

B.Sc. AGRICULTURE

SYLLABUS

(with effect from June 2015)



FACULTY OF AGRICULTURE AND ANIMAL HUSBANDRY
The Gandhigram Rural Institute – Deemed University
Gandhigram – 624 302 Tamil Nadu

FACULTY OF AGRICULTURE AND ANIMAL HUSBANDRY

B.Sc. (Agriculture) Programme

(2015-2016 onwards)

Scheme of Examination

S. No	Subject Code	Name of the Course	Scheme of Examination				
			Credit		Marks		Total
			T	P	T	P	
		I Semester					
1	15AGRU0101	Principles of Agronomy and Agricultural Heritage	2	1	60	40	100
2	15AGSU0101	Introduction to Analytical Chemistry	1	1	60	40	100
3	15AGBU0101	Fundamentals of Crop Botany	1	1	60	40	100
4	15AENU0101	Fundamentals of Entomology	2	1	60	40	100
5	15AMMU0101	Mathematics for Agriculture	1	1	60	40	100
6	15ACSU0101	Computer Fundamentals and Office Automation	2	1	60	40	100
7	15GTPU0001	Gandhi's Life, Thought and Work	2	0	100	-	100
8	15AEXU0101	Introduction to Rural Sociology and Educational Psychology	2	0	100	-	100
		Total	13	6	560	240	800
		II Semester					
1	15AGRU0202	Fundamentals of Agricultural Meteorology	1	1	60	40	100
2	15AGSU0202	Fundamentals of Soil Science	2	1	60	40	100
3	15AGBU0202	Principles of Genetics	1	1	60	40	100
4	15HORU0201	Fundamentals of Horticulture	1	1	60	40	100
5	15ABCU0201	Fundamentals of Biochemistry	1	1	60	40	100
6	15AGPU0201	Fundamentals of Agricultural Physics	2	1	60	40	100
7	15AEXU0202	Agricultural Extension as applied to Rural Development	2	1	60	40	100
8	15AGLU0201	Effective Communication skills	2	0	100	-	100
9	15APEU0201	Physical Education/ Yoga	0	1	-	100	100
10	15NSSU0201	NSS / Shanthi Sena	0	1	-	100	100
		Total	12	9	520	480	1000
		III Semester					
1	15AGRU0303	Principles of Weed Management and Dry Farming	2	1	60	40	100
2	15AGSU0303	Nutrient Management and Fertilizer Technology	2	1	60	40	100
3	15AGBU0303	Principles and Methods of Plant Breeding	2	1	60	40	100
4	15AENU0302	Pest Management in Field crops	2	1	60	40	100
5	15APPU0301	Fundamentals of Plant Pathology	2	1	60	40	100
6	15AECU0301	Principles of Agricultural Economics	2	0	60	40	100
7	15AFSU0301	Principles of Food Science	1	1	60	40	100
8	15AGEU0301	Irrigation and Drainage	2	1	60	40	100

9	15AEXU0303	Rural Agricultural Work Experience (RAWE I) – Agri. Dept.	0	2	-	100	100
		Total	15	9	480	420	900
		IV Semester					
1	15AGRU0404	Agronomy of Field Crops -I	1	1	60	40	100
2	15AGRU0405	Short Tour-I (South TamilNadu)	0	1	-	100	100
3	15ACPU0401	Principles of Crop Physiology	2	1	60	40	100
4	15AENU0403	Pest Management in Horticultural Crops	2	1	60	40	100
5	15APPU0402	Disease Management in Field Crops	2	1	60	40	100
6	15HORU0402	Production Technology of Fruits and Plantation Crops	2	1	60	40	100
7	15AGNU0401	Nanotechnology and its applications in Agriculture	1	0	100	-	100
8	15AGEU0402	Farm power and Machinery	2	1	60	40	100
9	15ANHU0401	Dairy Cattle Production	2	1	60	40	100
10	15AGSU0404	Soil Survey, Remote Sensing, GIS and their applications in Agriculture	1	1	60	40	100
		Total	15	9	580	420	1000
		V Semester					
1	15AGRU0506	Agronomy of Field Crops - II	1	1	60	40	100
2	15AGRU0507	Crop Production	0	1	-	100	100
3	15AGSU0505	Problem soils and their Management	1	1	60	40	100
4	15AGBU0504	Breeding of Field crops and Horticultural crops	2	1	60	40	100
5	15AENU0504	Sericulture Technology	1	1	60	40	100
6	15APPU0503	Disease Management in Horticultural Crops	2	1	60	40	100
7	15HORU0503	Production Technology of Vegetables and Spice crops	2	1	60	40	100
8	15ANHU0502	Dairy Technology	1	1	60	40	100
9	15AECU0502	Production Economics and Farm Management	2	1	60	40	100
10	15AEXU0504	RAWE II - NGOs	0	2	-	100	100
		Total	12	11	480	520	1000
		VI Semester					
1	15AGRU0608	Principles and Practices of Cropping and Farming System	1	1	60	40	100
2	15AGRU0609	Short Tour II (North Tamil Nadu)	0	1	-	100	100
3	15AGBU0605	Principles of Seed Production Technology	2	1	60	40	100
4	15HORU0604	Production Technology of Flower Crops, Medicinal and Aromatic Crops	2	1	60	40	100
5	15AGMU0601	Agricultural Microbiology	2	1	60	40	100
6	15AGSU0606	Fundamentals of Environmental Science	1	1	60	40	100
7	15AGEU0603	Soil and Water Conservation	2	1	60	40	100
8	15AECU0603	Agricultural Finance, Banking and Co-operation	1	1	60	40	100
9	15AEXU0605	Agricultural Extension for Transfer of	1	1	60	40	100

		Technology					
10	15AGRU0610	Experiential Learning-I	0	5	---	100	100
		Total	12	14	480	520	1000
		VII Semester					
1	15AGRU0711	Forestry and Watershed Management	2	1	60	40	100
2	15AGBU0706	Principles and Applied Plant Biotechnology	2	1	60	40	100
3	15HORU0705	Landscape Gardening	1	1	60	40	100
4	15AGEU0704	Energy Management in Agriculture	1	1	60	40	100
5	15ANHU0703	Livestock and Chicken Production	2	1	60	40	100
6	15AECU0704	Agricultural Marketing, Trade and Prices	1	1	60	40	100
7	15AEXU0706	Instructional Methods for Extension Communication	1	1	60	40	100
8	15ASTU0701	Agricultural Statistics	1	1	60	40	100
9	15AEXU0707	RAWE III – Industrial Tie up	0	2	-	100	100
		Total	11	10	480	420	900
		VIII Semester					
1	15AGRU0812	Organic Agriculture and Climate Change	2	1	60	40	100
2	15AGSU0807	Crop and Pesticide Chemistry	2	1	60	40	100
3	15AENU0805	Fundamentals of Nematology	1	1	60	40	100
4	15AGEU0805	Post Harvest Technology	1	1	60	40	100
5	15AECU0805	Fundamentals of Agri Business Management	1	1	60	40	100
6	15AGLU0802	Parambariya Velanmai / Development Education (Non Tamil Students)	1	0	100	-	100
7	15AGRU0813	Experiential Learning-II	0	5	---	100	100
8	15AEXU0808	Study Tour (All India)	0	1	-	100	100
9	15AEXU0809	Project work	0	4	-	100	100
		Total	8	15	400	500	900
		Grand Total	98	83	3980	3520	7500
Total Credit Hours = 98+83= 181							

B.Sc. Agriculture Programme
Discipline wise Distribution of courses – 2015-2016

I. AGRONOMY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	15AGRU0101	Principles of Agronomy and Agricultural Heritage	2	1	3
2	15AGRU0202	Fundamentals of Agricultural Meteorology	1	1	2
3	15AGRU0303	Principles of Weed Management & Dry Farming	2	1	3
4	15AGRU0404	Agronomy of Field Crops -I	1	1	2
5	15AGRU0405	Short Tour-I (South Tamil Nadu)	0	1	1
6	15AGRU0506	Agronomy of Field crops – II	1	1	2
7	15AGRU0507	Crop Production	0	1	1
8	15AGRU0608	Principles and Practices of Cropping and Farming System	1	1	2
9	15AGRU0609	Short Tour – II (North Tamil Nadu)	0	1	1
10	15AGRU0610	Experiential Learning-I	0	5	5
11	15AGRU0711	Forestry and Watershed Management	2	1	3
12	15AGRU0812	Organic Agriculture and Climate Change	2	1	3
13	15AGRU0813	Experiential Learning-II	0	5	5
			12	21	33

II. SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	15AGSU0101	Introduction to Analytical Chemistry	1	1	2
2	15AGSU0202	Fundamentals of Soil Science	2	1	3
3	15AGSU0303	Nutrient Management and Fertilizer Technology	2	1	3
4	15AGSU0404	Soil Survey, Remote Sensing, GIS and their applications in Agriculture	1	1	2
5	15AGSU0505	Problem soils and their Management	1	1	2
6	15AGSU0606	Fundamentals of Environmental Science	1	1	2
7	15AGSU0807	Crop and Pesticide Chemistry	2	1	3
		Total	10	7	17

III. AGRICULTURAL BOTANY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15AGBU0101	Fundamentals of Crop Botany	1	1	2
2.	15AGBU0202	Principles of Genetics	1	1	2
3.	15AGBU0303	Principles and Methods of Plant Breeding	2	1	3
4.	15AGBU0504	Breeding of Field crops and Horticultural crops	2	1	3
5.	15AGBU0605	Principles of Seed Production Technology	2	1	3
6.	15AGBU0706	Principles and Applied Plant Biotechnology	2	1	3
		Total	10	6	16

IV. AGRICULTURAL ENTOMOLOGY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15AENU0101	Fundamentals of Entomology	2	1	3
2.	15AENU0302	Pest Management in Field crops	2	1	3
3.	15AENU0403	Pest Management in Horticultural Crops	2	1	3
4.	15AENU0504	Sericulture Technology	1	1	2
5.	15AENU0805	Fundamentals of Nematology	1	1	2
		Total	8	5	13

V. PLANT PATHOLOGY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15APPU0301	Fundamentals of Plant Pathology	2	1	3
2.	15APPU0402	Disease Management in Field Crops	2	1	3
3.	15APPU0503	Disease Management in Horticultural Crops	2	1	3
		Total	6	3	9

VI. AGRICULTURAL MICROBIOLOGY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15AGMU0601	Agricultural Microbiology	2	1	3
		Total	2	1	3

VII. HORTICULTURE

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15HORU0201	Fundamentals of Horticulture	1	1	2
2.	15HORU0402	Production Technology of Fruits and Plantation Crops	2	1	3
3.	15HORU0503	Production Technology of Vegetables and Spice crops	2	1	3
4.	15HORU0604	Production Technology of Flower crops, Medicinal and Aromatic crops	2	1	3
5.	15HORU0705	Landscape Gardening	1	1	2
		Total	8	5	13

VIII. AGRICULTURAL ENGINEERING

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15AGEU0301	Irrigation and Drainage	2	1	3
2.	15AGEU0402	Farm Power and Machinery	2	1	3
3.	15AGEU0603	Soil and Water Conservation	2	1	3
4.	15AGEU0704	Energy Management in Agriculture	1	1	2
5.	15AGEU0805	Post Harvest Technology	1	1	2
		Total	8	5	13

IX. ANIMAL HUSBANDRY AND DAIRY SCIENCE

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15ANH0401	Dairy Cattle Production	2	1	3
2.	15ANH0502	Dairy Technology	1	1	2
3	15ANH0703	Livestock and Chicken Production	2	1	3
		Total	5	3	8

X. AGRICULTURAL ECONOMICS

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15AECU0301	Principles of Agricultural Economics	2	0	2
2.	15AECU0502	Production Economics and Farm Management	2	1	3
3.	15AECU0603	Agricultural Finance, Banking and Co-operation	1	1	2
4.	15AECU0704	Agricultural Marketing, Trade and Prices	1	1	2
5.	15AECU0805	Fundamentals of Agri Business Management	1	1	2
6..	15AECU0806	Project Work	0	4	4
		Total	7	8	15

XI. AGRICULTURAL EXTENSION

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	15AEXU0101	Introduction to Rural Sociology and Educational Psychology	2	0	2
2	15AEXU0202	Agricultural Extension as applied to Rural Development	2	1	3
3	15AEXU0303	Rural Agricultural Work Experience (RAWE I) – Agri. Dept.	0	2	2
4	15AEXU0504	RAWE II - NGOs	0	2	2
5	15AEXU0605	Agricultural Extension for Transfer of Technology	1	1	2
6	15AEXU0706	Instructional Methods for Extension Communication	1	1	2
7	15AEXU0707	RAWE III – Industrial Tie up	0	2	2
8	15AEXU0808	Study Tour (All India)	0	1	1
		Total	6	10	16

**COURSES OFFERED BY OTHER DEPARTMENTS OF GRI
XII. PHYSICAL SCIENCES**

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15AMMU0101	Mathematics for Agriculture	1	1	2
2.	15ACSU0101	Computer Fundamentals and Office Automation	2	1	3
3.	15AGPU0201	Fundamentals of Agricultural Physics	2	1	3
4.	15ASTU0701	Agricultural Statistics	1	1	2
		Total	6	4	10

XIII. BIOLOGICAL SCIENCES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15ABCU0201	Fundamentals of Biochemistry	1	1	2
2.	15AFSU0301	Principles of Food Science	1	1	2
3.	15ACPU0401	Principles of Crop Physiology	2	1	3
4.	15AGNU0401	Nanotechnology and its Applications in Agriculture	1	0	1
		Total	5	3	8

XIV. LANGUAGES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15AGLU0201	Effective Communication Skills	2	0	2
2.	15AGLU0802	Tamil/English – Parambariya Velanmai / Development Education (Non Tamil Students)	1	0	1
		Total	3	0	3

XV. GANDHIAN THOUGHT

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15GTPU0001	Gandhi's Life, Thought and Work	2	0	2

XVI. OTHER COURSES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	15APEU0201	Physical Education	0	1	1
2.	15NSSU0201	NSS/Shanthi Sena	0	1	1
		Total	0	2	2

ABSTRACT OF DISCIPLINE WISE DISTRIBUTION OF COURSES

S.No	Name of the Discipline	Credit		
		Theory	Practical	Total
1	Agronomy	12	21	33
2	Soil Science and Agricultural Chemistry	10	7	17
3	Agricultural Botany	10	6	16
4	Agricultural Entomology	8	5	13
5	Plant Pathology	6	3	9
6	Agricultural Microbiology	2	1	3
7	Horticulture	8	5	13
8	Agricultural Engineering	8	5	13
9	Animal Husbandry and Dairy Science	5	3	8
10	Agricultural Economics	7	8	15
11	Agricultural Extension	6	10	16
12	Physical Sciences	6	4	10
13	Biological Sciences	5	3	8
14	Languages	3	0	3
15	Gandhian Thought	2	0	2
16	Other Courses	0	2	2
	Total	98	83	181

I SEMESTER

15AGRU0101–PRINCIPLES OF AGRONOMY AND AGRICULTURAL HERITAGE (2+1)

Unit I

Introduction to Agriculture – Definition of Agriculture -Scope of agriculture in India and Tamil Nadu. Agriculture-art, science and business-Branches of agriculture-History of agricultural development

Unit II

Development of scientific agriculture in world. National and International Institutions / Centers on agricultural research; Agronomy-definition and relationship with other disciplines. Agricultural heritage – Historical facts, development of human culture

Unit III

Origin of crops, crop distribution and production; origin of crop species, agronomic classification of crops-their economic importance-major crops of India and Tamil Nadu-adaptation and distribution. Factors affecting crop distribution and production. Soils and agriculture seasons of India and Tamil Nadu. Prediction of monsoon rain through IK.

Unit IV

Farming systems; system of farming –wet, irrigated, dry and rainfed farming. Factors governing choice of crops and varieties. Intensive cropping-crop rotation-advantages. Cropping pattern and cropping systems in India and Tamil Nadu. Concepts and principles of sustainable agriculture-Integrated Farming System (IFS) – Organic farming-Natural farming Eco- friendly agriculture and Conservation agriculture-LEISA

Unit V

Basics of agricultural operations; Principles and practices of agricultural operations. Tillage and tillage-types of tillage-modern concepts of tillage-tools, implements and machineries for different agricultural operations. Seeds and sowing-factors affecting germination – seed rate – seed treatment – methods of sowing – nursery methods and transplanting- plant population and geometry time and methods of application and INM, harvesting –threshing-drying and storage.

Practical schedule

1. Field visit-wet, irrigated, dry and dry farming.
2. Identification of principal crops, manures and fertilizers.
3. Identification of agrochemicals and their usage.
4. Identification of green manures-green leaf manures.
5. Study of tools, implements and machineries and acquiring skill in the use of various agricultural tools and implements
6. Nursery preparation-seed treatment techniques, sowing and transplanting methods
7. Practicing seed treatment techniques
8. Sowing and transplanting methods
9. Practicing thinning and gap filling
10. Practicing different methods of fertilizer application
11. Practicing weeding in wet land and garden land
12. Working out seed rate and fertilizer requirement for important crops
13. Practicing harvesting and processing of important crops.

Reference books

1. Balasubramaniyan,P and SP. Palaniappan. 2002. Principles and Practices of Agronomy, Agrobios (India), Jodhpur.
2. Dahama.A.K. 1996. Organic farming for Sustainable Agriculture. Agro Botanical Publishers (India), Bikaner.
3. Gopal Chandra De. 1997. Fundamentals of Agronomy. Oxford and IBH publishing Co.Pvt.Ltd., New Delhi.
4. ICAR. 1996. Handbook of Agriculture. Indian Council of Agriculture Research, New Delhi.
5. Morachan, Y.B. 1980. Crop Production and Management. Oxford and IBH publishing Co.Pvt.Ltd., New Delhi.
6. Reddy. S.R. 1999. Principles of Agronomy. Kalyani Publishers, New Delhi.
7. Sankaran, S. and V.T. Subbiah Mudaliar, 1997. Principles of Agronomy. The Bangalore Printing and Publishing Company Ltd., Bangalore.
8. Singh. S.S. 1998. Principles and Practices of Agronomy. Kalyani Publishers, New Delhi.
9. Somasundaram, E and A. Arokiaraj. 2002. Text book on Principles of Agronomy. Crystal Printers, Tiruchirappalli, Tamil Nadu.
10. Thakur, C. 1980. Scientific Crop Production. Vol.I. Meteoropolitan Book Co. Pvt, Ltd., New Delhi.

