Study &Evaluation Scheme

of

Bachelor of Science (Agriculture)

[Applicable w.e.f. Academic Session 2014-15]

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 : 207
Minimum credit required for the degree : 199

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.	$1\frac{1}{2}$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.

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE

SEMESTER- I, 2014-2015

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 101	Principles of Agronomy	3	-	-	3	40	60	100
2.	BAG 102	Fundamentals of Soil Science	3	-	-	3	40	60	100
3.	BAG 103	Elements of Genetics	3	2	-	4	40	60	100
4.	BAG 104	Fundamentals of Horticulture	3	-	-	3	40	60	100
5.	BAG 105	Agricultural Meteorology	3	2	-	4	40	60	100
6.	BAG 106	Foundation English-I	3	-	-	3	40	60	100
7.	BAG 151	Principles of Agronomy Practical	-	-	4	2	50	50	100
8.	BAG 152	Fundamentals of Soil Science Practical	-	-	4	2	50	50	100
9.	BAG 153	Fundamentals of Horticulture Practical	-	-	4	2	50	50	100
		Total Credit	**18**	**4**	**12**	**26**	**390**	**510**	**900**

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE

SEMESTER- II, 2014-2015

TEERTHANKER MAHAVEER COLLEGE OF AGRICULTURE SCIENCES

Teerthanker Mahaveer University

Sl. No.	Course Code	Course Title	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1.	BAG 201	Introductory Entomology	3	-	-	3	40	60	100
2.	BAG 202	Weed Management	3	2	-	4	40	60	100
3.	BAG 203	Introductory Plant Pathology	3	-	-	3	40	60	100
4.	BAG 204	Rural Sociology and Educational Psychology	3	2	-	4	40	60	100
5.	BAG 205	Quantitative Techniques	3	2	-	4	40	60	100
6.	BAG 206	Fundamentals of Computer	3	2		4	40	60	100
7.	BAG 251	Introductory Entomology Practical	-	-	4	2	50	50	100
8.	BAG 252	Introductory Plant Pathology Practical	-	-	4	2	50	50	100
		Total Credit	**18**	**8**	**8**	**26**	**340**	**460**	**800**

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-301	Economic Entomology	2	-	-	2	40	60	100
2.	BAG-302	Diseases of Field Crops and their Management	2	-	-	2	40	60	100
3.	BAG-303	Principles of Plant Breeding	3	-	-	3	40	60	100
4.	BAG-304	Crop Production-I	3	-	-	3	40	60	100
5.	BAG-305	Soil Chemistry, Fertility and Nutrient Management	2	2	-	3	40	60	100
6.	BAG-306	Production Technology of Fruit and Vegetable Crops	3	-	-	4	40	60	100
7.	BAG-307	Principles of Agricultural Economics	3	2	-	4	40	60	100
8.	BAG- 351	Economic Entomology Practical	-	-	2	1	50	50	100
9.	BAG- 352	Diseases of Field Crops and their Management Practical	-	-	2	1	50	50	100
10.	BAG- 353	Principles of Plant Breeding Practical	-	-	2	1	50	50	100
11.	BAG- 354	Crop Production-I Practical	-	-	2	1	50	50	100
12.	BAG- 355	Soil Chemistry Fertility and Nutrient Management Practical	-	-	2	1	50	50	100
13.	BAG- 356	Production Technology of Fruit and Vegetable Crops Practical	-	-	2	1	50	50	100
14.	BAG-357	Work Programme (Field Work)	-	-	2	1	100	-	100
		Total Credit	**18**	**4**	**14**	**28**	**680**	**720**	**1400**

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE

SEMESTER- IV, 2014-2015

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-401	Crop Production-II	2	-	-	2	40	60	100
2.	BAG-402	Irrigation and Water Management	2	-	-	2	40	60	100
3.	BAG-403	Principles of Plant Biotechnology	2	-	-	2	40	60	100
4.	BAG-404	Insect Physiology and Systematics	2	2	-	3	40	60	100
5.	BAG-405	Principles of Soil Physics	2	2	-	3	40	60	100
6.	BAG-406	Integrated Pest Management	2	2	-	3	40	60	100
7.	BAG-407	Agriculture Cooperation, Finance and Management	3	2	-	4	40	60	100
8.	BAG-408	Farm Machinery and Power	3	-	-	3	40	60	100
9.	BAG-409	Diseases of Horticulture Crops	2	-	-	2	40	60	100
10.	BAG-451	Crop Production-II Practical	-	-	2	1	50	50	100
11.	BAG-452	Irrigation and Water Management Practical	-	-	2	1	50	50	100
12.	BAG-453	Principles of Plant Biotechnology Practical	-	-	2	1	50	50	100
13.	BAG-454	Diseases of Horticulture Crops Practical	-	-	2	1	50	50	100
		Total Credit	**20**	**8**	**8**	**28**	**560**	**740**	**1300**

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE

SEMESTER- V, 2014-2015

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-501	Farming System and Sustainable Agriculture	3	-	-	3	40	60	100
2.	BAG-502	Seed Production, Plant Breeders and Farmer Rights	3	-	-	3	40	60	100
3.	BAG-503	Elementary Crop Physiology	3	-	-	3	40	60	100
4.	BAG-504	Agricultural Microbiology and Biochemistry	3	-	-	3	40	60	100
5.	BAG-505	Insect Ecology	2	2	-	3	40	60	100
6.	BAG-506	Conservation and Management of Soil and Water Resources	2	2	-	3	40	60	100
7.	BAG-507	Dimensions of Agriculture Extension and Rural Development	2	2	-	3	40	60	100
8.	BAG-508	Protected Cultivation and Post Harvest Technology	2	2	-	3	40	60	100
9.	BAG-551	Farming System and Sustainable Agriculture Practical	-	-	2	1	50	50	100
10.	BAG-552	Seed Production, Plant Breeders and Farmer Rights Practical	-	-	2	1	50	50	100
11.	BAG-553	Elementary Crop Physiology Practical	-	-	2	1	50	50	100
12.	BAG-554	Agricultural Microbiology and Biochemistry Practical	-	-	2	1	50	50	100
		Total Credit	**20**	**8**	**8**	**28**	**520**	**680**	**1200**

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE

SEMESTER- VI, 2014-2015

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-601	Elements of Food Technology	2	-	-	2	40	60	100
2.	BAG-602	Breeding of Field and Horticulture Crops	2	-	-	2	40	60	100
3.	BAG-603	Manures, Fertilizers and Agrochemicals	2	-	-	2	40	60	100
4.	BAG-604	Silviculture and Agroforestry	2	-	-	2	40	60	100
5.	BAG-605	Introductory Nematology	2	2	-	3	40	60	100
6.	BAG-606	Post Harvest Management of Horticulture crops	2	2	-	3	40	60	100
7.	BAG-651	Elements of Food Technology Practical	-	-	2	1	50	50	100
8.	BAG-652	Breeding of Field and Horticulture Crops Practical	-	-	2	1	50	50	100
9.	BAG-653	Manures, Fertilizers and Agrochemicals Practical	-	-	2	1	50	50	100
10.	BAG-654	Silviculture and Agroforestry Practical	-	-	2	1	50	50	100
11.	BAG-655	Practical Crop Production	-	-	4	2	100	-	100
12.	BAG-656	Language Lab I	-	-	4	2	50	50	100
Elective courses to be offered in VI Semester									
13.	BAG6E1	Biofertilizers for Sustainable Agriculture	2	2	-	3	40	60	100
14.	BAG6E2	Ornamental Horticulture	2	2	-	3	40	60	100
		Total Credit	**14**	**6**	**16**	**25**	**630**	**670**	**1300**

Note: In elective courses students can choose any one of the two carrying equal credit hours.

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE

SEMESTER- VII, 2014-2015

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-701	Stored Grain Pests and their Management	2	-	-	2	40	60	100
2.	BAG-702	Livestock Production and Management	2	-	-	2	40	60	100
3.	BAG-703	Extension Methodologies and Entrepreneurship Development	3	-	-	3	40	60	100
4.	BAG-751	Stored Grain Pests and their Management Practical	-	-	2	1	50	50	100
5.	BAG-752	Livestock Production and Management Practical	-	-	2	1	50	50	100
6.	BAG-753	Rural Agricultural Work Experience	-	-	20	10	100	-	100
Elective courses to be offered in VII Semester									
7.	BAG7E1	Organic Farming	3	-	-	3	40	60	100
8.	BAG7E2	Mass multiplication of biopesticides, biocontrol agents and biofertilizers	3	-	-	3	40	60	100
		Total	**10**	**00**	**24**	**22**	**360**	**340**	**700**

Note: In elective courses the students can choose any one of the two carrying equal credit hours.

COURSE OUTLINE AND SYLLABUS OF B.Sc. AGRICULTURE

SEMESTER- VIII, 2014-2015

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 801/TMU X01	Environmental Studies	4	-	-	4	40	60	100
2.	BAG-802	Production Economics and Farm Business Management	3	-	-	3	40	60	100
3.	BAG-803	Agricultural Marketing, International Trade and Prices	4	-	-	4	40	60	100
4.	BAG-804	Rainfed Agriculture and Watershed Management	3	-	-	3	40	60	100
5.	BAG-805	Entrepreneurship Development and Business Management	4	-	-	3	40	60	100
6.	BAG-806	Landscaping	3	-	-	3	40	60	100
7.	BAG-851	Landscaping practical	-	-	2	1	50	50	100
Elective courses to be offered in VIII Semester									
8.	BAG8E1	Production Technology of Spices, Aromatic, Medicinal and Plantation Crops	3	-	-	3	40	60	100
9.	BAG8E2	Renewable Energy and Green Technology	3	-	-	3	40	60	100
		Total Credit	**24**	**-**	**2**	**24**	**330**	**470**	**800**

Note: Students can choose any one of the two carrying equal credit hours.

Principles of Agronomy

L	T	P	C
3	0	0	3

Course Code: BAG 101

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.

Course Contents:

Unit-I **(Lectures 08)**

Meaning and scope of Agronomy, Role of Agronomist, National and International Agricultural Research Institutes located in India, Indian agricultural Universities. Sustainable Agriculture.

Unit-II **(Lectures 08)**

Cropping systems, cropping pattern, cropping schemes, multiple cropping and mixed cropping principles and advantages, intercropping systems and advantages, Efficient cropping system, Interaction between different component crops, Economic Evaluation, Cropping system management.

Unit-III **(Lectures 08)**

Classification of crops, Crop rotation principles and advantages, Agricultural seasons in India, Factors Governing Crop Production or Affecting Crop Growth.

Unit-IV **(Lectures 08)**

Selection of seed, sowing methods, tillage and its objectives, essential nutrients, Criteria of Essentiality, Classification of essential nutrients, sources of essential nutrients, availability and uptake by crops.

Unit-V **(Lectures 08)**

Manures and fertilizers- organic inorganic, green manuring, bio-fertilizers, balanced fertilizers, principles governing time and method of fertilizer application, integrated nutrient management.

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:

4. 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
3	0	0	3

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 I **(Lectures 08)**

Definition of Soil, Components of Soil and their role in agriculture; Soil forming rocks and minerals, Development, of Soil profile, Soil formation, factors affecting soil formation, soil forming processes, Soil reaction, its measurements and significance.

Unit II **(Lectures 08)**

Chemistry of clay minerals with special reference to Kaoinite, Montmorrillonite. Physical properties of soil, and their significance; Chemical properties of soil, cation and anion exchange phenomenon and their importance in agriculture.

Unit III **(Lectures 08)**

Soil organic matter, humus formation and its importance in soil fertility, management and maintenance of organic matter in soils.

Unit IV **(Lectures 08)**

Classification of soil, distribution and characteristics, description of soils of India, Elementary idea of soil survey.

Unit V **(Lectures 08)**

Occurrence, distribution and functions of Soil Micro-organism. Biological Nitrogen Fixation (Symbiotic and Non symbiotics), Nitrification, Microbial decomposition of organic matter in soil. Role and use of Biofertilizers in Crop Production.

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.

Elements of Genetics

L	T	P	C
3	2	0	4

Course Code: BAG 103

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.

