regulators in horticulture, water management– irrigation methods, merits and demerits, weed management, fertility management in horticultural crops-manures and fertilizers, different methods of application

Unit 4 (4 Hours)

Cropping systems, intercropping, multi-tier cropping, mulching– objectives, types merits and demerits, Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness.

Unit 5 (4 Hours)

Rejuvenation of old orchards, top working, frame working, principles of organic farming, market chain management. Production and practices for fruit, vegetable and floriculture crops.

Text Books:

1. Basic Horticulture-Jitendra Singh. Kalyani Publisher
2. Horticulture at a glance- A. Salaria. Jain Brothers
3. Instant Horticulture-S. N. Gupta. Jain Brothers

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)

Introduction to Forestry

L T P C
1 0 0 1

Course Code: BAG 108

Objective- Trees play a crucial role in almost all terrestrial ecosystems and provide a range of products and services to rural and urban people. As natural vegetation is cleared for agriculture and other types of development, the benefits that trees provide are best sustained by integrating trees into agriculturally productive landscapes - a practice known as agroforestry.

Unit 1 (4 Hours)

Agroforestry – definition, objectives and potential. Distinction between agroforestry and social forestry. Status of Indian forests and role in India farming systems.

Unit II (4 Hours)

Agroforestry system, sub-system and practice: agri-silviculture, silvipastoral, horti-silviculture, horti-silvipastoral

Unit III (4 Hours)

Shifting cultivation, taungya, home gardens, alley cropping, intercropping, wind breaks, shelterbelts and energy plantations. Planning for agroforestry – constraints, diagnosis and design methodology

Unit IV (4 Hours)

Selection of tree crop species for agro-forestry. Agroforestry projects – national, overseas, MPTS – their management practices

Unit V (4 Hours)

Economics of cultivation – nursery and planting (*Acacia catechu*, *Dalbergiasissoo*, Tectona, Populus, Morus, Grewia, Eucalyptus, Quercus spp. and bamboo, tamarind, neem etc.).

Text Books

1. Indian wood technology, Brown, H., IBD Publishers, Dehra Dun.
2. Agroforestry – Principles and practices, Diwedi, A.P. Oxford and IBH Publishing Co., New Delhi.
3. Principles and Practice of Silviculture, Khanna. L.S., IBD Publishers, Dehra Dun.
4. Hand Book of Forestry, Negi. S.S., IBD Publishers, Dehra Dun.

Reference Books:

1. Heygreen, G. and J.L. Bowyer, Forest products and wood science. The Ohio State University Press, Ames.
2. Lal, J.B. India's forest – Myth and reality. Natraj Publishers, Dehra Dun. Journals.
3. Indian Journal of Forestry.
4. Indian Journal of Agroforestry.

Fundamentals of Plant Biochemistry and Biotechnology

L T P C
2 0 0 2

Course Code: BAG 109

Objective: The study of biochemistry helps one understand the actual chemical concepts of functioning of various body processes and physiology. Agricultural microbiology is a branch of microbiology dealing with plant-associated microbes and plant and animal diseases. It also deals with the microbiology of soil fertility, such as microbial degradation of organic matter and soil nutrient transformations.

Unit-1

(4 Hours)

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids.

Unit 2

(4 Hours)

Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes. Nucleic acids: Importance and classification.

Unit3

(4 Hours)

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

Unit 4

(4 Hours)

Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; somatic hybridization and cybrids.

Unit5

(4 Hours)

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

Text books:

1. Agricultural microbiology, D. J. Bagyaraj, g. Rangaswami phi learning Pvt. Ltd.,
2. Principles of Biochemistry, David Lee Nelson, Michael M. Cox. W.H. Freeman
3. Agricultural Microbiology Nilangshu Mukherjee, Tapash Ghosh, Kalyani Publishers,
4. Atlas, R.M. 1984. Microbiology : Fundamentals and Applications, Collier Macmillan, London.

Reference books:

1. Soil Microbiology Rao Oxford and IBH Publishing,
2. Agricultural Applications of Microbiology Neelima Rajvaidya, Dilip Kumar Markandey APH Publishing
3. Fundamentals of Agricultural Microbiology K. C. Mahanta Oxford & IBH Publishing,

Rural Sociology and Educational Psychology

L T P C
2 0 0 2

Course Code: BAG 110

Objective: The prime objective of Rural Sociology should be to make a scientific systematic and comprehensive study of the rural social organization of its structure function and objective tendencies of development. To familiarize the student with the relevant terminologies of psychology, so as to be able to outline and discuss conceptual framework, theories and experimental data.

Unit-1 (4 Hours)

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

Unit-II (4 Hours)

Rural society, Social Groups, Social Stratification, Culture concept, Social Institution,

Unit-III (4 Hours)

Social Change & Development. Educational psychology: Meaning & its importance in agriculture extension.

Unit-IV (4 Hours)

Behavior: Cognitive, affective, psychomotor domain,

Unit-V (4 Hours)

Personality, Learning, Motivation, Theories of Motivation, Intelligence.

Text books:

1. Introductory Rural Sociology: A synopsis of concepts and principles. J. B. Chitambar. New Age International.
2. Rural Sociology and Psychology in Extension Education. N.K. Tripathi Aman Publishing House.
3. Fundamentals of Extension Education and Rural Development (In Hindi). B. D. Tyagi, Dr S.K. Arun and Dr Manju Tyagi. Rama Publishing House.

Reference books:

1. Rural Sociology and Psychology. B. D. Tyagi, Anshu and Parul Tyagi. Rama Publishing House.
2. Rural Sociology J. M. Gillette. Mcmillon Publishers.
3. Extension communication and management. G. L. Ray. Kalyani Publication.

Introductory Biology

L T P C
1 0 0 1

Course Code: BAG 111

Objective: To introduces the students of major principles of evolutionary theory and ranges from the origins of life, through evolution of plants and animals to the evolution of behaviour. To develop practical biological skills of students.

Unit-1 (4 Hours)

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

Unit-II (4 Hours)

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

Unit-III (4 Hours)

Morphology of flowering plants.

Unit-IV (4 Hours)

Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae.

Unit-V (4 Hours)

Role of animals in agriculture.

Text Books:

- 1 Cytogenetics, Evolution and Biostatistics, P S Chandel & R S Shukla, S. Chand Publishing
- 2 Fundamentals of Genetics-B.D. Singh, Kalyani Publishers
3. Elementary Biochemistry, J L Jain, Nitin Jain & Sunjay Jain, S. Chand Publishing
4. Modern Practical Botany , B P Pandey, S. Chand Publishing

Reference Books:

1. Concept of Biology, Eldon D. Enger, Frederick C. ross, David B. Bailey, McGraw Hill Education
2. Principles of Genetics-Phundan Singh, Kalyani Publishers
3. Klug. W.S. and Cummings, M.R. 1983. Concepts of Genetics. Charles E. Merrill Publishing Co., London.

Course Code: BAG 112

Objective: To understand the basic rules of logic. To develop the ability to problem solving and modeling skills. Ability to formulate a mathematical statement precisely.

Unit 1 **(4 Hours)**

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

Unit 2 **(4 Hours)**

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

Unit 3 **(4 Hours)**

Differential Calculus : Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions.

Unit 4 **(4 Hours)**

Differentiation : Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it. Maxima and Minima of the functions of the form $y=f(x)$ (Simple problems based on it).

Unit 5 **(4 Hours)**

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

Text books:

1. Applied Mathematics-I , H. R. Luthra , Bharat Bharti Publication.
2. A Problem Book in Mathematical Analysis, G. N. Berman CBS,
3. Problems in Mathematics: V. Govorov, P. Dybov, N. Miroshin and S. Smirnova, CBS

Reference books:

1. Mathematics , class XII Vol-I and Vol-II , R.D. Sharma , Dhanpat Rai Publications.
2. Linear Algebra A Geometric Approach, S. Kumaresan, Prentice Hall India Learning Private Limited.
3. Elementary Mathematics, G. Dorofeev, M.Potapov, N. Rozov, CBS Publisher.

Agricultural Heritage

L T P C
1 0 0 1

Course Code: BAG 113

Unit-1

(4 Hours)

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture;

Unit-II

(4 Hours)

Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modern era;

Unit-III

(4 Hours)

Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world;

Unit-IV

(4 Hours)

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

Unit-V

(4 Hours)

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

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.
2. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
3. Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy-Kalyani Publisher
4. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri- Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.
4. Agricultural Extension: Worldwide Innovations R. Saravanan, New India Publishing,

English Communication & Soft Skills – I

L T P C
3 0 2 4

Course Code: BAG 199

Objective: To comprehend and communicate in simple English.

Course Content

Module -1: Introduction to English language (6 Hours)

- a) Role and significance of English language in the present scenario
- b) English Language: Its relevance for the Indian industry
- c) Introduction to Listening, Speaking, Reading, Writing (LSRW) and benchmarking of the class
[Note: As part of classroom activity, a guest lecture from an industry representative/Director (CRC) and maintaining progress card for each student on LSRW for future reference]

Module -2: Phonetics& Functional Grammar (14 Hours)

- a) Pronunciation and daily usage correction (speak with differences between p/b, s/sh, f/ph, t/d, v/w sounds)
- b) Parts of speech, articles, tenses, verbs and modals
- c) Practice of daily use words, numerals and tongue twisters
- d) Vocabulary building, Construction of simple sentences: Basic sentence pattern, subject and Predicate

[Note: As part of classroom activity, language games, tongue & jaw exercises, simple passages from the newspapers for oral drills in the classroom and practice tests (written and oral)]

Module -3: English Communication- About Myself (14 Hours)

- a) Let's talk, making conversation, meeting and greeting
- b) Introducing myself, my family and my friends
- c) My opinions, my likes and dislikes
- d) Life at college, hostel and workplace

[Note: As part of classroom activity, use the Workbook for reference for classroom and home assignments, carry out practice tests (written and oral)]

Module -4: Personality Development-I (8 Hours)

- a) First impression: Dressing sense, good manners, speaking well and respectably
- b) Positive Attitude: Being happy and alert, a good listener and a good friend
- c) Consultation among peers: Soliciting advice and giving advice
- d) Goal setting, confidence building& handling rejection

[Note: As part of classroom activity, refer Workbook for classroom and home assignments; carry out practice tests (written and oral)]

First Semester Outcome:

1. Students will realise the significance of English for their career progression
2. Benchmarking the students in the first semester to observe their progression in terms of LSRW
3. Students will be able to understand distinct sounds and improve pronunciation
4. Students will improve their English vocabulary of daily usage
5. Students will be able to form simple sentences to talk about themselves, friends and relatives.
6. Students will be able to imbibe the pre-requisites of personality development.

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Workbook Assignments & Viva</i>	<i>Total</i>
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

External Assessment: 50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

The external evaluation would also be done by the external examiner based on the Practical and viva conducted during the examination.

*** Practical Exam Paper Structure: (Duration 01 hr)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

Reference Books:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers
3. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi
4. Communication Skills by Sanjay Kumar &PushpLata, Oxford University Press

Fundamentals of Agronomy Practical

L T P C
0 0 2 1

Course code: BAG 154

LIST OF PRACTICALS

Practical

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

Evaluation of practical examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Soil Science Practical

L T P C
0 0 2 1

Course Code: BAG 152

LIST OF PRACTICALS

Practical

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

Evaluation of practical examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Horticulture Practical

L T P C
0 0 2 1

Course Code: BAG 153 Practical

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

Evaluation of Practical Examination: Internal Evaluation (50 marks)

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Introduction to Forestry Practical

L T P C
0 0 2 1

Course Code: BAG 155

Practical

1. Identification and seeds and seedlings of multipurpose tree species.
2. Nursery practices for poplar, *Grewiaoptiva*, *Morus alba*,
3. Nursery practices for *Acacia catechu*, *Dalbergiasissoo*, robinia, leucaena etc.
4. Visit to agro-forestry fields to study the compatibility of MPTS with agricultural crops: silvipastoral,
5. alley cropping, horti-silviculture, agro-silvipasture, fuel and fodder blocks.
6. Visit to social forestry plantations – railway line plantations, canal plantations,
7. Visit to roadside plantations,
8. Visit to industrial plantations and shelterbelts.
9. Rapid assessment of farmers needs for green manure, fodder, fuel wood in selected villages.
10. Economics and marketing of products raised in agro-forestry systems.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Plant Biochemistry and Biotechnology Practical

Course Code: BAG 156

L T P C
0 0 2 1

Practical

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Introductory Biology Practical

L T P C
0 0 2 1

Course Code: BAG 157

Practical

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Genetics

L T P C
2 0 0 2

Course Code: BAG207

Objective: Plant genetic resources are the backbone of agriculture which play a positive and unique role in the development of new cultivars including the restructuring of existing ones.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Chromosomal theory of inheritance- cell cycle and cell division- mitosis and meiosis. Probability and Chi-square. Dominance relationships, Epistatic interactions with example. Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics.