I SEMESTER

15AGSU0101-INTRODUCTION TO ANALYTICAL CHEMISTRY (1+1)

Objective :

- To impart knowledge on Analytical Techniques in terms of qualitative and quantitative and the basic principles of radiation chemistry
- To inculcate the preparation of different standard solutions for laboratory analysis

Unit I

Analytical principles - General principles of Analytical Chemistry – Common analytical methods – Qualitative and Quantitative analysis – Classification. Terminologies commonly used in Analytical Chemistry - Accuracy and Precision of analytical results.

Unit II :

Preparation of laboratory reagents;– preparation of Primary and Secondary standards- Theory of indicators and buffers – Volumetric analysis - Acidimetry, Alkalimetry, Oxidometry, Complexometry, Cyanometry.

Unit III

Gravimetric analysis –precipitation reactions - principles – Solubility Product Constant – Common Ion Effect – Filtration techniques –washing techniques and washing solutions

Unit IV

Instrumentation - instrumental analysis – principles and practical applications of pH meter, Conductivity meter, Colorimetry, Spectroscopy and Atomic Absorption Spectroscopy.

Unit V:

Radiation chemistry – Radioactivity – Radioactive elements – Detection and measurement of radioactivity – Radiological safety – stable isotopes, mass spectroscopic measurements and their applications in Agricultural research

Practical Schedule

1. Study of common laboratory glass wares and apparatus
2. Principles of Gravimetry and Moisture estimation
3. Volumetric analysis – Preparation of primary, Secondary standards and indicators
4. Acidimetry – Standardization of acids
5. Alkalimetry – Standardization of bases
6. Permanganometry – Standardization of KMnO_4
7. Dichrometry – Standardization of Ferrous sulphate
8. Complexometry – Estimation of Calcium and Magnesium
9. Potentiometry and Conductometry – Determination of pH and EC
10. Spectrophotometry – Principles and practices
11. Turbidimetry and Flame photometry – Principles and practices
12. Absorption spectrophotometry – Estimation of Cu/Fe /Mn /Si
13. Detection and measurement of radioactivity using Geiger Muller (GM) Counter

Reference books

- 1.Hesse, P.R. 1971. A Text book of Soil Chemical Analysis, John Murray (Publishers) Ltd London
- 2.Jackson, M.L. 1973. Soil Chemical Analysis. Prentice Hall Pvt.Ltd
- 3.Piper, C.S.1996. Soil and Plant Analysis: Interscience *Publishers*, New York.
- 4.Keith A.Smith, 1983. Soil Analysis – Instrumental Techniques and Related Procedures, New York.

5.Kreshkov A.P. and Yarolavtsev, 1977. Course of Analysis Chemistry Vol. II. Quantitative Analysis – Mir Publishers, Moscow.

Learning outcome		
Unit	Vague outcome	Precious outcome
I	Studying the general principles of analytical chemistry and common analytical methods	Understanding the general principles of Analytical Chemistry in terms of qualitative and quantitative
II	Studying the preparation of primary and secondary standards and Volumetric analysis	Understanding the preparation of primary and secondary standards and volumetric analysis viz., Acidimetry, Alkalimetry, Oxidometry, Complexometry and Cyanometry
III	Studying the principles of Gravimetric analysis	Understanding the principles of precipitation reactions, solubility product constant and common ion effect
IV	Studying the basic principles of Instrumentation	Understanding the principles and practical applications of pH meter, conductivity meter, colorimetry, spectrophotometry and Atomic Absorption Spectroscopy.
V	Studying the concepts of Radiation Chemistry	Understanding about Radioactivity, Radioactive elements, Detection and measurement of radioactivity, Radiological safety, stable isotopes, Mass spectroscopic measurements and their applications in Agricultural research

I SEMESTER
15AGBU0101- FUNDAMENTALS OF CROP BOTANY (1+1)

Objective

This course is aimed at understand the basic concepts of classical and to provide insight into recent advances in improvement and botanical description, economic uses, value addition of cereals, pulses, oilseeds, fibers, forage crops, sugarcane and narcotics.

Unit I

Introduction to Field crops : Agricultural classification of Field crops.

Family description, economic parts, economic uses, value additions, in the following crops: **cereals and millets:** rice, wheat, maize, sorghum, pearl millet, finger millet, foxtail millet, little millet, barn yard millet, proso millet and kodo millet.

Unit II

Pulses: redgram, blackgram, greengram, soybean, bengalgram, horsegram, cowpea, lablab and dew gram. **Oilseeds:** groundnut, gingelly, castor, sunflower, safflower, niger, rape and mustard, jatropha.

Unit III

Fibre crops: cotton, jute, mesta, sunnhemp, agave and silk cotton.

Sugars: sugar cane, sugar palm and sugar beet.

Unit IV

Forage crops: grasses - napier, pearl millet, guinea grass, *cenchrus* sp., johnson grass, marvel grass, spear grass, buffalo grass and bermuda grass.

Legume fodders: lucerne, cowpea, desmanthus, desmodium.

Tree fodders - agathi, glyricidia, erythrina, subabul and *acacia* sp.

Unit V

Green and green leaf manures: sunnhemp, sesbania, daincha, glyricidia, neem and pungam, **narcotics** –tobacco. **Horticultural crops:** tomato, brinjal, chillies, potato, tapioca. Perennial crops – coconut, mango, banana, papaya. **Plantation crops:** tea, coffee.

Practical schedule

Observation and description of plant parts – root, stem, leaves, inflorescence and flowers of the following crops.

1. Rice
2. Maize
3. Sorghum
4. Pearl millet
5. Finger millet
6. Red gram, black gram, green gram and Bengal gram
7. Cowpea, soybean
8. Groundnut, sesame,
9. Sunflower, castor
10. Coconut
11. Cotton, Mesta
12. Sugarcane
13. Forages and fodders

References

- Albert F. Hill and O.P. Sharma, 1996. Economic Botany. Tata McGraw - Hill Publishing Co. Ltd., New Delhi.
- Chalam, G.V., J. Venkateswarlu. 1966. Agricultural Botany in India - vol:1. Asia Publishing House, Bombay, New Delhi.
- Daniel Sundararaj, D. and G. Thulasidas, 1993. Botany of Field crops. Macmillan India Ltd. New Delhi.
- Kochar, S.L. 1988. Economic Botany in the Tropics, Macmillan India Ltd. New Delhi.
- Purse Glow. 1988. Tropical crops - Dicotyledons. The English Language Book society and Longman Co., Singapore.
- Purse Glow, 1988. Tropical crops - Monocotyledons. The English Language Book Society and Longman Co., Singapore.
- Sambamurthy, V.S. and N.S. Subramanian, 1989. Text book of Economic Botany, Wiley Eastern, New Delhi.
- Sen, S. 1990. Economic Botany. New Central Book Agency. Calcutta -9.

Outcome:

The students will learn about the basic concepts of classical, botanical description, economic uses and value addition of agricultural crops.

I SEMESTER

15AENU0101 FUNDAMENTALS OF ENTOMOLOGY (2 + 1)

Unit I: Insects and their importance

Entomology as a science – its importance in Agriculture – History of Entomology in India – Position of insects in the animal kingdom and their relationship with other classes of Arthropoda - Origin of insects - reasons for insect dominance.

Unit II: Insect morphology

General organization of insect body – segmentation - body wall – structure and function – cuticular appendages – moulting - Body regions – insect head, thorax and abdomen – their structure and appendages - modifications – sense organs and their functions.

Unit III: Insect physiology

Elementary knowledge of digestive, excretory, respiratory, circulatory, nervous and reproductive systems – modifications and functions – digestive enzymes – respiration in aquatic insects – haemolymph – types of reproduction – Metamorphosis – life cycle – immature stages of insects - exocrine and endocrine glands – location and simple functions – biocommunication in insects – sound and light production – Tropisms in insects - defense and offence organs.

Unit IV: Insect Taxonomy - I

Nomenclature and Classification of insects - distinguishing characters of Collembola, Thysanura, Ephemeroptera, Odonata, Embioptera, Phasmida, Orthoptera, Dermaptera, Isoptera, Blattodea, Mantodea, Thysanoptera, Hemiptera, Homoptera and their key families of Agricultural importance.

Unit V: Insect Taxonomy - II

Distinguishing features of Coleoptera, Neuroptera, Diptera, Lepidoptera, Hymenoptera and their key families of Agricultural importance.

Practical Schedule

1. Different Methods of insect collection and preservation.
2. Observations and sketching of external structure of grasshopper / cockroach.
3. Structure of insect head – head orientation - types of antennae.
4. Mounting of mouthparts of cockroach- examining the mouthparts of a bug, grasshopper and honeybee and making diagrams.
5. Structure and modification of thoracic and abdominal appendages.
6. Recording types of metamorphosis – observing and sketching the immature stages, eggs, nymphs, naiad, caterpillar, grub, pupae of insects.
7. Dissection of grasshopper/ blister beetle to note the alimentary canal and make diagrams.
8. Dissection of grasshopper / blister beetle to observe and sketch the male reproductive systems.
9. Dissection of grasshopper / blister beetle to observe and sketch the female reproductive systems.
10. Observing the characters of Collembola, Thysanura, Ephemeroptera, Odonata, Embioptera and making diagrams.
11. Observing the characters of Mantodea, Thysanoptera, Hemiptera, Homoptera and making diagrams.
12. Recording the characters of Coleoptera, Neuroptera, Diptera and making diagrams.
13. Observing characters of the order Lepidoptera and Hymenoptera and making diagrams.

Reference Books

1. Borror, D.J., D.M. DeLong and C.A. Triple Horn. 1976. An Introduction to the Study of Insects (IV Edition). Holt, Rinehart and Winston, New York, 852 p.
2. Chapman, R.F. 1981. The Insects: Structure and Function. Edward Arnold (Pub.) Ltd., London. 919 p.
3. Nayar, K.K., T.N. Ananthakrishnan and B.V. David. 1976. General and Applied Entomology, Tata McGraw Hill Publishing Company Limited, New Delhi, 589 p.
4. Pedigo, L.P. 1999. Entomology and Pest Management. III Edition. Prentice Hall, New Jersey, USA, 691 p.
5. Romoser, W.S. 1988. The Science of Entomology, Mcmillan Pub., New York, 449 p.
6. Saxena, S.C. 1992. Biology of Insects. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 366 p.
7. Selvanarayanan, V. and S. Arivudainambi. 2004. Introductory Entomology, Manivasagar Padhippagam, Chennai. 262 p.
8. Srivastava, P.D. and R.P. Singh. 1997. An Introduction to Entomology. Concept Publishing Company, New Delhi, 269 p.

I SEMESTER

15AMMU0101- MATHEMATICS FOR AGRICULTURE (1+1)

Objective :

- To offer Basic Mathematics for the students coming from Non Mathematics stream
- To create confidence to solve the problems relevant to Agricultural Sciences

Unit I:

Review of basic formulae in algebra, Trigonometry and Analytical geometry – Matrices – Algebra of matrices - determinants - inverse and solution of linear equations

Unit II:

Differentiation – methods – geometrical meaning of differentiation – growth rate- RGR – marginal product – marginal cost- marginal revenue

Unit III:

Elasticity of demand and supply – Simple partial differentiation- application of maxima and minima of functions of single and several variables in agricultural sciences

Unit IV:

Physical optimum – Economic optimum- single and several inputs – application of total Differentiation – Integration- methods and applications – producers and consumers surplus

Unit V:

Differential equations- formation – solution- first order – variable separable – homogeneous – linear differential equations

Practical schedule

1. Differentiation – methods – problems based on product and quotient rule
2. Problems in function of a function rule – implicit functions and parametric forms
3. Partial differentiation
4. Crop growth rate – rgr; marginal cost, marginal revenue and elasticity of demand
5. Physical and economic optimum for single input
6. Integration – simple problems
7. Integration by parts
8. Applications of integration – producer's and consumer's surplus
9. Formulation of differential equations
10. Solution of first order differential equations by variables separable
11. Solution of linear differential equations
12. Solution of simple equations reducible to linear form

Reference Books:

1. Manickavasagam Pillai T.K. and T. Natarajan, 1989. Calculus – Viswanathan Publications, Chennai
2. Mehta .B.C.and G.M.K.Madnani. 1982, Mathematics for Economists, Sultan Chand & Sons, New Delhi
3. Suyambulingom and C. Kailasam. 1990, Mathematics for Plant Sciences – Sakthi Publications, Coimbatore.

I SEMESTER

15ACSU0101- COMPUTER FUNDAMENTALS AND OFFICE AUTOMATION (2+1)

OBJECTIVES

- To understand the basic concepts of computers
- To develop applications using MS Word, MS Excel and MS Powerpoint.

UNIT I: Definition of a computer - Computer terminologies - Anatomy of a computer - Generations of computers - Types of computers- Types of operating system - Types of programming languages - assembler - translator - compiler – cross compiler
[11 Hrs]

UNIT II: Input devices - Output devices - Storage devices - Source data entry devices. [8 Hrs]

UNIT III: MS-Word: Introduction - features - Document creation - Document editing: cursor movements - selecting text - copying text - moving text - finding and replacing text - Spelling and Grammar - Page setup - Mail Merge - Table creation. [8 Hrs]

UNIT IV: MS-Excel : Introduction - Advantages & applications - Organization of workbook - Editing a worksheet - Range - Formatting worksheet - Chart: creation - changing type - Print options - Built-in functions. [7 Hrs]

UNIT V: MS-Power Point: Introduction - features - creating presentation - viewing - saving and close presentation - Changing Layout - Changing Designs - Slide transition – Adding animation effects - inserting table, charts, pictures, clipart in presentation.
[8 Hrs]

Reference Books:

1. Fundamentals of Information Technology, S.K.Bansal, A.P.H. Publishing company, New Delhi, 2002.
2. 2007 Microsoft Office System step by step, Joyce Cox, Joan Preppernau, Steve Lambert and Curtis Frye, 2007

OUTCOMES

Students should be able to

- Know the basic computer concepts.
- Understand the basic hardware devices.
- Create document in MS Word.
- Draw chart using MS Excel.
- Design presentation using MS Powerpoint

I SEMESTER
15GTPU0001 GANDHI'S LIFE, THOUGHT AND WORK (2+0)
(FOUNDATION COURSE FOR ALL UG PROGRAMMES)(F)

Objectives

1. To enable students to understand and appreciate the principles and practices of Gandhi and their relevance in the contemporary times.
2. To develop character and attitude to follow Gandhian values and responsibilities in their personal and social life.

Specific Objectives of Learning:

This will make the students:

- To understand the life of Gandhiji in-depth.
- To get introduced to the relevant Gandhian philosophies.
- To apply the Gandhian concepts in the relevant context.
- To envision the Gandhian socio-economic, political and cultural ideas.
- To get educated on Gandhian lines in a multi-dimensional way.

Unit 1: Life of Gandhi in brief: Early life in India – London Phase – South African Adventure - Struggle for total freedom in India – Martyrdom

Unit II: Concepts of Gandhi's Philosophy, Truth and Nonviolence, Ends and Means, Right and Duties, Simply Living and High Thinking

Unit III: Gandhi's concepts and their applications: Sarvodaya, Satyagraha, Santhi Sena Constructive Work

Unit IV: Gandhian Vision of Society: Self and society-Communal harmony, removal of untouchability and Equality of sexes – Policies: Decentralization of power, Gram Swaraj (Panchayatui Raj) and good governance- Economics of Swadeshi, Trusteeship, Bread Labour and Self-employment.

Unit V: Gandhian Dimension of Education: Basic Education, Adult Education, Pluralism-Multilingualism, Religions and interfaith relations- Health; Diet, Nature Cure, Education on Health, Sanitation and Hygiene.

Reference:

- M.K. Gandhi: (1983), An Autography of the Story of My Experiments with Truth, Navajivan Publishing House, Ahmedabad.
- M.K. Gandhi: (1951), Satyagraha in South Africa: Navajivan Publishing House, Ahamadabad.
- M.K. Gandhi: (1983), Construtive Programme" Its Meaning and Place. Navajivan Publishing House, Ahamadabad.
- M.K. Gandhi: (1948) Key to Health, Navajivan Publishing House, Ahamadabad.
- M.K. Gandhi: (1949), Diet and Diet Reforms, Navajivan Publishing House, Ahamadabad.
- M.K. Gandhi: Basic Education, Navajivan Publishing House, Ahamadabad.

M.K. Gandhi: (2004), Village Industries, Navajivan Publishing House, Ahamadabad.
M.K. Gandhi: (1962), Hindi Swaraj, Navajivan Publishing House, Ahamadabad.
M.K. Gandhi: (2004), Trusteeship Dreams, Navajivan Publishing House, Ahamadabad.
M.K. Gandhi: (2001), India of my Dreams, Navajivan Publishing House, Ahamadabad.
M.K. Gandhi: Self Restraint Vs. Self Indulgence, Navajivan Publishing House, Ahamadabad.
Arunachalam:Gandhi: (1985), The Peace Maker,Gandhi Samarak Nidhi, Madurai
R.R. Prabhu & UR Rao. The Mind of Mahatma Gandhi, Navajivan Publishing House.

I SEMESTER
15AEXU0101 - INTRODUCTION TO RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY (2+0)

Objectives:

- To impart idea on Rural Social situation to the students in view of learning rural settings
- To offer the importance of Educational Psychology for understanding Agricultural Extension

Unit I: Introduction - Sociology and Rural Sociology , Extension Education and Agricultural Extension- Meaning and Definitions – Importance of Rural Sociology in Agricultural Extension and their interrelationship - Characteristics of Indian rural society – Differences and relationships between rural and urban societies.