Course Contents:

Unit I **(Lectures 08)**

Definition, significance and historical development in genetics; Ultra structure of cell, cell organelles and their functions. Mendel's Law's of inheritance

Unit II **(Lectures 08)**

Role of Genetics in Agriculture, Chromosomal theory of inheritance, meiosis and mitosis; Linkage and crossing overtypes, mechanism and significance,

Unit III **(Lectures 08)**

Nucleic acid as genetic material-structure, replication, genetic code and translation, Mutation-spontaneous and induced.

Unit IV **(Lectures 08)**

Study of chromosome, structure, morphology, number and types-karyotypes and idiogram multiple alleles, blood groups in man and body coat colour in rabits.

Unit V **(Lectures 08)**

Sex chromosomes and its determination in man and droisophila, sex linked characters; Cytoplasmic inheritance-plasma and nuclear, gene inter-action.

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. Merill Publishing Co., London.

Fundamentals of Horticulture

L	T	P	C
3	0	0	3

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.

Course Contents:

Unit I **(Lectures 08)**

Introductory knowledge of main branches of horticulture and their Importance.

Unit II **(Lectures 10)**

Botanical classification of fruits; climatic fruit zones of Uttar Pradesh and fruits grown therein.

Unit III **(Lectures 10)**

Establishment of orchards; Selection of site, systems of planting; Orchard soil management.

Unit IV **(Lectures 08)**

Systems of irrigation; Principles of pruning and systems of training of fruit plants; Unfruitfulness, its causes and measures to overcome it; fruit drop, its causes and measures to control it; rejuvenation of orchards.

Unit V **(Lectures 04)**

Brief studies of polyembryony, parthenocarpy and incompatibility.

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)

Agricultural Meteorology

L	T	P	C
3	2	0	4

Course Code: BAG 105

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.

Course Contents:

Unit I **(Lectures 08)**

Different meteorological variables related to agriculture; Rainfall- Hydrologic cycle and it's components. Types and forms of precipitation. Storms, occurrence, variation and measurement of rainfall. Rainguages, Computation and analyses of data. Plotting of mass curve and rainfall, intensity curve.

Unit II **(Lectures 08)**

Run-off- Definition, types, factors affecting, estimation and measurement of run-off.

Unit III **(Lectures 08)**

Atmosphere - Definition and structure, climate and weather, atmospheric pressure, factors affecting, measurement.

Unit IV **(Lectures 08)**

Elementary idea of insolation, Temperature, kinds and measuring instruments, evaporation, factors affecting, measurement

Unit V **(Lectures 08)**

Humidity, definition, windvane, Anemo-meter. Indian Agro Climatic Zones. Elementry idea of weather forecasting.

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.

FOUNDATION ENGLISH - I

Course code: BAG 106

L	T	P	C
3	0	0	3

(Common with DIP 149)

Objective- In today English language occupies an important place in people lives. Nowadays everyone knows the importance of English language in today's world.

Course Content: Module -1

Introduction to English language **(4 hours)**

a) Need of knowing language
b) Importance of language in present scenario
c) Importance of spoken language

Module -2

Introduction to Personnel **(6 hours)**

a) Self Introduction
b) Motivation , Positive attitude & Body Language

Module -3

Functional Grammar **(8 hours)**

a) Parts of Speech
b) Tenses and Modals

Module -4

Writing Skills **(6 hours)**

a) Applications
b) Short passages on given topics

Lab Exercise **(2 hours)**

1. Activity Based Sessions
2. Asking the students to speak on given topics
3. Oral Exercises

Reference Books:

1. Remedial English Language by Malti Agarwal, Krishna Prakashan Media (P) Ltd., Meerut.
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 & Pushp Lata, Oxford University Press

Principles of Agronomy (Practical)

L	T	P	C
0	0	4	2

Course code: BAG 151

LIST OF PRACTICALS

1. Identification of different group of crops.
2. Morphological description of major crops
3. Identification of different weed plants and study of weed control experiments.
4. Seed germination and viability test.
5. Study of manures, fertilizers and green manure crops / seeds
6. Preparation of fertilizers mixture and spray solutions
7. Preparation of cropping scheme for a given farm
8. Compost making. Practice of ploughing. Different methods of sowing.
9. Participation in ongoing field operations.
10. Study of inter-cultivation implements and practice.

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	4	2

Course Code: BAG 152

LIST OF PRACTICALS

1. Measurement of Soil pH.
2. Determination of soil Colour.
3. Determination of soil structure types.
4. Identification of different macronutrients in the soil.
5. Identification of different micronutrients in the soil.
6. Determine soil texture by feel method.
7. Soil survey.
8. Study of soil profile and identification of rocks and minerals.
9. Identification of rocks.
10. A field trip.

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 Horticulture (Practical)

L	T	P	C
0	0	4	2

Course Code: BAG 153

LIST OF EXPERIMENTS

1. Identification of garden tools and plants.
2. Identification of garden plants.
3. Lining out, digging and packing of plants from nursery
4. Preparation of orchards layout.
5. Plant propagation methods and: Sexual and Asexual
6. Training and Pruning of fruit plants.
7. Storage of harvested fruits.
8. Practice of propagation of major fruit plants.
9. Preparation and seed beds and raising of seedlings.
10. Visit to nurseries, gardens and research stations.

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

Introductory Entomology

L	T	P	C
3	0	0	3

Course Code: BAG 201

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.

Course Contents:

Unit I **(8 Hours)**

History and Development of Entomology, Evolution of Insects, Position of insects in the animal world, characteristics of phylum arthropoda.

Unit II **(8 Hours)**

Body wall, its structure, outgrowths, endoskeleton, Body regions, segmentation, sclerites and sutures. Head and head appendages, types of mouth parts, antennae, their structure and types.

Unit III **(8 Hours)**

Thorax structure, thoracic appendages and their modification. Wings, their modification and venation, types of legs, Abdomen.

Unit IV **(8 Hours)**

Classification of insects up to order level, habits, habitats and distinguishing features of different Order and important Families.

Unit V Integrated pest management **(8 Hours)**

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

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.

WEED MANAGEMENT

L	T	P	C
3	2	0	4

Course Code: BAG 202

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.

Course Contents:

Unit I **(8 Hours)**

Definition, weed problems advantages and disadvantages of weeds.

Unit II **(8 Hours)**

Classification and general characteristics of weeds, Crop –weed competition.

Unit III **(8 Hours)**

Weed growth stages, Crop weed competition, critical period of weed competition Establishment of weeds

Unit IV **(8 Hours)**

Weed control methods- Cultural methods of Weed control, Cultural methods of Weed control, Physical methods of Weed control, Biological methods of Weed control, Chemical weed control- Classification of herbicide, Methods of application, Effect of herbicides on crops.

Unit V **(8 Hours)**

Integrated weed management and its importance.

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.

Introductory Plant Pathology

L	T	P	C
3	0	0	3

Course Code: BAG 203

Objective- Plant Pathology is one among the branches of agricultural science that deals with cases, etiology, resulting losses and management of plant diseases.

Course Contents:

UNIT-1 **(8 Hours)**

Definition and objectives of Plant Pathology. History of Plant Pathology. Important plant pathogenic organisms. Components of disease, Significance of plant disease, Classification of plant disease, General symptoms of plant disease.

UNIT-2 **(8 Hours)**

General Characters of fungi, Definition of fungus, somatic structures, reproduction in fungi (asexual and sexual).

UNIT-3 **(8 Hours)**

Nomenclature, Binomial system of nomenclature, classification of fungi. Key to divisions and sub-divisions.

UNIT-4 **(8 Hours)**

Survival and Dispersal of Plant Pathogens. Phenomenon of infection – pre-penetration, penetration and post penetration. Pathogenesis – Role of enzymes, toxins, growth regulators and polysaccharides. Defense mechanism in plants – Structural and Bio-chemical (pre and post infection). Plant disease epidemiology.

UNIT-5 **(8 Hours)**

General principles of plant diseases management, Importance, general Principles – Avoidance, exclusion, protection – Plant Quarantine and Inspection – Quarantine Rules and Regulations. Methods of application of fungicides. Host plant resistance, Application of biotechnology in plant disease management, Development of disease resistant transgenic plants through gene cloning. Integrated plant disease management (IDM), Concept, advantages and importance.

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 (l972).

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 (l967).

3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.

Rural Sociology and Educational Psychology

L	T	P	C
3	2	0	4

Course Code: BAG 204

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.

Course Contents:

Unit I **(8 Hours)**
Definition and scope of rural sociology. Basic concept of society, community and groups Characteristics and Differences of rural and urban communities.

Unit II **(8 Hours)**
Basic rural institutions and their role in Agriculture development. Definition and types of rural leadership and their role in social /rural change.

Unit III **(8 Hours)**
Socio-economic problems of rural India. Educational psychology. Definition, nature and importance of psychology in the development of human behaviour.

Unit IV **(8 Hours)**
Meaning of habit and habit development. Basic Psychological concepts; motivation, Social Interaction, Attitudes, Emotions, prejudices and Social Perception.

Unit V **(8 Hours)**
Personality- definition, development and factors affecting them.

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.

QUANTITATIVE TECHNIQUES

L	T	P	C
3	2	0	4

Course Code: BAG 205
Common with- BCH-202 (B.Com hons.) BCP-202 (B.Com pass)
Objective: The basic objective of this course is to provide knowledge about the agricultural statistics.

Course Contents:

Unit-I **(8 Hours)**
Introduction to Statistics: Concepts, Scope, Significance & Limitations, Type of Data, Primary & Secondary Classification & Tabulation, Frequency Distribution, Graphical & Diagrammatic representation.

Unit-II **(8 Hours)**
Measures of Central Tendency: Meaning, Application & Limitation, (Mean, Median, Mode), Geometric & Harmonic mean. Dispersion: Range, Mean deviation, Standard deviation, Skewness, Kurtosis.

Unit-III **(8 Hours)**
Correlation: Significance of Correlation, Types of correlation, Scatter Diagram method, Karl Pearson coefficient of Correlation. Regression: Introduction, Regression lines and Regression coefficient – their properties and applications.

Unit-IV **(8 Hours)**
Probability: Basic concepts, mathematical statistical and axiomatic approach. Addition Law, Conditional Probability, Multiplication Law. Probability Distribution, Binomial Distribution, Poisson distribution, Normal distributions and their applications.

Unit-V **(8 Hours)**
Sampling: Sample and census, Methods of sampling, Sampling and Non- sampling errors. Procedure of testing the Hypothesis, Type II Type- I Errors, T-test, Z –test, Chi-square test and their applications.

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.
3An Introduction to Statistical Methods. C. B. Gupta. Vikas Publication.
* Latest editions of all the suggested books are recommended.

Fundamentals of Computer

L	T	P	C
3	2	0	4

Course Code: BAG 206
(Common with BCS- 301/BCS- 401)

Course Contents:

Unit I **(8 Hours)**

Concepts in Computer Application: Definition of Electronic Computer, History, Generations, Characteristic and Application of Computers, Classification of Computers, Functional Component of Computer: CPU, I/O devices, Type of Memory & Memory Hierarchy, Firmware and Human ware.

Unit II **(8 Hours)**

Programming Language Classification & Number System: Generation of Languages, Introduction to 4GLs.Translators: Assembler, Compiler, and Interpreter. Number System: Decimal, Octal, Binary and Hexadecimal & their Conversions. Various Codes: BCD, ASCII and EBCDIC and Gray Code.

Unit III **(8 Hours)**

Concepts in Operating System, Office Tools and Data Management: Elementary Concepts in Operating System, textual Vs GUI Interface, Introduction to DOS, MS Windows, MS office Tools, MS WORD, MS EXCEL, MS Power Point.

Unit IV **(8 Hours)**

Data Communication & Networks: Basic Concepts in Computer Networks, Networking of Computers- Introduction of LAN and WAN, Network Topologies. Internet and Web Technologies: Hypertext Markup Language, DHTML, WWW, Gopher, FTP, Telnet, Web Browsers, Net Surfing, Search Engines, Email.

Unit V **(8 Hours)**

IT Industry Trends: Careers and Applications in India Basic Awareness of NICNET and ERNET. Application of IT to Areas like E Commerce, electronic governance, Multimedia, and Entertainment. Information Representation: Introduction to Information representation in Digital Media, Text, image, graphics, Animation, Audio, Video etc., Introduction to JPEG, MPEG, MHEG, MP3 & AVI.