Unit 3 (4 Hours)

Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics.

Unit 4 (4 Hours)

Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance.

Unit 5 (4 Hours)

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

Text Books:

1. Fundamentals of Genetics-B.D. Singh, Kalyani Publishers
2. Principles of Genetics-Phundan Singh, Kalyani Publishers
3. Principles of Cytogenetics-P.K.Gupta

Reference Books:

1. Singh, B.D. 1990. Fundamentals of Genetics. Kalyani Publishers, Ludhiana.
2. Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi.
3. Klug. W.S. and Cummings, M.R. 1983. Concepts of Genetics. Charles E. Merrill Publishing Co., London.

Fundamentals of Plant Pathology and Agricultural Microbiology

L	T	P	C
3	0	0	3

Course code: BAG 208

Objective- Plant Pathology is one among the branches of agricultural science that deals with cases, etiology, resulting losses and management of plant diseases. The study of biochemistry helps one understand the actual chemical concepts of functioning of various body processes and physiology. Agricultural microbiology is a branch of microbiology dealing with plant-associated microbes and plant and animal diseases. It also deals with the microbiology of soil fertility, such as microbial degradation of organic matter and soil nutrient transformations.

Unit 1

(8 Hours)

Introduction to the science of phytopathology, its objectives, scope and historical background. Classification of plant diseases, symptoms, signs, and related terminology. Parasitic causes of plant diseases (fungi, bacteria, viruses, phytoplasma, protozoa, algae and flowering parasitic plants), their characteristics and classification.

Unit 2

(8 Hours)

Non-parasitic causes of plant diseases. Infection process. Survival and dispersal of plant pathogens. Plant disease epidemiology, forecasting and disease assessment. Principles and methods of plant disease management.

Unit 3

(8 Hours)

Fungicides classification based on chemical nature, Commonly used fungicides, bactericides and nematicides. Integrated plant disease management. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction; plasmids, transposon.

Unit 4

(8 Hours)

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

Unit 5

(8 Hours)

Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere.

Text Books:

1. Plant Pathology – P.D. Sharma. Rastogi Publications.
2. Crop Diseases and Their Management. H.S. Chaube and V. S. Pundhir PHI Learning Private Limited.
3. Essentials of Plant Pathology by V. N. Pathak, Prakash Publ., Jaipur (1972).
4. Agricultural microbiology, D. J. Bagyaraj, g. Rangaswami phi learning Pvt. Ltd.,
5. Principles of Biochemistry, David Lee Nelson, Michael M. Cox. W.H. Freeman

6. Agricultural Microbiology Nilangshu Mukherjee, Tapash Ghosh, Kalyani Publishers,

Reference Books:

1. Plant pathology by G. N. Agrios, Elsevier Academic press, London.
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.
4. Soil Microbiology Rao Oxford and IBH Publishing,
5. Agricultural Applications of Microbiology Neelima Rajvaidya, Dilip Kumar Markandey APH Publishing
6. Fundamentals of Agricultural Microbiology K. C. Mahanta Oxford & IBH Publishing,

Soil and Water Conservation

L T P C
1 0 0 1

Course code: BAG209

Objective: This course is designed to assist students to develop a broad understanding about the Conservation and Management of Soil and Water Resources.

Unit 1 (4 Hours)

Soil erosion - Introduction, causes and types - geological and accelerated erosion, agents, factors affecting and effects of erosion. Water erosion - Mechanics and forms - splash, sheet, rill, gully, ravine and stream bank erosion. Gullies - Classification, stages of development.

Unit 2 (4 Hours)

Soil loss estimation – Universal soil loss equation (USLE) and modified USLE. Rainfall erosivity - estimation by $KE > 25$ and EI_{30} methods. Soil erodibility - topography, crop management and conservation practice factors.

Unit 3 (4 Hours)

Measurement of soil erosion - Runoff plots, soil samplers. Water erosion control measures - agronomical measures - contour farming, strip cropping, conservation tillage and mulching. Engineering measures– Bunds and terraces. Bunds - contour and graded bunds - design and surplussing arrangements.

Unit 4 (4 Hours)

Terraces - level and graded broad base terraces, bench terraces - planning, design and layout procedure, contour stonewall and trenching. Gully and ravine reclamation - principles of gully control - vegetative measures, temporary structures and diversion drains. Grassed waterways and design.

Unit 5 (4 Hours)

Wind erosion- Factors affecting, mechanics, soil loss estimation and control measures - vegetative, mechanical measures, wind breaks and shelter belts and stabilization of sand dunes. Land capability classification. Rate of sedimentation, silt monitoring and storage loss in tanks.

Suggested Readings

Text Books:

1. Principles of soil conservation and water management Hanumappa Ramappa Arakeri, Roy Luther Donahue Rowman & Allanheld
2. Watershed Management Vijay P. Singh, Ram Narayan Yadava Allied Publishers
3. Handbook of Agriculture. ICAR.

Reference Books:

1. Principles of Soil Conservation and Management, Humberto Blanco-Canqui, Rattan Lal Springer,
2. Advances in Soil and Water Conservation Francis J. Pierce CRC Press.
3. Integrated Watershed Management in Rainfed Agriculture, Suhas P. Wani, Johan Rockstrom, Kanwar Lal Sahrawat, CRC Press.

Fundamentals of Crop Physiology

L	T	P	C
1	0	0	1

Course code: BAG 210

Objective- This course is designed to assist students to develop a broad understanding about the functioning of plants.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms.

Unit 3 (4 Hours)

Photosynthesis: Light and Dark reactions, C₃, C₄ and CAM plants. Respiration: Glycolysis, TCA cycle and electron transport chain.

Unit 4 (4 Hours)

Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses.

Unit 5 (4 Hours)

Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.

Text Books:

1. Gardner, F.P., Pearce, R.B. and Mitchell, R.L. 1988. Physiology of Crop Plants. Scientific Publishers, Jodhpur.
2. Pessaraki, M. 2002. Handbook of Plant and Crop Physiology. Marcel and Dekker Inc. New York
3. Handbook of Plant and Crop Physiology, Mohammad Pessaraki CRC Press,
4. Plant Physiology Gupta Oxford and IBH Publishing
5. Plant Physiology Hari Shankar Srivastava Rastogi Publications

Reference Books:

1. Crop Physiology, Girish Chand Srivastava Biotech Books
2. Crop Physiology S. R. Ghadekar, C. N. Chore, R. K. Patil Agromet Publishers
3. A Text Book of Crop Physiology, A.B. Jadhav, S.B. Borgaonkar, Shri Rajlaxmi Prakashan,

Fundamentals of Entomology

L	T	P	C
3	0	0	3

Course code: BAG 211

Objective: Study of Entomology aims and understanding insect body organization and function, their habitats, behaviours, relation to one another and to the surrounding in which they live, their classification, and their economic importance. Entomology is the study of insects and their relationship to humans, the environment, and other organisms. Entomologists make great contributions to such diverse fields as agriculture, chemistry, biology, human/animal health, molecular science, criminology, and forensics.

Unit 1 (8 Hours)

Introduction to phylum arthropoda. Importance of class Insecta. Insect dominance. History of entomology in India, Importance of entomology in different fields. Definition, division and scope of entomology.

Unit 2 (8 Hours)

Comparative account of external morphonology-types of mouth parts, antennae, legs, wings and genitalia. Structure, function of cuticle & moulting and body segmentation,

Unit 3 (8 Hours)

Anatomy of digestive, Circulatory, Sensory, respiratory, glandular, excretory, nervous and reproductive systems.

Unit 4 (8 Hours)

Types of reproduction. Postembryonic development-eclosion. Matamorphosis. Types of egg larvae and pupa.

Unit 5 (8 Hours)

Classification of insects upto orders, sub-order and families of economic importance and their distinguished characters. Plant mites – morphological features, important families with examples.

Text books: 1. Insecta: An Introduction- K. N. Ragumoorthi, V. Balasubramani, M.R. Srinivasan, N. Natarajan. A.E. Publications

2. The Insect: Structure and Function- R.F. Chapman. Cambridge University Press.

3. Elements of Entomology: Rajendra Singh. Rastogi Publications

4. Mani, M.S. 1968. *General entomology*. Oxford and IBH Publishing Co. Pvt Ltd., New Delhi, 912p.

5. Snodgrass, R.E. 2001. Principles of Insect Morphology. CBS Publishers and Distributors, New Delhi

Reference books: 1. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher

2. Agricultural Pests of South Asia and Their Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher

3. Principles of Insect Morphology. R. E. Snodgrass. Cornell University Press.

4. Pedigo, L.P. 1999. *Entomology and pest management*. III Edition. Prentice Hall, New Jersey, USA, 691p.

Fundamentals of Agricultural Extension Education

L	T	P	C
3	0	0	3

Course code: BAG 212

Objective: The main objective of the course is to provide the knowledge regarding agriculture extension methodologies, use of innovative information sources, entrepreneurship development and government policy on Small and Medium Enterprises.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.).

Unit 3 (4 Hours)

New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc. Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D.

Unit 4 (4 Hours)

Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods,

Unit 5 (4 Hours)

ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Text Books:

1. Textbook of Agricultural Extension Management, C. Karthikeyan, R. Sendikumar And D. Jaganathan Atlantic Publishers & Dist
2. Agricultural Extension (scope & Methods) and Community Development, Jagdish Saran Garg Gya Prasad,
3. Agricultural Extension: Worldwide Innovations R. Saravanan New India Publishing,

Reference Books:

1. Agricultural Extension Systems: Issues and Approaches B.S. Hansra (ed.) Concept Publishing Company
2. Handbook of Agriculture. ICAR Publication.
3. A Textbook of Agricultural Extension Management, by C. Karthikeyan, R. Sendikumar, D. Jaganathan, Atlantic.

Fundamentals of Agricultural Economics

L	T	P	C
2	0	0	2

Course code: BAG 213

Objective: The basic objective of this course is to provide fundamental knowledge about Agriculture Economics.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

Production: process, creation of utility, factors of production, input output relationship. *Laws of returns:* Law of variable proportions and law of returns to scale. *Cost:* Cost concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets.

Unit 4 (4 Hours)

Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. *National income:* Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control.

Unit 5 (4 Hours)

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

Text Books

1. Principles of Agricultural Economics, David Colman and Trevor Young, Cambridge University Press
2. A Textbook of Agricultural Economics. C.B. Singh and R.K. Singh (Author)
3. Agricultural Economy of India by S.Sankaran

Reference Books

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.
2. Agricultural Finance And Management Subba Reddy
3. Modern Economic Theory” by Dewett K.K.

Computer Fundamentals, Internet, & MS-Office

L	T	P	C
4	0	0	4

Course Code: BAG 231

Objective: To give the basic knowledge of Computer hardware, Internet and application software with DOS keys to the students.

Course Contents

Unit I:

Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional components of a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, Bar Code Reader b) Output Devices – Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD, ASCII and EBCDIC Codes. **(Lecture08)**

Unit II:

MS – DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR(CD),CLS, COPY, DATE, DEL(ERASE), DIR, CHARACTER, EXIT,MKDIR(MD), REM, RENAME(REN), RMDIR(RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT,HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT,XCOPY.

Introduction of Internet: History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails. **(Lecture 08)**

Unit III:

MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge. **(Lecture 08)**

Unit IV:

MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping , Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets.

MS Power Point: Starting MS–Power Point., Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS – Access: creating table and database. **(Lecture 08)**

Unit V:

MS-POWERPOINT: Starting MS–Power Point,, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents.

(Lecture 08)

Course outcomes:

After studying this course, you should be able to:

- Understand the fundamental hardware components that make up a computer’s hardware and the role of each of these components
- Understand the difference between an operating system and an application program, and what each is used for in a computer
- Describe some examples of computers and state the effect that the use of computer technology has had on some common products
- Be familiar with software applications
- Understand file management
- Accomplish creating basic documents, worksheets, presentations with their properties.
- Experience working with email and recognize email netiquette.

Text Books:

1. Sinha P.K., Computer Fundamentals, BPB Publishing.
2. Bill Bruck., The Essentials Office 2000 Book, BPB Publishing.
3. Leon A. & Leon M., Introductions to Computers, Vikas Publications.