Unit II : Social Group : Classification – Characteristics – Formation and organization of groups – Role of social groups in Agricultural Extension – Social stratification – meaning, forms, class system and cast systems – culture and concepts – their role in Agricultural extension.

Unit III: Leadership: Leader and Leadership – types, roles, qualities and theories –Selection and training of leaders and use of local leaders in Agri. Extension

Unit IV: Psychology: Psychology and Educational psychology – meaning, scope and importance; Intelligence - meaning, types, factors and importance in Agricultural Extension – Personality , Perception , Emotions, Frustration and Motivation - meaning and types – Factors and importance in Agricultural extension.

Unit V: Teaching and Learning: Teaching, Learning, learning experience and learning situation – meaning and definition – Elements of learning situation and its characteristics – Steps in extension teaching.

References :

1. Annamalai, R. (1998). Extension Education and Programme Planning. Palaniappa Printers, Tirunelveli.
2. Dahama, O.P and O.P.Bhatnagar. (2008). Education and Communication for Development, Oxford & IBH Publishing Co., Ltd., New Delhi.
3. Ray, G.L.(2006). Extension Communication and Management. Naya Prakash, Kolkata.
4. Reddy, A.A. (2001). Extension Education. Shree Laxmi Press, Bapatla
5. Tripathi, N.K. (2000). Rural Sociology and Psychology in Extension Education.
6. Supe, S.V. (1983). An Introduction to Extension Education. Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.
7. Chitamber, J.B. (1997). Introducing Rural Sociology, Wiley Eastern Ltd., New Delhi.
8. Mangal, S.K. (2000). Educational Psychology, Prakash Brothers, Ludhiana.

Outcome

The students can learn the Rural Social situation for effective Agricultural Extension

II SEMESTER

15AGRU0202 – FUNDAMENTALS OF AGRICULTURAL METEOROLOGY (1+1)

Unit I:

Introduction to Agricultural Meteorology; Agricultural Meteorology-Definition of Meteorology, agro-climatology-weather and climate. Factors affecting weather and climate- climatic types - scope of Agricultural Meteorology. Co-ordinates of India and TamilNadu-atmosphere stratification and composition.

Unit II:

Study on climatic factors; clouds, classification and characteristics-precipitation-forms-Hydrological cycle-rainfall-monsoons of India, onset and withdrawal, effect on crop production

Unit III:

Measurement of rainfall. Isohyets-Artificial rain making-Solar radiation-light and heat energy-intensity, quality, day length and direction of light, effect on crop production, measurement-temperature effect on crop growth, cardinal temperature, diurnal and seasonal variations, isotherm- soil temperature and effect on crop growth

Unit IV:

Measurement of temperature-atmospheric humidity-its measurement- Wind systems of world-tropical convergence zones, speed and direction of wind measurement-Effect of wind on crops.

Unit V:

Weather aberrations and forecasting; weather aberrations-Deficient rainfall (drought), cyclone, anticyclones, hurricane, tornado, storms-effect on agriculture- Agricultural seasons of India -Agroclimatic zones of world, India and Tamil Nadu-Weather forecasting-importance-types-agrimet observatory-synoptic chart, Crop weather calendar-Remote sensing and crop weather modelling-agroclimatic normals for field crops-effect of climate and weather on crop production and pest and diseases.

Practical schedule

1. Site selection, layout and classification of Agrimet. observatory.
2. An introduction to Gandhigram university meteorological observatory.
3. Measurement of maximum and minimum temperature
4. Measurement of soil temperature.
5. Measurement of solar radiation and sunshine hours.
6. Measurement of rainfall and humidity.
7. Measurement of wind direction and wind velocity
8. Measurement of evaporation
9. Mapping of arid and semi arid regions of India
10. Rainfall analysis and Crop planning
11. Acquiring skill in land shaping methods for insitu moisture conservation
12. Drawing Synoptic charts.
13. Preparation of Crop weather calendars.

References :

1. Harbal Singh, M.1974. Agricultural Meteorology, Punjab Agriculture University, Ludhiana.
2. Krishnamurthy.U.R.1995. Practical manual on Agricultural meteorology. Kalyani publishers, Ludhiana.
3. Mavi, H.S. 1994. Introduction to Agrometeorology. Oxford &IBH publishing Co., New Delhi.
4. Radhakrishna murthy, V. 2002. Basic principles of Agricultural Meteorology. BS Publications, Hyderabad, 261 p.
5. Srivastava and Tyagi 2011, Practical Agricultural Meteorology, New India Publishing Agency.
6. Prasad Rao, G.S.L.H.V. 2003. Agricultural Meteorology, Kerala Agricultural University, Thirussur, Kerala.
7. Govindan, K. 2010. Agricultural Meteorology and Dry Farming. Kalyan Publishers. Ludhiana.

II SEMESTER
15AGSU0202-FUNDAMENTALS OF SOIL SCIENCE (2+1)

Objective:

- To impart the basics of soil with relevant to its origin, classification, physical, chemical and biological properties.
- To enrich knowledge on organic matter and its fate after applied

Unit I:

Soil forming rocks and minerals; History and development of Soil Science and its branches. Origin of earth-Soil forming rocks and minerals-origin-classification. Weathering of rocks and minerals-physical, chemical and biological weathering.

Unit II:

Soil forming processes; Soil formation-Factors of soil formation-Soil forming processes-Profile development-Definition of soil- Soil composition-Types of soils found in India and Tamil Nadu - Soil Taxonomy.

Unit III:

Physical Properties of Soils; Physical properties of soils-texture-mechanical components and structure. Physical constants-true and apparent specific gravity, pore space, soil colour, soil air, soil temperature - sources-distribution of heat in the soil, soil water-measurement-soil and water relationship moisture constants-soil water movement. Soil consistency. Significance of physical properties in relation to plant growth.

Unit IV:

Chemical properties of soils; Chemical properties of soils- Chemical composition-Soil reaction-Buffering capacity of soils-Soil colloids-Inorganic colloids-Clay minerals-Amorphous-Ion exchange reactions-Organic colloids-Colloids in relation to fertility of soil and their effect on plant growth. Soil pH – Problem soils their reclamation and management.

Unit V:

Soil Organic matter and their Turn over; Soil Organic matter - sources-general chemical composition-decomposition-humus formation-role and functions of organic matter in soil-biological properties of soil-nutrient availability-factors influencing the availability.

Practical Schedule

1. Identification of rocks and minerals
2. Collection & Preparation of soil samples for laboratory analysis
3. Estimation of moisture in soil
4. Estimation of EC and pH in soil
5. Estimation of CEC in soil
6. Estimation of Bulk Density, Particle Density and pore space by cylinder and clod method
7. Determination of Soil texture by Feel method and Soil Colour
8. Estimation of loss on ignition
9. Preparation of HCl extract
10. Estimation of acid insolubles
11. Estimation of iron and aluminium oxides
12. Estimation of organic carbon in soil
13. Estimation of Ca and Mg in soil

Reference books

1. Biswas, T.D. and Mukherjee, S.K. 1997. Text book of Soil Science. Tata McGraw Hill Publishing Co. Ltd., New Delhi

2. Brady, N.C. 1995. The Nature and Properties of Soils. Prentice Hall of India Pvt. Ltd., New Delhi
3. Daji, A.J. 1970. A Text Book of Soil Science. Asia Publishing House, Madras
4. Dhanasekaran, K., Poonkodi, P., Singaravel, R and Raghupathy, B 2003, Fundamentals of Soil Science. Om Sakthi Pathippagam, Chidambaram
5. Dilip Kumar Das. 1997. Introductory Soil Science. Kalyani Publishers, Ludhiana
6. Donahue, R.L., Miller, T.W. and Shickluna, J.C. 1987. Soils – An introduction to Soils and Plant Growth. Prentice Hall of India (P) Ltd., New Delhi
7. Kolay, A.K. 1993. Basic concepts of Soil Science. Wiley Eastern Limited, 4835/24 Ansari Road, Daryaganj, New Delhi
8. Rai, M.M. 1998. Principles of Soil Science. MacMillan India Limited, New Delhi
9. Sahai, V.N. 2001. Fundamentals of Soil, Kalyani Publishers, Ludhiana
10. Sehgal, J. 1997. Pedology-Concepts and applications. Kalyani Publishers, Ludhiana
11. Sekhon, G.S. Eds., 2002. Fundamentals of Soil Science. Indian Society of Soil Science, IARI, New Delhi

Learning outcome		
Unit	Vague outcome	Precious outcome
I	Studying the Soil forming rocks and minerals	Understanding the History and development of Soil Science and its branches. Origin of earth-Soil forming rocks and minerals-origin-classification. Weathering of rocks and minerals-physical, chemical and biological weathering.
II	Studying the Soil forming processes	Understanding the Soil formation-Factors of soil formation, soil forming processes-Profile development- Definition of soil and Soil composition-Types of soils found in India and Tamil Nadu - Soil Taxonomy.
III	Studying the physical properties of soils	Understanding the physical properties of soils-texture-mechanical components and structure. Physical constants-true and apparent specific gravity, pore space, soil colour, soil air, soil temperature
IV	Studying the chemical properties of soils	Understanding the Chemical properties of soils-Chemical composition-Soil reaction-Buffering capacity of soils-Soil colloids-Inorganic colloids-Clay minerals-Amorphous-Ion exchange reactions-Organic colloids-Colloids in relation to fertility of soil and their effect on plant growth.
V	Studying the Soil Organic Matter and their turn Over	Understanding about Radioactivity, Radioactive elements, Detection and measurement of radioactivity, Radiological safety, stable isotopes, Mass spectroscopic measurements and their applications in Agricultural research

II SEMESTER
15AGBU0202 PRINCIPLES OF GENETICS (1+1)

Objective

This course is aimed at understanding the basic concepts of genetics and developmental genetics, helping students to develop their analytical and problem solving skills.

Unit I

Earlier concepts of heredity - Mendel's work - Laws of heredity- gene-allele - homozygous, heterozygous, genome phenotype, genotype, monohybrid, dihybrid, polyhybrid, backcross and test cross. Lethal genes, Pleiotropy with examples; phenocopy, penetrance and expressivity.

Unit II

Allelic interaction – Types – Complete dominance, incomplete dominance, Co-dominance and Over dominance with examples. Non allelic interaction - Epistatic and hypostatic genes, types of epistasis, Dominant epistasis, Recessive epistasis, Duplicate and additive epistasis, Duplicate dominant epistasis, Duplicate recessive epistasis, Dominant and recessive epistasis.

Unit III

Multiple alleles - characteristic features, study of blood group, coat colour in rabbits. Multiple factor hypothesis - Nilson - Ehle - Wheat kernel colour experiment

Unit IV

Linkage - coupling and repulsion - experiment of Bateson and Punnett - chromosomal theory of linkage of Morgan - complete and incomplete linkage. Crossing over - significance of crossing over - cytological proof for crossing over - Stern's experiment, Strength of linkage and recombination - interference and coincidence – Estimation of strength of linkage and cross over value

Unit V

Sex determination - chromosomal mechanism of sex determination and its types. Genic balance theory of sex determination of Bridges, Sex linked inheritance - Holandric genes - sex influenced and sex limited inheritance - sex determination in plants - melandrium, papaya and maize

PRACTICAL:

1. Use of microscopes and study cell organelles
2. Preparation of stains and preservatives
3. Mitosis cell division, meiotic phases
4. Meiotic studies in maize, sorghum and making temporary and permanent slides
5. Principles of dominance, recessive, backcross, test cross, incomplete dominance and chi square test.
6. Study of genetic ratios – mono hybrid- incomplete dominance and test cross ratios
7. Study of dihybrid ratio with dominance, with incomplete dominance and test cross
8. Study of simple interaction of genes- dominant epistasis, recessive epistasis, duplicate and additive epistasis
9. Duplicate dominant and recessive epistasis
10. Multiple alleles and polygenic inheritance
11. Estimation of linkage with F3 data
12. Problems on two point test cross

13. Problems on three point test cross – drawing genetic maps.

References

1. Allard, R. 1989. Principles of Plant Breeding. John Wiley & Sons, New Delhi.
2. Chopra, V.L. 1994. Plant Breeding – Theory and Practice. Oxford & IBH publication co., Pvt. Ltd., New Delhi
3. Daniel Sundararaj, G. Thulasidas and M. Stephan Dorairaj, 1997. Introduction to Cytogenetics and Plant Breeding. Popular Book Depot, Chennai – 15.
4. Mandal, A.K., P.K. Ganguli and S. P. Vanerjee. 1991. Advances in Plant Breeding –Vol: I & II. CBS Publishers and distributors, New Delhi.
5. Sharma, J.R. 1994. Principles and Practices of Plant Breeding. Tata McGraw –Hill publishing co., New Delhi.
6. Singh, B.D. 1986. Plant Breeding – Principles and Methods. Kalyani Publishers, New Delhi.
7. Thirugnanakumar, S. K. Manivannan and S. Manickavasagam. 2004. Molecular Plant Breeding, SKS Publications, Chidambaram.
8. Thirugnanakumar, S. K. Manivannan and S. Manickavasagam. 2004. Organelle genomes in Plant breeding, SKS Publications, Chidambaram.
9. Bhojwani, S.S. and Razdan, M.K. 2006, Plant Tissue Culture Studies – Theory and Practice Elsevier Publication.

Outcome :

The students will learn the basic concepts of developmental genetics and to develop their analytical and problem solving skills.

II SEMESTER
15HORU0210- FUNDAMENTALS OF HORTICULTURE (1+1)

Objectives:

1. To learn about the importance, branches, layout, bearing habits and special horticulture techniques of horticultural crops.
2. To learn about the sexual and asexual propagation techniques.

Unit I:Introduction: Scope and importance of Horticulture -Divisions of Horticulture – Area, production – Exports and imports – Special features of horticultural crops grown in India – Climatic zones of India and Tamil Nadu in relation to horticultural crops – Factors limiting horticultural crop production.

Unit II: Production Technology and Cropping systems: Establishment of orchard – Manures and manuring – Irrigation methods – Cropping systems – Multitier cropping – Cover crops – Intercrops – Mulching – Protected cultivation – Organic farming.

Unit III:Fruiting and Crop Regulation: Bearing habits – Training and pruning – Flowering, pollination and fruit set – unfruitfulness –Causative factors – Fruit drop – Causes and prevention – Role of growth regulators in Horticulture.

Unit IV: Sexual Propagation:Advantages and disadvantages-apomixis-polyembryony-seed formation and maturity-seed storage-seed germination-dormancy in seeds-seed viability and longevity and techniques of seed propagation

Unit V:Vegetative Propagation: Vegetative Propagation – Advantages and disadvantages – Important vegetative propagation methods - Principles underlying in cutting, layering, grafting and budding, stock – scion relationship –Mist propagation – Micropropagation – Propagation by specialized plant parts

Practical:

1. Acquiring knowledge about different features of an orchard and soil profile suitability
2. Acquiring knowledge about tools and implements
3. Practising preparation of nursery beds for raising rootstocks and seedlings
4. Practising propagation by different methods of cutting and layering
5. Practising propagation by different methods of budding and grafting
6. Acquiring knowledge about use of plant parts in vegetative propagation
7. Practising preparation of pot mixture, potting and repotting of plants
8. Practising planning, layout and planting of fruit trees
9. Practising application of manures and irrigation methods
10. Acquiring knowledge about study of bearing habits in horticultural crops
11. Practising training and pruning techniques of fruits trees
12. Learning about them micropropagation techniques
13. Visit to a nursery

Reference Books

1. Adams C.R., K.H. Bradford, M.P. Early. 1996. Principles of Horticulture. CBS Publishers and Distributors, New Delhi.
2. Christopher, E.P. 2001. Introductory Horticulture. Biotech Books, New Delhi.
3. Edmond J.B., A.M. Musser and F.S. Andrews. 1975. Fundamentals of Horticulture. Tata Mc Graw Hill Publishing Co., New Delhi.
4. Hartman. H.T. and D.E. Kester. 1986. Plant Propagation – Principles and Practices. Prentice Hall of India Ltd., New Delhi.
5. Janic, J.W.H., 1988. Horticultural Science. Freeman and Co., San Francisco.

6. Jitendra Singh. 2004. Basic Horticulture. Kalyani Publishers, New Delhi.
Kumar, N. 1997. Introduction to Horticulture. Rajalakshmi Publication, Nagercoil

Learning out come		
Unit	Vague out come	Most precious out come
I	Studying the. Scope and importance of Horticulture ,Divisions of Horticulture , Area, production , Exports and imports , Special features of horticultural crops grown in India , Climatic zones of India and Tamil Nadu in relation to horticultural crops, Factors limiting horticultural crop production	1.Understanding the importance and branches of horticulture. 2. Understanding the climatic zones of India and TamilNadu
II	Studying the Establishment of orchard ,Manures and manuring , Irrigation methods ,Cropping systems , Multitier cropping ,Cover crops, Intercrops , Mulching ,Protected cultivation , Organic farming	1. Understanding the Establishment of orchard 2. Understanding the Cropping systems.
III	Studying the Bearing habits ,Training and pruning, Flowering, pollination and fruit set, unfruitfulness,Causative factors,Fruit drop,Causes and prevention,Role of growth regulators in Horticulture	1.Understanding the bearing habits of horticultural crops . 2.Understanding the special horticulture techniques followed for horticultural crops
IV	Studying the Advantages and disadvantages,apomixis,polyembryony,seed formation and maturity,seed storage,seed germination,dormancy in seeds,seed vibility and longevity and techniques of seed propagation	1.Understanding the Advantages and disadvantages of sexual propagation 2. .Understanding the various techniques of seed propagation
V	Studying the Vegetative Propagation, Advantages and disadvantages ,Important vegetative propagation methods , Principles underlying in cutting, layering, grafting and budding,stock,scion relationship ,Mist propagation, Micropropagation , Propagation by specialized plant parts	1.understanding the different vegetative propagation methods 2. understanding the requirements and procedure for micro propagation

II SEMESTER
15ABCU0201 - FUNDAMENTALS OF BIOCHEMISTRY (1+1)

Unit I

Carbohydrates; Carbohydrates – Occurrence and classification, structure of monosaccharide, disaccharides and polysaccharides. Physical and chemical properties of carbohydrates – Optical isomerism, Optical activity, reducing property, reaction with acids and alkalies. Industrial uses.