Text Books

1. Sinha P.K., Computer Fundamemtals
2. Yadav, D S, Foundations of IT, New Age, Delhi
3. Rajaraman, Introduction to Computers, Prentice-Hall India

Reference Books

1. Peter Nortans, Introduction to Computers, TME
2. Leon & Leon, Fundamental of Information Technology, Vikas Publishing
3. Lehngart, Internet 101, Addison Wesley

* Latest editions of all the suggested books are recommended.

Introductory Entomology (Practical)

L	T	P	C
0	0	4	2

Course code: BAG 251

LIST OF PRACTICALS

1. Insect collection from different group of crops.
2. Study of different insect orders.
3. Handling of Insect collection kit.
4. Identification of different types of insects both in useful and harmful aspects.
5. Preparation of permanent slides of different parts of insect body.
6. Field visit in insect damage fields.
7. Visit to Insects museum.
8. Dissection of Insects.
9. Pinning methods of insects.
10. Identification of different pesticide application equipments.

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 Plant Pathology (Practical)

L	T	P	C
0	0	4	2

Course code: BAG 252

LIST OF PRACTICALS

1. Field Visit for plant disease identification.
2. Study of different Fungi orders.
3. Identification of different Fungus under microscope.
4. Identification of different fungal infection symptoms.
5. Study of different equipments used in Plant Pathology.
6. Study of plant disease
7. Methods of diagnosis
8. Study of pathogenesis.
9. Study of different group of fungicides.
10. Study of different fungicides equipments.

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

Economic Entomology

L	T	P	C
2	0	0	2

Course Code: BAG 301

Objective: Economic entomology is a field of entomology, which involves the study of insects that benefit or harm humans, domestic animals, and crops.

Course Contents:

Unit I **(8 Hours)**

Economic importance of insects, nature and extent of damage, life history and management of the major insect pests of cereals, oilseeds, pulses and vegetables.

Unit II **(8 Hours)**

Economic importance of insects, nature and extent of damage, life history and management of the major insect pests horticultural crops

Unit III Fundamentals of Apiculture **(8 Hours)**

Unit IV Fundamentals of Sericulture **(8 Hours)**

Unit V Fundamentals of Lac culture. **(8 Hours)**

Text books: 1. Elements of Economic Entomology, B.Vasantharaj David and V.V. Ramamurthy N Publications

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

3. Elements of Entomology: Rajendra Singh. Rastogi Publications

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

Diseases of Field Crops and Their Management

L	T	P	C
2	0	0	2

Course Code: BAG 302

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 I **(8 Hours)**

Economic importance, symptoms, cause, epidemiology and disease cycle and integrated management of diseases of cereal crops.

Unit II **(8 Hours)**

Economic importance, symptoms, cause, epidemiology and disease cycle and integrated management of diseases of pulses.

Unit III **(8 Hours)**

Economic importance, symptoms, cause, epidemiology and disease cycle and integrated management of diseases of high value crops.

Unit IV **(8 Hours)**

Economic importance, symptoms, cause, epidemiology and disease cycle and integrated management of diseases of oilseed crops.

Unit V **(8 Hours)**

Economic importance, symptoms, cause, epidemiology and disease cycle and integrated management of diseases of vegetable and fruit crops.

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 (l972).

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 (l967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.

Principles of Plant Breeding

Course Code: BAG 303

L	T	P	C
3	0	0	3

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

Course Contents:

UNIT-1 Plant Breeding-history, objectives and scope. Mode of reproduction in crop plants in relation to breeding techniques. Plant variation kind and causes. **(8 Hours)**

UNIT-2 Genetic consequences of self and cross pollinated crops. Plant Introduction and exploration **(8 Hours)**

UNIT-3 Breeding self pollinated crops, population's improvement, Mass selection, recurrent selection **(8 Hours)**

UNIT-4 Breeding cross pollinated crops mass selection, pedigree, bulk and back cross methods, Male sterility and its importance. **(8 Hours)**

UNIT-5 Breeding of asexually propagated crops, Clonal selection and apomixes. Polyploidy and mutation breeding. **(8 Hours)**

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

Crop Production-I

L	T	P	C
3	0	0	3

Course Code: BAG 304

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

Course Contents:

Unit I **(8 Hours)**

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif cereal crops- rice, maize, sorghum, pearl millet and minor millets

Unit II **(8 Hours)**

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of summer and kharif pulse crops- pigeonpea, green gram and black gram.

Unit III **(8 Hours)**

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif oilseed crops- sesame and soybean

Unit IV **(8 Hours)**

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif fibre crops- cotton, jute and sunhemp.

Unit V **(8 Hours)**

Origin, geographic distribution, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif forage crops- sorghum, maize, cowpea, 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.

Soil Chemistry, Fertility and Nutrient Management

L	T	P	C
2	2	0	3

Course Code: BAG 305

Objective: Soil is a source of plant nutrients. This course is designed to develop comprehensive understanding of soil chemistry, fertility and nutrient management.

Course Contents:

Unit-I **(8 Hours)**

Soil as a source of plant nutrients. Essential nutrients, criteria of essentiality, forms of nutrients in soil, mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Measures to overcome deficiencies and toxicities.

Unit-II **(8 Hours)**

Problem soils – acid, saline and calcareous soils, characteristics, nutrient availabilities. Reclamation – mechanical, chemical and biological methods. Fertilizer and insecticides and their effect on soil, water and air. Irrigation water – quality and its determination. Indian standards for water quality. Use of saline water for agriculture.

Unit-III **(8 Hours)**

Soil fertility – Different approaches for soil fertility evaluation. Methods of soil testing – Chemical methods. critical levels of different nutrients in soil. Plant analysis – DRIS methods, critical levels in plants.

Unit-IV **(8 Hours)**

Rapid tissue tests. Indicator plants. Biological method of soil fertility evaluation. Soil test based fertilizer recommendations to crops. Factors influencing nutrient use efficiency (NUE) in respect of N, P, K, S, Mg, Ca and micronutrients.

Unit-V **(8 Hours)**

Source, method and scheduling of nutrients for different soils and crops grown 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.

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.

Production Technology of Fruit and Vegetable Crops

L	T	P	C
4	0	0	4

Course Code: BAG 306

Objective: The main goal of this course is to increase the fruit and vegetable production through various methods.

Course Contents:

Unit I **(8 Hours)**

Definition and importance of horticulture. Classes of horticulture. Climatic zones of horticulture crops. Area and production of different fruit crops. Selection of site, fencing, and wind break, planting systems, high density planting, planning and establishment.

Unit II **(8 Hours)**

Propagation methods and use of rootstocks. Methods of training and pruning. Use of growth regulators in fruit production. Methods of grafting.

Unit III **(8 Hours)**

Package of practices for the cultivation of major fruits – mango, banana, citrus, grape, guava, sapota, apple, litchi, papaya, Minor fruits – pineapple, pomegranate, ber, fig, phalsa, jack, pear, plum, peaches and cherry.

Unit IV **(8 Hours)**

Importance of Olericulture, vegetable gardens, classification of vegetables, origin, area, production, varieties.

Unit V **(8 Hours)**

Package of practices for fruit vegetables –, tomato, brinjal, chillies, and okera; Cucurbitaceous vegetables cucumber, ridge gourd, ash gourd, snake gourd, bottle gourd, bitter gourd and melons, Cole crops – cabbage, cauliflower and knol-khol. Bulb crops – onion and garlic. Beans and peas – French beans, cluster beans, dolichos beans, peas and cowpea. Tuber crops – potato, sweet potato, tapioca, colocasia, yams; Root crops – carrot, radish, turnip and beet root; Leafy vegetables – amaranthus, palak, gogu; Perennial vegetables – drumstick, coccinia and curry leaf

Text Books:

1. Basic Horticulture-Jitendra Singh. Kalyani Publisher
2. Horticulture at a glance- A. Salaria. Jain Brothers
3. Vegetable Science And Technology In India Vishnu Swarap, Kalyani Publishers

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. Basic Concepts of Vegetable Science Singh N. P. International Book Distributing Company,

Principles of Agricultural Economics

L	T	P	C
3	2	0	4

Course Code: BAG 307

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

Course Contents:

Unit I **(8 Hours)**

Economics: Meaning, Definition, Subject matter, Divisions of Economics, Importance of Economics; Agricultural Economics: Meaning, Definition; Basic Concepts: Goods, Service, Utility, Value, Price, Wealth, Welfare. Wants: Meaning, Characteristics, Classifications of Wants, Importance.

Unit II **(8 Hours)**

Theory of consumption: Law of Diminishing Marginal utility, Meaning, Definition, Assumption, Limitations, Importance. Consumer's surplus: Meaning, Definition, Importance. Demand: Meaning, Definition, Kinds of Demand, Demand schedule, Demand Curve, Law of Demand, Extension and Contraction Vs Increase and Decrease in Demand. Elasticity of Demand:

Unit III **(8 Hours)**

Types of Elasticity of Demand, Degrees of price elasticity of Demand, Methods of Measuring Elasticity, Factors influencing elasticity of Demand, Importance of Elasticity of Demand.

Unit IV **(8 Hours)**

Welfare Economics: Meaning, Pareto's optimality. National Income: Concepts, Measurement. Public Finance: Meaning, Principles. Public Resource: Meaning, Services Tax, Meaning,

Unit V **(8 Hours)**

Classification of Taxes: Cannons of Taxation, Public expenditure: Meaning, Principles. Inflation: Meaning, Definition, Kinds of inflation.

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. Agricultural Economics by subha reddy
2. Agricultural Finance And Management Subba Reddy
3. Modern Economic Theory" by Dewett K.K.

* Latest editions of all the suggested books are recommended.

Economic Entomology (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 351

1. Collection, mounting and preservation of economically important insect pests of crops stages.
2. Study of different insect orders.
3. Handling of Insect collection kit.
4. Identification of different types of beneficial and harmful insects.
5. Field and laboratory acquaintance with insect pests, the various stages and damaged materials.
6. Visit to Insects museum.
7. Visit to insect damage fields.
8. Technical knowledge of honey production.
9. Technical knowledge of Silk production.
10. Technical knowledge of Lac 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

Diseases of Field Crops and Their Management (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 352

1. Identification of different Plant pathogenic symptoms.
2. Study of symptoms, etiology, host-parasite relationship.
3. Presentation of disease samples.
4. Survey and collection of disease samples of different field crops.
5. Field visits at appropriate time during the semester.
6. Educational visit to any Plant Pathological Centre.
7. Study of Pathogenesis of different Plant Pathogens.
8. Study of different group of fungicides.
9. Study of different fungicides equipments.
10. Visit to plant pathogen infested 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 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 Plant Breeding (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 353

LIST OF PRACTICALS

1. Botanical description and floral biology;
2. Study of megasporogenesis and microsporogenesis;
3. Fertilization and life cycle of an angiospermic plant;
4. Plant Breeder's kit; Hybridization techniques and precautions to be taken;
5. Floral morphology, selfing, emasculation and crossing techniques;
6. Study of male sterility and incomapribility in field plots; Rice and Sorghum; Maize and Wheat;
7. Study of male sterility and incomapribility in field plots; Bajra and ragi; Sugarcane and coconut;
8. Study of male sterility and incomapribility in field plots; Groundnut, Castor, Safflower and Sesamum;
9. Study of male sterility and incomapribility in field plots; Redgram, Bengalgram and Greengram;
10. Visit to any Plant Genetic Resource Centre.

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-I (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 354

LIST OF PRACTICALS

1. Rice nursery preparation and transplanting/seed bed preparation and sowing of Kharif crops;
2. Calculations on seed rate of some cereals, oilseeds and pulses.
3. Effect of seed size on germination and seedling vigour of soybean/groundnut
4. Effect of sowing depth on germination of soybean
5. Identification of weeds in rice, maize and soybean fields
6. Study of weed control experiments in cereal crops
7. Top dressing of nitrogen in maize and rice and study of fertilizer experiments on rice, maize, sorghum and millets;
8. Study of yield contributing characters, yield calculations, harvesting and yield estimation of above crops;
9. Study of crop varieties and important agronomic experiments;
10. Study of forage experiments.