Reference Books:

1. Peter Norton_s, Introductions to Computers, Tata McGraw Hill.
2. Price Michael, Office in Easy Steps, TMH Publication.

***Latest editions of all the suggested books are recommended.**

Course Code: BAG 299

Objective: To build vocabulary, make simple sentences and communicate freely in simple English and overall professional development.

Course Content

Module -1: Basic Communication & Soft Skills (6 Hours)

- a) Reading comprehension
- b) Building conversational skills
- c) Verbal & Non-verbal communication

[Note: As part of classroom activity, review and recap the last semester and carry out (oral and written) practice test to update the progress card of each student, refer to the Workbook]

Module -2: Vocabulary: Building Blocks (10 Hours)

- a) Word Formation: Prefix, suffix, conversion and compounding
- b) Homophones and one-word substitution
- c) Words often confused and misused
- d) Idiomatic phrase, Antonyms and Synonyms

[Note: As part of classroom activity, organise and learning language games, initiate the learning of 5 new words per class]

Module-3: English Communication: World around Me (12 Hours)

- a) Market place, Bus stop, Bank, Post Office
- b) Village, Town and City
- c) Eating out: Stall, Dhaba and Restaurant

[Note: As part of classroom activity, refer Work book for classroom and home assignments; carry out practice tests (written and oral)]

Module -4: Personality Development-II (12 Lectures)

- a) Etiquettes: Telephone, e-mail and at a wedding or social gathering
- b) Public dealing: Making enquiries and requesting for help, handling difference of opinion, giving directions, instructions and getting assistance
- c) Expressions: Giving compliments, making complaints, Feeling sorry and saying thank you
- d) Entertainment: Radio, music, television, and computers

[Note: As part of classroom activity, refer Workbook for classroom and home assignments; carry out practice tests (written and oral)]

Second Semester Outcome:

1. Gradual but significant improvement in student's progression in terms of LSRW to be noted
2. Students will improve their English vocabulary of daily usage
3. Students will be able to understand the world around them and communicate in diverse situations
4. Students will be able to imbibe the requisites of personality development for demonstrating good manners in society
5. Students will be able to exhibit basic etiquettes of personal communication

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Workbook Assignments & Viva</i>	<i>Total</i>
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

External Assessment: 50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

The external evaluation would also be done by the external examiner based on the Practical and viva conducted during the examination.

*** Practical Exam Paper Structure: (Duration 01 hr)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

Reference Books:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. English Grammar Composition & Usage by J.C. Nesfield, Macmillan Publishers
3. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi
4. Communication Skills by Sanjay Kumar &PushpLata, Oxford University Press
5. Newspapers

Fundamentals of Genetics Practical

L T P C
0 0 2 1

Course code: BAG253

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Plant Pathology and Agricultural Microbiology Practical

L T P C
0 0 2 1

Course code: BAG254

1. Familiarity with general plant pathological laboratory and field equipments.
2. Study of disease symptoms and signs and host parasite relationship.
3. Identification and isolation of plant pathogens. Koch's postulates. Preparation of fungicidal solutions, slurries, pastes and their applications.
4. Introduction to microbiology laboratory and its equipment.
5. Microscope- parts, principles of microscopy, resolving power and numerical aperture. Methods of sterilization. Nutritional media and their preparations.
6. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes.
7. Methods of isolation and purification of microbial cultures.
8. Isolation of *Rhizobium* from legume root nodule.
9. Isolation of *Azotobacter* from soil. Isolation of *Azospirillum* from roots. Isolation of BGA.
10. Staining and microscopic examination of microbes.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Soil and Water Conservation Practical

L	T	P	C
0	0	2	1

Course code: BAG 255

1. Study of different types and forms of water erosion. Exercises on computation of rainfall erosivity index.
2. Computation of soil erodibility index in soil loss estimation.
3. Determination of length of slope (LS) and cropping practice (CP) factors for soil loss estimation by USLE and MUSLE.
4. Exercises on soil loss estimation/measuring techniques. Study of rainfall simulator for erosion assessment.
5. Estimation of sediment rate using Coshocton wheel sampler and multi-slot divisor.
6. Determination of sediment concentration through oven dry method. Design and layout of contour bunds.
7. Design and layout of graded bunds and Design and layout of broad base terraces.
8. Design and layout of bench terraces. Design of vegetative waterways. Exercises on rate of sedimentation and storage loss in tanks.
9. Computation of soil loss by wind erosion. Design of shelterbelts and wind breaks for wind erosion control.
10. Visit to soil erosion sites and watershed project areas for studying erosion control and water conservation measures.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Crop Physiology Practical

L T P C
0 0 2 1

Course code: BAG256

- 1) Study of plant cells.
- 2) Structure and distribution of stomata.
- 3) Measurement of Imbibitions, osmosis, plasmolysis.
- 4) Measurement of root pressure.
- 5) Rate of transpiration.
- 6) Separation of photosynthetic pigments through paper chromatography.
- 7) Rate of transpiration, photosynthesis and respiration.
- 8) Tissue test for mineral nutrients.
- 9) Estimation of relative water content.
- 10) Measurement of photosynthetic CO₂ assimilation by Infra Red Gas Analyser (IRGA).

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Entomology Practical

L T P C
0 0 2 1

Course code: BAG257

1. Insect collection and preservation.
2. Identification of important insects.
3. General body organization of insects.
4. Study on morphology of grasshopper or cockroach.
5. Preparation of permanent mounts of mouth parts, antennae, legs and wings.
6. Dissection of grasshopper and caterpillar for study of internal morphology.
7. Observations on metamorphosis of larvae and pupae. Dissection of cockroaches.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Agricultural Extension Education Practical

L T P C
0 0 2 1

Course code: BAG258

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Crop Production Technology-I (Kharif Crops)

L T P C
1 0 0 1

Course Code: BAG 308

Objective: The objective of this course is to develop basic understanding about the different group of crops.

Unit 1 (4 Hours)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *Kharif* crops.

Unit 2 (4 Hours)

Cereals – rice, maize, sorghum, pearl millet and finger millet,

Unit 3 (4 Hours)

pulses-pigeonpea, mungbean and urdbean;

Unit 4 (4 Hours)

oilseeds- groundnut, and soybean; fibre crops- cotton & Jute;

Unit 5 (4 Hours)

forage crops-sorghum, cowpea, cluster bean and napier.

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.
2. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
3. Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy- Kalyani Publisher

Reference books:

- 1.Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.

Fundamentals of Plant Breeding

L	T	P	C
1	0	0	1

Course Code: BAG 309

Objective- The course is designed to develop an understanding of breeding in plants and how to increase crop production through the breeding methods.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

Breeding methods in asexually propagated crops, clonal selection and hybridization; Maintenance of breeding records and data collection; Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses;

Unit 5 (4 Hours)

Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

Text Books:

1. Principles of Plant Breeding. Robert Wayne Allard, John Wiley and Sons
2. Principles and procedure of Plant Breeding, G. S. Chahal, S. S. Gosal, CRC Press
3. Plant Breeding: Principles and Prospects, M.D.Hayward, N. O. Bosemark, T. Romagosa

Reference Books:

1. Elementary Principles of Plant Breeding, Choudhary H.K. IBH Publication
2. Breeding of field crops, D.N. Bhardwaj, Agrobios
3. Breeding of Horticultural crops: Principles and Practices, N. Kumar, New India Publishing

Agricultural Finance, Cooperation and Agri- Informatics

L	T	P	C
3	0	0	3

Course Code: BAG 310

Objective: This course is designed to assist students to develop a broad understanding of finance and marketing and management in the field of Agriculture. Importance of e-Agriculture for the farmers.

Unit 1 (8 Hours)

Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost.

Unit 2 (8 Hours)

An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Unit 3 (8 Hours)

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

Unit 4 (8 Hours)

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

Unit 5 (8 Hours)

e-Agriculture, concepts and applications, Use of ICT in Agriculture. Computer Models for understanding plant processes. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management Smartphone Apps in Agriculture for farm advises, market price, postharvest management etc; Geospatial technology for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning using IT tools.

Text Books:

1. Agricultural Cooperation, Martin Abraham Abrahamsen, Claude L. Scroggs U of Minnesota Press.
1. Rural Marketing: Text and Cases, Krishnamacharyulu, Pearson Education India.
2. Handbook of Agriculture. ICAR Publication
3. Acharya, S.S. and Agarawal, A.N. 2005. Agricultural Marketing. Oxford and IBH, New Delhi.
4. Acharya, S.S. and Agarawal, A.N. 2000. Agricultural Price Analysis. Oxford and IBH, New Delhi.
5. Agri Informatics: An Introduction (Industry Series), by R Chakravarthy, ICFAI UNIVERSITY PRESS
6. Yadav, D S, Foundations of IT, New Age, Delhi
7. E-Agriculture: Concepts and Applications (Agriculture Series),Rahul Gupta (Author), ICFAI UNIVERSITY PRESS
8. Rajaraman, Introduction to Computers, Prentice-Hall India

Reference Books:

1. Cooperation Principles, Problems And Practice, T.N. Hajela Ane Books Pvt Ltd.
2. Agricultural Prices and Commodity Market Analysis. John N. Ferris McGraw-Hill Inc.,US
3. Agricultural Economics. Subba Reddy._Oxford
4. 1. Agro-Informatics, G. vanitha, New Delhi Publishing Agency
5. 2. Leon & Leon, Fundamental of Information Technology, Vikas Publishing
6. 3. Lehngart, Internet 101, Addison Wesley

* Latest editions of all the suggested books are recommended.

Principles of Seed Technology

L T P C
1 0 0 1

Course Code: BAG 311

Objective- This course is designed to assist students to develop a broad understanding about the quality of seeds and seed testing,

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage; general principles, stages and factors affecting seed longevity during storage.

Unit 5 (4 Hours)

Measures for pest and disease control during storage. Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Text books:

1. Seed Technology, Agrawal, Oxford and IBH Publishing
2. Principles of Seed Science and Technology, Lawrence O. Copeland, Springer Science & Business Media
3. Handbook of Seed Science and Technology, Amarjit Basra, Taylor & Francis
4. Seed Technology, Khare, D. and Bhole, M.S. Scientific Publishers (India) Jodhpur.
- 5.

Reference books:

1. Seed Technology, Agarwal Rattan Lal, Oxford and IBh Publishing Company Pvt. Ltd.
2. Seed Production Technology, J. P. Srivastava, L. T. Simarski, International Center for Agricultural Research in the Dry Areas,
3. Status of the rights of farmers and plant breeders in Asia, Ujjwal Kumar, Gene Campaign

Production Technology for Vegetable and Spices

L	T	P	C
1	0	0	1

Course Code: BAG 312

Objective- Spices, aromatic, medicinal and plantation crops are a major components of horticulture. This course provides the knowledge about their importance and technologies involved in their production.

Unit 1 (4 Hours)

Importance of vegetables & spices in human nutrition and national economy, kitchen gardening,

Unit 2 (4 Hours)

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices (Tomato, Brinjal, Chilli, Capsicum,

Unit 3 (4 Hours)

Brief about origin, area, climate, soil, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield, physiological disorders, of important vegetable and spices Cucumber, Melons, Gourds, Pumpkin,

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text Books:

1. Introduction to spices, plantation crops, medicinal and aromatic plants, N. Kumar, JBM Md. Abdul Khader, P. Rangaswami, I. Irulappan. Oxford and IBH.
2. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices, Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy CRC Press.
3. Production Technology of Plantation Crops, Spices, Aromatic and Medicinal Plants. L.K. Dashora, S.S. Lakhawat, Abhay Dashora. Agrotech Publishing Academy.

Reference Books:

1. Postharvest Management and Value Addition Ashwai K.Goel, Rajinder Kumar, Satwinder S. Mann Daya Books.
2. Handbook of Agriculture. ICAR.
3. Production Technology Of Plantation Crops, Spices, Aromatic And Medicinal Plants, L K Dashora, Abhay Dashora, S S Lakhawat, Agrotech Publishing Academy

Environmental Studies

L T P C
4 0 0 4

Course Code: TMU – X01/ BAG 801

Objective: *To create awareness among students about environment protection.*

Course Outcomes: Based on this course, the graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

Course Content:

Unit I (Lectures 08)

Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem- its structure and functions, Energy Flow in an Ecosystem, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.

Unit II (Lectures 08)

Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; Land degradation, Soil erosion & desertification. Deforestation: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. Energy Resources: Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies. Biodiversity: Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Biogeographical Classification of India

Unit III (Lectures 08)

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies.