Unit II

Lipids – Occurrence and classification. Essential fatty acids – Physical and chemical constants of oils. Rancidity of oils. Waxes and phospholipids – Types and importance. Plant pigments – structure and function of chlorophyll and carotenoids. Proteins – Occurrence, classification, structure. Amino acids – Classification and structure. Essential amino acids, physical and chemical properties of amino acids – Colour reactions, amphoteric nature and isomerism. Classification of proteins based on functions and solubility.

Unit III

Enzymes – Classification and nomenclature. Mechanism of enzyme action. Factors affecting enzyme action. Cofactors and coenzymes.

Unit IV

Metabolism of major nutrients and its energetics – Glucose oxidation, gluconeogenesis, glycogenolysis & Fatty acid synthesis, Protein biosynthesis, RNA Transcription, replication, HMP, TCA Cycle & DNA Repair, Electron transport chain

Unit V

Secondary Metabolites; Secondary metabolites – occurrence, classification and functions of phenolics, vitamins, minerals, calcium, phosphorus, iron, iodine, selenium and zinc and its biological role.

Practical

1. Qualitative tests for carbohydrates.
2. Estimation of total sugars.
3. Determination of reducing and non-reducing sugars.
4. Starch estimation.
5. Colour reactions of proteins.
6. Estimation of proteins.
7. Sorenson's formal titration of amino acids.
8. Estimation of total free amino acids.
9. Estimation of free fatty acids.
10. Determination of iodine number.
11. Estimation of calcium
12. Estimation of Vitamin C
13. Qualitative analysis of phytonutrients

References

1. Conn, E.E. and Stumpf, P.K. 1996. Outlines of Biochemistry – Wiley Eastern Ltd., Fifth Edition.
2. Chesworth, J.M., Stuchbury, T. and Scaife, J.R. 1998. An Introduction to Agricultural Biochemistry. Chapman and Hall.
3. Dey, P.M. and Harborne, H.B. 1997. Plant Biochemistry, Academic Press.
4. Goodwin, T.W. and Mercer, E.I. 1991. Introduction to Plant Biochemistry. Pergamon Press.
5. Murray, P. K., Gramner, P.A., Mayes, P.A. and Rodwell, V.W. 1999. Harper's Biochemistry 24th Ed., Prentice Hall International.
6. Nelson DL, Cox MM. 2000. Lehninger Principles of Biochemistry Third (Indian) edition Macmillan, Worth Publishers.
7. Sadasivam, S. and Manickam, A. 1996. Biochemical Methods – New Age International, New Delhi.
8. Stryer L, Berg T, Tymoczko, J, Biochemistry. 5th Ed. Wiley Eastern Ltd, New Delhi
9. Voet D, Voet JG and CW Pratt. 2002. Biochemistry. John Wiley & Sons, Inc, Singapore.
10. Wilson, K. and Walker, J.M. 1994. Practical Biochemistry 4th Ed. – Cambridge University Press.

II SEMESTER

15AGPU0201- FUNDAMENTALS OF AGRICULTURAL PHYSICS (2+1)

Unit I:

Basic concepts of physics - Importance of physics related to agriculture- physical laws – Brownian movement – Tyndall effect – Raman Effect – Spectroscopy – Adhesion and Cohesion properties – relevant to agriculture

Unit II:

Soil physics- soil moisture movement – physical classification of soil moisture – soil air movement – thermal diffusion in soils – thermal properties of soils – heat capacity – heat conductivity – specific heat

Unit III:

Nanophysics - nano particles – physical properties of nanoparticles – Moore's law – semi conductors – diode – biosensors – quantum dots – working principles of Transmission Electron microscope – Scanning Electron Microscope – Scanning Tunneling Microscope – their applications

Unit IV:

Soil – plant - water continuum – capillary movement of water in soil and plant – tortuosity of water in soils – Hysteresis effect – osmosis – diffusion

Unit V:

Physical constraints in agriculture – soil constraints – impermeability of soil – compaction methods – physical constants of soils – Soil physics as a factor in soil management.

Practical

1. Estimation of moisture in soil and plant samples
2. Optical methods
3. Electrical and thermal properties of agro materials
4. Physical methods to prepare nanoparticles
5. Application of TEM in identifying nanofertilizers
6. Application of SEM in identifying nanoparticles
7. Visit to Nanotechnology laboratory
8. Working principle of basic Physical instruments
9. Capillary movement of water
10. Estimation of pore space in soil particles
11. Determination of bulk and particle density of soil particles
12. Detection and measurement of radio activity using Geiger Muller Counter
13. Visit to an Isotope Laboratory

Reference Books:

1. William Lambe, T. and Robert V. Whitman. 1979. Soil Mechanics. Wiley Eastern Ltd. New Delhi.
2. Helmut Kohnke, 1979. Soil Physics. Tata McGraw-Hill Publishing Company Ltd. New Delhi.
3. Biswas, T.D. and Mukherjee, S.K. 1997. Text book of soil science. Tata McGraw-Hill Publishing Company Ltd. New Delhi.
4. Chinnamuthu, C.R., B.Chandrasekaran and C.Ramasamy, 2007. Nanotechnology Applications in Agriculture. TNAU Offset & Printing Press, Directorate of Open and Distance Learning, TNAU, Coimbatore.

II SEMESTER
15AEXU0202 –AGRICULTURAL EXTENSION AS APPLIED TO
RURAL DEVELOPMENT (2+1)

Objective :

- To impart knowledge on community and rural development programmes
- To give knowledge on various Agricultural Development Programmes implemented by Dept. of Agriculture for welfare of the farmers

Unit I: Introduction: Socio-economic conditions of rural population - Causes for poverty conditions in villages and differences between rural and urban societies. Rural Development-meaning definition, Concepts, Characteristics and objectives. Its importance in the development of Indian economy. Rural Development Attempts in the Pre-independent Era: Shantiniketan, Gurgaon Experiment, Etawah Pilot Project, Marthandam Project, Gandhian Constructive Programme, Firka Development Scheme of Madras State, Nilokheri Experiment.

Unit II: CDP and Panchayati Raj: Community Development Programme- meaning, principles, definition, objectives and administration. Community Development and National Extension Service. Panchayati Raj- evolution, earlier efforts and setup in 1957-59. 73rd Constitutional Amendment- New Panchayati Raj- Tamil Nadu Panchayati Raj Act- Constitution, Structure and Functions of Panchayati bodies at Three tiers in Tamil Nadu.

Unit III: Agricultural Development Programmes: Origin, Objectives and Functions of IADP, IAAP, HYVP, Multiple Cropping programme, DPAP, Dryland Agricultural Development Programme, IWDP, DDP and NWDPA. TOT Programmes: Origin, objectives and functions of Training and Visit System, TNADP and TANWA. TOT by ICAR- KVK, FLDs, OFTs, ICDP, ATIC, ATMA, Kisan Credit Scheme, National Agricultural Insurance Scheme, NHM, NFSM, IAMWARM, Precision Farming Project.

Unit IV Poverty Alleviation Programmes: Origin, Objectives and Functions of IRDP, TYRSEM, SGSY, JGSY, SGRY, Indira Awas Yojana, Employment Assurance Scheme and NREGS, Rastriya Sam Vikas Yojana, and Prime minister Gram Rojgar Yojana. National Social Assistance Programme- NOAPS, NMBS, NFBS, Annaporna Scheme, DRDA, NABARD and CAPART.

Unit V Rural Social Organizations: Self Help Groups- background, meaning, functioning and their role in rural development. TNCWD and its role in SHGs. Role of NGOs in the development of SHGs- provision of inputs- role in linking SHGs to formal credit system. NGOs – characteristics, methods of work and sustainability. NYKs and IDARA. Concepts and role of Information Village and Seed Village.

Practical:

1. Study of tools of data collection.
2. Preparation of schedules to collect village basic data and socio-economic status.
3. Visit to nearby villages to collect village basic data.
4. Micro level survey to assess the Socio-economic status of people in nearby villages.
5. PRA techniques in a village to identify Agricultural problems
6. Study of attitude of villagers towards Agricultural Development programmes

7. Visit to a nearby Village Panchayat office and attending Gram Sabha Meeting.
8. Visit to Panchayat Union to learn its administrative setup, functions and programmes.
9. Visit and study of organizational structure, functions and programmes of DRDA.
10. Visit to a nearby KVK to learn its activities and programmes.
11. Interaction with SHG' members about their activities and experience.
12. Visit to an NGO and learning its activities and role in rural development
13. Visit to JDA office - Dindigul

References:

1. Annamalai, R. (1993). Extension Education and Programme Planning. Palaniappa Printers, Tirunelveli.
2. Dahama, O.P and O.P.Bhatnagar. (1998). Education and Communication for Development, Oxford & IBH Publishing Co., Ltd., New Delhi.
3. Mamoria, C.B. (1995). Agricultural Problems of India.
4. Ray, G.L. (1999). Extension Communication and Management. Naya Prakash, Kolkata.
5. Adivi Reddy. A., (2001). Extension Education, Sri Lakshmi Press, Bapla.
6. Tripathi, N.K. (2000). Rural Sociology and Psychology in Extension Education.
7. Sundaramari, M. (2006). Agriculture and Dairying- A Rural Development Perspective, NCBH, Chennai.
8. Supe, S.V. (1983). An introduction to Extension Education. Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.
9. Sanders, H.C. (1996). Cooperative Extension Service, Printice Hall Inc., New Jersey, USA.

Outcome:

The wards can understand the concepts of Rural Development and how far it can be utilized for transfer of Agricultural technology.

II SEMESTER
15AGLU0201 - EFFECTIVE COMMUNICATION SKILLS (2 +0)

Unit I

What is communication? Verbal and Non-verbal communication- The communication process- Barriers to effective communication

Unit II

Grammar: Voice, Reported speech, Conditional clauses, Transformation of sentences.

Unit III

Vocabulary enrichment: Homonym, homophone and homographs- Synonyms and antonyms- Idioms and phrases (25 commonly used idioms and phrases)- Common errors/ Indianisms (50 errors)

Unit IV

Business communication- kinds of Business letters- Circulars and their uses in different contexts- Drafting Agenda and preparing minutes of meetings- Drafting Reports and Projects.

Unit V

Presentation skills: Effective reading skills- Extempore speeches- job interviews- Group discussions. (Testing III CFA is oral. The other two tests follow regular pattern. There is no oral component in ESE).

II SEMESTER
15APEU0201 - PHYSICAL EDUCATION (0+1)

Unit I

Concept and meaning of Physical Education – Definition of Physical Education – Aims and Objectives of Physical Education – Scope of Physical Education

Unit II

Origin of games (Basket ball, Ball-Badminton, Cricket, Football, Hockey, Kabbadi, Kho-Kho, Tennikoit, Volleyball) – Basic skills of major Games (Basket ball, Volleyball, Kabbadi, Football) and Track and Field Events. (Each student must specialize in any one of the major game and two track and field events) – Intramural and Extramural Tournaments – Recreational activities.

Unit III

Field marking of major games (Basketball, Volleyball, Football, Hockey, Kabbadi, Kho-Kho, Tennikoit, Ball-Badminton)- Rules and regulations of the major game opted for specialization (Volleyball, Basketball, Kabbadi, Football)

Unit IV

Common athletic injuries and their treatment – Personal Hygiene – Safety education with special reference to play fields

Unit V

Modern coaching methods – circuit training, Interval training, weight training, Fartlek Training, Aerobic Training and Anaerobic Training- Counseling against doping, drug addition, smoking, alcoholism – Nutrition and sports diet.

Preparation of Physical Education record / album in the area of specialization of one of the major game and two track and field events is a must for each student.

Reference Books:

1. Track and Field by C.Thirunarayanan and S. Harihara Sharma
2. Track and Field by Mariyyah
3. Essentials of Exercise Physiology by Larry G.Shaver
4. Organization of Physical Education by J.P. Thomas
5. Methods in Physical Education by S. Harihara Sharma
6. Principles of Physical Education by R.C. Sathiyanesan
7. The Complete Book of First Aid by John Handerson
8. The Official Rules book of Basketball, Football, Hockey, Volley ball, Kabbadi Federations of India

II SEMESTER
15NSSU0201 - NSS / Shanthi Sena (0+1)

Unit I

NSS – History, philosophy, principles and objectives

Unit II

Working with people – Methods and Techniques

Unit III

NSS – Regular Programme: Objectives, activities – role and responsibilities of volunteers

Unit IV

NSS Special Camping Programme: Objectives, activities – role and responsibilities of volunteers

Unit V

Evaluation of the NSS activities – Tools and Techniques

References:

1. National Service Scheme Manual, 1997. Department of Youth Affairs and Sports, Ministry of Human Resource Development, Government of India.
2. Supe, S.V. 1995, Extension Education, Sterling Publications, Madras
3. Advi Reddy, 1996, Extension Education Babatal Publications, Hyderabad
4. Narayanasamy N, M.P.Boraian and R. Ramesh. 1997. Participatory Rural Appraisal, GRU, Gandhigram.

III SEMESTER

15AGRU0303- PRINCIPLES OF WEED MANAGEMENT AND DRY FARMING (2+1)

Unit I:

Weeds classification and characteristics - Critical periods of crop-weed competition - Definition - Principles and Methods of weed management - Herbicide classification, formulations, Mode of action, selectivity, Application techniques - Herbicide mixtures and rotation – safeners, adjuvants and antidotes.

Unit II:

Persistence and Residual effect of herbicides - Management of residues - Biological control – Bioherbicides - Allelopathy - Definition - Application for weed management – Integrated weed management – Weed management for cropping system.

Unit III:

Dry farming and Rainfed farming - Definition - Aridity - Drought – Definition - Impact of drought on crop production -Dry farming regions - Climatic characteristics - rainfall - intensity, distribution and reliability, aberrations - rainfall use efficiency - Choice of crops and cropping system - Intercropping (biological water harvesting) - Sequential cropping - Crop substitution and their importance

Unit IV:

Soil moisture constraints and their management – In-situ soil moisture conservation principles and practices – Tillage - Control of water and wind erosion - Mechanical, Agronomic and Vegetative methods - Recycling and reducing loss of soil moisture - Mulching – Anti-evaporants and Anti-transpirants

Unit V:

Establishment of optimum population -Seed hardening – Pre-monsoon sowing - Time, method and depth of sowing - Density and geometry – Alternate land use system - Watershed development - Micro and Macro watershed - Scope - Components of watershed technology – Dryland integrated farming system and its importance.

Practical schedule:

1. Identification, collection and observation on general characters of weeds of arable lands
2. Identification and acquiring skill on the use of tools and implements used for mechanical method of weed control and working out their efficiencies.
3. Study of herbicides and their formulations and working out herbicide requirement for different crops.
4. Calibration of sprayer and preparation of spray fluid, selection of nozzles and practicing the methods of application of herbicides for different crops - granular, spray and herbigation.
5. Working out weed control efficiency and evaluation of weed control methods.
6. Practicing methods for control of perennial, problematic and aquatic weeds.
7. Mapping of arid and semi arid regions of world and India.
8. Rainfall analysis and crop planning.
9. Estimation of length of growing periods using weekly rainfall data.
10. Acquiring skill in land shaping methods for in situ moisture conservation.
11. Preparation of cropping scheme for different dry farming situations.
12. Working out Cropping Intensity and Crop Calendar
13. Watershed Management and Dry land IFS

Reference books

1. Aldrich, R.J. and R.J. Kremer. 1997. Principles in weed management. Iowa State University Press, Iowa.
2. Arnon, I. 1972. Crop Production in Dry Regions. Vol.I and II. Leonard Hill, London.
3. Gupta, U.S. 1995. Production and Improvement of Crops for Dry lands. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Gupta, O.P. 1998. Weed Management - Principles and Practices. Agro Botanical Publishers, Bikaner.
5. Singh, R.P. 1996. Sustainable Development of Dryland Agriculture in India. Scientific Publishers, Jodhpur.
6. Rao, V.S.1994. Principles of Weed Science. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
7. Sankaran, S., R.Jeyakumar and N. Kempu Chetty. 1993. Herbicide Residues. Gandhi Book House, Coimbatore
8. Govindan, K. 2010. Agricultural Meteorology and Dry Farming. Kalyani Publishers, Ludhiana.

III SEMESTER
15AGSU0303 - NUTRIENT MANAGEMENT AND FERTILIZER TECHNOLOGY (2+1)

Objective:

- To offer the elements of nutrient management
- To give a detailed idea about the preparation of commercial fertilizers available in the market and their reactions in soils

Unit I: Soil fertility

Soil fertility and soil productivity – essential nutrients – Criteria for Essentiality – functions, deficiency and toxicity symptoms of major, secondary and micro nutrients. Concepts of soil fertility evaluation. Terminologies used in plant nutrition studies.

Unit II: Nutrient transformation

Essential nutrients – sources – forms – transformation – mobility - uptake – fixation – losses of nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.