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 Chemistry Fertility and Nutrient Management (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 355

LIST OF PRACTICALS

1. Principles of analytical Instruments and their calibration and applications,
2. Colorimetry and flame photometry.
3. Estimation of available N, P, K, S, Mg and Ca in soils, pH, EC, soluble cations and anions in soil water extracts.
4. Lime requirement and gypsum requirement of problem soils.
5. Field capacity Infiltration rate, water holding capacity, soil texture and mechanical analysis, soil temperature.
6. Estimation of N, P and K in plants.
7. Determination of bulk density and particle density,
8. Aggregate analysis, soil strength, soil moisture determination, soil moisture constants
9. Analytical chemistry – Basic concepts, techniques and calculations
10. Educational visit to Soil Research Centre

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 of Fruit and Vegetable Crops (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 356

LIST OF PRACTICALS

1. Identification of fruits;
2. Study of horticultural tools and implements and their uses;
3. Orchard layout and planting;
4. Different propagation methods for fruits
5. Practice of training and pruning of fruit plants
6. Plant protection practices
7. Visit to orchards, nurseries and research centers of fruits.
8. Irrigation methods in fruit crops including drip – Micro irrigation methods of establishment of orchard;
9. Methods of Fertilizer application methods in fruit crops including fertigation technology; Study of different fungicides equipments.
10. Description and identification of varieties of mango, guava, grape, papaya, apple and sapota, banana, citrus, ber.

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

Work Programme (Field Work)

L	T	P	C
0	0	2	1

Course code: BAG 357

LIST OF FIELD WORK

1. Cleaning of field areas.
2. Plantation of flowers in field.
3. Removal of weeds from the cultivated fields.
4. Seed sowing.
5. Field visit.
6. Awareness programme among the farmers.
7. Plantation of different ornamental plants in university.
8. Visit to village areas.
9. Cleaning programmes in university.
10. Cleaning programmes in village areas.

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	File work	Viva	Attendance	Total internal
40 marks	20 marks	30 marks	10marks	100 marks

Crop Production-II

Course Code: BAG 401

L	T	P	C
2	0	0	2

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

Unit I **(8 Hours)**

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; Cereals: wheat, barley; Pulses: chickpea, lentil, peas, french bean.

Unit II **(8 Hours)**

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; Oilseeds: rapeseed and mustard, sunflower, safflower and linseed, groundnut;

Unit III **(8 Hours)**

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; Sugar crops: sugarcane and sugarbeet.

Unit IV **(8 Hours)**

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; Medicinal and aromatic crops such as mentha, lemon grass, citronella.

Unit V **(8 Hours)**

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rabi crops; Commercial crops: potato and tobacco, 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.

Irrigation and Water Management

L	T	P	C
2	0	0	2

Course Code: BAG 402

Objective- The objective of this course is to develop basic understanding about the irrigation and water management.

Course Contents:

Unit I **(8 Hours)**

Irrigation: definition and objectives, water resources and irrigation development in India, Soil plant water relationships, irrigation principles.

Unit II **(8 Hours)**

Methods of soil moisture estimation, evapotranspiration and crop water requirement; effective rainfall, scheduling of irrigation; water budgeting, water application in relation to soil-plant and climatic parameters

Unit III **(8 Hours)**

Methods of irrigation: surface, sprinkler and drip irrigation.

Unit IV **(8 Hours)**

Irrigation efficiency and water use efficiency, conjunctive use of water, irrigation water quality and its management, comparative economics of surface and groundwater use for irrigation. Legal aspects of groundwater exploitation

Unit V **(8 Hours)**

Water management of different major crops of India, Agricultural drainage

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.
4. Doneen, D. and Westcot, D.W. 1984. Irrigation Practice and Water Management. FAO, Irrigation and Drainage Paper 1 (Rev.), Rome, 63 pp

Principles of Plant Biotechnology

Course Code: BAG 403

L	T	P	C
2	0	0	2

Objective- Plant Biotechnology is one among the branches of agricultural science, which play an important role in transgenic.

UNIT-1 **(8 Hours)**

Concepts of Plant Biotechnology: History of Plant Tissue Culture and Plant Genetic Engineering; Scope and importance in Crop Improvement:

UNIT-2 **(8 Hours)**

Totipotency and Morphogenesis, Nutritional requirements of in-vitro cultures; Techniques of In-vitro cultures, Micro propagation, Anther culture, Pollen culture, Ovule culture, Embryo culture,

UNIT-3 **(8 Hours)**

Test tube fertilization, Endosperm culture, Factors affecting above in-vitro culture; Applications and Achievements; Somaclonal variation, Types, Reasons: Somatic embryogenesis and synthetic seed production technology;

UNIT-4 **(8 Hours)**

Protoplast isolation, Culture, Manipulation and Fusion; Products of somatic hybrids and cybrids, Applications in crop improvement. Genetic engineering; Restriction enzymes; Vectors for gene transfer – Gene cloning – Direct and indirect method of gene transfer.

UNIT-5 **(8 Hours)**

Transgenic plants and their applications. Blotting techniques – DNA finger printing – DNA based markers – RFLP, AFLP, RAPD, SSR and DNA Probes – Mapping QTL – Future prospects. MAS, and its application in crop improvement.

Text Books:

1. Introduction to Plant Biotechnology, Chawla, Oxford and IBH Publishing
2. Plant Biotechnology, Ashok Kumar, Discovery Publishing House
3. Plant Biotechnology and Tissue Culture Atul Kumar, Vandana A. Kumar International Book Distributing Company
4. Bojwani, S.S. and Razdan, M.K. 1983. Plant Tissue Culture: Theory and Practices, Elsevier, Amsterdam.

Reference Books:

1. Plant Biotechnology and Agriculture A. Altman, Paul M. Hasegawa Academic Press,
2. Plant Biotechnology: Practical Manual, C. C. Giri, Archana Giri
3. Klug. W.S. and Cummings, M.R. 1983. Concepts of Genetics. Charles E. Merill Publishing Co., London

Insect Physiology and Systematics

L	T	P	C
2	2	0	3

Course Code: BAG 404

Objective: Insect cause the major damage in our crops, so that it's very important to know about their physiology and systematics.

Course Contents:

Unit I **(8 Hours)**

Structure and functions of digestive and circulatory system in insects

Unit II **(8 Hours)**

Structure and functions of respiratory, nervous and excretory system in insects.

Unit III **(8 Hours)**

Structure and functions of secretory (Endocrine) and reproductive system in insects.

Unit IV **(8 Hours)**

Physiology of integument, moulting; growth, metamorphosis and diapause. Types of reproduction in insects.

Unit V **(8 Hours)**

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Classification of insects, Definitions of Biotype, Sub-species, Species, Genus, family and Order.

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

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. Blum, M.S. 1985. Fundamental of Insect Physiology, Publ. Witey, New York.

5. Eugelman, F. 1970. The Physiology of Insect Reproduction, Publ. Pergamon Press, New York.

Principles of Soil Physics

L	T	P	C
2	2	0	3

Course Code: BAG 405

Objective: The practical application of Soil Physics aims at the proper management of the soil by mean of cultivating irrigation drainage, aeration, importance of soil structure, control of infiltration evaporation and regulation of soil temperature.

Course Contents:

Unit I **(8 Hours)**

Importance of Soil Physics in Agriculture, Mechanical analysis and soil separates-Stroke's law, limitations characteristics of soil separates/particles.

Unit II **(8 Hours)**

Densities of soil-particle density, bulk density, porosity, soil structure-genesis of soil structure and its evaluation and importance, factors affecting soil structure and influence of soil structure or soil physical property. soil structural stability and indices; soil tilth; soil conditioners.

Unit III **(8 Hours)**

Soil air- Composition of soil air, gaseous exchange, factors affecting composition of soil air, ODR, Fick's law, importance of soil air in plant growth and biological activities in soil. Renewal of soil air

Unit IV **(8 Hours)**

Soil temperature and soil colour-Source of soil heat and losses of soil heat, soil temperature regimes, factors affecting soil temperature, specific heat capacity, thermal conductivity and diffusivity, influence of soil temperature on plant growth and nutrition, management of soil temperature, factors affecting soil colour and determination of soil colour.

Unit V **(8 Hours)**

Soil water-Importance of soil water, soil water energy concept, soil water potential, classification of soil water and factors affecting soil water. Measurement of soil moisture, movement of soil water and factors affecting it, losses of soil water and their management, infiltration, soil consistency.

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. Ghildyal, B.P. and Tripathi, R.P. 1987. Soil Physics. Wiley Eastern and New Age International, New Delhi.

5. Hillel, D. 1980. Applications of Soil Physics. Academic Press, New York.

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.

Integrated Pest Management

L	T	P	C
2	2	0	3

Course Code: BAG 406

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

Course Contents:

Unit-I **(8 Hours)**

Pest surveillance and pest forecasting. Categories of pests. IPM- Definition, Introduction, concepts, principles and tools of IPM-Host plant resistance, Cultural, Mechanical, Physical, Legislative and Biological.

Unit-II **(8 Hours)**

Methods of control. Chemical control – importance, hazards and limitations. Classification of insecticides,toxicity of insecticides and formulations of insecticides. Study of important insecticides. , Cyclodiens, Organophosphates, Carbamates, Synthetic pyrethroids, development of IPM modules, Botanical insecticides.

Unit-III **(8 Hours)**

Novel insecticides, Pheromones, Nicotinyl insecticides, Chitin synthesis inhibitors, Phenyl pyrazoles, Avermectins, Macrocyclic lactones, Oxadiazimes, Thiourea derivaties, pyridine azomethines, pyrroles, etc. Nematicides, Rodenticides, Acaricides and fumigants. Recent methods of pest control, repellents, antifeedants, hormones, attractants, gamma radiation and genetic control.

Unit-IV **(8 Hours)**

Insecticides Act 1968 – Important provisions. Application techniques of spray fluids. Phytotoxicity of insecticides. Symptoms of poisoning, first aid and antidotes.

Unit-V **(8 Hours)**

Beneficial insects: parasites and predators used in pest control and their mass multiplication techniques. Important groups of microorganisms, bacteria, viruses and fungi used in pest control and their mass multiplication techniques. bio-intensive IPM, bio-pesticides and toxicology in pest management, sanitary and phytosanitary measures. Scope and limitations of IPM.

Text books: **1.** Integrated Pest Management. G.S.Dhaliwal and Ramesh Arora. Kalyani **3.** Elements of Entomology: Rajendra Singh. Rastogi Publications

2. Integrated Pest Management: D. Dent, N.C. Elliott. Springer Science & Business Media

3. Dhaliwal, G.S., Singh, R. and Chillar, B.S. 2006. Essentials of Agricultural Entomology. Kalyani Publ.,New Delhi.

4. Flint, M.C. and Brosch, R.V. 1981. Introduction to Integrated Pest Management.1st ED., Springer, New York.

5. Horowitz, A.R. and Ishaaya, I. 2004. Insect Pest Management: Field and Protected Crops. Springer, New Delhi.

Reference books: **1.** The Insect: Structure and Function- R.F. Chapman. Cambridge University Press.

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.

Agriculture Cooperation, Finance and Management

L	T	P	C
3	2	0	4

Course Code: BAG 407

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

Unit I **(8 Hours)**

History of financing agriculture in India. Agricultural finance: nature and scope. Differences between financing Agriculture and other sectors. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4R's 5C's and 7 P's of credit, repayment plans. History of financing agriculture in India.

Unit II **(8 Hours)**

Commercial banks, nationalization of commercial banks. Lead bank scheme, regional rural banks, scale of finance. Higher financing agencies, RBI, NABARD, AFC, Asian Development Bank, World Bank, Methods of Processing loan application.

Unit III **(8 Hours)**

Insurance and Credit Guarantee Corporation of India. Crop insurance, advantages and limitations in application.

Unit IV **(8 Hours)**

Meaning of management, Functions of management, role of management and scope of management in agriculture business, Functional area of management and relationship with agriculture production, finance and marketing.

Unit V **(8 Hours)**

History of Indian cooperative Movement, pre-independence and post independence periods, cooperation in different plan periods, Agricultural crop philosophy and principles. Cooperative credit structure: PACS, FSCS. Government intervention; market infrastructure needs, performance and Government role; value chains.