Unit IV (Lectures 08)

Environmental policies & practices: Climate change & Global Warming (Greenhouse Effect), Ozone Layer - Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human wild life conflicts in Indian context

Unit V (Lectures 08)

Human Communities & Environment: Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case study

Field Work:

1. Visit to an area to document environmental assets; river/forest/flora-fauna etc.
2. Visit to a local polluted site: urban/ rural/industrial/agricultural.
3. Study of common plants, insects, birds & basic principles of identification.
4. Study of simple ecosystem; pond, river etc.

Text Books:

1. “Environmental Chemistry”, De, A. K., New Age Publishers Pvt. Ltd.
2. “Introduction to Environmental Engineering and Science”, Masters, G. M., Prentice Hall India Pvt. Ltd.
3. “Fundamentals of Ecology”, Odum, E. P., W. B. Sannders Co.

Reference Books:

1. “Biodiversity and Conservation”, Bryant, P. J., Hypertext Book
2. “Textbook of Environment Studies”, Tewari, Khulbe & Tewari, I.K. Publication

***Latest editions of all the suggested books are recommended.**

Statistical Methods

L T P C
1 0 0 1

Course Code: BAG 314

Objective: The basic objective of this course is to provide knowledge about the agricultural statistics.

Unit 1

(4 Hours)

Introduction to Statistics and its Applications in Agriculture, Concept of primary & secondary sources of data, Classification- objectives & types of classification, Construction of frequency distribution, Tabulation- meaning advantages & types of tabulation.

Unit 2

(4 Hours)

Diagrammatic presentation- meaning , importance & rules for constructing diagrams, types of diagrams- bar, square, pie diagrams, cartograms, Graphical presentation- histogram, frequency curve, ogive.

Unit 3

(4 Hours)

Measures of central tendency- meaning, objectives, characteristics of a good average, arithmetic mean, median, quartiles, mode & their applications.

Unit 4

(4 Hours)

Measures of dispersion- meaning, objectives, characteristics of a good measure of dispersion, types – range, quartile deviation, mean deviation, standard deviation, coefficient of variation & their applications.

Unit 5

(4 Hours)

Correlation analysis- meaning importance, types- positive, negative & linear correlation, methods- scatter diagram, Karl Pearson's coefficient of correlation (for ungrouped data), linear regression analysis- meaning utility, regression lines & regression coefficients (for ungrouped data).

Text Books:

1. Hand Book of Agricultural Statistics, Shri Ram Singh Chandel, Achal Prakashan Mandir.
2. A Textbook of Agricultural Statistics, Rangaswamy, R., NEW AGE.
3. Introduction to Agricultural Statistics, Bob Davis, Delmar Cengage Learning.

Reference Books:

1. Agricultural Statistics. R. Singh, A.K.Sharma and S.P. Singh. Aman Publication.
2. Agricultural Mathematics and Statistics. R. Singh. Rama Publication.
3. An Introduction to Statistical Methods. C. B. Gupta. Vikas Publication.

* Latest editions of all the suggested books are recommended.

Livestock & Poultry Management

L	T	P	C
1	0	0	1

Course Code: BAG 315

Objective: This course aims at the importance of livestock production, selection and breeding of livestock, rearing and disease control measures along with preservation and marketing of livestock products.

Unit 1 (8 Hours)

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

Unit 2 (8 Hours)

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

Unit 3 (8 Hours)

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

Unit 4 (8 Hours)

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

Unit 5 (8 Hours)

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

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.
2. Modern Livestock & Poultry Production, Cengage Learning, James R. Gillespie and Frank Flanders.
3. Handbook of Livestock Management Richard A. Battaglia, Pearson/Prentice Hall.

Reference books:

1. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
2. Agriculture and Live-stock in India, Indian Council of Agricultural Research.
3. Mineral Nutrition of Livestock, CABI By N. F. Suttle Manager of Publications [Government of India], 1939

Course Code: BAG 399

Objective: To learn job oriented, presentation and interview skills and business correspondence.

Course Content

Module -1 Functional Grammar-II (8 Hours)

- a) Sentence construction: Simple, Complex and Compound
- b) Application writing
- c) Paragraph writing, essay writing and précis writing
- d) Pre-testing of oral and writing skills

[Note: As part of classroom activity, Review and recap of last semester and update progress of each student refer Module 3 of Workbook]

Module-2 Professional Skills (8 Hours)

- a) Biodata, CV and resume writing
- b) Joining Letter, Cover Letter & Resignation letter
- c) Inter-Office Memo, Formal Business Letter, Informal Notes
- d) Minutes of the Meeting, Reporting Events, Summary Writing

[Note: As part of classroom activity, use of standard templates and scenario buildings, practice sessions in classroom and homework assignments, refer to Workbook]

Module -3Presentation Skills (8 Hours)

- a) Power-point presentations & presentation techniques
- b) Body language
- c) Describing people, places and events
- d) Extempore speech and Just-a minute sessions

[Note: As part of classroom activity, practice sessions carried out in class on different topics of the domain expertise, refer to Workbook]

Module -4Interview Skills (8 Hours)

- a) Developing skill to (a) Debate (b)Discussion, Basics of GD & styles of GD
- b) Discussion in groups and group discussion on current issues
- c) Steps to prepare for an interview and mock interviews

[Note: As part of classroom activity, language games, extensive coverage of contemporary issues for GDs, facing mock interview sessions with faculty, respective TPOs and Director CRC]

Third Semester Outcome:

1. Considerable improvement in student’s progression in terms of LSRW to be noted.
2. Students will improve their writing skills for official communication.
3. Students will be able to give presentation and extempore speech on select topics.
4. Students will be able to discuss among peers and participate in group discussions on current issues.

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Workbook Assignments & Viva</i>	<i>Total</i>
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

External Assessment: 50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

The external evaluation would also be done by the external examiner based on the Practical and viva conducted during the examination.

*** Practical Exam Paper Structure: (Duration 01 hr)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

Reference Books*:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. Communication Skills for Engineers and Scientists by Sangeeta Sharma & Binod Mishra, PHI Learning Private Limited, New Delhi.
3. Professional Communication by Malti Agarwal, Krishna Prakashan Media (P) Ltd., Meerut.
4. Communication Skills by Sanjay Kumar & Pushp Lata, Oxford University Press
5. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi

Crop Production Technology-I (Kharif Crops) Practical

L T P C
0 0 2 1

Course Code: BAG 358

1. Rice nursery preparation, transplanting of Rice,
2. Sowing of soybean, pigeonpea and mungbean. maize, groundnut and cotton,
3. Effect of seed size on germination and seedling vigour of kharif season crops,
4. Effect of sowing depth on germination of kharif crops,
5. Identification of weeds in kharif season crops, top dressing and foliar feeding of nutrients,
6. Study of yield contributing characters and yield calculation of kharif season crops,
7. Study of crop varieties and important agronomic experiments at experimental farm.
8. Study of forage experiments, morphological description of kharif season crops, visit to research centres of related crops.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Fundamentals of Plant Breeding Practical

L T P C
0 0 2 1

Course Code: BAG 359

Practical

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Agricultural Finance, Co-Operation and Agri-informatics Practical

L T P C
0 0 2 1

Course Code: BAG 360

1. Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise.
2. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data.
3. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management,
4. Schemes and procedures. Estimation of credit requirement of farm business – A case study. Preparation and analysis of balance sheet – A case study. Preparation and analysis of income statement – A case study.
5. Appraisal of a loan proposal – A case study. Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural products and its value added products. Seminar on selected topics.
6. Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management.
7. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific document. MS-EXCEL - Creating a spreadsheet,
8. Use of statistical tools, writing expressions, creating graphs, analysis of scientific data. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introduction to World Wide Web (WWW).
9. Introduction of programming languages. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost;
10. Computation of water and nutrient requirements of crop using CSM and IT tools. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hands on Decision Support System. Preparation of contingent crop planning.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Principles of Seed Technology Practical

L T P C
0 0 2 1

Course Code: BAG 361

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Production Technology for Vegetable and Spices Practical

L T P C
0 0 2 1

Course Code: BAG 362

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Statistical Methods Practical

L T P C
0 0 2 1

Course Code: BAG 364

1. Collection of data from primary / secondary sources related with agriculture.
2. Classification & tabulation of the collected data.
3. Diagrammatic / graphical presentation of the tabulated data.
4. Find the suitable average of the collected data.
5. Find the suitable measure of dispersion of the collected data.
6. Find the correlation coefficient of the collected data related with agriculture.
7. Find the regression lines of the collected data related with agriculture.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Livestock & Poultry Management Practical

L T P C
0 0 2 1

Course Code: BAG 365

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

National Service Scheme

L T P C
0 0 2 1

Course Code: BAG 366

1. Introduction and basic components of NSS:

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

2. 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

3. Understanding youth

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

4. Community mobilisation

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

5. Social harmony and national integration

Indian history and culture, role of youth in nation building, conflict resolution and peace-building

6. Volunteerism and shramdan

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

7. 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

8. Family and society

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

Evaluation

Internal Evaluation (100 marks)

The above mentioned course be conducted under the supervision of one faculty member and would be evaluated by the two internal faculty members on a 4 point scale as mentioned below.

Assignment	Viva	Attendance	Skill	Total
10 marks	30 marks	10 marks	50 marks	100 marks

Crop Production Technology-II (Rabi crops)

L T PC
2 0 0 2

Course Code: BAG- 410

Objective: The objective of this course is to develop basic understanding about the different group of crops of rabi season.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.
2. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
3. Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy-Kalyani Publisher

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.

Production Technology for Ornamental Crops, Fruit Plantation Crops MAPs and Landscaping

L T P C
3 0 0 3

Course Code: BAG- 411

Objective: The main goal of this course is to increase the ornamental crop production through various methods and beautification of different places. To increase the fruits and ornamental crops production through various methods and beautification of different places.

Unit 1 (4 Hours)

Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of trees, shrubs and climbers. Production technology of important cut flowers like rose, gerbera, carnation, liliun and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions.

Unit 2 (4 Hours)

Package of practices for loose flowers like marigold and jasmine under open conditions. Production technology of important medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol

Unit 3 (4 Hours)

Production technology of important aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver. Processing and value addition in ornamental crops and MAPs produce.

Unit 4 (4 Hours)

Importance and scope of fruit and plantation crop industry in India; Importance of rootstocks; Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, Production technologies for the cultivation of major fruits litchi, papaya, sapota, apple, pear, peach, walnut, almond and;

Unit 5 (4 Hours)

Production technologies for the cultivation of major fruits plantation crops-coconut, arecanut, cashew, tea, coffee & rubber. Production technologies for the cultivation of major fruits minor fruits- date, ber, pineapple, pomegranate, jackfruit, strawberry,

Text Books:

1. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)
2. Introduction to spices, plantation crops, medicinal and aromatic plants, N. Kumar, JBM Md. Abdul Khader, P. Rangaswami, I. Irulappan. Oxford and IBH.
3. Production Technology of Plantation Crops, Spices, Aromatic and Medicinal Plants. L.K. Dashora, S.S. Lakhawat, Abhay Dashora. Agrotech Publishing Academy.
4. Basic Horticulture-Jitendra Singh. Kalyani Publisher
5. Horticulture at a glance- A. Salaria. Jain Brothers
6. Vegetable Science And Technology In India Vishnu Swarap, Kalyani Publishers

Reference Books:

4. Postharvest Management and Value Addition Ashwai K.Goel, Rajinder Kumar, Satwinder S. Mann Daya Books.
5. Handbook of Agriculture. ICAR.
6. Production Technology Of Plantation Crops, Spices, Aromatic And Medicinal Plants, L K Dashora, Abhay Dashora, S S Lakhawat, Agrotech Publishing Academy
7. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
8. 2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
9. 3. Basic Concepts of Vegetable Science Singh N. P. International Book Distributing Company,

Farm Machinery and Power

L	T	P	C
1	0	0	1

Course Code: BAG 408

Objective: This course is designed to assist students to develop a broad understanding of farm machinery.