Unit III : Chemical fertilizers

Classification of NPK fertilizers – sources, properties, manufacture of nitrogenous, phosphatic and potassic fertilizers- preparation of mixed and complex fertilizers – secondary fertilizers micronutrient mixtures –slow release N fertilizers, coated fertilizers, nitrification inhibitors –sources, properties and reaction in soils

Unit IV: Organic manures and composting

Organic manures – Classification of BOM, COM– Compost – Enriched FYM, composting of organic wastes viz, coir pith, sugarcane trash, leaf litters and farm wastes – Bangalore and Coimbatore method

Unit V: Nutrient use efficiency

Fertilizer use efficiency – time and method of fertilizer application- methods to improve use efficiency of N, P and K – nutrient management strategies – INM, IPNS, RTNM, SSNM. Fertilizer recommendation based on soil test –STCR - Soil quality and soil health - soil quality, indices of soil quality – effect of long term fertilization in soil and environment

Practical:

1. Estimation of available N in soils.
2. Estimation of available P in soils.
3. Estimation of K in soils
4. Estimation of micronutrients in soil
5. Estimation of $\text{NH}_4^+ \text{N}$ and $\text{NO}_3^- \text{N}$ in N fertilizers.
6. Estimation of N in Urea.
7. Estimation of water soluble and citric acid soluble P.
8. Estimation of K in potassium fertilizers.
9. Estimation of N in organic manures and oil cakes.
10. Estimation of P in organic manures and oil cakes.
11. Estimation of K in organic manures and oil cakes
12. Fertilizer sampling technique
13. Visit to FTL and STL

Reference Books

1. Das, P.C. 1993. Manures and Fertilizers. Kalyani Publishers, Ludhiana
2. Hand Book of Fertilizer Technology. 2001. FAI, New Delhi
3. Hand Book of Fertilizer Usage. FAI, New Delhi

4. Kanwar, J.S. 1976. Soil Fertility – Theory and Practice. ICAR, New Delhi
5. Krishna, K.R.(Ed.). 2002. Soil Fertility and Crop Production. Oxford and IBH Publishing Co., New Delhi
6. Sehgal, J. 1996. Pedology concepts and applications. Kalyani Publishers, New Delhi
7. Singh, S.S.1995. Soil Fertility and Nutrient Management. Kalyani Publishers, Ludhiana.
8. Soil Survey Staff. 1996. Soil Survey Manual. Oxford and IBH Publishing Co., New Delhi
9. Tisdale, S.L., Nelson, W.L. and Beaton, J.D. 1990. Soil Fertility and Fertilizers. MacMillan Publishing Company, New York.

Learning out come		
Unit	Vague out come	Most precious out come
I	Studying about soil fertility	Understanding the principles of soil fertility and soil productivity – Essential nutrients – Criteria for essentiality – functions, deficiency and toxicity symptoms of major, secondary and micro nutrients. Concepts of soil fertility evaluation
II	Studying the nutrient transformation	Understanding about the essential nutrients, sources, Forms, transformation, mobility, nutrient uptake, fixation losses of nutrients
III	Studying the types of Chemical Fertilizers	Understanding the Classification of NPK fertilizers – Sources, properties, manufacture of nitrogenous, phosphatic and Potassic fertilizers
IV	Studying the Organic manures and composting techniques	Understanding the classification of organic manures, their role and decomposition
V	Studying the concepts of nutrient use efficiency	Understanding the concepts of nutrient management and effect of long term fertilization in soils

III SEMESTER
15AGBU0303- PRINCIPLES AND METHODS OF PLANT BREEDING (2+1)

Objective

This course is aimed at understand to impart theoretical knowledge and practical skills about plant breeding objectives, modes of reproduction and genetic consequences, breeding methods for crop improvement.

Unit I

History of plant breeding-reproductive and pollination systems in plants- Self incompatibility- apomixis and their classification- centre of origin- domestication of crop plants- germplasm , plant genetic resources- conservation and utilization – biodiversity.

Unit II

Introduction and acclimatization. Breeding of self pollinated crops, genetic make up of self pollinated crops- pure line concept and selection mass selection- hybridization - selection- pedigree method, bulk method, mass pedigree method, SSD, back cross method and multilines.

Unit III

Breeding of cross pollinated crops: genetic makeup of cross pollinated crops- Hardy Weinberg law- heterosis and inbreeding- exploitation of heterosis – synthetics and composites- population improvement-mass selection –progeny selection- recurrent selection.

Unit IV

Breeding of asexually propagated crop: genetic makeup - hybridization and clonal selection- exploitation of heterosis- polycross. Mutation breeding: types –mutagens and mutagenesis- handling of mutagenized population. Application of mutation.

Unit V

Polyploidbreeding: Auto and allopolyploids- aneuploids- their practical application. Resistant breeding: biotic and abiotic stresses.

References

1. Allard, R. 1989. Principles of Plant Breeding. John Wiley & Sons, New Delhi.
2. Chopra, V.L. 1994. Plant Breeding – Theory and Practice. Oxford & IBH Publication CO., Pvt. Ltd.,
3. Daniel Sundararaj, G. Thulasidas and M. Stephan Dorairaj, 1997. Introduction to Cytogenetics and Plant Breeding. Popular Book Depot, Chennai – 15.
4. Mandal, A.K., P.K. Ganguli and S. P. Vanerjee. 1991. Advances in Plant Breeding –Vol: I & II. CBS Publishers and Distributors, New Delhi.
5. Sharma, J.R. 1994. Principles and Practices of Plant Breeding. Tata Mcgraw –Hill Publishing CO., New Delhi.
6. Singh, B.D. 1986. Plant Breeding – Principles and Methods. Kalyani Publishers, New Delhi.
7. Thirugnanakumar, S. K. Manivannan and S. Manickavasagam. 2004. Molecular Plant Breeding, SKS Publications, Chidambaram.
8. Thirugnanakumar, S. K. Manivannan and S. Manickavasagam. 2004. Organelle Genomes in Plant Breeding, SKS Publications, Chidambaram.
9. Bhojwani, S.S. and Razdan, M.K. 2006, Plant Tissue Culture Studies – Theory and Practice Elsevier Publication.

Practical:

1. Pollination and reproduction in plants – alternation of generation and life cycle
2. Description and drawing different pollination systems – mechanisms enforcing self and cross pollination in crops
3. Pollen morphology-exine structure of different crops
4. Fertility and sterility in A,B,R and TGMS lines and their maintenance
5. Breeder kits and its components – uses
6. Selfing and crossing techniques in different crops
7. Emasculation and kinds of emasculation and pollination technique
8. Chemical mutagenesis- procedure for chemical mutagenesis
9. Calculation of three types of heterosis
10. Hybrid seed production techniques and calculation of PCV, GCV, Heritability and Genetic advance
11. Studies on segregating generations and maintenance of records
12. Observation and germplasm collection – evaluation- records maintained in research station
13. Studies of different wild species in crop plants and wide hybridization

Outcome:

The students will be thoroughly exposed about the principles and applications of breeding of different field crops.

III SEMESTER
15AENU0302- PEST MANAGEMENT IN FIELD CROPS (2+1)

Unit I: Pest management in Cereals and Millets

A study of bionomics, damage, host range and integrated management of insect pests of cereals and millets – rice wheat, sorghum, ragi, cumbu and maize

Unit II: Pest management in Oilseeds

A study of bionomics, damage, host range and integrated management of insect pests of oilseeds – coconut, groundnut, gingelly, castor, sunflower

Unit III: Pest management in Fibre crops and Sugars

A study of bionomics, damage, host range and integrated management of insect pests of fibre crops and sugars

Unit IV: Pest management in Forage crops

A study of bionomics, damage, host range and integrated management of insect pests of forage crops – subabul, agathi and sunhemp.

Unit V: Locusts and Mites - management

Locusts – outbreaks – swarms – forewarning – methods of management. Mites and their management. Case studies of IPM in cotton / rice/sugarcane. Rodents and birds- methods of management. Management of pests of stored agro products and processed foods.

Practical

Field identification of symptoms of damage, collection and preservation of important pests of the following field crops.

1. Pests of Rice (sucking pests).
2. Pests of Rice (borers and defoliators).
3. Pests of Wheat
4. Pests of Sorghum and Maize
5. Pests of Ragi and Cumbu
6. Pests of Pulses (redgram, greengram, blackgram, bengalgram and cowpea).
7. Pests of Oilseeds (coconut and groundnut).
8. Pests of Oilseeds (gingelly, soybean, sunflower and castor).
9. Pests of Cotton (sucking pests).
10. Pests of Cotton (bollworms, borers and defoliators).
11. Pests of Sugarcane.
12. IPM strategies
13. Pest damages of stored agro products

References

1. Atwal, A.S. 1991. Agricultural Pests of India and South – East Asia. Kalyani Publishers, New Delhi, 529 p.
2. Ayyar, T.V.R. 1963. Hand Book of Economic Entomology for South India – Govt. Press, Madras, 516p.
3. David, B.V. 2001. Elements of Economic Entomology – Popular Book Depot, Madras, 536p.
4. Dhaliwal, G.S., Randhawa, N.S., Ramesh Arora and Dhawan, A.K. 1998 (Eds.). Ecological Agriculture and Sustainable Development Vol.11. Indian Ecological Society, Punjab Agricultural University, Ludhiana, 716 p.
5. Fletcher, T. B. 1914. Some South Indian Insects and Other Animals of Economic Importance. Govt. Press. Madras. India, 565 p.

III SEMESTER
15APPU0301- FUNDAMENTALS OF PLANT PATHOLOGY (2+1)

Objective :

To facilitate the students to learn and understand the plant disease causing agents, their properties and management practices of crop plants.

Theory

Unit I:

Plant pathology-definition, history-pathogens: fungi, bacteria, virus, viroid, phytoplasma, rickettsia-like organism, spiroplasma – like organism and phanerogamic parasites – Koch's postulates. Fungi – General characters of fungi – Types of parasitism.

Unit II:

Major symptoms of fungal diseases – Taxonomy of fungal pathogens Myxomycota, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina

Unit III:

Bacteria – Characters and classification, symptoms – Virus – single stranded and double stranded DNA, RNA viruses- symptoms, nature and properties, transmission

Unit IV:

Virus-Vector relationship, Symptoms and transmission of viroid, phytoplasma, spiroplasma like organism, rickettsia like organism – difference between deficiency, virus and Phytoplasma diseases.

Unit V:

Methods and management of plant diseases – Fungicides – Characteristics of ideal fungicide – Classification – groups of fungicides – antibiotics, formulations – compatibility, phytotoxicity – precautions and safety measures in handling. Seed treatment – Biocontrol agents mycorrhizae – plant products.

Practical

1. Handling and care of microscope – preparation of temporary mount
2. General characters of fungi – Types of mycelium and resting bodies, types of asexual and sexual spores
3. Study of symptoms and host parasite relationships systematic position of plant pathogens
Club root, Damping off, Rhizopus rot
4. Root rot, stem rot, foot rot, collar rot and wilt
5. White rust and downy mildew
6. Powdery mildews, rusts
7. Smuts and sugary diseases, leaf spots and blights
8. Anthracnose, scab, sooty mould and gummosis
9. Symptoms of bacterial diseases – Leaf spot, blight, canker, scab, crown gall, wilt and soft rot
10. Symptoms and vectors of viral diseases – Chlorosis, mosaic, stripe, vein clearing, vein banding, leaf crinkle and leaf curl
11. Symptoms of algal diseases – *Cephaleuros*, Phanerogamic parasites and deficiency diseases
12. Preparation of Bordeaux mixture and Bordeaux paste and fungicidal spray solution
13. Herbarium collection (25 Numbers)

Reference

1. Agrios, G.N.(1997) Plant Pathology – 4th Edition. Academic Press, New York.
2. Alexopoulos, C.J. Mims, C.W. and Blackwell, M. (1996), 1989. Introductory Mycology, 4th Edn., Wiley Eastern Ltd., New Delhi.
3. Mehrotra, R.S.1990. Plant Pathology, Wiley Eastern Ltd., New Delhi.
4. Dasgupta, M.K. 1988. Principles of Plant Pathology. Allied Publishers Pvt. Ltd., Bangalore.
5. Dube, H.C. 1978. A Text Book of Fungi, Bacteria and Viruses. Vikas Publishing House Pvt. Ltd., New Delhi.
6. Govindasamy, C.V. and M.N. Alagianagalingam. 1981. Plant Pathology. Popular Book Depot, Madras.
7. Prakasam.V., V.Valluvaparidasan, T. Raguchander and K. Prabakar. 1997. Field Crop Diseases. AE Publication, Coimbatore

Learning out come		
Unit	Vague out come	Most precious out come
I.	Studying the History and I plant disease causing agents	1.Understanding the History of plant Plant pathology 2.Understanding the important disease causing agents
II.	Studying the Plant Disease Taxonomy of fungal pathoge	1.Understanding the basic symptoms of plant diseases 2.Understanding the Taxonomy and Managemen pathogens
III.	Studying the characters pathogenic bacteria and its T	1.Understanding the basic symptoms of Bacterial plant 2.Understanding the Taxonomy and Managment of pathogens
IV.	Studying the characters pathogenic viruses and its pr	1.Understanding the basic symptoms of plant virus dise 2.Understanding the important virus disease managemen
V.	Studying the Plant Diseases methods and handling of pl chemicals.	1.Understanding the general plant disease management 2.Understanding the Handling of palnt protection chem

III SEMESTER

15AECU0301 – PRINCIPLES OF AGRICULTURAL ECONOMICS (2+0)

Unit I:

Economics – definition and nature & scope of economics – divisions of economics - economic systems – definitions and characteristics - theory of consumer behaviour - utility- definition and measurement – cardinal and ordinal approaches – Law of diminishing marginal utility

Unit II:

Graphical derivation of demand curve - ordinal approach - indifference curve – characteristics – budget line – equilibrium of consumer. - Demand –individual demand – market demand – demand schedule – demand curve – law of demand and factors affecting it. Elasticity of demand – price, income and cross elasticities – estimation – point and arc elasticity - Giffen good – normal and inferior goods – substitutes and complementary goods - Engel's law of family expenditure and significance.

Unit III:

Consumer's surplus –estimation and applications. - Law of diminishing marginal return – its application to agriculture - cost concepts – optimum level of production. Graphical derivation of supply from cost curve - supply schedule – supply curve – law of supply – elasticity of supply. Theory of firm – factors of production – land & characteristics; labour – quantity and quality of labour - division of labour – efficiency of labour - Malthusian theory. Capital - characteristics - capital formation;

Unit IV:

Organization of business firms – types and characteristics - concept of shares & debenture. Market and its structure - perfectly competitive market and derivation of equilibrium price – definition and characteristics of imperfectly competitive markets. Factor pricing; rent - Ricardian rent-economic rent – quasi rent; wage – marginal productivity theory of wage; interest – interest liquidity preference theory; profit.

Unit V:

Risk- bearing theory of profit. – Macro economics – concepts of gross national product (GNP) - gross domestic product (GDP) - net national product (NNP) - percapita income. - Money – definition & functions of money; inflation –consequences & control. - Public finance - public revenue - public expenditure; taxation - principles of taxation.

References

1. Ahuja, H.L. 2001. A Text Book of Modern Economics, Sultan Chand and sons Co.Ltd., New Delhi.
2. Dewett, K.K. 2001. Modern Economic Theory, Syamlal Charitable Trust, New Delhi.
3. Diwvedi, D.N. 2000. Principles of Economics, Vikas Pub. House Pvt. Ltd., New Delhi.
4. Samuelson, P.A. 1998. Economics, Mc Graw Hill Kogakuisha Ltd., New Delhi.
5. Sankaran, S. 2000. Principles of Economics, Progressive Corporation Pvt. Ltd., Madras.
6. Sen, K.K. 2000. An Introduction to Economics, Sultan Chand and Sons Co. Ltd., New Delhi.
7. Seth, M.L. 2000. Principles of Economics, Lakshmi Narain Agarwal Co., Agra.

III SEMESTER
15AFSU0301- PRINCIPLES OF FOOD SCIENCE (1+1)

Unit I

Objectives of studying food science-food composition- nutritive value of various foods- physicochemical properties; pH, enzymes, dispersion, methods of cooking of cereals, pulse, fruits and vegetables, fats/oil and sugar- minimizing cooking losses. Sensory evaluation of foods- acceptability tests.

Unit II

Cereals, pulses, nuts and oilseeds-changes in cooking-fermentation-baking-malting-non-enzymatic browning- anti-nutritional properties-rancidity-prevention. Sugars- types, factors affecting crystallization-stages in cookery- crystalline candies, fruits and vegetables-pectic substance- changes in cooking-enzymatic browning-prevention.

Unit III

Food additives-classification-role of thickeners- sweeteners, stabiliser, emulsifiers, leaveners, colours, preservatives and flavoring agents, flavour enhancers (MSG), food fortification- enrichment-need-application in foods.

Unit IV

Importance of nutrition-relation of nutrition to health, food groups-classification, carbohydrates-classification-functions-sources-digestion requirements – proteins - classification-properties-functions-digestion-sources and requirements- lipids - classification-properties-functions

Unit V

Vitamins-fat soluble vitamins-A, D, E, K-functions-effects of deficiency-requirements-sources-water soluble vitamins-B1, B2, Niacin, B6, B12, Folic acid, Biotin, Para amino benzoic acid, Pantothenic acid and vitamin C - functions-effects of deficiency-requirement-sources.

Practical

1. Identification of starch granules.
2. Gelatinization of starch granules.
3. Cooking quality of raw and parboiled rice by different methods.
4. Baking of bun, cake and biscuits.
5. Stages of sugar cookery and crystallization of sugar.
6. Factors affecting pulse cookery.
7. Frying of foods in oil and free fatty acid estimation.
8. Cooking of vegetables by different methods.
9. Use of milk in cookery.
10. Changes in meat during cooking by different methods.
11. Egg cookery and its quality determination.
12. Use of food foams and emulsions in cookery.
13. Detection of food colours by paper chromatography.

Reference

1. Brian, A Fox. Allan, G.Cameron. Food Science Nutrition and Health. 3rd Edition
2. Meyer, 1987. Food Chemistry. CB Publishers and Distributors, New Delhi.
3. Swaminathan, M. 1990. Food Science. Chemistry and Experimental Foods. The Bangalore Printing and Publishing CO., Ltd.
4. Sumathi. R. Mudambi and Shalini M. Rao. 1990. Food science Willey Easter Ltd., New Delhi.