Text Books:

1. Agricultural Cooperation, Martin Abraham Abrahamsen, Claude L. Scroggs U of Minnesota Press.
2. Rural Marketing: Text and Cases, Krishnamacharyulu, Pearson Education India.
3. Handbook of Agriculture. ICAR Publication
4. Acharya, S.S. and Agarawal, A.N. 2005. Agricultural Marketing. Oxford and IBH, New Delhi.
5. Acharya, S.S. and Agarawal, A.N. 2000. Agricultural Price Analysis. Oxford and IBH, New Delhi.

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

Farm Machinery and Power

L	T	P	C
3	0	0	3

Course Code: BAG 408

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

Course Contents:

Unit I **(8 Hours)**

Farm power in India: sources, I.C engines, working principles, two stroke and four stroke engines, I.C. engine terminology, Agricultural equipment and machines for seed-bed preparation, seeding, intercultural, plant protection, harvesting and threshing.

Unit II **(8 Hours)**

Different systems of I.C. engine. Tractors, Types, Selection of tractor and cost of tractor power.

Unit III **(8 Hours)**

Tillage implements: Primary and Secondary tillage implements,

Unit IV **(8 Hours)**

Implements for intercultural operations, seed drills, paddy transplanters, plant protection equipment and harvesting equipment;

Unit V **(8 Hours)**

Equipment for land development and soil conservation.

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.

Diseases of Horticulture crops

L	T	P	C
2	0	0	2

Course Code: BAG 409

Objective: This course is designed to assist students to develop a broad understanding of Plant pathogens of horticultural crops, their causes and their management.

Course Contents:

Unit-I **(8 Hours)**

Economic Importance, symptoms, cause, disease cycle and integrated management of diseases of: citrus, mango, banana, grapevine, pomegranate,

Unit-II **(8 Hours)**

Economic Importance, symptoms, cause, disease cycle and integrated management of diseases of papaya, guava, sapota, apple, chilli, brinjal, bhendi,

Unit-III **(8 Hours)**

Economic Importance, symptoms, cause, disease cycle and integrated management of potato, crucifers, cucurbits, tomato, beans, onion.

Unit-IV **(8 Hours)**

Economic Importance, symptoms, cause, disease cycle and integrated management of coconut, oil palm, betelvine, mulberry

Unit-V **(8 Hours)**

Economic Importance, symptoms, cause, disease cycle and integrated management of coffee, tea, rose, chrysanthemum and jasmine.

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. Diseases of Horticultural Crops: Nematode Problems and Their Management, P.Parvatha Reddy, Scientific Publishers
4. Kalloo, G. and Chadha, K.L. 1993. Advances in Horticulture- Vegetable Crops (Vols. 5 & 6) Malhotra Pub. House, New Delhi

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 (l967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.

Crop Production-II (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 451

LIST OF PRACTICALS

1. Seed bed preparation and sowing of wheat, sugarcane and sunflower
2. Calculations on seed rate.
3. Top dressing of nitrogen in wheat
4. Study of fertilizer experiments and mustard;
5. Identification of weeds in wheat and grain legumes,
6. application of herbicide and study of weed control experiments;
7. Morphological characteristics of wheat, sugarcane, chickpea and mustard;.
8. Yield contributing characters of wheat; Yield and quality analysis of sugarcane.
9. Important agronomic experiments of rabi crops.
10. Visit to research stations related to rabi 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

Irrigation and Water Management Practical (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 452

LIST OF PRACTICALS

1. Determination of bulk density by field method;
2. Determination of soil moisture content by gravimetric method, tensiometer, electrical resistance block and neutron moisture meter.
3. Determination of field capacity by field method; Determination of permanent wilting point
4. Calculation of irrigation water requirement (Problems)
5. Measurement of irrigation water through flumes and weirs
6. Demonstration of furrow method of irrigation;
7. Demonstration of check basin and basin method of irrigation;
8. Visit to farmers field and cost estimation of drip irrigation system
9. Demonstration of filter cleaning, fertigation, injection and flushing of laterals; Erection and operation of sprinkler irrigation system
10. Measurement of emitter discharge rate, wetted diameter and calculation of emitter discharge variability.

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 Plant Biotechnology (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 453

LIST OF PRACTICALS

1. Techniques in Plant Tissue Culture
2. Media components and preparations; Sterilization techniques and Inoculation of various explants.
3. Aseptic manipulation of various explants; Callus induction and Plant Regeneration
4. Micro propagation of important crops; Anther, Embryo and Endosperm culture;
5. Hardening / Acclimatization of regenerated plants; Somatic embryogenesis and synthetic seed production;
6. Isolation of protoplast; Demonstration of Culturing of protoplast
7. Demonstration of Isolation of DNA
8. Demonstration of Gene transfer techniques, direct methods
9. Demonstration of Gene transfer techniques, indirect methods;
10. Demonstration of gel-electrophoricsis techniques.

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 Horticulture Crops Practical

L	T	P	C
0	0	2	1

Course code: BAG 454

LIST OF PRACTICALS

1. Identification the diseases of citrus, guava, & sapota
2. Identification the diseases of papaya, banana, pomegranate & ber
3. Identification the diseases of mango, grapes & apple;
4. Identification the diseases of chilli, brinjal & bhendi;
5. Identification the diseases of potato, tomato & crucifers
6. Identification the diseases of cucurbits,
7. Identification the diseases of oil palm, coconut, tea, coffee & mulberry
8. Identification the diseases of rose, chrysanthemum and jasmine.
9. Field visits at appropriate time during the semester.
10. Visit to any Plant Pathology Centre.

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

Farming System and Sustainable Agriculture

Course Code: BAG 501

L	T	P	C
3	0	0	3

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

Unit I **(8 Hours)**

Sustainable agriculture: Introduction, definition, goal and current concepts, factors affecting ecological balance and ameliorative measures

Unit II **(8 Hours)**

Land degradation and conservators of natural resources, LEIA & HEIA; resources conservation technologies, conservation agriculture, integrated farming systems, precision agriculture

Unit III **(8 Hours)**

Irrigation problems, waste lands and their development; Organic farming: definition, principles and components;

Unit IV **(8 Hours)**

Farming systems: definition, principles and components, Concept of sustainability in farming systems; efficient farming systems

Unit V **(8 Hours)**

IFS models for wetland, irrigated dryland and dryland situations. interactions and resource recycling among different enterprises.

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.

Seed Production, Plant Breeders and Farmer Rights

L	T	P	C
3	0	0	3

Course Code: BAG 502

Course Contents:

Unit I **(8 Hours)**

What is Seed and Seed certification, different phases of seed certification, procedure for seed certification, field inspection and field counts etc.; Foundation and certified seed production of rice (varieties & hybrids)

Unit II **(8 Hours)**

Foundation and certified seed production in maize and sorghum (varieties, hybrids, synthetics and composites); Foundation and certified seed production of sunflower, and tomato (varieties and hybrids);

Unit III **(8 Hours)**

Seed Act and Seed Act enforcement, Seed Act 2000 and other issues related to seed quality regulation; Central Seed Committee, Central Seed Certification Board, State Seed Certification Agency, Central and State Seed Testing Laboratories; Duties and powers of seed inspectors.

Unit IV **(8 Hours)**

Seed testing procedures for quality assessment of seed; Seed treatment, Importance of seed treatment, types of seed treatment, Establishment of seed processing plant, Different upgrading equipments and their use, establishing a seed testing laboratory, its equipments used for seed treatment.

Unit V **(8 Hours)**

Plant breeder's rights and farmers rights; UPOV, PPV and FR act. Plant variety registration, DUS testing, General principles of seed storage, measures for pest and disease control, Seed marketing, Factors affecting seed marketing.

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

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

Elementary Crop Physiology

Course Code: BAG 503

L	T	P	C
3	0	0	3

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

UNIT-1 **(8 Hours)**

Importance of crop physiology in Agriculture. Adaptability of crop to different agro climatic conditions. Seed Physiology, Seed structures, Morphological, physiological and biochemical changes during seed development, Physiological maturity –Morphological and physiological changes associated with physiological maturity in crop, Harvestable maturity.

UNIT-2 **(8 Hours)**

Seed viability and vigour, Factors affecting seed viability and vigour. Methods of testing seed viability and vigour, Germination, Utilization of seed reserves during seed germination.

UNIT-3 **(8 Hours)**

Morphological, physiological and biochemical changes during seed germination, Factors affecting seed germination. Significance of C3, C4 and CAM pathway, Relationship of Photosynthesis and crop productivity, Methods of measuring photosynthesis, Photosynthetic efficiency, Dry matter partitioning, Harvest index of crops. Respiration and its significance, source sink relationship

UNIT-4 **(8 Hours)**

Introduction of Photoperiodism and Vernalisation in relation to crop productivity, Plant Growth Regulators – Occurrence – Biosynthesis – Mode of action of Auxins, Gibberellins, Cytokinins, ABA, Ethylene. Novel plant growth regulators, Commercial application of plant growth regulators in agriculture.

UNIT-5 **(8 Hours)**

Definition – Classification – Theories of mechanism and control of senescence –Physiological and biochemical changes and their significance. Post Harvest Physiology, Seed dormancy – Definition, types of seed dormancy, Advantages and disadvantages of seed dormancy, Causes and remedial measures for breaking seed dormancy,

Text Books:

1. Gardner, F.P., Pearce, R.B. and Mitchell, R.L. 1988. Physiology of Crop Plants. Scientific Publishers, Jodhpur.

2. Pessarakli, M. 2002. Handbook of Plant and Crop Physiology. Marcel and Dekker Inc. New York

3. Handbook of Plant and Crop Physiology, Mohammad Pessarakli 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 PhysiologyS. 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,

Agricultural Microbiology and Biochemistry

L	T	P	C
3	0	0	3

Course Code: BAG 504

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.

Course Contents:

Unit I **(8 Hours)**

History of Microbiology: Applied areas of Microbiology Metabolism in bacteria: ATP generation. Spontaneous generation theory, Role of microbes in fermentation, Germ theory of disease, techniques used in identification and classification of bacteria.

Unit II **(8 Hours)**

Bacteriophages: structure and properties of Bacterial viruses – Lytic and Lysogenic cycles: viroids, prions. Bacterial genetics; Gene expression; Genetic recombination: transformation, conjugation and transduction, genetic engineering, Plasmids.

Unit III **(8 Hours)**

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

Unit IV **(8 Hours)**

Carbohydrates: Occurrence classification and structure, physical and chemical properties of carbohydrates, isomerism, optical activity, reducing property, reaction with acids and alkalis, ozone formation. Lipids: Classification, important fatty acids and triglycerides, essential fatty acids. Classification, function and solubility, amino acids – classification and structure, essential amino acids, properties of amino acids, structure of proteins –primary, secondary tertiary and quaternary properties and reaction of proteins.

Unit V **(8 Hours)**

Enzymes: Classification and mechanism of action; factors affecting enzyme action, co-factors and coenzymes, Vitamins and minerals as co-enzymes/co-factors Carbohydrate metabolism –glycolysis and TCA-cycle; metabolism of lipids, fatty acid oxidation, biosynthesis of fatty acids, electron transport chain, bioenergetics of glucose and fatty acids.

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,

Insect Ecology

L	T	P	C
2	2	0	3

Course Code: BAG 505

Objective: This course is designed to assist students to develop a broad understanding about the interrelationship between insect and their environment.

Course Contents:

Unit-I **(8 Hours)**

Insect Ecology: Introduction, Subdivision of Ecology, Environment and its components. History; habitat and niche,

Unit-II **(8 Hours)**

Effect of abiotic factors–temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents.

Unit-III **(8 Hours)**

Effect of biotic factors – food competition, natural and environmental resistance. migration and dispersal; tropism and kinesis. Concepts of Balance of life in nature, biotic potential, causes for outbreak of pests in agro-ecosystem. Pest surveillance and pest forecasting.

Unit-IV **(8 Hours)**

Concept of Population Ecology, Characteristics of a population, Population structures, Population Dynamics, Population dispersal, Population Theory, Concept of Life system and Life Table

Unit-V **(8 Hours)**

Ecosystem, Types of Ecosystem, Community, Ecological Succession, Chemical Cycle, Trophic Structure, Energy Flow

Text books: **1.** Elements of Insect Ecology, S.S. Yazdani, M. L. Agarwal, Narosa Publishing House

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

3. Price, P.W. 1997. Insect Ecology. 3rd Ed. John Wiley, New York.

4. Elements of Entomology: Rajendra Singh. Rastogi Publications

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

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

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

Conservation and Management of Soil and Water Resources

L	T	P	C
2	2	0	3

Course Code: BAG 506

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

Course Contents:

Unit I **(8 Hours)**

Physical properties of soil and their determination. Definition and importance of soil conservation in agriculture. History of soil conservation in India.