Unit 1 (4 Hours)

Status of Farm Power in India, Sources of Farm Power , I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines ,

Unit 2 (4 Hours)

Study of different components of I.C. engine, I.C. engine terminology and solved problems, Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication ,fuel supply and hydraulic control system of a tractor,

Unit 3 (4 Hours)

Familiarization with Power transmission system : clutch, gear box, differential and final drive of a tractor , Tractor types, Cost analysis of tractor power and attached implement,

Unit 4 (4 Hours)

Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations, Familiarization with sowing and planting equipment,

Unit 5 (4 Hours)

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

Text Books

1. Farm Machinery Fundamentals, Marshall F. Finner, Richard J. Straub, American Publishing.
2. Principles of Agricultural Engineering: Farm power, farm machinery, and farm buildings Arayathinal Michael Michael, T. P. Ojha, Jain Brothers,
3. Farm Mechanisation and Farm Machinery & Power [agriculture Engineering Vol. I & II] Singhal O. P. Naresh Chandra Agarwal

Reference Books

1. Principles of Farm Machinery, Roy Bainer, Read Books Design
2. Farm Machinery, Claude Culpin, Read Books.
3. Farm Machinery: Heavy Equipment, David Amentrout, Patricia Amentrout.

* Latest editions of all the suggested books are recommended.

Course Code: BAG 412

Objective: The course is designed to acquaint the students with the principles and practices of marketing of agricultural products. The subject matter comprises markets, types of markets, producers surplus, product life cycle, product pricing and promotion, agencies involved in marketing, marketing channels, costs, margins and price spread, market integration, marketing efficiency, cooperative marketing, warehousing, marketing risk and a brief overview of future trading.

Unit 1 **(4 Hours)**

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

Unit 2 **(4 Hours)**

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

Unit 3 **(4 Hours)**

Exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread:

Unit 4 **(4 Hours)**

Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions;

Unit 5 **(4 Hours)**

Cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Text books:

1. Acharya, S.S. and Agarwal, N.L. Agricultural Marketing in India. Oxford and IBH Publishers Co. Pvt. Ltd., New Delhi.
2. Agarwal, P.K. Marketing Management- An Indian Perspective, Pragati Prakashan, Meerut.
3. Modern Economic Theory” by Dewett K.K.

Reference books: 1. Kahlon, A.S. and Tyagi, S.D. Agricultural Price Policy in India. Allied Publishers Co Pvt Ltd., Bombay.

2. Mamoria, C.B. Principles and Practices of Marketing in India. Kitab Mahal, Allahabad.

3. Dutta, R. Sundaram K.P.M. Indian Economy. S.Chand & Company Ltd., New Delhi.

Introductory Agro-meteorology & Climate Change

L	T	P	C
1	0	0	1

Course Code: BAG 413

Objective: Weather and climate is a resource and considered as basic input or resources in agricultural planning, every plant process related with growth development and yield of a crop is affected by weather.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text Books:

1. Varshneya, M.C. and Pillai, P.B. 2003. Text book of Agricultural Meteorology, ICAR Pusa, New Delhi.
2. Mavi H. S. 1986. Introduction to Agrometeorology (2nd ed.), Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi.
3. Murthy, V.R.K 1993. Practical Manual in Agriculture Meteorology, Kalyani Pub., New Delhi.

Reference Books:

1. Seeman. J., Chiskov, Y.Z., Lomsa, J. and Primault, B. 1979. Agrometeorology, Springer Verlag, berlin.
2. Sunith, C.P. 1975. Methods in Agriculture Meteorology, Elsevier Sc. Co., Amsterdam.
3. Prasad Rao, G.S.L.H.V. 2003. Agricultural Meteorology, Kerala Agricultural University, Thrissur, Kerala.

Farming System & Sustainable Agriculture

L	T	P	C
1	0	0	1

Course Code: BAG 414

Objective: This course is designed to assist students to develop a broad understanding about the farming system and ecofriendly agriculture.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

Conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability, Integrated farming system-historical background, objectives and characteristics,

Unit 4 (4 Hours)

Components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques,

Unit 5 (4 Hours)

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

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.
2. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
3. Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy- Kalyani Publisher

Reference books:

1. Palaniappan, S.P. and Sivaraman, K. 1996. Cropping Systems in the Tropics: Principles and Management. New Age Publ.
2. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.
3. Panda, S.C. 2004. Cropping Systems and Farming Systems. Agribios.

Course Code- BAG499

Objective: To inculcate behavioural skills in students for the Corporate World.

Course Content

Module -1 Fundamentals of Time Management & Managing Change (12 Hours)

- a) Time Management
- b) Managing People and managing change
- c) Team building, Leadership and taking decisions
- d) Stress Management

[Note: As part of classroom activity, refer to the Workbook, guest lecture by management faculty]

Module -2 Public Speaking (8 Hours)

- a) Art of public speaking
- b) Welcome speech
- c) Farewell Speech
- d) Vote of thanks

[Note: As part of classroom activity, extensive practice sessions in class and home assignments]

Module -3 Personality Development-III (8 Hours)

- a) Rude vs Polite Behaviour
- b) Ethics and human values
- c) Concern for environment
- d) Crisis Management

[Note: As part of classroom activity, refer to the Workbook, guest lecture by management faculty and industry representative]

Module -4 Oral Practice (12 Hours)

- a) Debate
- b) Just-a-minute
- c) Group Discussions
- d) Mock Interviews

[Note: As part of classroom activity, extensively test the oral skills and update the progress card of each student]

Fourth Semester Outcome:

1. Notable improvement in student's progression in terms of LSRW.
2. Students will be able to imbibe good practices of self-discipline and professionalism required in the corporate world.
3. Students will be able to develop the art of public speaking.
4. Students will be able to learn behavioural skills suitable for the corporate world.

Evaluation & Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Workbook Assignments & Viva</i>	<i>Total</i>
20	10	10+10	50

Viva to be carried out by external English faculty from within the university

External Assessment: 50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

The external evaluation would also be done by the external examiner based on the Practical and viva conducted during the examination.

*** Practical Exam Paper Structure: (Duration 01 hr)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

Reference Books*:

1. ILFS Bi-lingual Course in Basic English, ILFS Skill Development Corporation
2. Communication Skills for Engineers and Scientists by Sangeeta Sharma & Binod Mishra, PHI Learning Private Limited, New Delhi.
3. Professional Communication by Malti Agarwal, Krishna Prakashan Media (P) Ltd., Meerut.
4. Communication Skills by Sanjay Kumar & Pushp Lata, Oxford University Press
5. The Business letters by Madan Sood, Goodwill Publishing House, New Delhi

Renewable Energy and Green Technology

L	T	P	C
1	0	0	1

Course Code: BAG 415/ BAGE 802

Objective: This course is focused on renewable energy like biogas plants, solar energy.

Unit 1 (4 Hours)

Classification of energy sources, contribution of these of sources in agricultural sector,

Unit 2 (4 Hours)

Familiarization with biomass utilization for biofuel production and their application,

Unit 3 (4 Hours)

Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel and biooil production and their utilization as bioenergy resource,

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text books:

1. Renewable Energy Sources and Emerging Technologies, by Kothari D.P. , Singal K. C. , Ranjan Rakesh , New Arrivals.
2. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.
3. Renewable Energy Sources and Emerging Technologies, by Kothari D.P. , Singal K. C. , Ranjan Rakesh , New Arrivals.
4. Wind Energy: Theory and Practice, by Ahmed Siraj (Author), New Arrivals – PHI.

Reference books:

1. Non-Conventional Energy Sources and Utilisation (Energy Engineering), by R.K. Rajput, S. Chand Publishing.
2. Renewable Energy Technologies: A Practical Guide for Beginners, Solanki Chetan Singh, PHI School Books.
3. Renewable Energy Technologies: A Practical guide for beginners, Chetan Singh Solanki

Course Code: BAG 455

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Production Technology for Ornamental Crops, Fruit Plantation Crops MAPs and Landscaping Practical

L T P C
0 0 2 1

Course Code: BAG 456

Practical

1. Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross pollinated crops.
2. Emasculation and hybridization techniques in self & cross pollinated crops.
3. Consequences of inbreeding on genetic structure of resulting populations.
4. Study of male sterility system. Handling of segregation populations.
5. Methods of calculating mean, range, variance, standard deviation, heritability.
6. Designs used in plant breeding experiments, analysis of Randomized Block Design.
7. To work out the mode of pollination in a given crop and extent of natural out-crossing. Prediction of performance of double cross hybrids.
8. Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruit.
9. Preparation of plant bio regulators and their uses, Important pests, diseases and physiological disorders of above fruit and plantation crops,
10. Visit to commercial orchards.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Farm Machinery and Power Practical

L T P C
0 0 2 1

Course Code: BAG 457

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Agricultural Marketing Trade & Prices Practical

L T P C
0 0 2 1

Course Code: BAG 458

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Introductory Agro-meteorology & Climate Change Practical

L T P C
0 0 2 1

Course Code: BAG 459

1. Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording.
2. Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law.
3. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS.
4. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis.
5. Measurement of soil temperature and computation of soil heat flux.
6. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions.
7. Measurement of wind speed and wind direction, preparation of windrose.
8. Measurement, tabulation and analysis of rain.
9. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Renewable Energy and Green Technology Practical

L T P C
0 0 2 1

Course Code: BAG 460

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Elective Courses

Agribusiness Management

L T P C
1 0 0 1

Course Code: BAGE 401

Objective: Objective: The course provides knowledge regarding the concept of production economics, its functions and determination of optimum input and output. It also emphasizes on the principles of farm management and budgeting.

Unit 1 (4 Hours)

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy.

Unit 2 (4 Hours)

Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries. Agri-value chain:

Unit 3 (4 Hours)

Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, policies procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation.

Unit 4 (4 Hours)

Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies.

Unit 5 (4 Hours)

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

Text books:

1. Personality Development, Swami Vivekanand, Advaita Ashram.
2. A Text Book of Agri Business management, A.C. Broadway Kalyani Publishers.
3. Wings of Fire: An autobiography of Abdul Kalam, Universities Press.
4. Train Your Brain, Ryuta Kawashima, Manjul Publishing.

Reference books:

1. Personality Development and soft Skills, Barun K. Mitra, Oxfors University.
2. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University.
3. Attitude is everything, Jeff Keller, Collins.

Agrochemicals

L T P C
1 0 0 1

Course Code: BAGE 402

Objective-The course aims at studying nature, composition and use of different types of agrochemicals in order to make their judicious use in sustainable agriculture.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Organic fungicides- Mode of action- Dithiocarbamates-characteristics, preparation and use of Zineb and maneb. Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids,

Unit 3 (4 Hours)

Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text Books:

1. Roy, N.K. 2002. Chemistry of Pesticides. CBS Publishers, New Delhi
2. Crop Diseases and Their Management. H.S. Chaube and V. S. Pundhir PHI Learning Private Limited.
1. 3. Essentials of Cremllyn, R.J. 1990. Pesticides: Preparation and Mode of Action.

Reference Books:

1. Integrated Pest Management. G.S. Dhaliwal and Ramesh Arora. Kalyani Publisher
2. Organic Farming for Sustainable Agriculture- S.C. Panda. Kalyani publishers.
3. Soil Science- Mangat Rai Anmol Publications Pvt. Ltd.

Commercial Plant Breeding

L	T	P	C
1	0	0	1

Course Code: BAGE 403

Objective- The course is designed to develop an understanding of breeding in plants and how to increase crop production through the breeding methods. How to develop the resistant varieties.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Genetic purity test of commercial hybrids. Advances in hybrid seed production of maize, rice, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica etc. Quality seed production of vegetable crops under open and protected environment.

Unit 3 (4 Hours)

Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.

Unit 4 (4 Hours)

IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act.

Unit 5 (4 Hours)

Variety testing, release and notification systems in India. Principles and techniques of seed production, types of seeds, quality testing in self and cross pollinated crops.

Text Books:

1. Principles of Plant Breeding. Robert Wayne Allard, John Wiley and Sons
2. Principles and procedure of Plant Breeding, G. S. Chahal, S. S. Gosal, CRC Press
3. Plant Breeding: Principles and Prospects, M.D.Hayward, N. O. Bosemark, T. Romagosa

Reference Books:

1. Elementry Principles of Plant Breeding, Choudhary H.K. IBH Publication
 2. Breeding of field crops, D.N. Bhardwaj, Agrobios
 3. Breeding of Horticultural crops: Principles and Practices, N. Kumar, New India Publishing
- B.Sc. Agriculture Syllabus Applicable w.e.f. Academic Year 2014-15

Landscaping

L	T	P	C
1	0	0	1

Course Code: BAGE 404

Objective- The objective of this course is the beautification of different places.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers: importance, selection, propagation, planting,

Unit 3 (4 Hours)

Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management.