III SEMESTER
15AGEU0301- IRRIGATION AND DRAINAGE (2+1)

Objectives:

- To study different sources of water availability for irrigation and identify suitable irrigation practices based on soil and crop
- To study suitable drainage system adopted for different field conditions and crops

Unit I : Irrigation – necessity, merits and demerits of irrigation. Sources of irrigation;; Surface resource - natural streams and rivers, surface resources, underground resources – ground water – aquifer - unconfined and confined; well irrigation – classification – open well, tube well – merits and demerits of the tube well;

Unit II : Soil – plant - water relationship; soil – textural classification of soil, soil structure, soil water, movement of water in the soil, soil moisture tension, available water, soil moisture determination – gravimetric method, tensiometer method, electrical resistance method, feel and appearance method; soil moisture and plant growth – amount of water required for irrigation, frequency of irrigation and irrigation efficiencies.

Unit III: Methods of irrigation: modes or methods of applying water to crops, uncontrolled or wild flooding, free flooding, border irrigation, check basin irrigation, furrow irrigation, sprinkler irrigation, drip irrigation and surge irrigation – suitability of crop, soil; design factors; merits and demerits of each irrigation system.

Unit IV : Water requirement of crops: consumptive use of water – factors affecting consumptive use of water – direct measurement of consumptive use – methods – tank and lysimeter, field experimental plots, soil moisture studies, inflow and out flow method; indirect methods - evaporation pan method, Blaney – Criddle method;

Unit V: Drainage: definition, benefits of drainage, methods of drainage – surface, subsurface and special methods of drainage; surface drainage – drainage systems for flat lands – random, parallel field, parallel open ditch and bedding system; drainage system for sloping areas – drainage co efficient; sub surface drainage systems. .

Practical

1. Estimation of soil moisture by gravimetric method and tensiometer
2. Estimation of soil moisture by resistance blocks.
3. Measurement of water flow in field channels
4. Measurement of water flow in weirs
5. Acquiring knowledge in drip irrigation methods
6. Acquiring knowledge in sprinkler irrigation methods
7. Study of surge irrigation, furrow irrigation, border irrigation
8. Study of the water requirement of different crops
9. Calculation of duty of water
10. Studying the importance of drainage in agriculture
11. Determination of the size of tile drainage, drainage coefficient.
12. Determination of the size of open channel for surface drainage
13. Visit to Dept. of Soil & Water Conservation, AEC & RI, TNAU, Coimbatore

References

1. Sharma, S.K. 1984. Principles and Practices of Irrigation Engg., S.Chand and company ltd., New Delhi.
2. Michael, A.M. and T.P.Ojha. 1987. Principles of Agricultural Engineering. Vol.2. Jain Brothers, New Delhi.
3. Michael, A.M. 1983. Irrigation Theory & Practice, Vikas Publishing House, New Delhi.
4. Sivanappan, R.K. and Karaigowder. 1997. Irrigation and Drainage, Popular Book Depot, Chennai.
5. Basak, N.N. 1999. Irrigation Engineering. Tata McGraw Hill, New Delhi.
- 6.

Outcome:

Acquiring knowledge by the students by selecting suitable irrigation methods and drainage systems based on crop, soil and availability of water resources.

III SEMESTER
15AEXU0303 - RURAL AGRICULTURAL WORK EXPERIENCE (RAWE I) – (0+2)
Agriculture Department

Objective:

1. To learn the real farming situation with the help of Agriculture Department and KVK
2. To assess the merits and demerits in farming systems

The students should get exposed to continuous field experience through RAWE programme. In the RAWE programme, students will stay with farmers in a village and study the agricultural practices carried out by the farmer. A separate record note book should be maintained by the students to record soil type, crop season, crop pattern, rain fall, animal power, tractor power, and availability of seed, fertilizers and pesticide in the sample field selected by the students. Further the students have to contact individual farmers to assess the differential farming system practiced by marginal, small medium, big farmers and farm women and they have to prepare of individual farm plan. The Chief Training Organizer of KVK will coordinate this programme with the help of Training Associates and Training Assistants from KVK and staff from Agriculture Faculty. The evaluation will be made purely on internal basis by the course teacher.

Outcome:

This programme will give the great opportunity to the students to learn from the farmers about the crop and animal husbandry practically by doing themselves in the field.

IV SEMESTER
15AGRU0404- AGRONOMY OF FIELD CROPS – I (1+1)

Unit I: Agronomy of Cereals

Rice, wheat, maize, barley, oats, rye and triticale

Unit II: Agronomy of Major and Minor millets

a) Major millets: - sorghum, pearl millet, and finger millet

b) Minor millets:- barnyard millet, foxtail millet, little millet, kodo millet and common millet.

Unit III: Agronomy of Pulses

Redgram, bengal gram, blackgram, greengram, cowpea, soybean, horse gram and lentil.

Unit IV: Importance / Agronomy of Green manures and Green leaf manures

Sesbania spp, sunhemp, kolinji, pillipesra, gliricidia, pungam, neem, calotropis and thespisia

Unit V: Agronomy of Forages, Grasses and Legumes

Guinea grass, cumbu napier, water grass, cenchrus, dinanath grass, fodder sorghum, pearl millet, maize, lucerne, berseem, desmanthus, stylosanthus, cowpea and fodder trees.

Practical

1. Maintenance of specimen plot involving cereals, millets, pulses, green manures
2. Maintenance of specimen plot involving forage crops.
3. Practicing nursery preparation for various rice eco-systems.
4. Identification of crop plants and seeds
5. Acquiring skill in nursery preparation for sorghum, pearl millet and finger millet.
6. Practicing main field preparation and manuring of important cereals under pure and intercropping systems.
7. Practicing main field preparation and sowing of plant pulses under pure and intercropping system.
8. Assessing and estimation of plant population per ha. For important crops.
9. Acquiring skill in foliar nutrition to pulses.
10. Various seed treatment practices pertaining to cereals, pulses, green manures
11. Various seed treatment practices pertaining to forage crops.
12. Estimation of yield in cereals, pulses and green manures.
13. Acquiring skill in preserving fodder (Hay and silage).

Reference

1. Ahlawat, I.P.S., Om Prakash and G.S.Saini.1998. Scientific Crop Production in India. Rama Publishing House, Meerut.
2. Chatterjee, B.N. and K.K.Bhattacharyya.1986. Principles and Practices of Grain Legume Production. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Chatterjee, B.N. and P.K.Das.1989. Forage Crop Production – Principles and Practices. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Chidda Singh.1997. Modern Techniques of Raising Field Crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
5. Singh, R.V.1982. Fodder Trees of India. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Singh, S.S.1997. Crop Management Under Irrigated and Rainfed Conditions. Kalyani Publishers, New Delhi.
7. Srivastava, H.C., S.Bhaskaran, K.K.G.Menon, S.Ramanujam and M.V.Rao.1984. Pulse production – Constraints and Opportunities. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Thakur, C.1980. Scientific Crop Production. Vol.I Metropolitan Book Co. Pvt. Ltd., New Delhi.
9. Thakur, C.1981. Scientific Crop Production. Vol.II Metropolitan Book Co. Pvt. Ltd., New Delhi.
10. Gururajan.B., R.Balasubramanian and V.Swaminathan. 2008. Recent Strategies on Crop Production, Kalyani Publishers, New Delhi.
11. TNAU Agriportal website

IV SEMESTER
15AGRU0405 – SHORT TOUR – I (SOUTH TAMILNADU) (0+1)

Students will be taken to tour with in south Tamil Nadu to study soils, crops, cropping pattern and cultivation practices for major crops in the various Agroclimatic zones of the area. The duration of the tour will be 7 days. During the tour, the students will visit important Research station / Institutes in southern zone of Tamilnadu. Students will maintain a Tour diary to record their observations at the places of visit. A Tour record has to be submitted after the tour. The evaluation procedure will be as follows:

Evaluation procedure

Written test	50 marks
Attendance and behaviour	20 marks
Record and Pocket note book	20 marks
Vivo - voce	10 marks
Total	100 marks

IV SEMESTER
15ACPU0401- PRINCIPLES OF CROP PHYSIOLOGY (2+1)

Objectives

To expose the students to the basic concepts and underlying application of Crop Physiology.

Unit I

Introduction - importance of crop physiology in agriculture. Water relations - role and its significance - diffusion - imbibition - osmosis and plasmolysis. Absorption and translocation of water and solutes. Transpiration - steward's theory of stomatal mechanism - guttation.

Unit II

Mineral nutrition - mechanism of nutrient uptake - physiological role - nutritional and physiological disorders and their correction - foliar nutrition. Photosynthesis - light reaction - red drop - Emerson's enhancement effect - dark reaction - different pathways - factors influencing photosynthesis. .

Unit III

Photorespiration. Respiration - mechanism - energy budgeting - respiratory quotient - factors affecting respiration. Flowering - photoperiodism - role of phytochrome - regulation of flowering in crops - vernalization. Growth - factors influencing growth - growth analysis.

Unit IV

Plant growth regulators - classification - physiological role - practical applications. Components of source and sink - yield components - Harvest index.

Unit V

Role of environment in crop physiology - water stress - temperature stress - light and salt stresses - physiological changes - alleviations. Global warming - physiological effects. Abscission and senescence - types - causes - physiological and biochemical changes - regulations.

Practical

1. Measurement of plant water status by different methods.
2. Estimation of stomatal index and stomatal frequency.
3. Measurement of leaf area by different methods.
4. Estimation of chlorophyll stability index and RWC to screen genotypes for drought tolerance.
5. Determination of photosynthetic efficiency in crop plants.
6. Estimation of soluble protein content in crops to assess the photosynthetic rate in crop plants.
7. Estimation of proline accumulation to assess the water stress in crop plants.
8. Rapid tissue tests for:
A) Nitrogen (b) Phosphorus (c) Potassium (d) Calcium (e) Iron
9. Physiological disorders in crops plants.
10. Nutritional disorders in crops plants.
11. Field visit for foliar diagnosis.
12. Growth analysis - determination of LAI, LAD, SLA, SLW, LAR, NAR, RGR, CGR and HI.
13. Seed viability and germination test.

References

1. Arvind Kumar and Purohit, S.S., 1996. Plant Physiology. Agrobotanical Publishers, India.
2. Bidwell, R.G.S.1974. Plant Physiology. Macmillan Publishing Co., Inc. New York. Collier Macmillan Publishers, London.
3. Devlin R.M. and Witham, F.H., 1986. Plant Physiology. CBS Publisher and Distributors, New Delhi.
4. Evans, L.T., 1975. Crop Physiology, Some Case Histories. Cambridge University Press, London.
5. Gupta, US., 1992. Crop Improvement : Physiological Attributes. Oxford and IBH Publishing Co. Pvt.Ltd., New Delhi.
6. Jain, V.K., 1996. Fundamentals of Plant Physiology. S.Chand and Company Limited, New Delhi.
7. Kramer, P.J., 1969. Plant and soil water relationships, a modern synthesis. McGraw Hill Book Company, New York.
8. Leopold, A.C. and Kriedmann, P.E., 1975. Plant Growth and Development. Mc Graw Hill Book Company, New York.
9. Nickell, L.G., 1981. Plant Growth Regulators : Agricultural Uses. Springer - Verlag, New York, Heidelberg, Berlin.
10. Pandey, S.N. and B.K.Sinha, 1972. Plant Physiology. 3rd Edition-Vikas Publishing House Private Limited, New Delhi.
11. Ray Noggle, G. and Fritz, G.J., 1991. Introductory Plant Physiology. Prentice Hall of India Pvt. Ltd., New Delhi.
12. Sprague, H.B., 1964. Hunger Sign in Crops - A Symposium. 3rd edition - Longman, New York.

Outcome:

The students will learn about the basic concepts and application of crop physiology.

IV SEMESTER

15AENU0403 – PEST MANAGEMENT IN HORTICULTURAL CROPS (2+1)

Unit I: Pest management in Fruits

Bionomics, damage, host range and integrated management of insect pests and mites of mango, citrus, cashew, sapota, guava, banana, amla, pomegranate, grapevine, ber, jack, fig, stargooseberry, wood apple, custard apple, jambulana, pineapple, papaya, tamarind, apple, pear, peach and plum.

Unit II: Pest management in Vegetables

Bionomics, damage, host range and integrated management of insect pests and mites of brinjal, tomato, bhendi, curcubits, crucifers (cole crops), moringa, peas, beans, amaranthus.

Unit III: Pest management in Flowers and Spices

Bionomics, damage, host range and integrated management of insect pests and mites of rose, jasmine, chrysanthemum, crotons, pepper, cardamom, turmeric, ginger, chillies, garlic, curryleaf, coriander, clove

Unit IV: Pest management in Plantation, Medicinal and Aromatic crops

Bionomics, damage, host range and integrated management of insect pests and mites of oilpalm, arecanut, rubber, coffee, tea, betelvine, belladonna, senna, periwinkle, opium poppy, geranium, patchouli, vetiver

Unit V: Pest management in Stored Horticultural crops and Polyhouse/ Greenhouse crops

Stored products of spices and plantation crops and their processed products- pest management in stored products. Pest management in polyhouse and greenhouse crops

Practical

Identification and field study of symptoms of damages and life-stages of important insects and mites of following crops

1. Mango, citrus, cashew, sapota, guava, banana, amla, pomegranate
2. Grapevine, ber, jack, fig, stargooseberry, wood apple, custard apple
3. Jambulana, pineapple, papaya, tamarind
4. Apple, pear, peach and plum
5. Brinjal, tomato, bhendi, curcubits, crucifers (cole crops)
6. Moringa, peas, beans, amaranthus
7. Rose, jasmine, chrysanthemum, crotons
8. Pepper, cardamom, turmeric, ginger, chillies
9. Garlic, curryleaf, coriander, clove
10. Oilpalm, arecanut, rubber, coffee, tea
11. Betelvine, belladonna, senna, opium poppy, geranium, patchouli, vetiver
12. Pests of stored horticultural produces
13. Pests of polyhouse and greenhouse crops

Reference books

1. Atwal, A.S. 1991. Agricultural pests of India and South – East Asia. Kalyani publishers, New Delhi, 529 p.
2. Ayyar, T.V.R. 1963. Hand book of economic entomology for South India – Govt. Press, Madras, 516 p.
3. Butani, D.K. 1979. Insects and fruits, Periodicals Expert Book Agency, New Delhi. 415 p.
4. David, B.V. 2001. Elements of Economic Entomology – Popular Book Depot, Madras, 536 p.
5. Dhaliwal, G.S., Randhawa, N.S., Ramesh Arora and Dhawan, A.K. 1998 (eds.). Ecological Agriculture and Sustainable Development Vol.11. Indian Ecological Society, Punjab Agricultural University, Ludhiana, 716 p.
6. Fletcher, T. B. 1914. Some South Indian insects and Other animals of Economic importance. Govt. Press. Madras. India, 565 p.
7. Hill, D.S. 1985. Agricultural insect pests of Tropics and their control – Cambridge University press, London, 746 p.
8. Kumaresan, D., A. Regupathy, and P. Baskaran. 1988. Pests of Spices, Rajalakshmi Publications, Nagercoil, India, 241 p.
9. Nair, M.R.G.K. 1986. Insects and Mites of crops in India – Indian Council of Agricultural Research, New Delhi, 267 p.
10. Pradhan, S. 1983. Agricultural Entomology and Pest control – Indian Council of Agricultural Research, New Delhi, 267 p.
11. Prasad, D. And Gautam, R.D. 1998. Potential Integrated Pest Management Tactics. West will publishing house, New Delhi, 449 p.
12. Pruthi, H.S. 1969. Text book on Agricultural Entomology – Indian Council of Agricultural Research, New Delhi, 979 p.
13. Regupathy, A., Palanisamy, S., Chandramohan, N. and Gunathilagaraj, K. 1987. A Guide on Crop Pests. Sooriya desktop publishers, Coimbatore, 290 p.
14. Srivastava, K. P. And D. K. Butani. 1998. Pest Management in Vegetables (part I & II). Research Periodicals & Book Publishing House, India. 589 p.

IV SEMESTER

15APPU0402 - DISEASE MANAGEMENT IN FIELD CROPS (2+1)

Objective :

To facilitate the students to learn and understand the Field crops plant disease symptoms and management practices.

Theory

Etiology, symptoms, mode of spread, survival, epidemiology and management of diseases of the following crops

Unit I.

Cereals: Rice, Wheat, Sorghum, Pearl millet, Finger millet, Foxtail millet

Unit II.

Pulses: Redgram, Blackgram, Greengram, Chickpea, Soybean, Cowpea, Lablab

Unit III.

Oilseeds: Groundnut, Sesame, Castor, Sunflower, Coconut

Unit IV.

Cash crops: Cotton, Sugarcane, Tobacco – Fungal spoilage of grains during storage

Unit V.

Mushroom cultivation – production constraints of edible mushrooms including pests, diseases and nematodes. *Pleurotus*, *Calocybe* and *Volvariella* – Nutritional status and uses

Practicals

Identification and observation of symptoms and host-parasite relationship of

1. Diseases of rice – blast, brown spot, sheath rot, sheath blight diseases.
2. Bacterial, viral and phytoplasma diseases of rice
3. Wheat diseases – Rusts, smuts and other diseases
4. Diseases of sorghum – Smuts, Downey mildew, sugary and rust
5. Diseases of pearl millet
6. Diseases of redgram and chickpea
7. Diseases of blackgram, greengram and cowpea
8. Diseases of soybean and lablab
9. Diseases of groundnut, sesame and castor
10. Diseases of sunflower and coconut
11. Diseases of cotton and tobacco
12. Cultivation techniques of *Pleurotus*, *Calocybe*
13. Field visits. Herbarium collection (25 Nos.)

Reference books

1. Agarwal, R.K. and C.L. Jandaik. 1986. Mushroom cultivation in India. Indian Mushroom Growers Association, Solan, HP p-83.
2. Agarwal, S.C. 1993. Diseases of greengram and blackgram, International Book Distributors, UP.
3. Agrios. G.N. 1997. Plant Pathology, 4th Edn, Academic Press, New York.
4. Dasgupta, M.K. 1988. Principles of Plant Pathology. Allied Publishers Pvt. Ltd., Bangalore.
5. Dube, H.C. 1978. A Text Book of Fungi, Bacteria and Viruses. Vikas Publishing House Pvt. Ltd., New Delhi.
6. Govindasamy, C.V. and M.N. Alagianagalingam. 1981. Plant Pathology. Popular Book Depot, Madras.
7. Prakasam.V., V.Valluvaparidasan, T. Raguchander and K. Prabakar 1997. Field Crops Diseases. AE Publication, Coimbatore.
8. Rangaswamy, G. 1998. Diseases of Crop Plants in India. Prentice Hall of India Pvt. Ltd., New Delhi, pp.504.
9. Singh, R.S. 1993. Plant Diseases. Oxford & IBH Publication. New Delhi.
10. Kapoor, J.N. 1989. Mushroom Cultivation. ICAR Publication. New Delhi. p. 89.