Unit II **(8 Hours)**

Soil survey, definition Land use capability classification. Soil erosion, definition types, mechanics and causes of erosion. Factors affecting soil erosion. Agronomical practices for soil and water conservation.

Unit III **(8 Hours)**

Engineering practices for erosion control such as bunding, terracing, temporary and permanent structures for Gully control. Farmer's participation in command areas; irrigation legislation

Unit IV **(8 Hours)**

Grassed waterways. Water harvesting. Wind erosion mechanics, control, sand dune fixation, shifting cultivation. Water stress – deficit and excess, its effect on growth and development, water stress injury and resistance, management of water stress through soil and crop manipulations

Unit V **(8 Hours)**

Survey, measurement of distance direction and elevation. Remote Sensing – definition, objectives and uses.

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.
4. Panda, S.C. 2003. Principles and Practices of Water Management. Agrobios

Dimensions of Agriculture Extension and Rural Development

L	T	P	C
2	2	0	3

Course Code: BAG 507

Objective: This course is designed to assist students to develop a broad understanding about the farmers status and rural areas. This course is also play a big for the personality of a student.

Course Contents:

Unit-I **(8 Hours)**

Education – Meaning, Definition, Types – Formal, Informal and Non-formal education and their Characteristics. Extension Education and Agricultural Extension – Meaning, Definition, Concepts, Objectives and Principles. Rural development – Meaning, Definition, Concepts, Objectives, Importance and Problems in rural development. Developmental programmes of pre-independence era – Sriniketan, Marthandam, Gurgaon experiment and Gandhian constructive proprogramme.

Unit-II **(8 Hours)**

Development programmes of Post independence era, Firka Development, Etawah – Pilot project and Nilokheri Experiment. Community Development Programme – Meaning, Definition, Concepts, Philosophy, Principles, Objectives, Differences between Community Development and Extension Education, National Extension service. Panchayat Raj system – Meaning of Democratic – Decentralization and Panchayat Raj, Three tiers of Panchayat Raj system, Powers, Functions and Organizational setup.

Unit-III **(8 Hours)**

Agricultural Development Programmes with reference to year of start, objectives & sailent features – Intensive Agricultural District Programme (IADP), High Yielding Varieties Programme (HYVP), Institution Village Linkage Programme (IVLP), Watershed. Development Programme (WDP), National Agricultural Technology Project (NATP), ATMA, ATIC.

Unit-IV **(8 Hours)**

Social Justice and Poverty alleviation programmes – Integrated Tribal Development Agency (ITDA), Integrated Rural Development Programme (IRDP), Swarna Jayanthi Gram Swarojgar Yojana (SGSY), Prime Minsiter Employment Yojana (CMEY).

Unit-V **(8 Hours)**

New trends in extension, privatization. Women Development programmes – Development of Women and Children in Rural Areas (DWCRA), Rashtriya Mahila Kosh (RMK), Integrated Child Development Scheme (ICDS) and Mahila Samriddi Yojana (MSY). Reorganized extension system (T&V System) – Salient features, Fort night Meetings, Monthly workshops, Linkages, Merits and Demerits, Emergence of Broad Based Extension (BBE).

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 Gaya 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.

Protected Cultivation and Post Harvest Technology

L	T	P	C
2	2	0	3

Course Code: BAG 508

Objective: This course is designed to assist students to develop a broad understanding about the cultivation in protected areas and post harvest technology.

Course Contents:

Unit I **(8 Hours)**

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

Unit II **(8 Hours)**

Green house equipment, Irrigation systems used in greenhouses, hot air green house heating systems. Environment control in protected structures. Growing media and sterilization. Soilless cultivation, hydroponics and aeroponics. Irrigation and fertigation.

Unit III **(8 Hours)**

Green house cultivation of important horticultural crops - Rose, carnation, chrysanthemum, capsicum, tomato, strawberry. (media, bed preparation, varieties, planting, irrigation and fertigation, harvesting, specific operation for different crops and economics).

Unit IV **(8 Hours)**

Fruits and vegetables cleaning, machinery for cleaning of fruits and vegetables, care and maintenance. Different systems of storage, packaging methods and types of packages.

Unit V **(8 Hours)**

Grading, methods of grading, equipment for grading of fruits and vegetables, care and maintenance. Size reduction. equipment for size reduction care and maintenance.

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. 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,

* Latest editions of all the suggested books are recommended.

Farming System and Sustainable Agriculture (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 551

Practical:

1. Preparation of cropping scheme for irrigated situations
2. Preparation of cropping scheme for dryland situations;
3. Study of existing farming systems in nearby villages;
4. Preparation of integrated farming system model for wetlands
5. Preparation of integrated farming system model for drylands
6. Preparation of enriched Farm Yard Manure; Preparation of vermicompost
7. Visit to urban waste recycling unit; Study of profitable utilization of agricultural wastes;
8. Visit to poultry and dairy units to study resource allocation, utilization and economics;
9. Visit to an organic farm to study various components and utilization;
10. Study of degraded lands.

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

Seed Production, Plant Breeders and Farmer Rights (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 552

1. Seed sampling principles and procedures
2. Physical Purity analysis of Field and Horticultural crops
3. Germination analysis of Field and Horticultural crops
4. Moisture tests of field and horticultural crops
5. Viability test of field and horticultural crops
6. Seed health test of field and horticultural crops
7. Visit to seed processing plants
8. Visit to seed testing laboratories
9. Visit to hybrid seed production farms
10. Varietal identification in seed production plots

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

Elementary Crop Physiology (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 553

1. Preparation of solutions; Growth analysis:
2. Calculation of growth parameters;
3. Methods of measuring water status in roots, stems and leaves;
4. Measurement of water potential by Chardakov' s method; Hardening / Acclimatization of regenerated plants; Somatic embryogenesis and synthetic seed production;
5. Measurement of absorption spectrum of chloroplastic pigments and fluorescence;
6. Measurement of leaf area by various methods; Stomatal frequency and index – Respirometer – measurement of respirometer;
7. Optimum conditions for seed
8. Breaking seed dormancy; (a) Chemical method (b) Mechanical method;
9. Seed viability and vigour tests.
10. Effect of ethylene on regulation of stomata

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 Microbiology and Biochemistry (Practical)

L	T	P	C
0	0	2	1

Course code: BAG 554

1. General instructions, Familiarization with instruments, materials, glassware etc. in a microbiology laboratory
2. Practice of Aseptic methods:
3. Methods of Sterilization and Preparation of media I- Preparation of nutrient broth, nutrient

agar plates, nutrient agar slant and nutrient agar stabling;

4. Sterilization of glassware by Dry heating;
5. Morphological examination of bacteria by Simple and Differential staining.
6. Paper electrophoresis for the separation of plant pigments
7. Extraction of nucleic acids
8. Extraction of oil from oil seeds
9. Paper chromatography for the separation of sugars
10. Determination of phenols.

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

Elements of Food Technology

L	T	P	C
2	0	0	2

Course Code: BAG 601

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.

Course contents

Unit I **(8 Hours)**

Food and its function, physio-chemical properties of foods, food preparation techniques, nutrition, relation of nutrition with good health. Characteristics of well and malnourished population. Energy, definition, determination of energy requirements, food energy, total energy needs of the body.

Unit II **(8 Hours)**

Carbohydrates: classification, properties, functions, source, requirements, digestion, absorption and utilization. Protein, classification, properties, functions, sources, requirements, digestion, absorption, essential and non-essential amino acids

Unit III **(8 Hours)**

Protein, classification, properties, functions, sources, requirements, digestion, absorption, essential and non-essential amino acids, quality of proteins, PER/NPR/NPU, supplementary value of proteins and deficiency.

Unit IV **(8 Hours)**

Lipids – classification, properties, functions, sources, requirements, digestion, absorption and utilization, saturated and unsaturated fatty acids, deficiency, rancidity, refining of fats. Mineral nutrition: macro and micro-minerals (Ca, Fe and P), function, utilization, requirements, sources, effects of deficiency.

Unit V **(8 Hours)**

Vitamins: functions, sources, effects of deficiency, requirements of water soluble and fat-soluble vitamins. Balanced diet: recommended dietary allowances for various age groups, assessment of nutritional status of the population.

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

Breeding of Field and Horticulture Crops

L	T	P	C
2	0	0	2

Course Code: BAG 602

Objective- To know the basics and fundamentals of breeding to develop improved varieties of horticultural crops

Course Contents:

Unit I **(8 Hours)**

Breeding objectives and important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops; Hardy-Weinberg Law; Study in respect of origin, distribution of species.

Unit II **(8 Hours)**

Wild relatives and forms, Cereals, (rice, wheat, maize, sorghum and bajra); Pulses (redgram, greengram, blackgram, soybean); Oilseeds (groundnut, sunflower and mustard); Vegetables (tomato, bhindi and cucumber).

Unit III **(8 Hours)**

Flower crops (Chrysanthemum & marigold); Fruit crops (amla, mango and papaya); Major breeding procedures for development of hybrids / varieties of various crops; Plant Genetic Resources their conservation and utilization in crop improvement.

Unit IV **(8 Hours)**

Ideotype concept in crop improvement; Breeding for resistance to biotic (disease & Pest) and abiotic stresses (Drought, cooling and water logging).

Unit V **(8 Hours)**

Variability in pathogens and pests; Mechanisms of resistance in plant to pathogens and pest; Genetic basis of adaptability to unfavourable environments; Definition of biometrics, assessment of variability.

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

Manures, Fertilizers and Agrochemicals

Course Code: BAG 603

L	T	P	C
2	0	0	2

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

Unit-1 **(8 Hours)**

Introduction – Raw materials – Manures – Bulky and concentrated – FYM, Composts – Different methods, Mechanical compost plants, Vermicomposting, Green manures, Oil cakes, Sewage and sludge – Biogas plant slurry, Plant and animal refuges.

Unit -2 **(8 Hours)**

Fertilizers–classifications, Manufacturing processes and properties of major nitrogenous (ammonium sulphate, urea, calcium ammonium nitrate, ammonium nitrate, ammonium sulphate nitrate) phosphatic (single super phosphate, enriched super phosphate, diammonium phosphate, ammonium poly phosphate), potassic and complex fertilizers their fate and reactions in the soil, Secondary and micronutrients fertilizers, Amendments.

Unit -3 **(8 Hours)**

Fertilizer Control Order, Fertilizer storage; Biofertilizers and their advantage, Organic chemistry as prelude to agro chemicals, soil testing and fertilizer recommendations.

Unit -4 **(8 Hours)**

Diverse types of agrochemicals, Synthetic and natural agrochemicals. Botanical insecticides (Neem), Pyrethrum, Synthetic pyrethroids. Synthetic organic insecticides, Major classes, Properties and uses of some important insecticides under each class. Structure-activity relationship (QSAR), Plant growth regulators.

Unit -5 **(8 Hours)**

Herbicides – Major classes – Properties and uses, Fungicides – Major classes –Properties and uses. Fumigants and other chemicals for post-harvest storage of agricultural commodities, Nematicides.

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.

Silviculture and Agroforestry

L	T	P	C
2	0	0	2

Course Code: BAG 604

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.

Course Contents:

Unit I **(8 Hours)**
Definition and scope of silviculture, Forestry, its scope and classification, role of forests, elementary idea of forest types.

Unit II **(8 Hours)**
Agroforestry system, sub-system and practice: agri-silviculture, silvipastoral, horti-silviculture, hortisilvipastoral, shifting cultivation, home gardens.

Unit III **(8 Hours)**
Definition, concept and need of agro forestry and social forestry, Classification of agro forestry and Social forestry systems.

Unit IV **(8 Hours)**
Limitations of agro forestry and Social forestry, choice of tree species for agro forestry and social forestry for fuel, fodder and timber requirement.

Unit V **(8 Hours)**
Shelter belt and wind breaks trees. Cultivation of teak, sal and poplar trees.

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.