Unit 4 (4 Hours)

Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships,

Unit 5 (4 Hours)

Landscaping of river banks, hospitals, play grounds, airports, industries, institutions. Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

Text Books:

1. Basic Horticulture-Jitendra Singh. Kalyani Publisher
2. Horticulture at a glance- A. Salaria. Jain Brothers
3. Instant Horticulture-S. N. Gupta. Jain Brothers

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)

Agribusiness Management Practical

L T P C
0 0 2 1

Course Code: BAGE451

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Course Code: BAGE452

1. Sampling of fertilizers and pesticides.
2. Pesticides application technology to study about various pesticides appliances.
3. Quick tests for identification of common fertilizers. Identification of anion and cation in fertilizer.
4. Calculation of doses of insecticides to be used.
5. To study and identify various formulations of insecticide available in market.
6. Estimation of nitrogen in Urea. Estimation of water soluble P_2O_5 and citrate soluble P_2O_5 in single super phosphate.
7. Estimation of potassium in Muriate of Potash/ Sulphate of Potash by flame photometer.
8. Determination of copper content in copper oxychloride.
9. Determination of sulphur content in sulphur fungicide.
10. Determination of thiram. Determination of ziram content.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Course Code: BAGE453

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Landscaping Practical

L T P C
0 0 2 1

Course Code: BAGE454

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Principles of Integrated Pest and Disease Management

L T P C
1 0 0 1

Course Code: BAG 509

Objective: The main goal of this course is to use of all integrated methods for the management of insects and diseases in an eco-friendly manner.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

Development and validation of IPM module. Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses.

Unit 5 (4 Hours)

Political, social and legal implication of IPM. Case histories of important IPM programmes. Case histories of important IPM programmes.

Text Books:

1. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani
3. Elements of Entomology: Rajendra Singh. Rastogi Publications
2. Crop Diseases and Their Management. H.S. Chaube and V. S. Pundhir PHI Learning Private Limited.
3. . Agricultural Pests of South Asia and Their Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher

Reference Books:

- 1 Integrated Pest Management: D. Dent, N.C. Elliott. Springer Science & Business Media
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Flint, M.C. and Brosch, R.V. 1981. Introduction to Integrated Pest Management.1st ED., Springer, New York.

Manures, Fertilizers and Soil Fertility Management

L T P C
1 0 0 1

Course Code: BAG 510

Objective-The course aims at studying nature, composition and use of different types of manures, fertilizers in order to make to increase the soil fertility.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.

Unit 4 (4 Hours)

Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests.

Unit 5 (4 Hours)

Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Text Books:

1. Introductory Soil Science- D.K. Das. Kalyani Publisher.
2. Fundamentals of Soil science-Indian Society of Soil Science.
3. Textbook of Soil Science- T. Biswas , S. Mukherjee Tata McGraw - Hill Publishing Company Limited.
4. Cremlyn, R.J. 1990. Pesticides: Preparation and Mode of Action.
5. Roy, N.K. 2002. Chemistry of Pesticides. CBS Publishers, New Delhi

Reference Books:

1. Soil Fertility and Fertilizer Use- Samuel L. Tisdale and Werner L. Nelson Macmillan Coll Div.
2. Nature and Property of Soil-N. C. Braby. Macmillan Publishing Company Incorporated
3. Soil Science- Mangat Rai Anmol Publications Pvt. Ltd.

Pests of Crops and Stored Grains and their Management and Management of Beneficial insects

L T P C
2 0 0 2

Course Code: BAG 511

Objective: Study of this course is aims to understanding the behaviour of stored grain pest and to protect our grains in store houses. Beneficial insects are any of a number of species of insects that perform valued services like pollination and pest control. Encouraging beneficial insects, by providing suitable living conditions, is a pest control strategy, often used in organic farming, organic gardening or integrated pest management. A number of products are produced from insects. The objective of this course is to manage the beneficial insects.

Unit 1

(4 Hours

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of vegetable crop, fruit crop,

Unit 2

(4 Hours

General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of plantation crops, ornamental crops, General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various spices and condiments.

Unit 3

(4 Hours

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

Unit 4

(4 Hours

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.

Unit 5

(4 Hours

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.

Text books: 1. Stored Grain Pests and Their Management, B.P. Khare. Kalyani Publisher.

2. Elements of Entomology: Rajendra Singh. Rastogi Publications

3. Insecta: An Introduction- K. N. Ragumoorthi, V. Balasubramani, M.R. Srinivasan, N. Natarajan. A.E. Publications

4. Bees and beekeeping in India, D.P. Abrol, Kalyani Publishers

5. Elements of Economic Entomology, B.V. David and V.V. Ramamurthy, Brillion Publishing

Reference books: 1. Pests of Stored grains and Their management. M.C. Bhargava, and K.C. Kumawat

2. Agricultural Pests of South Asia and Their Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher

3. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher

4. Agricultural Pests of South Asia and Their Management. G.S.Dhaliwal and Ramesh Arora. Kalyani Publisher

5. Principles of Insect Morphology. R. E. Snodgrass. Cornell University Press.

Diseases of Field & Horticultural Crops & their Management-I

L T P C
1 0 0 1

Course Code: BAG 512

Objective- This course is designed to assist students to develop a broad understanding of plant pathogens, diseases caused by them and disease management approaches.

Unit 1 (4 Hours)

Symptoms, etiology, disease cycle and management of major diseases of following crops:
Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

Symptoms, etiology, disease cycle and management of major diseases of following crops:
Castor: Phytophthora blight; Tobacco: black shank, black root rot and mosaic. Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight;

Unit 4 (4 Hours)

Symptoms, etiology, disease cycle and management of major diseases of following crops:
Cruciferous vegetables: Alternaria leaf spot and black rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic;

Unit 5 (4 Hours)

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

Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust

Text Books:

1. Plant Pathology – P.D. Sharma. Rastogi Publications.
2. Crop Diseases and Their Management. H.S. Chaube and V. S. Pundhir PHI Learning Private Limited.
3. Essentials of Plant Pathology by V. N. Pathak, Prakash Publ., Jaipur (1972).

Reference Books:

1. Plant pathology by G. N. Agrios 4th edition, Academ. Press, New york (1997).
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.

Crop Improvement – I (*Kharif*)

L T P C
1 0 0 1

Course Code: BAG 513

Objective: Utilization of innovative approaches for the development of variety in quality as well as quantity.

Unit 1 **(4 Hours)**

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

Unit 2 **(4 Hours)**

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

Unit 3 **(4 Hours)**

Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops;

Unit 4 **(4 Hours)**

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

Unit 5 **(4 Hours)**

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

Text books:

4. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.
5. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
6. Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy- Kalyani Publisher

Reference books:

7. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House.

Entrepreneurship Development and Business Communication

L T P C
1 0 0 1

Course Code: BAG 514

Objective- The objective of this course is to develop and polishing of entrepreneurial skills into a person needed to establish and successfully run his / her enterprise.

Unit 1 (4 Hours)
Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation,

Unit 2 (4 Hours)
Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agrienterprises, Entrepreneurial Development Process;

Unit 3 (4 Hours)
Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills,

Unit 4 (4 Hours)
Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management,

Unit 5 (4 Hours)
Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

Text books:

5. Personality Development, Swami Vivekanand, Advaita Ashram
6. A Text Book of Agri Business management, A.C. Broadway Kalyani Publishers
7. Wings of Fire: An autobiography of Abdul Kalam, Universities Press
8. Train Your Brain, Ryuta Kawashima, Manjul Publishing

Reference books:

4. Personality Development and soft Skills, Barun K. Mitra, Oxfors University
5. Communication Skills, Sanjay Kumar and Pushp Lata, Oxford University
6. Attitude is everything, Jeff Keller, Collins

Geoinformatics, Nano-technology and Precision Farming

L T P C
1 0 0 1

Course Code: BAG 515

Objective- The objective of this course is to utilize advanced technologies in farming.

- Unit 1** (4 Hours)
Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture.
- Unit 2** (4 Hours)
Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS;
- Unit 3** (4 Hours)
Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions;
- Unit 4** (4 Hours)
Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology, definition, concepts and techniques,
- Unit 5** (4 Hours)
Brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Text books:

1. Geoinformatics application in Agriculture, A.K. Singh and U.K. Chopra, New India Publishing Agency.
2. Nanotechnology-An Introduction, James J. Ramsden, Mathew Deans
3. Precision Farming, Soil Fertility and Productivity aspects, K.R. Krishna, Apple Academic Press and CRC Press
4. Nanoscience Scenario in India, Chakrapani, Srinivasan, Independently Published.

Reference books:

1. Textbook of nanoscience and Technology, B. S. Murthy, P. Shankar., Baldev Raj, B.B. Rath, James Murday, Springer and Univ. Press
2. Nanotechnology Fundamentals and Application, Manasi Karkare, I.K. International Publishing House Pvt. Ltd.
3. Nanotechnology: Principles and Practices, Kulkarni, Sulabha K., Springer

Intellectual Property Rights

L T P C
1 0 0 1

Course Code: BAG 516

Objective- To create public awareness about the benefits of Intellectual property among all sections of society.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Unit 3 (4 Hours)

Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India,

Unit 4 (4 Hours)

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.

Unit 5 (4 Hours)

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.

Text Books:

1. Status of the rights of farmers and plant breeders in Asia, Ujjwal Kumar, Gene Campaign
2. Intellectual Property Rights, by Neeraj Pandey, Khushdeep Dharni , Prentice-Hall of India Pvt.Ltd
3. IPR and Plant Breeders Rights at a Glance, Phundan Singh and Rajeev Singh, New Vishal Publications;

Reference Books:

1. Intellectual Property Rights Related Issues in Plant Breeding, Mangala Rai, S. MauriaNarosa Publishing House , New Delhi,
2. IPR & Plant Breeders' Rights Paperback ,Phundan Singh (Author), New Vishal Publications;
3. Essentials of Plant Breeding, by Mohanan K.V (Author), Prentice Hall India Learning Private Limited

Principles of Integrated Pest and Disease Management Practical

L T P C
0 0 2 1

Course Code: BAG 555

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Manures, Fertilizers and Soil Fertility Management Practical

L T P C
0 0 2 1

Course Code: BAG 556

1. Introduction of analytical instruments and their principles, calibration and applications,
2. Colorimetry and flame photometry.
3. Estimation of soil organic carbon,
4. Estimation of alkaline hydrolysable N in soils.
5. Estimation of soil extractable P in soils.
6. Estimation of exchangeable K; Ca and Mg in soils .
7. Estimation of soil extractable S in soils.
8. Estimation of DTPA extractable Zn in soils.
9. Estimation of N in plants. Estimation of P in plants.
10. Estimation of K in plants. Estimation of S in plants.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Pests of Crops and Stored Grains and their Management and Management of Beneficial insects Practical

L T P C
0 0 2 1

Course Code: BAG 557

1. Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (a) Field Crops; (b) Vegetable Crops;
2. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments. Identification of insect pests and Mites associated with stored grain.
3. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown.
4. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition.
5. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI godowns.
6. Honey bee species, castes of bees. Beekeeping appliances and seasonal management,
7. Bee enemies and disease. Bee pasturage, bee foraging and communication.
8. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves.
9. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers.
10. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniques for mass multiplication of natural enemies.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Diseases of Field & Horticultural Crops & their Management-I Practical

L T P C
0 0 2 1

Course Code: BAG 558

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Crop Improvement – I (*Kharif Crops*) Practical

L T P C
0 0 2 1

Course Code: BAG 559

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Entrepreneurship Development and Business Communication Practical

L T P C
0 0 2 1

Course Code: BAG 560

1. Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation,
2. Exercise in creativity, time audit through planning, monitoring and supervision,
3. Identification and selection of business idea,
4. Preparation of business plan and proposal writing,
5. Visit to entrepreneurship development institute and entrepreneurs.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Geoinformatics, Nano-technology and Precision Farming Practical

L T P C
0 0 2 1

Course Code: BAG 561

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Practical Crop Production-I (*Kharif Crops*)

L T P C
0 0 2 1

Course Code: BAG 562

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

Evaluation of Field Work:

Internal Evaluation (100 marks)

The above mentioned field work shall be conducted under the supervision of one faculty member and would be evaluated by the two internal faculty members on a 4 point scale as mentioned below.

Field work 40 marks	File work 20 marks	Viva 30 marks	Attendance 10marks	Total internal 100 marks
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Physical Education and Yoga Practices-I

L T P C
0 0 2 1

Course Code: BAG 563

1. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit) Teaching of different skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit) Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game
2. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation .Teaching of skills of Basketball – demonstration, practice of the skills, involvement in game situation.
3. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation
4. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game.Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation
5. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game Teaching of some of Asanas – demonstration, practice, correction and practice Teaching of some more of Asanas – demonstration, practice, correction and practice
6. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation Teaching of skills of Table Tennis – involvement of all the skills in game situation with teaching of rule of the game
7. Teaching – Meaning, Scope and importance of Physical Education Teaching – Definition, Type of Tournaments Teaching – Physical Fitness and Health Education Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).