Learning out come		
Unit	Vague out come	Most precious out come
I.	Studying the Diseases of Cereals	1.Understanding the basic symptoms of diseases of cereal crops 2.Understanding the important disease management methods in Cereal crops
II.	Studying the Disease of and Pulses	1.Understanding the basic symptoms of diseases of Pulses 2.Understanding the important disease management methods in Pulses
III.	Studying the Diseases of Oilseeds	1.Understanding the basic symptoms of diseases of Oilseeds 2.Understanding the important disease management methods in Oil seeds
IV.	Studying the Diseases of cash crops	1.Understanding the basic symptoms of diseases of cash crops 2.Understanding the important disease management methods in Cash crops
V.	Studying the Mushroom cultivation and its production constraints	1.Understanding the basics of cultivation methods of Mushrooms 2.Understanding the Mushroom production constraints

IV SEMESTER
15HORU0411- PRODUCTION TECHNOLOGY OF FRUITS AND
PLANTATION CROPS (2+1)

Objectives:

1. To learn about the production technology of tropical, subtropical, humid zone, arid and temperate fruit crops.
2. To learn about the production technology of plantation crops.

Unit I: Introduction

Importance and production technologies of tropical fruit crops. Horticultural classification – horticultural zones of India and Tamil Nadu – area and production – export potentials – nutritive value – value added products – climate and soil requirements – varieties

Unit II: Cultivation details of tropical fruit crops

Propagation techniques – planting density and systems – after care – training and pruning – management of irrigation, nutrient and weed – inter- cropping and multi-tier cropping – special horticultural techniques including plant growth regulators –maturity indices – harvesting methods – processing techniques – grading – packaging and storage of: mango, banana, grapes, papaya, guava and sapota.

Unit III: Subtropical and humid zone fruit crops

Citrus, jack and pineapple.

Unit IV: Arid and temperate fruit crops

Pomegranate,annonaceous fruits, apple, pear, avocado,mangosteen,

Unit V: Plantation crops

Coffee, tea, rubber, cocoa, cashew, coconut and oilpalm.

Practical:

1. Identifying and description of mango varieties
2. Identifying and description of banana varieties
3. Practising intercultural operations in mango and banana
4. Identifying and description of guava and sapota varieties
5. practising calculation and application of manures and fertilizers in fruit crops
6. practising preparation and application of growth regulators in fruit crops
7. learning about the maturity indices of fruit crops
8. practising harvesting and post harvest handling of fruit crops
9. practising the cost of cultivation of major fruit crops
10. practising nursery methods followed in Coffee
11. practising training & pruning methods followed in Tea
12. acquiring knowledge about tapping method followed in Rubber
13. Visit to a plantation

Reference books:

1. Bose, T.K. 1988. Fruits of India – Tropical and Sub-tropical, Naya Prakash Publications, Calcutta.
2. Gardner, V.R., F.F. Bradford and H.D. Hooker. 1952. Fundamentals of fruit production. Mc Graw Hill Book Co., Inc. London.

3. Peter, K.V. 2002. Plantation crops – National Book Trust of India – New Delhi.
4. Shanmugavelu, K.G. 1990. Production technology of fruit crops. Oxford and IBH Publishing Co(P) Ltd., New Delhi.
5. Shanmugavelu, K.G. and V.N. Madhava Rao. 1980. Spices and plantation crops. India Book House, New Delhi.
- 6.

Learning out come		
Unit	Vague out come	Most precious out come
I	Studying the Importance and production technologies of tropical fruit crops. Horticultural classification ,horticultural zones of India and Tamil Nadu , area and production , export potentials , nutritive value , value added products , climate and soil requirements , varieties	1.Understanding the importance and horticultural classification of fruit crops 2. Understanding the climatic zones of india and tamilnadu
II	Studying the Propagation techniques , planting density and systems, after care , training and pruning , management of irrigation, nutrient and weed , inter-cropping and multi-tier cropping , special horticultural techniques including plant growth regulators ,maturity indices , harvesting methods, processing techniques, grading, packaging and storage of mango, banana, grapes, papaya, guava and sapota.	1.Understanding the production technology of tropical fruit crops. 2. Understanding the papain extraction method
III	Studying the production technology of Citrus, jack and pineapple.	1.Understanding the production technology of Citrus, jack and pineapple 2. Understanding the virus diseases and control measures of citrus
IV	Studying the production technology of Pomegranate,annonaceous fruits, apple, pear, avocado,mangosteen,	1.Understanding the production technology of Pomegranate,annonaceous fruits, apple, pear, avocado,mangosteen,. 2. Understanding the bahar treatment followed for pomegranate
V	Studying the production technology of Coffee, tea, rubber, cocoa, cashew, coconut and oilpalm.	1.Understanding the production technology of Coffee, tea, rubber, cocoa, cashew, coconut and oilpalm. 2. Understanding the pruning techniques followed for tea

IV SEMESTER
15AGNU0401 - NANOTECHNOLOGY AND ITS APPLICATIONS IN
AGRICULTURE (1+0)

Objective:

To impart knowledge or skills on basic concepts of Nanoscience and their impact on Agriculture and allied sectors

Unit I : Basic principles of Nanoscience

History- definition, Terminology in nanoscience and importance of Moore's law. Introduction to nanomaterials- nanoparticles.

Unit II: Synthesis of nanoparticles

Methods of nanomaterials synthesis- Mechanical Methods – Chemical and Biological methods of nanoparticles synthesis

Unit III: Properties of nanoparticles

Physical properties of nanomaterials- Mechanical and optical properties. Magnetic and size dependent properties of nanomaterials. Electrical conductivity and photoluminescence properties of nanomaterials

Unit IV: Manipulation of nanoparticles

Nanoparticles size determination by x-ray diffraction technique and dynamic light scattering method for colloidal nanoparticles. Manipulation of nanomaterials by transmission electron microscopy (TEM) and scanning electron microscopy (SEM).

Unit V: Applications of nanotechnology

Nanotechnology in agriculture – health – food preservation – energy and environment – ethical issues in nanotechnology – socio-economic issues- benefits, challenges and future of nanotechnology

Learning outcome		
Unit	Vague outcome	Precious outcome
I	Studying the basic principles of Nanoscience	Understanding the history, definition and terminologies in Nanoscience
II	Studying the synthesis of nanoparticles	Understanding the physical, chemical and biological synthesis of nanoparticles.
III	Studying the physical properties of nanoparticles	Understanding the physical, optical, thermal and electrical properties of nanoparticles
IV	Studying the manipulation of nanoparticles	Understanding the working principles and applications of SEM, TEM, AFM in indentifying the nanoparticles
V	Studying the applications of nanotechnology	Understanding the major applications of nanotechnology in the field of Agriculture and allied sectors

IV SEMESTER
15AGEU0402 – FARM POWER AND MACHINERY (2+1)

Objectives:

- To identify suitable implements for tillage, sowing, weeding and plant protection operations for different crop and soil conditions
- To understand the operation and maintenance of oil engine and electric motor pumpsets

Unit I: Farm power:

Farm power sources – man, animal, mechanical and electrical – advantages and disadvantages of different forms of power, tractors and power tillers – its major functions – selection, cost of operation and implement selection for different agricultural operations..

Unit II: Tillage machinery

Tillage, definition and objectives; primary tillage implements – country plough, mould board plough, disc plough, chisel plough, secondary tillage implements – harrows, cultivators, weeders, basinlisters, puddler, green manure trampler; rotovator; calculation of draft, field capacity and power required for the farm implements.

Unit III: Sowing and Harvesting machinery

Sowing machinery – seed drill, seed cum fertilizer drill, broadcasting device, transplanter, direct paddy seeder; harvesting tools and equipment – reapers and combine harvester; harvesting machine for groundnut, tuber crops and sugarcane.

Unit IV: Pumping machinery:

Oil engine coupled with centrifugal pump set – study of the parts, working principles and repair and maintenance; electric motor – types of AC - three phase induction motor – monoblock, motor coupled with centrifugal pump set – study of parts, working principles, repair and maintenance

Unit V: Plant protection machinery:

Sprayers and dusters – hand operated and power operated, working principles – bucket type sprayer – knapsack sprayer – rocker arm sprayer – engine powered sprayer – power duster – rotary hand duster – repairs and maintenance of sprayers and dusters.

Practical

1. Identification of different parts of tractor,
2. Identification of different parts of power tiller
3. Study the different systems of tractor
4. Study the different systems of power tiller.
5. Study the operation of different primary tillage implements
6. Study the operation of different secondary tillage implements
7. Study the operation of different sowing and planting machinery
8. Assessment of machinery power, field capacity and cost of operation
9. Study the operation of different parts of hand operated sprayers and duster & power
10. Study the operation of different parts of power operated sprayers and dusters
11. Study the operation of different parts and types of electric motors and pumps
12. Field visit to college of Agriculture Engineering College, TNAU, Coimbatore/Kumalur
13. Field visit to Agril. College & Res. Instt., TNAU, Madurai.

Reference books

1. Nakra C.P 2006, Farm Machinery and Equipment ; Dhanapat RaiPublishing Company (P) Ltd, New Delhi.
2. Bindra, O.S. and Harcharan Singh, 1971. Pesticide Application Equipment. Oxford and IBH Pub Co., New Delhi.
3. Srivastava, A.C., 1990. Elements of Farm Machinery. Oxford IBH Pub. Co, New Delhi
4. Jagadishwar Sahay, 2004. Elements of Agricultural Engineering. Standard Publishers Distributors, New Delhi. – 4th Edition
5. Michael and T.P.Ojha, 1996. Principles of Agricultural Engineering. Jain brothers, New Delhi

Outcome :

- The students can learn in selection of suitable farm power source, farm implements based on field conditions and crop conditions
- The students can get practical knowledge in handling of farm machineries and maintenance of oil engine and electric motor pumpsets

IV SEMESTER
15ANHU0420 – DAIRY CATTLE PRODUCTION (2+1)

Objectives:

1. The General objective of this course is to establish basic knowledge of how to manage and operate dairy farm.
2. This course is designed to impart basic technical knowledge and skills required for entry level positions or to successfully run a dairy farm enterprise by developing competencies concerning the selection and breeding of dairy cattle, management of animals of different physiological status, feeding, housing and health care.
3. To provide hands-on experiences with handling and restraining of cattle, milking and other dairy husbandry practices.

Unit I:Cattle breeds and selection: Introduction - Meaning of commonly used terms - Origin and domestication of livestock - Dairy cattle census – Milk production and availability – Description of parts of dairy cow, cattle breeds – Indigenous breeds – Red Sindhi, Sahiwal, Gir, Kangayam – Exotic breeds – Holstein Friesian, Jersey, Brown Swiss. Breeds of buffalo – Murrah – Surti – Nili - Ravi – Selection of dairy cattle – objectives – dairy characters – selection of individual cows - Choice of breeds.

Unit II:Cattle breeding: Male and Female reproductive system – Oestrous cycle - Signs of heat – Concept of breeding – Inbreeding – Out breeding - breeding efficiency – Artificial insemination – Semen collection – Evaluation – Freezing technique – Insemination – Advantage and disadvantages of frozen semen.

Unit III:Zootechny and Housing: Handling and restraining of dairy cow – Casting – Putting nose ring and string – Dehorning – Castration – Dentition and ageing – Identification of dairy cow – Tattooing – Branding – Selection of site for the farm buildings — Planning and designing - construction details – Foundation – Wall, floor, roof, manger, drain etc. – Types of animal housing – Conventional barn – Loose housing. Training of work bullocks for ploughing and carting – age at work – draught capacity.

Unit IV:Feeds and Feeding: Classification of feeds – Roughage – Concentrate – Grains – Mill by products – Molasses – Oil cakes – Role of water, protein, carbohydrates, fats, vitamins and minerals in animal nutrition – Digestive system of ruminants – Digestion of carbohydrates, protein and fats – Nutrient requirements for maintenance and milk production – Urea feeding – Urea treatment of paddy straw.

Unit V:ABC of Veterinary medicine: Elementary principles of treatment and care of sick animals – Signs of health and ill health – Temperature – Respiration – Pulse – Mastitis - Common ailments – Bloat – Carbohydrate engorgement – Diarrhoea – Indigestion – Wounds. Common contagious diseases – Foot and Mouth disease – Rinderpest – Anthrax – Black quarter – Tuberculosis – John's disease – Brucellosis – Rabies, Hemorrhagic Septicemia – Endoparasites – Ectoparasites.

Practical:

1. Familiarizing with of body parts of dairy cow
2. Identification of breeds of cattle and buffaloes
3. Estimation of body weight by body measurements
4. Demonstration of semen collection, evaluation and insemination

5. Restraining of dairy cattle
6. Disbudding of calves
7. Castration of male calves
8. Dentition and ageing
9. Recording of temperature, pulse and respiration
10. Identification of feeds and fodder
11. Preparation of plans for animal housing
12. Calculations of nutrient requirements for maintenance and milk production
13. Preparation of projects for obtaining bank loan

References:

1. ICAR, 2013. Hand book of Animal Husbandry, 4th Ed. ICAR Publication, Pusa, New Delhi.
2. Banerjee, G.C., 2006. Text book of Animal Husbandry 8th Ed. Oxford and IBH Publishing Company Ltd., New Delhi.
3. Jagadish Prasad, 2002. Principles and practices of Dairy Farm Management, 3rd Ed. Kalyani Publishers, Ludhiana.
4. Sastry, N.S.R., C.K. Thomas and R.A. Singh, 2015. Livestock Production Management, 4th Ed. Kalyani Publishers, New Delhi.
5. Ranjhan, S.K., and N.N. Pathak, 2003. Text book on buffalo production, 4 Ed. Vikas Publishing House Pvt. Ltd., New Delhi.

Learning Outcome

Unit I: Instruction in lessons in Unit I should result in students achieving the following objectives

1. Describe the size and contribution of dairying to Indian economy and rural livelihood
2. Describe the various breeds of dairy cattle, giving their origin and breed characteristics and milk production capacity.
3. Identify the anatomical parts of the dairy animal
4. Identify various breeds of cattle and buffalo by viewing photographs or live animals.
5. Name the parts of dairy cattle and describe economically important traits.
6. Describe the characteristics of a good dairy cow
7. Select desirable breeding and production animals.
8. Differentiate desirable from undesirable traits

Unit II: Instruction in lessons in Unit II should result in students achieving the following objectives

1. Describe the male and female reproductive organs.
2. Identify the signs of heat and right time for insemination.
3. Able to identify suitable method of breeding for improving the productivity of herd
4. Able to determine the breeding efficiency of cows and bulls
5. Acquire knowledge skills in semen collection, evaluation, dilution and insemination

Unit III: Instruction in lessons in Unit III should result in students achieving the following objectives

1. Ability to handle and restrain animals safely.
2. Acquired skill in putting nose ring, castration, dehorning tattooing, branding, tattooing and dentition and ageing of cattle.
3. Ability to prepare plans for housing of dairy cows.

Unit IV: Instruction in lessons in Unit IV should result in students achieving the following objectives

1. Able to classify feeds according to their nutritive values
2. Acquire knowledge in feeding value of locally available feed
3. Able to list key nutrients for animals
4. Able to outline how carbohydrates, lipids and proteins can be classified
5. Able to describe the functions of minerals and vitamins in the nutrition of animals, and list the sources as well as the clinical signs associated with deficiency symptoms of these nutrients.
6. Describe the functions of the parts of the digestive systems of cow
7. Acquire knowledge in the use of urea as protein supplement

Unit V: Instruction in lessons in Unit V should result in students achieving the following objectives

1. Able to take care of sick animals
2. Able to identify healthy and sick animals
3. Able describe the basic physical examination of animals for health assessment
4. Able to list and describe the common diseases of cattle
5. Able to diagnose and treat mastitis, FMD, Rinderpest, anthrax, black quarters and Hemorrhagic Septicemia
6. Able to diagnose Tuberculosis, Johne's disease, Brucellosis and Rabies
7. Able to diagnose and treat Bloat, Carbohydrate engorgement, Diarrhoea and Indigestion
8. Able to control common Endoparasites and Ectoparasites

IV SEMESTER
15AGSU0404- SOIL SURVEY, REMOTE SENSING, GIS AND THEIR APPLICATIONS
IN AGRICULTURE (1+1)

Objective:

To impart knowledge on resource inventories on Agriculture and natural resource management

To offer elementary level concepts soil mapping and delineation

Unit I

Origin of Earth – Hypothesis in earth formation - Geological formations of India – History of soil survey – Objectives of soil survey – Types of soil survey – Terminologies used in geological methods

Unit II

Soil mapping units and legends –Methods of soil survey- Old and Modern system of soil classification – Land use principles – Concept and Objective of land use classification and land use planning- Soil survey interpretation

Unit III

Aerial photography – Remote sensing – Data acquisition – Electromagnetic spectrum – sensors – cameras – platforms – satellite images – physical basis – Techniques (visual/digital)- Advantages and limitations – Applications in natural resources – radars and scanners and their applications in remote sensing

Unit IV

Geo spatial technology in land use- Introduction to GIS – history and development of GIS - GIS techniques and technologies- applications of GIS in cropping system and soil resource management

Unit V

Land capability and land irrigability classification – land suitability classification for field crops – Horticultural crops – Forest trees – Computation of soil and run off losses – Disaster study

Practical

1. Soil profile description
2. Study of base maps, aerial photos
3. Satellite data
4. Visit to degraded lands
5. Land suitability classification for field crops, horticultural crops and forest trees
6. Soil data interpretation for land irrigability classification
7. Computation of soil and run off losses
8. GIS applications
9. Visit to soil survey organization
10. Preparation of soil survey report
11. Data representation and data capture by GIS
12. Visit to Geological unit
13. Visit to remote sensing laboratory

Reference

1. David Dent, Anthony Young, 1981. Soil Survey and Land Evaluation. HarperCollins Publishers Ltd. US.
2. Eden, M.J and Pary, J.T., 1986. Remote Sensing and Tropical Land Management. Wiley and Sons, London.
3. IARI, 1960. Soil Survey Manual, USDA, Washington.
4. Paul A.Longley, Mike Goodchild, David J.Maguire and David W.Rhind, 2010. Geographic Information Systems and Science, John Wiley and Sons Ltd., Chichester.
5. Poonkodi, P., Dhanasekaran, K. and Rasavel, M. 2004. Soil Survey, Taxonomy, Remote Sensing and Problem soils. Rasi offset Printers, Chidambaram.
6. Sehgal, J. 1996. Pedology: Concepts and Applications. Kalyani Publishers, New Delhi, India.
7. www.tnau.ac.in

Outcome:

Complete comprehension of students about the methods of Soil Survey, types of Remote Sensing, Geographical Information System and their usage in natural resource management

V SEMESTER

15AGRU0506- AGRONOMY OF FIELD CROPS – II (1+1)

Agronomy - Importance - origin - soil and climatic requirement - area, production and productivity in World, India and Tamilnadu - systems and methods of cultivation - season - varieties - seed rate - seed treatment - sowing - density and geometry - growth stages - critical stages - nutrient, irrigation, weed management - after cultivation - harvest and storage - byproducts and cropping systems of following crops

Unit I: Oil seeds

Groundnut, Sesame, Sunflower, Rapeseed and Mustard, Castor, Safflower, Niger and Linseed

Unit II: Sugar crops

Sugarcane, Sugar beet, Sweet sorghum

Unit III: Major Fiber crops

Cotton, Jute

Unit IV: Minor Fiber crops

Mesta, Sunhemp, Agave.