Introductory Nematology

L	T	P	C
2	2	0	3

Course Code: BAG 605

Objective: To understand the morphology and physiological functions of nematodes, their role in etiology of infections and disease complexes. It also provides the understanding of different principles of controlling nematode diseases of plants.

Unit-I **(8 Hours)**

Introduction: History of phytonematology, economic importance, general characteristics of plant pathogenic nematodes. Nematode general morphology and biology.

Unit-II **(8 Hours)**

Classification of nematodes up to family level with emphasis on groups containing economically important genera, classification of nematodes by habitat, characteristics of phylum nematoda and its relationship with other related phyla.

Unit-III **(8 Hours)**

Identification of economically important plant nematodes up to generic level with the help of keys and description. Types of parasitism; nature of damage and general symptoms, interaction of plant-parasitic Nematodes. Symptoms caused by nematodes with examples.

Unit-IV **(8 Hours)**

Interaction between plant parasitic nematodes and disease causing fungi, bacteria and viruses. Different methods of nematode management. Cultural methods (crop rotation, fallowing, soil amendments, other land management techniques), physical methods (soil solarisation, hot water treatment) Biological methods, Chemical methods.

Unit-V **(8 Hours)**

Fumigants and Non Fumigants, Resistant varieties and IDM (Integrated Disease Management).

Text Books:

1. Textbook on Introductory Plant Nematology, Raman K Walia and Harish K Bajaj.
2. Crop Diseases and Their Management. H.S. Chaube and V. S. Pundhir PHI Learning Private Limited.

3. Bridge, J. and Starr, J. 2007. Plant Nematodes of Agricultural Importance, Manson Publishing, 128pp.

Reference Books:

1. Plant pathology by G. N. Agrios 4th edition, Academy. Press, New York (1997).
2. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (l967).
3. Plant diseases by R. S. Singh. Oxford and IBH Publishing.

Post Harvest Management of Horticulture crops

L	T	P	C
2	2	0	3

Course Code: BAG 606

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.

Course Contents:

Unit I **(8 Hours)**

Importance of post harvest technology in horticultural crops. Maturity indices, harvesting and post harvest handling of fruits and vegetables.

Unit II **(8 Hours)**

Methods of storage: pre-cooling, pre-storage treatments, low temperature storage, controlled atmospheric storage, hypobaric storage, irradiation and low cost storage structures.

Unit III **(8 Hours)**

Various methods of packing, packaging materials and transport. Packing technology for export. Fabrication of different types of containers.

Unit IV **(8 Hours)**

Importance and scope of fruit and vegetable preservation in India. Principles of preservation by heat, low temperature, chemicals and fermentation. Preservation through canning, bottling, freezing, dehydration, drying, ultraviolet and ionizing radiations.

Unit V **(8 Hours)**

Preparation of jams, jellies, marmalades, candies, crystallized and glazed fruits, preserves, chutneys, pickles, ketchup, sauce, syrups, juices, squashes and cordials. Spoilage of canned products, biochemical, enzymatic and microbial spoilage.

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,

Elements of Food Technology Practical

L	T	P	C
0	0	2	1

Course code: BAG 651

1. Methods of measuring food ingredients
2. Effect of cooking on volume and weight, determination of percentage of edible portion.
3. Determination of percentage of edible portion.
4. Browning reactions of fruits and vegetables.
5. Microscopic examination of starches
6. Estimation of energy, value proteins and fats of foods.
7. Planning diet for various age groups.

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

Breeding of Field and Horticulture Crops Practical

L	T	P	C
0	0	2	1

Course code: BAG 652

1. Emasculation and Hybridization techniques
2. Handling of segregating generations
3. Handling of segregating generations
4. back cross methods
5. Field layout of experiments, Field trials
6. Estimation of variability parameters
7. Study of quality characters
8. Visit to seed production and certification plots
9. Visit to AICRP trials and programs
10. Visit to various research stations, Visit to other institutions

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

Manures, Fertilizers and Agrochemicals Practical

L	T	P	C
0	0	2	1

Course code: BAG 653

LIST OF PRACTICALS

Practical:

1. Total nitrogen and phosphorus in manures / composts – Ammoniacal and nitrate nitrogen Water soluble P_2O_5, potassium, calcium, sulphur and zinc contents of fertilizers.
2. COD in organic wastes – Adulteration in fertilizer.
3. Study of different group of Insecticides
4. Study of different group of Fungicides
5. Study of different group of Herbicides
6. Study of spray solution
7. Compatibility of fertilizers with pesticides.

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

Silviculture and Agroforestry Practical

L	T	P	C
0	0	2	1

Course code: BAG 654

1. Identification of forest tree species.
2. Nursery practices for poplar, *Grewia optiva*, *Morus alba*, *Acacia catechu*, *Dalbergia sissoo*, *Robinia*, *Leucaena* etc.
3. Visit to agro-forestry fields to study the compatibility of MPTS with agricultural crops: silvipastoral, alley cropping, horti-silviculture, agro-silvipasture.

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

L	T	P	C
0	0	4	2

Course code: BAG 655

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

Language Lab - I

Course code: BAG-656

L	T	P	C
0	0	4	2

Objective: This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

Lab Module

1. Written exercises based on Grammar portion covered in BAG 106.
2. Common conversation practice (making small talk etc.)
3. JAM Session (just a minute session) on various topics.
4. Presentations on relevant topics
5. Describing a scene, picture, situation, etc.

Learning Outcomes:

1. Student will be able to overcome stage fright, nervousness and indecisiveness.
2. To speak in English on contemporary issues confidently and effectively.
3. To master the art of making Power-Point Presentation before their peers\colleagues.
4. They will be able to communicate with a range of people in informal and guided activity, demonstrate and adjust interaction skills to suit the changing situations.

Evaluation Scheme
Ist year & IIIrd Year (Odd Semesters)
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Internal Viva Marks: 50

Presentation

Knowledge of topic	Body Language & Voice Modulation	Quiz	Attendance	Class Participation	**Total (50)**
10 marks	10 marks	10 marks	10 marks	10 marks	

External Viva Marks:50

Presentation

Knowledge of topic	Body Language & Voice Modulation	Time Management	Quiz	Approach to Interaction	**Total (50)**
10 marks	10 marks	10 marks	10 marks	10 marks	

Biofertilizers for Sustainable Agriculture

L	T	P	C
2	2	0	3

Course Code: BAG 6E1

Objective: To impart basic knowledge about the biofertilizers and their role in the field of Agriculture.

UNIT I:

Biological Fertilizers, Role of Soil Biota in Sustainable Agriculture, Biodiversity of Soil Biota, Biofertilizers for Sustainable Agriculture, History of Biofertilizer Research.

UNIT II:

Classification of Biofertilizers and their nutrient potential, Economical and Environmental Benefits, Development of Biofertilizer Industry, Mechanism of action of various Biofertilizers, Mass Production.

UNIT III:

Types of Biofertilizers: Rhizobium Inoculants, Azotobacter Inoculants, Azospirillum Inoculants, Blue-Green Algae Inoculants, Azolla-Anabaena Symbiosis, Mycorrhizae: Special Method for Obtaining Essential Elements Phosphate Mobilizing Biofertilizers.

UNIT IV:

Techniques of Biofertilizer Application: Seed Treatment, Seedling Root Dip, Soil Application, Granular Biofertilizers, Solarization of FYM/Compost, Granular Biofertilizers Mixed With Seed, Broadcasting of Granular Biofertilizers.

UNIT V:

Cost Effectiveness of Biofertilizers, Constraints in Biofertilizer Technology, Economics, List of Biofertilizer Production Units. Azolla as cattle feed, Biofertilizer strains developed in India , strategies for popularizing biofertilizer in India.

Text Books:

1. Introductory Soil Science- D.K. Das. Kalyani Publisher.
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

Ornamental Horticulture

L	T	P	C
2	2	0	3

Course Code: BAG 6E2

Objective: To impart basic knowledge about the importance and production technology of cut flowers grown in India.

Unit-I

Scope of cut flowers in global trade, global scenario of cut flowers production, variety wealth and diversity, area under cut flowers andproduction problem in India, patent right, nursery management,media for nursery,special nursery practices.

Unit-II

Growing environment, open cultivation, protected cultivation, soil requirements, artificial growing media, and soil de-contamination techniques, planting methods, influences of Environment, parameters, light, temperature, moisture, humidity and CO2 on growth and flowering.

Unit-III

Flower production, water and nutrient management, fertigation, weed management, rationing, training and pruning, disbudding, special horticultural practices, use of growth regulators, physiological disorders and remedies, IPM and IDM (Integrated Pest Management and Integrated Disease Management).

Unit-IV

Flower forcing and year around flowering through physiological intervention, chemical regulation, environment manipulations.

Unit-V

Cut flowers standards and grades, harvest indices , harvesting techniques, post -harvest handling, method of delaying, flower opening, pre-cooling, pulsing, packing , storage and transportation , marketing , export potential, institutional support , agri -export zones (AEZ), cut roses, cut chrysanthemum , carnations, aster, alpinia, ornamental ginger, bromeliads, dahlia, gypsophilia, limonium, foliage and fillers.

Text books:

1. Introductory Ornamental Horticulture, Arora J. S., Kalyani publication.
2. Advances in Ornamental Horticulture,Bhattacharjee, S.K. and De, L.C.Vol. IV, Pointer Publishers, Jaipur.
3. Advanced Commercial Floriculture. Vol. I & II, Bhattacharjee and De. L.C.

Reference books:

1. Commercial floriculture, Agro Botanic.Prasad, S. and U. Kumar, Bikaner.
2. Ornamental Horticulture, Vishnu Swarup Macmillan India Ltd., New Delhi-2.
3. Advances in Floriculture, Foja Singh. Media Today Pvt. Ltd., New Delhi-17.
4. Introduction of Floriculture,Roy.A.Larson. International Book Distributing o., Lucknow.

Stored Grain Pests and their Management

L	T	P	C
2	0	0	2

Course Code: BAG 701

Objective: Study of this course is aims to understanding the behaviour of stored grain pest and to protect our grains in store houses.

Course Contents:

Unit I **(8 Hours)**

History of grain storage, Concept of grain storage, Important Indian Regulations and Establishments in the field of grain storage, Post harvest losses, Types of losses, Factors responsible for losses, Effects of abiotic and biotic factors on store pest biology.

Unit II **(8 Hours)**

Distribution, biology, nature and symptoms of damage, and management strategies of insect pests of rice, sorghum, maize, wheat, oats, barley and millet.

Unit III **(8 Hours)**

Distribution, biology, nature and symptoms of damage, and management strategies of insect pests of oilseed crops.

Unit IV **(8 Hours)**

Distribution, biology, nature and symptoms of damage, and management strategies of insect of cotton, pulses, groundnut, castor, spices, lentil, peas, potato,

Unit V **(8 Hours)**

Non insect pest of storage, management of Rodents and Birds under storage condition. Fungi and mycotoxins, Fumigants, Store management, Integrated pest management of storage pests. Traditional farm/village storage methods, Recent methods of grain storage.

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

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

Livestock Production and Management

L	T	P	C
2	0	0	2

Course Code: BAG 702

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.

Course Contents:

Unit I **(8 Hours)**

Place of livestock in the national economy, different livestock development programmes of Govt. of India. Important exotic and Indian breeds of cattle, buffalo, sheep, goat and swine.

Unit II **(8 Hours)**

Measures and factors affecting fertility in livestock, reproductive behaviour like oestrus, parturition, farrowing etc. Milk secretion, milking of animals and factors affecting milk yield and composition.

Unit III **(8 Hours)**

Selection and breeding of livestock for higher milk and meat production.Feeding and management of calves, growing heifers and milch animals and other classes and types of animals, housing principles, space requirements for different species of livestock.

Unit IV **(8 Hours)**

Disease control measures, sanitation and care, breeding, feeding and production records. Breed characteristics of poultry, their methods of rearing, breeding, feeding and management, incubation, hatching and brooding, vaccination and prevention of diseases,

Unit V **(8 Hours)**

preservation and marketing of eggs, its economics and keeping quality. Cost of production of milk, economical units of cattle, buffalo, sheep, goat and swine.

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

Extension Methodologies and Entrepreneurship Development

L	T	P	C
3	0	0	3

Course Code: BAG 703

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.