Evaluation

Internal Evaluation (100 marks)

The above mentioned course be conducted under the supervision of one faculty member and would be evaluated by the two internal faculty members on a 5 point scale as mentioned below.

Assignment	Attendance	Community Activities	Viva	Report	Total
10 marks	10 marks	50 marks	10 marks	20 marks	100 marks

Elective Courses

Food Safety and Standards

L T P C
1 0 0 1

Course Code: BAGE 501

Objective: Food safety objectives are the goals that foodbusiness sets around producing and providing safe and suitable food to customers. To study the guiding principles that build the food safety implementation plans.

Unit 1 **(4 Hours**
Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control.

Unit 2 **(4 Hours**
Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal.

Unit 3 **(4 Hours**
Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP.

Unit 4 **(4 Hours**
ISO series. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene.

Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food.

Unit 5 **(4 Hours**
Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

Text books:

1. Food Safety Management: Implementing a Food Safety Program in a Food Retail Business, King, Hal, Springer-Verlag New York
2. Principles of Food Processing, Dennis R. Heldman, Richard W Hartel Springer Science & Business Media.
3. Food Safety Culture Creating a Behavior-Based Food Safety Management System, **Yiannas**, Frank, Springer-Verlag New York
4. Elements of food technology, Norman W. Desrosier. Avi Pub. Co.

Reference books:

1. A Practical Guide to Food Laws and Regulations, Kiron Prabhakar, Bloomsbury Publishing
2. Food Processing: Recent Developments, Anilkumar G. Gaonkar Elsevier,
3. Fundamentals of Food Process Engineering, Romeo T. Toledo Springer Science & Business Media.
4. Food Technology an introduction, Anita Tull, Oxford University Press

Course Code: BAGE 502

Objective: The objective of this course is based on the growing need for biopesticides and biofertilizers for food security requirements.

Unit 1 (4 Hours)
History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses.

Unit 2 (4 Hours)
Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes. Methods of application of biopesticides. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticide.

Unit 3 (4 Hours)
Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum*, *Azotobacter*, *Bacillus*, *Pseudomonas*, *Rhizobium* and *Frankia*; Cynobacterial biofertilizers- *Anabaena*, *Nostoc*, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza.

Unit 4 (4 Hours)
Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation,

Unit 5 (4 Hours)
Mass production of carrier based and liquid biofertilizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers - Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

Text Books:

1. Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani 3. Elements of Entomology: Rajendra Singh. Rastogi Publications
2. Textbook of Soil Science- T. Biswas , S. Mukherjee Tata McGraw - Hill Publishing Company Limited.
3. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.

Reference books:

1. **The complete technology book on Bio-fertilizer and organic farming**, NIIR Board of National Institute of Industrial Technology
2. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
3. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. BokdeAgri-Horticultural Pub. House
4. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT

Course Code: BAGE 503

Unit 1

Objectives: The main objectives of protected cultivation are to protect the crops from harmful temperatures, wind, rain, hail and snow, and from pests, diseases and predators, creating a microclimate that allows for the improvement of their productivity and quality contributing to a better use of resources

(4 Hours)

Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly house.

Unit 2

(4 Hours)

Greenhouse design, environment control, artificial lights, Automation. Soil preparation and management, Substrate management. Types of benches and containers.

Unit 3

(4 Hours)

Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops.

Unit 4

(4 Hours)

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

Unit 5

(4 Hours)

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

Text Books

1. Greenhouse Technology and Management, Nicolas Castilla, CABI,
2. Postharvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation, and Waste Management, L. R. Verma, Dr. V. K. Joshi, Indus Publishing.
3. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy CRC Press.
4. Handbook of Agriculture. ICAR Publication.

Reference Books

1. Postharvest Management and Value Addition, Ashwai K.Goel, Rajinder Kumar, Satwinder S. Mann Daya Books,
2. Postharvest Technology of Fruits and Vegetables: General concepts and principles L. R. Verma, Dr. V. K. Joshi Indus Publishing Company.
3. Greenhouse Technology and Management, Nicolas Castilla, CABI

Micro propagation Technologies

L T P C
1 0 0 1

Course Code: BAGE 504

Objectives: Micropropagation is the practice of rapidly multiplying stock plant material to produce a large number of progeny plants, using modern plant tissue culture methods.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

Organogenesis (callus and direct organ formation),

Unit 4 (4 Hours)

Somatic embryogenesis, cell suspension cultures,

Unit 5 (4 Hours)

Production of secondary metabolites , Somaclonal variation, Cryopreservation

Text Books:

4. Basic Horticulture-Jitendra Singh. Kalyani Publisher
5. Horticulture at a glance- A. Salaria. Jain Brothers
6. Instant Horticulture-S. N. Gupta. Jain Brothers

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)

Food Safety and Standards Practical

L T P C
0 0 2 1

Course Code: BAGE 551

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Biopesticides & Biofertilizers Practical

L T P C
0 0 2 1

Course Code: BAGE 552

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Protected Cultivation Practical

L T P C
0 0 2 1

Course Code: BAGE 553

1. Raising of seedlings and saplings under protected conditions,
2. Use of protrays in quality planting material production,
3. Bed preparation and planting of crop for production,
4. Inter cultural operations,
5. Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip,
6. Fogging and misting.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Micro propagation Technologies Practical

L T P C
0 0 2 1

Course Code: BAGE 554

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Rainfed Agriculture, Watershed Management and Organic Farming

L	T	P	C
1	0	0	1

Course Code: BAG 607

Objective: The main objective is to study about the agriculture in rainfed areas.

To study the significance, use and marketing of organic manures, biofertilizers and biological agents for different agricultural practices.

Unit 1 (4 Hours)

Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India ; Soil and climatic conditions prevalent in rainfed areas; Soil and water conservation techniques,

Unit 2 (4 Hours)

Drought: types, Effect of water deficit on physio- morphological characteristics of the plants, Crop adaptation and mitigation to drought;

Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas,

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

Organic farming, principles and its scope in India; Initiatives taken by Government (central/state),

NGOs and other organizations for promotion of organic agriculture;

Organic ecosystem and their concepts; Organic nutrient resources and its fortification;

Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming;

Unit 5 (4 Hours)

Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

Fundamentals of insect, pest, disease and weed management under organic mode of production;

Operational structure of NPOP; Certification process and standards of organic farming;

Text Books:

4. Principles of soil conservation and water management Hanumappa Ramappa Arakeri, Roy Luther Donahue Rowman & Allanheld
5. Watershed Management Vijay P. Singh, Ram Narayan Yadava Allied Publishers
6. Organic Farming: components and Management- Dushyent Gehlot. Agrobios

7. Principles of Organic Farming- S.R. Reddy. Kalyani publishers.
8. Organic Farming for Sustainable Agriculture- S.C. Panda. Kalyani publishers.

Reference Books:

1. Principles of Soil Conservation and Management, Humberto Blanco-Canqui, Rattan Lal Springer,
2. Advances in Soil and Water Conservation Francis J. Pierce CRC Press.
3. Integrated Watershed Management in Rainfed Agriculture, Suhas P. Wani, Johan Rockstrom, Kanwar Lal Sahrawat, CRC Press.
4. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition
5. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication

Protected Cultivation and Secondary Agriculture

L T P C
1 0 0 1

Course Code: BAG 608

Objectives: The main objectives of protected cultivation are to protect the crops creating a microclimate that allows for the improvement of their quantity and quality contributing to a better use of resources

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer,

Unit 5 (4 Hours)

Recirculatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

Books

5. Greenhouse Technology and Management, Nicolas Castilla, CABI,
6. Postharvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation, and Waste Management, L. R. Verma, Dr. V. K. Joshi, Indus Publishing.
7. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy CRC Press.
8. Handbook of Agriculture. ICAR Publication.

Reference Books

1. Postharvest Management and Value Addition, Ashwai K.Goel, Rajinder Kumar, Satwinder S. Mann Daya Books,
2. Postharvest Technology of Fruits and Vegetables: General concepts and principles L. R. Verma, Dr. V. K. Joshi Indus Publishing Company.
3. Greenhouse Technology and Management, Nicolas Castilla, CABI,

Diseases of Field & Horticultural Crops & their Management-II

L	T	P	C
2	0	0	2

Course Code: BAG 609

Objective- This course is designed to assist students to develop a broad understanding of plant pathogens, diseases caused by them and disease management approaches.

Unit 1 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in wheat- rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle;

Unit 2 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng;

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

Symptoms, etiology, disease cycle and management of following diseases in mango in Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leaf spot.

Text Books:

1. Plant Pathology – P.D. Sharma. Rastogi Publications.
2. Crop Diseases and Their Management. H.S. Chaube and V. S. Punthir PHI Learning Private Limited.
3. Essentials of Plant Pathology by V. N. Pathak, Prakash Publ., Jaipur (1972).

Reference Books:

1. Plant pathology by G. N. Agrios 4th edition, Academ. Press, New york (1997).
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (1967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.

Post-harvest Management and Value Addition of Fruits and Vegetables

L T P C
1 0 0 1

Course Code: BAG 610

Objective: Fruits and vegetables are perishable in nature. A considerable amount of fruits and vegetables produced in India is lost due to improper post-harvest operations; as a result there is a considerable gap between the gross production and net availability. The course emphasizes on different process and methods for reduction of losses in handling, packaging and storage of horticultural crops along with preparation of processed items from them.

Unit 1 (4 Hours)

Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post harvest losses;

Unit 2 (4 Hours)

Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening;

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text Books:

1. Postharvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation, and Waste Management, L. R. Verma, Dr. V. K. Joshi Indus Publishing
2. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy CRC Press
3. Post Harvest Management of Horticultural Crops, Saraswathy S, Agrobios (India)

Reference Books:

1. Postharvest Management and Value Addition, Ashwai K.Goel, Rajinder Kumar, Satwinder S. Mann Daya Books.
2. Postharvest Technology of Fruits and Vegetables: General concepts and principles L. R. Verma, Dr. V. K. Joshi Indus Publishing Company.
3. Postharvest: an introduction to the physiology & handling of fruit, vegetables & ornamentals, R. B. H. Wills, UNSW Press,

Crop Improvement – II (*Rabi crops*)

L T P C
1 0 0 1

Course Code: BAG 611

Objective: Utilization of innovative approaches for the development of variety in quality as well as quantity.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text books:

8. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.
9. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
10. Principles and procedure of Plant Breeding, G. S. Chahal, S. S. Gosal, CRC Press
11. Plant Breeding: Principles and Prospects, M.D.Hayward, N. O. Bosermark, T. Romagosa

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Breeding of field crops, D.N. Bhardwaj, Agrobios
3. Breeding of Horticultural crops: Principles and Practices, N. Kumar, New India Publishing
4. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.

Farm Management, Production and Resource Economics

L T P C
1 0 0 1

Course Code: BAG 612

Objective: Objective: The course provides knowledge regarding the concept of production economics, its functions and determination of optimum input and output. It also emphasizes on the principles of farm management and budgeting

Unit 1 (4 Hours)

Meaning and concept of farm management, objectives and relationship with other sciences.

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting,

Unit 4 (4 Hours)

steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies, Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation.

Unit 5 (4 Hours)

Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Text Books

1. Principles of Agricultural Economics, David Colman and Trevor Young, Cambridge University Press
2. A Textbook of Agricultural Economics. C.B. Singh and R.K. Singh (Author)
3. Agricultural Economy of India by S.Sankaran

Reference Books

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.
2. Agricultural Finance And Management Subba Reddy
3. Modern Economic Theory” by Dewett K.K.

Problematic Soils and their Management

L T P C
2 0 0 2

Course Code: BAG 613

Unit 1

(4 Hours)

Objective: Soil science studies how soil is formed and how it functions and interacts with the biosphere and what role it plays in the development of natural and cultural landscapes and study the problems in soil and their management.

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

Unit 2

(4 Hours)

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

Unit 3

(4 Hours)

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

Unit 4

(4 Hours)

Multipurpose tree species, bio remediation through MPTs of soils, land capability

Unit 5

(4 Hours)

Classification, land suitability classification. Problematic soils under different Agro-ecosystems.