Course Contents:

Unit I **(8 Hours)**

Communication – Meaning, Definition, Models, Elements and their Characteristics, Types and Barriers in communication. Extension Programme Planning – Meaning, Definitions of Planning, Programme, Project, Importance, Principles and Steps in Programme Development Process, Monitoring and Evaluation of Extension Programmes.

Unit II **(8 Hours)**

Extension Teaching methods Meaning, Definition, Functions and Classification. Individual contact methods – Farm and Home visit, Result Demonstration, Field trials – Meaning, Objectives, Steps, Merits and Demerits. Group contact methods – Group discussion, Method demonstration, Field Trips Meaning, Objectives, Steps, Merits and Demerits. Small group discussion techniques –Lecture, Symposium, Panel, Debate, Forum, Buzz group, Workshop, Brain Storming, Seminar and Conference. Mass contact Methods – Campaign, Exhibition, Kisan Mela, Radio& Television – Meaning, Importance, Steps, Merits & Demerits.

Unit III **(8 Hours)**

Agricultural Journalism – Meaning, Scope and Importance, Sources of news, Types, Merits and Limitations. Diffusion and Adoption of Innovations – Meaning, Definition, Models of adoption Process, Innovation

Unit IV **(8 Hours)**

Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs. Market led extension – emerging perspectives; Market-led extension – issues and challenges; Dimensions of market-led extension.

Unit V **(8 Hours)**

Government policy on Small and Medium Enterprises (SMEs) / SSIs. Export and Import Policies relevant to agriculture sector. Venture capital. Contract farming and joint ventures, public-private partnerships. Overview of agri inputs industry. Characteristics of Indian agricultural processing and export industry.

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 Gaya 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. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication

3. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition.

Stored Grain Pests and their Management Practical

L	T	P	C
0	0	2	1

Course code: BAG 751

LIST OF PRACTICALS

1. Identification of pests, their damage symptoms and management of rice, wheat
2. Identification of pests, their damage symptoms and management of sorghum and Maize
3. Identification of pests, their damage symptoms and management of oilseed crops
4. Identification of pests, their damage symptoms and management of cotton
5. Identification of pests, their damage symptoms and management of Pulses
6. Identification of pests, their damage symptoms and management of vegetables
7. Identification of pests, their damage symptoms and management of groundnut.
8. Identification the symptoms of Rodents damage and their management.
9. Fumigants study
10. Visit to grain storage centre.

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 Production and Management Practical

L	T	P	C
0	0	2	1

Course code: BAG 752

1. Identification of farm animals
2. Classification of different farm animals
3. Study the body parts of different farm animals
4. Handling and restraining of animals
5. Judging and culling;
6. Feeding and ration formulation;
7. Incubation and Hatching,
8. Housing management of poultry;
9. Economics of livestock production.
10. Visit to livestock farms

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

Rural Agricultural Work Experience

L	T	P	C
0	0	20	10

Course Code: BAG- 753

Objective: 1. To provide an opportunity to the students to understand the rural setting in relation to agriculture and allied activities
2. To make the students familiar with socio-economic conditions of the farmers and their problems.
3. To impart diagnostic and remedial knowledge to the students relevant to real field situations through through practical training.
4. To develop communication skills in students using extension teaching methods in transfer of technology.
5. To develop confidence and competence to solve agricultural problems
6. To acquaint students with on-going extension and rural development programmes.

Course Contents:

Unit I
Field Visits
Unit II
Plant Health clinics
Unit III
Industrial Visits
Unit IV
Village attachment
Unit V
Report preparation

Internal Evaluation (100 marks)
The above mentioned RAWE components shall be conducted under the supervision of four faculty members and would be evaluated by the two internal faculty members on a 7 point scale as mentioned below.

Plant Health Clinic	Field Visits	Industrial Visits	Village Attachment	Report	Viva	Attendance	Total Internal
10 marks	10 marks	10 marks	30 marks	20 marks	10 marks	10 marks	100 marks

Organic Farming

L	T	P	C
3	0	0	3

Course Code: BAG7E1

Objective: This course aims at the significance, use and marketing of organic manures, biofertilizers and biological agents for different agricultural practices.

Unit-I **(8 Hours)**

Introduction, concept, relevance in present context, Organic production requirements

Unit-II **(8 Hours)**

Importance of organic farming, organic production scenario in the world, relevance and scope in India, principles, myths and constraints, Limitations of organic farming.

Unit-III **(8 Hours)**

Biological intensive nutrient management: organic manures, vermi composting, green manuring, recycling of organic residues.

Unit-IV **(8 Hours)**

Biofertilizers, Soil improvement and amendments, integrated diseases and pest management, use of biocontrol agents.

Unit-V **(8 Hours)**

Biopesticides, pheromones, trap crops, bird perches, weed management, quality considerations, Organic certification, labeling and accreditation processors, Organic marketing.

Text books:

1. Organic Farming: components and Management- Dushyent Gehlot. Agrobios
2. Principles of Organic Farming- S.R. Reddy. Kalyani publishers.
3. Organic Farming for Sustainable Agriculture- S.C. Panda. Kalyani publishers.

Reference books:

1. Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri-Horticultural Pub. House.
2. Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi.6th edition
3. Fundamentals of Agriculture-Arun Katyayan- Kushal Publication

Mass Multiplication of Biopesticides, Biocontrol agents and Biofertilizers

L	T	P	C
3	0	0	3

Course Code: BAG 7E2

Objective: This course aims at the significance, use and marketing of organic manures, biofertilizers and biological agents for different agricultural practices.

Unit-1

History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses.

Unit- 2

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

Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia*, Cynobacterial biofertilizers- *Anabaena, Nostoc*,

Unit- 4

Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCO specifications and quality control of biofertilizers.

Unit-5

Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers. Beneficial insects: parasites and predators used in pest control and their mass multiplication techniques.

Text books: 1.

1. Plant pathology by G. N. Agrios 4th edition, Academ. Press, New york (1997).

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

3. Plant Pathology – P.D. Sharma. Rastogi Publications.

Reference books:

1. Essentials of Plant Pathology by V. N. Pathak, Prakash Publ., Jaipur (l972).
2. Crop Diseases and Their Management. H.S. Chaube and V. S. Pundhir PHI Learning Private Limited.
3. Introductory Plant Pathology by M. N. Kamat, Prakash Publ, Jaipur (l967).

Environmental Studies

L T P C
4 0 0 4

Course Code: BAG 801/TMU X01

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 landuse 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", Odem, 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.**

Production Economics and Farm Business Management

L	T	P	C
3	0	0	3

Course Code: BAG 802

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

Course Contents:

Unit I **(8 Hours)**

Production Economics: Meaning, Definition, Nature and Scope of Agricultural Production Economics. Basic concepts and terms.

Unit II **(8 Hours)**

Production Functions: Meaning, Definition, Types. Laws of returns: Increasing, Constant and decreasing. Factor Product Relationship.

Unit III **(8 Hours)**

Determination of optimum input and output. Factor relationship. Product relationship. Types of enterprise relationships. Returns to scale: Meaning, Definition, Importance.

Unit IV **(8 Hours)**

Farm Management. Economic principles applied to the Organisations of farm business. Types and systems of farming. Farm planning and budgeting.

Unit V **(8 Hours)**

Risk and uncertainty. Farm budgeting. Linear programming: Assumptions, Advantages and Limitations of Linear programming.

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.

Agricultural Marketing, International Trade and Prices

L	T	P	C
4	0	0	4

Course Code: BAG 803

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.

Course Contents:

Unit I **(8 Hours)**

Introduction: Concepts and definitions of market, marketing, agricultural marketing, market structure, demand, supply and producers surplus of agri-commodities.

Unit II **(8 Hours)**

Product lifecycle and competitive strategies: Meaning, stages and characteristics, Pricing and promotion strategies: Meaning, merits and demerits.

Unit III **(8 Hours)**

Marketing process and functions, market functionaries and marketing channels. Meaning, Definition and types of market integration, marketing efficiency, marketing cost, margins and price spread. Types of risk in marketing, speculation and hedging; an overview of futures trading.

Unit IV **(8 Hours)**

Role of government in agriculture marketing: public sector institutions- CWC, SWC, FCI, CACP and DMI- Their objectives and functions; cooperative marketing in India, Agricultural prices and policies.

Unit V **(8 Hours)**

International Trade: 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.

Rainfed Agriculture and Watershed Management

Course Code: BAG 804

L	T	P	C
3	0	0	3

Objective- The main objective of this course is to study about the agriculture in rainfed areas.

UNIT-1 **(8 Hours)**

Definition, Characteristics and distribution of rainfed/dry land farming areas in the country. climate change and its impact, moisture stress and low productivity, dry and wet spells, drought.

UNIT-2 **(8 Hours)**

Problems in dry land agriculture, Drought and its management , Efficient management of rainfed crops.

UNIT-3 **(8 Hours)**

Moisture conservation practices and use of antitranspirants in dryland farming. Study of mulches

UNIT-4 **(8 Hours)**

Watershed management concept, Principles and practices. Crop diversification, farming system approach, alternate land use systems.

UNIT-5 **(8 Hours)**

Selection of suitable crops, crop rotations and crop mixtures for various categories of rainfed areas.

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.

Entrepreneurship Development and Business Management

Course Code: BAG 805

L	T	P	C
4	0	0	4

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.

Course Contents:

UNIT-1 **(8 Hours)**

Concept of Entrepreneur, Entrepreneurship Development, Assessment of entrepreneurship skills,

UNIT-2 **(8 Hours)**

SWOT Analysis & achievement motivation, Entrepreneurial behavior, Government policy and plan for entrepreneurship development

UNIT-3 **(8 Hours)**

Developing Leadership Skills, Encoding and decoding communication skills;

UNIT-4 **(8 Hours)**

Communication skills for entrepreneurship development, Developing Speaking Skills, Developing Listening Skills, Developing organizational skill , Developing Managerial skills, Problem solving skill,

UNIT-5 **(8 Hours)**

Supply chain management and Total quality management, Project Planning Formulation and report preparation.

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
3. 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

Landscaping

Course Code: BAG 806

L	T	P	C
3	0	0	3

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

UNIT-1 **(8 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 **(8 Hours)**

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

UNIT-3 **(8 Hours)**

Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management.

UNIT-4 **(8 Hours)**

Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping,

UNIT-5 **(8 Hours)**

Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai: principles and management, lawn: establishment and maintenance. CAD application.

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)

Landscaping Practical

Course Code: BAG 851

L	T	P	C
0	0	2	1

LIST OF PRACTICALS

1. Identification of trees, shrubs, annuals,
2. Propagation of trees, shrubs and annuals,
3. Care and maintenance of plants,
4. Identification of tools and implements used in landscape design,
5. Training and pruning of plants for special effects,
6. lawn establishment and maintenance,
7. layout of formal gardens, informal gardens,
8. layout of special type of gardens (sunken garden, terrace garden, rock garden)
9. Designing of conservatory and lathe house. Use of computer software,
10. 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

Production Technology of Spices, Aromatic, Medicinal and Plantation Crops

Course Code: BAG 8E1

L	T	P	C
3	0	0	3

Course Contents:

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 **(8 Hours)**

Importance and cultivation technology of Spices – Ginger, turmeric, pepper, cardamom, coriander, cumin, fenugreek;

UNIT-2 **(8 Hours)**

Aromatic crops – Lemon grass, citronella, palmarose, vetiver, geranium, dawana;

UNIT-3 **(8 Hours)**

Plantation crops – Coconut, arecanut, betelvine, cashew, cocoa, coffee, oilpalm;

UNIT-4 **(8 Hours)**

Medicinal plants – Diascoria, rauvolfia, opium, ocimum, perwinkle, aloe, guggul, belladonna, nuxvomica,

UNIT-5 **(8 Hours)**

Production technology of Indian night shade, aonla,senna, plantago, stevia,coleus and Acorus.

Text Books:

1.Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices, Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy CRC Press.

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.

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

Renewable Energy and Green Technology

L	T	P	C
3	0	0	3

Course Code: BAG 8E2

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

Course Contents:

Unit I **(8 Hours)**

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

Unit II **(8 Hours)**

Familiarization with biomass utilization for biofuel production and their application,

Unit III **(8 Hours)**

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

Unit IV **(8 Hours)**

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

Unit V **(8 Hours)**

Application of solar energy: 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