Text Books:

4. Introductory Soil Science- D.K. Das. Kalyani Publisher.
5. Fundamentals of Soil science-Indian Society of Soil Science.
6. Textbook of Soil Science- T. Biswas , S. Mukherjee Tata McGraw - Hill Publishing Company Limited.

Reference Books:

4. Soil Fertility and Fertilizer Use- Samuel L. Tisdale and Werner L. Nelson Macmillan Coll Div.
5. Nature and Property of Soil-N. C. Braby. Macmillan Publishing Company Incorporated
6. Soil Science- Mangat Rai Anmol Publications Pvt. Ltd.

Principles of Food Science and Nutrition

L T P C
1 0 0 1

Course Code: BAG 614

Objective: Food technology is a branch of food science that deals with the production processes that make foods. The main objective for the course is to study different properties of food, their functions and sources of different components.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives,

Unit 3 (4 Hours)

Important reactions); Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods);

Unit 4 (4 Hours)

Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.);

Unit 5 (4 Hours)

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

Text books:

1. Food Processing Technology: Principles and Practice, P.J. Fellows CRC Press,
2. Principles of Food Processing, Dennis R. Heldman, Richard W Hartel Springer Science & Business Media.
3. Elements of food technology, Norman W. Desrosier. Avi Pub. Co.

Reference books:

1. Food Processing: Recent Developments, Anilkumar G. Gaonkar Elsevier,
2. Fundamentals of Food Process Engineering, Romeo T. Toledo Springer Science & Business Media.
3. Food Technology an introduction, Anita Tull, Oxford University Press

Rainfed Agriculture and Watershed Management and Organic Farming Practical

L T P C
0 0 2 1

Course Code: BAG 657

1. Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons.
2. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India.
3. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops.
4. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation.
5. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed.
6. Field demonstration on soil & moisture conservation measures.
7. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed.
8. Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost,
9. Bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management;
10. Cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Protected Cultivation and Secondary Agriculture Practical

L T P C
0 0 2 1

Course Code: BAG 658

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Diseases of Field & Horticultural Crops & their Management-II Practical

L T P C
0 0 2 1

Course Code: BAG 659

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Post-harvest Management and Value Addition of Fruits and Vegetables Practical

L T P C
0 0 2 1

Course Code: BAG 660

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Crop Improvement – II (*Rabi crops*) Practical

L T P C
0 0 2 1

Course Code: BAG 661

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Farm Management, Production and Resource Economics Practical

L T P C
0 0 2 1

Course Code: BAG 662

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Practical Crop Production-II (*Rabi Crops*)

L T P C
0 0 2 1

Course Code: BAG 663

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

Evaluation of Field Work:

Internal Evaluation (100 marks)

The above mentioned field work shall be conducted under the supervision of one faculty member and would be evaluated by the two internal faculty members on a 4 point scale as mentioned below.

Field work 40 marks	File work 20 marks	Viva 30 marks	Attendance 10marks	Total internal 100 marks
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Educational Tour

L T P C
0 0 2 1

Course Code: BAG 664

1. To visit different Farmer Fairs organized by different Agricultural Universities.
2. Visit to Krishi Vigyan Kendra.
3. Visit to Different ICAR institutes.

Evaluation

Internal Evaluation (100 marks)

The above tour evaluated by the faculty members concerned for the tour on a 4 point scale as mentioned below.

Attendance	Discipline	Report Preparation	Viva	Total
10 marks	10 marks	50	30 marks	100 marks

Elective Courses

Hi-tech. Horticulture

L	T	P	C
1	0	0	1

Course Code: BAGE 601

Objective: Horticulturists apply their knowledge, skills, and technologies used to grow intensively produced plants for human food and non-food uses and for social needs. Development of modern post-harvest management infrastructure as an integral part of area expansion projects or as common facility for cluster of projects. Development of integrated, energy efficient cold chain infrastructure for fresh horticulture produce.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

High density orcharding, Components of precision farming: Remote sensing, Geographical Information System (GIS),

Unit 4 (4 Hours)

Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA),

Unit 5 (4 Hours)

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

Text Books:

7. Basic Horticulture-Jitendra Singh. Kalyani Publisher
8. Horticulture at a glance- A. Salaria. Jain Brothers
9. Instant Horticulture-S. N. Gupta. Jain Brothers

Reference Books:

1. Basics of Horticulture by K.V. Peter. New India Publishing Agency, New Delhi
2. Principles of Horticulture by C.R. Adams, M.P. Early. Routledge
3. Terminology of Horticulture by Neeraj Pratap Singh. International Book Distributing Co (IBDC Publishers)

Weed Management

L	T	P	C
1	0	0	1

Course Code: BAGE 602

Objective: Weeds are usually opportunistic plant species that are not native to an area, but once introduced, are able to compete effectively for resources. The purpose of this course is to protect our crops from weeds.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

Herbicide classification, concept of adjuvant, surfactant, herbicide formulation and their use. Introduction to mode of action of herbicides and selectivity.

Unit 3 (4 Hours)

Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture.

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text books:

1. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi
2. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication
3. Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy-Kalyani Publisher

Reference books:

1. Principles of Agronomy - S. R. Reddy. Kalyani Publisher
2. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. PVT. LTD.

System Simulation and Agroadvisory

L	T	P	C
1	0	0	1

Course Code: BAGE 603

Objective: Crop model predictions will be input into economic models to study and of enhancing world food security and adaptation capacity in both developing and developed countries. Weather and climate is a resource and considered as basic input or resources in agricultural planning, every plant process related with growth development and yield of a crop is affected by weather. The meteorological, hydrological and pedological factors affecting agricultural production and also with agriculture's interaction with the environment. Its objectives are to elucidate such effects, and then to assist farmers to apply this supportive knowledge and information in agrometeorological practices and services.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance. Weather forecasting, types, methods, tools & techniques, forecast verification;

Unit 4 (4 Hours)

Value added weather forecast, ITK for weather forecast and its validity; Crop-Weather Calendars;

Unit 5 (4 Hours)

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

Text Books:

1. Varshneya, M.C. and Pillai, P.B. 2003. Text book of Agricultural Meteorology, ICAR Pusa, New Delhi.
2. Plant and Crop Modeling: A Mathematical Approach to Plant and Crop Physiology, John H. M. Thornley Ian R. Johnson, The Blackburn Press
3. Mavi H. S. 1986. Introduction to Agrometeorology (2nd ed.), Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi.
4. Murthy, V.R.K 1993. Practical Manual in Agriculture Meteorology, Kalyani Pub., New Delhi.
5. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. 6th edition.

Reference Books:

1. Seeman. J., Chiskov, Y.Z., Lomsa, J. and Primault, B. 1979. Agrometeorology, Springer Verlag, berlin.
2. Sunith, C.P. 1975. Methods in Agriculture Meteorology, Elsevier Sc. Co., Amsterdam.
3. Prasad Rao, G.S.L.H.V. 2003. Agricultural Meteorology, Kerala Agricultural University, Thrissur, Kerala.

Agricultural Journalism

L	T	P	C
1	0	0	1

Course Code: BAGE 604

Objectives: Mainstream media outlets routinely cover agriculturally relevant topics such as biotechnology, ethanol, and E. Coli. Because of the complexity of these issues, including the scientific background that is necessary to understand them, it is important that reporters use good critical thinking skills to ensure fair and accurate coverage.

Unit 1 (4 Hours)

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

Unit 2 (4 Hours)

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

Unit 3 (4 Hours)

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

Unit 4 (4 Hours)

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

Unit 5 (4 Hours)

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

Text Books

1. Mass Communication and Journalism in India, D.S.Mehta, Allied Publishers Private Limited
2. Agricultural Journalism, B.L. Jana, Natraj Publishers, Delhi
3. History of Indian journalism, Thiaga Rajan, Columbia House

Reference Books:

1. Style in Journalism, P.V.L.Narasimha Rao, Readworth Publication
2. Agricultural Extension: Worldwide Innovations R. Saravanan New India Publishing
3. Agricultural Extension Systems: Issues and Approaches B.S. Hansra (ed.) Concept Publishing Company.

Hi-tech. Horticulture Practical

L T P C
0 0 2 1

Course Code: BAGE 651

1. Types of polyhouses and shade net houses,
2. Intercultural operations, tools and equipments
3. Identification and application,
4. Micro propagation,
5. Nursery-protrays, micro-irrigation, EC, pH based fertilizer scheduling,
6. Canopy management,
7. Visit to hi-tech orchard/nursery.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Weed Management Practical

Course Code: BAGE 652

L T P C
0 0 2 1

1. Techniques of weed preservation.
2. Weed identification and their losses study.
3. Biology of important weeds.
4. Study of herbicide formulations and mixture of herbicide.
5. Herbicide and agro-chemicals study.
6. Shift of weed flora study in long term experiments.
7. Study of methods of herbicide application,
8. Spraying equipments.
9. Calculations of herbicide doses
10. weed control efficiency and weed index.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks 50
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

System Simulation and Agroadvisory Practical

L T P C
0 0 2 1

Course Code: BAGE 653

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

Agricultural Journalism Practical

L T P C
0 0 2 1

Course Code: BAGE 654

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

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 3 point scale which would include the practical conducted by the students and a viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Practical Performance during the semester 35 marks				On the day of exam 15 marks		
Experiment	File work	Viva	Attendance	Experiment	Viva	Total internal marks
05 marks	10 marks	10 marks	10 marks	5 marks	10 marks	50

External Evaluation (50 marks)

The external evaluation would also be done by the external examiner based on the experiment conducted during the examination.

Experiment	File Works	Viva	Total External
30 marks	10 marks	10 marks	50 marks

VII Semester			
SN.	Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA) BAG 754		
	Activities	No. of weeks	Credit Hours
1	General orientation & On campus training by different faculties	1	14
2	Village attachment	8	
	Unit attachment in Univ./ College. KVK/ Research Station Attachment	5	
3	Plant clinic	2	02
	Agro-Industrial Attachment	3	04
4	Project Report Preparation, Presentation and Evaluation	1	
Total weeks for RAWE & AIA		20	20

- **Agro- Industrial Attachment:** The students would be attached with the agro-industries for a period of 3 weeks to get an experience of the industrial environment and working.

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-processing-value addition, Agri-finance institutions, etc.

Activities and Tasks during Agro-Industrial Attachment Programme

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

Evaluation

Internal Evaluation (100 marks)

The above mentioned RAWE programme conducted under the supervision of concerned faculty members and would be evaluated by the 3 internal faculty members on a 8 point scale as mentioned below.

Plant Health Clinic	Field Visits	Unit attachment in Univ./ College. KVK/ Research Station Attachment	Agro-industrial Attachment	Village Attachment	Report/Presentation	Viva	Attendance	Total Internal
10 marks	10 marks	10 marks	10 marks	30 marks	10 marks	10 marks	10 marks	100 marks

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE
SEMESTER- VIII
TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES
Teerthanker Mahaveer University

Sr. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG-852	Production Technology for Bioagents and Biofertilizer	-	-	20	10	100	-	100
2.	BAG-853	Seed Production and Technology	-	-	20	10	100	-	100
3.	BAG-854	Mushroom Cultivation Technology	-	-	20	10	100	-	100
4.	BAG-855	Soil, Plant, Water and Seed Testing	-	-	20	10	100	-	100
5.	BAG-856	Commercial Beekeeping	-	-	20	10	100	-	100
6	BAG-857	Poultry Production Technology	-	-	20	10	100	-	100
7	BAG-858	Commercial Horticulture	-	-	20	10	100	-	100
8	BAG-859	Floriculture and Landscaping	-	-	20	10	100	-	100
9	BAG-860	Food Processing	-	-	20	10	100	-	100
10	BAG-861	Agriculture Waste Management	-	-	20	10	100	-	100
11	BAG-862	Organic Production Technology	-	-	20	10	100	-	100
12	BAG-863	Commercial Sericulture	-	-	20	10	100	-	100
		Total	-	-	40	20	200	-	200

A student has to register 20 credits opting for two modules of 10 credits each (total 20 credits) from the package of modules in the VIII semester

Evaluation

Internal Evaluation (100 marks)

The above courses be conducted under the supervision of 4 faculty members and by the attached unit and would be evaluated on a 7 point scale as mentioned below.

Sr. No.	Description	Marks
Pre Final Examination		
1	Business Planning and Designing	05
2	Planning for Production	05
3	Organization of production, quality and schedule adherence	15
4	Written Examination	20
5	Student performance (class assessment, regularity etc.)	05
	Sub Total A	50
Final Examination		
6	Report writing and records	20
7	Oral examination or Power point presentation	30
	Sub Total B	50
	Total (A+B)	100