Unit V: Narcotics

Tobacco

Practical

1. Acquiring skill in field preparation, sowing and manuring of oilseeds under pure and intercropping situations.
2. Acquiring skill in field preparation, preparation of setts, planting and manuring of sugarcane and ratoon cane management.
3. Acquiring skill in different seed treatment techniques for oilseeds, fibers, sugar crops and narcotics.
4. Nursery preparation and management in tobacco (topping, desuckering and different curing methods)
5. Estimation of plant population per unit area for various oilseeds, fibers, sugar crops and narcotics.
6. Observations on growth and yield parameters and estimation of yield of various oilseeds and sugar crops.
7. Observations on growth and yield parameters and estimation of yield of various fiber crops - visit to ginning factory.
8. Acquiring skill in after cultivation practices in cotton - earthing up – topping.
9. Acquiring skill in after cultivation practices in sugarcane - earthing up - detrashing, propping.
10. Observation on harvest symptoms of oilseeds, sugar crops, fibres and narcotics and assessment of maturity.
11. Cost of cultivation and economics of important oilseeds.
12. Cost of cultivation and economics of sugar crops.
13. Cost of cultivation and economics of important fiber crops and narcotics.

Reference

1. Ahlawat, I.P.S, Om Prakash and G.S Saini. 1998. Scientific Crop Production in India. Rama publishing House, Meerut.

2. Chidda Singh, 1997. Modern techniques of Raising Field Crops. Oxford and IBH Publishing CO. Pvt.Ltd., New Delhi
3. Das, P.C. 1997 Oilseed crops of India, Kalyani Publishers, New Delhi
4. Gopalachari, N.C. 1984. Tobacco, ICAR, New Delhi
5. John, M.M. 1987. Cotton.Longman Scientific and Technical, New York
6. Maiti, S., M.R. Hedge and S.B. Chattopadhyay, 1988. Hand book of annual oilseed crops. Oxford and IBH Publishing Co. Pvt Ltd., New Delhi
7. Thakur,C. 1981. Scientific crop production. Vol.II Metropolitan Book Co.Pvt. Ltd., New Delhi
8. TNAU, 1999. Crop production Guide. TNAU and Directorate of Agriculture , Chennai
9. Yadava, R.L, 1993. Agronomy of Sugarcane. Principles and Practices. International Book Distribution Co.,Lucknow, U.P.
10. ICAR Publication. Hand Book of Agriculture (Revised edition)
11. Gururajan.B., R.Balasubramanian and V.Swaminathan 2008 Recent Strategies on Crop Production, Kalyani Publishers, New Delhi.
12. TNAU Agriportal website

V SEMESTER
15AGRU0507 - CROP PRODUCTION (0+1)

Practicals

Unit I: If Transplanted crop

Selection of nursery area - preparation of nursery - application of manures to nursery - seed treatment with fungicide and bio-fertilizers- seed soaking and incubation - forming nursery beds and sowing seeds, seedling biometric studies on height, leaf number, biomass and root volume. Weed control and plant protection to nursery - preparation of main field - crop biometric studies on height, leaf number, tillering, biomass and flowering and yield components. Application of organic manures, basal application of fertilizers - after cultivation practices - top dressing of fertilizers - plant protection measures - harvesting, threshing, drying and cleaning the produce - working out cost of cultivation and economics.

Unit II : If Direct sown crop

Selection of main field - preparation of main field - land configuration for sowing - application of manures and fertilizers - seed treatment with fungicide and bio - fertilizers - sowing and irrigation. Crop biometric studies as above. Application of herbicide - after cultivation practices - top dressing of fertilizers - plant protection measures – harvesting, threshing, drying and cleaning the produce - working out cost of cultivation and economics.

1. Each student will be allotted a minimum land area of 200 m² (five cents) and he/ she will do all field operations in the allotted land from field preparation to harvest and processing.
2. Sowing of the crop may be in accordance with season and not on the basis of semester. Evaluation may be continued in the subsequent semester, if needed as in the case of NSS / NCC

Reference

1. Chidda Singh.1997. Modern Techniques of Raising Field Crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Thakur, C.1980. Scientific Crop Production. Vol.I Metropolitan Book Co. Pvt. Ltd., New Delhi.
3. Thakur, C.1981. Scientific Crop Production. Vol.II. Metropolitan Book Co. Pvt. Ltd., New Delhi.
4. TNAU. 1999. Crop Production Guide. TNAU and Directorate of Agriculture, Chennai.
5. Gururajan, B., R.Balasubramanian and V. Swaminathan, 2008. Recent Strategies on Crop Production, Kalyani Publishers, New Delhi.
6. TNAU Agriportal website

V SEMESTER

15AGSU0505-PROBLEM SOILS AND THEIR MANAGEMENT (1+1)

Objective:

To teach the matters pertaining to the problematic soils, their reclamation and crop suitability to those soils

Unit I :

Soil Degradation – Basic Concepts – causes and factors for soil degradation- resilience and rehabilitation – Physical problems of soils – Highly permeable, Impermeable and ill drained soils – characteristics and their management.

Unit II:

Soil Physical constraints - Soil crusting, sub soil hardening, fluffy paddy soils- characteristics and their management. Eroded soils, Land degradation and management, waste land- Classification and Management

Unit III:

Soil Chemical problems – Acid soils, Acid sulphate soils, saline soils, sodic soils and saline sodic soils – Genesis, characteristics - Reclamation and management techniques of chemical problem soils.

Unit IV:

Long term effect of application of toxic organic and inorganic wastes viz., fertilizers, pesticides, sewage, industrial effluents on soil properties and crop growth – Soil health and soil quality indicators

Unit V:

Quality of irrigation waters – water quality parameters - water quality appraisal – effect of poor quality waters on soil and crop growth and management – gypsum requirement for managing poor quality irrigation water.

Practical schedule

1. Visit to problem soil areas and collection of soils and water samples
2. Analysis of soil for pH and EC
3. Analysis of soil sample for Ca & Mg
4. Analysis of soil sample for Na and K
5. Analysis of soil for gypsum requirement
6. Analysis of soil for lime requirement
7. Analysis of irrigation water for pH and EC
8. Analysis of irrigation water for chloride
9. Analysis of irrigation water for carbonate and bicarbonate
10. Analysis of irrigation water for sulphate
11. Analysis of irrigation water for calcium and magnesium
12. Analysis of irrigation water for sodium and potassium
13. Classification of irrigation water as per USSL and other systems

Reference Books

1. Buol, S.W., Hole, F.D., McCracken, R.J., (1973). Soil genesis and classification. Oxford and IBH publishing Co., New Delhi
2. Sehgal, J.2005. Pedology concepts and applications, Kalyani Publishers, New Delhi
3. USDA, 1954. Diagnosis and improvements of saline and alkali soils (Ed) L.A.Richards, Handbook No.60. USDA Washington DC.
4. Somani, L.L. and K.L. Totawat, 1993. Management of salt affected soils and water

Outcome:

The students can obtain an absolute comprehension of ill effects of problem soils to the crops and their reclamation strategies.

V SEMESTER

15AGBU0504- BREEDING OF FIELD CROPS AND HORTICULTURAL CROPS (2+1)

Objective

This course, aimed at to understand the impart theoretical knowledge and practical skills about recent advances in improvement of field crops and horticultural crops using conventional and modern biotechnological approaches.

Unit I

Place of origin - putative parents - related wild species - classification - chromosome number - objectives of breeding – methods of breeding – conventional – distance hybridization – heterosis breeding and latest varieties of the following crops.

Cereals and millets: rice, wheat, maize, sorghum, pearl millet, finger millet, foxtail millet, kodo millet, little millet, proso millet and barn yard millet.

Unit II

Pulses: redgram, greengram, blackgram, bengalgram, cowpea, lablab, horsegram, soybean and dew gram.

Unit III

Oilseeds: groundnut, gingelly, castor, sunflower, safflower and mustard.
Fibres: cotton and jute, sugars: sugar cane & tobacco

Unit IV

Annual horticultural crops: tomato, brinjal, chillies, potato, tapioca and perennial crops-coconut, mango, banana, papaya. **Plantation crop:** tea, coffee,

Unit V

Breeding for insect and disease resistance
Breeding for drought cold, salinity and alkalinity
Breeding for quality
Procedure for release of a variety

Practical

Study of floral biology – anthesis and pollination – selfing and crossing techniques – distant hybridization – study of wild species, description of important released varieties of the following crops

1. Cereals – rice, wheat and maize.
2. Sorghum, pearl millet, finger millet, kodo millet, little millet, proso millets, barnyard millet
3. Redgram, soybean, greengram, blackgram, horsegram, cowpea, lablab & bengal gram.
4. Groundnut, gingelly, mustard , niger
5. Castor, sunflower, safflower.

6. Cotton, jute and mesta
7. Sugarcane and tobacco.
8. Forage grass: guinea grass, napier, pearl millet, *Cenchrus* sp, forage crops: fodder cowpea, desmanthus, stylosanthus, subabul.
9. Annual horticultural crops: tomato, brinjal, chillies, cabbage, cauliflower, potato, tapioca
10. Perennial crops-coconut, mango, tea, coffee
11. Pine apple , sapota, citrus, grapes, papaya
12. Breeding for insect and disease resistance.
13. Breeding for drought cold, salinity and alkalinity resistance

Reference books

1. Briggs, F.N. And P.F. Knowles, 1970. Introduction to plant breeding. Reinhold, New York.
2. Chopra, V.L. 1990. Plant Breeding. Theory and practice. Oxford and IBH publishing co., New Delhi.
3. Chopra, V.L. 1994. Plant breeding. Theory and practice. Oxford and IBH publishing co., New Delhi.
4. Daniel Sundararaj, D., G. Thulasidoss, and M. Stephan Dorian 1997. Introduction to cytogenetics and crop improvement. Popular book depot, Chennai - 15.
5. Harihar Ram and Hari Govind Singh, 1994. Crop breeding and genetics. Kalyani publishers, New Delhi.
6. Jules Janick, 1983. Plant breeding reviews, vol: 1. The AVI publishing co., USA.
7. Phoelman, J.N. And Borthakur, 1969. Breeding Asian field crops Oxford & IBH publishing co., New Delhi.
8. Richards, A.J. 1986. Plant breeding systems. George Allen & Unwin, London.
9. Sharma, J.R. 1994. Principles and practice of plant breeding. Tata McGraw - Hill publishing co. Ltd., New Delhi.
10. Singh, R.B., R.M. Singh and I.B.D. Singh, 1984. Advances in cytogenetics and crop improvement. Kalyani publishers, New Delhi.

Outcome:

The students will understand about crop improvement of field crops and horticultural crops.

V SEMESTER
15AENU0504 – SERICULTURE TECHNOLOGY (1+1)

Unit I:

Introduction to Moriculture - Morphology of mulberry plants -popular mulberry genotypes - methods of propagation- nursery and main field preparation- planting methods.

Unit II:

Nutrient deficiency symptoms and their management in mulberry plants. Weed and irrigation management. Pests, diseases and nematode management in mulberry plants. Pruning and harvesting methods of mulberry leaves – preservation of leaves.

Unit III:

Sericulture – merits of sericulture - silkworm – kinds of silkworm –mulberry silkworm – morphology, biology and rearing of silkworms - feeding, cleaning and spacing.

Unit IV:

Mounting, harvesting and processing of cocoons - disinfection techniques – types of disinfectants – byproducts of sericulture.

Unit V:

Pests and diseases of silkworm and their management. Non mulberry silkworms - Eri, Tasar and Muga silkworms- biology and importance - food plants - economics of sericulture.

Practical schedule

1. Morphology of mulberry plant - description and propagation techniques.
2. Nursery bed preparation - care in selection of planting materials - biofertilizer treatment in nursery main field preparation - methods of planting.
3. Identification of nutrient deficiency symptoms and identification of weeds –
4. Pruning and training methods -selection of leaf for harvesting based on the larval instar - preservation of leaves.
5. Identification of damaged symptoms of pests, diseases and nematodes of mulberry
6. Morphology of mulberry silkworm - different stages - sexual dimorphism- identification of races by cocoon shape and colour- dissection of mouth parts and silk glands.
7. Ideal rearing house and rearing appliances - preparation and methods of disinfection.
8. Incubation of eggs - methods - chawki rearing - brushing – feeding- cleaning and other practices in silkworm unit.
9. Identification of pests and diseases of silkworm.
10. Visit to Grainage and cocoon market - fixing up of cocoon price - auction procedures- observing the activities involved in selection of parent races - pairing - depairing - sheet and loose egg preparation - cold storage - mother moth testing - acid treatment of eggs.
11. Visit to silk reeling centre - observing various processes - stifling - cooking -reeling - re-reeling - winding -twisting- warp and weft making -bleaching - dyeing - weaving - silk grades - working out economics of raw silk production - types of silk fabrics and garments.
12. Eri and Tasar silkworms - morphology - food plants-rearing methods.
13. Economics of mulberry silkworm rearing and visit to sericulture farms - interaction with sericulturists.

References

1. Dandin, S.B., Jayant Jayaswal and K.Giridhar.2000. Handbook of Sericulture Technologies. Central Silk Board, Bangalore, 259 p.
2. Jolly, M.S. 1987. Appropriate sericulture techniques. Central Sericultural Research and Training Institute, Mysore, 176 p.
3. Jolly, M.S., S.K. Sen, T.N. Sonwalker and G.K. Prasad. 1981. Non-mulberry silks. FAO Agricultural Services Bulletin 29. Food and Agriculture Organization of the United Nations, Rome, 178 p.
4. Krishnaswami, S., N.R. Madhava Rao, S.K. Suryanarayan and T.S.Sundaramurthy. 1978. Sericulture Manual 3 - Silk reeling. FAO Agricultural Services Bulletin 15/3. Food and Agriculture Organization of the United Nations, Rome, 112 p.
5. Krishnaswami, S., M.N.Narasimhanna, S.K. Suryanarayan and S.Kumararaj. 1978. Sericulture Manual 2 - Silkworm Rearing. FAO Agricultural Services Bulletin 15/2. Food and Agriculture Organization of the United Nations, Rome, 131 p.
6. Rangaswami, G., M.N. Narasimhanna, K.Kasiviswanathan, C.R.Sastry and M.S.Jolly.1978. Sericulture manual 1- mulberry cultivation. FAO Agricultural Services Bulletin 15/1. Food and Agriculture Organization of the United Nations, Rome, 150p.
7. Ullal, S.R. and M.N. Narasimhanna. 1987. Hand book of Practical Sericulture. Central Silk Board, Bangalore, 166 p.

V SEMESTER
15APPU0503 - DISEASE MANAGEMENT IN HORTICULTURAL CROPS (2+1)

Objective :

To facilitate the students to learn and understand the Horticultural crops plant disease symptoms and management practices.

Theory

Etiology, symptoms, mode of spread, survival, epidemiology and management of diseases of following crops.

Unit I.

Fruit crops; Mango, Banana, Citrus, Grapes, Guava, Sapota, Pomegranate, Annona, Papaya, Jack, Pineapple, Ber, Aonla, Apple, Pear, Peach, Plum

Unit II.

Vegetables; Brinjal, Tomato, Bhendi, Cucurbits, Crucifers, Beans, Peas and Tuber crops

Unit III.

Spices & Condiments; Onion, Garlic, Chillies, Cardamom, Betelvine, Pepper, Clove, Nutmeg, Cinnamon, Turmeric, Ginger, Coriander

Unit IV.

Plantation crops: Tea, Coffee, Cocoa, Rubber, Coconut, Oil palm, Arecanut and Vanilla

Unit V.

Ornamental crops: Jasmine, Rose, Crossandra, Chrysanthemum, Orchids and Carnation. Post harvest diseases of major fruits and vegetables and their management

Practicals

Identification and observation of symptoms, host-parasite relationship of

1. Diseases of mango, banana
2. Diseases of citrus, and grapes
3. Diseases of Guava, Sapota, Pomegranate, Annona, Jack, Papaya, Pineapple, Ber, Annona
4. Diseases of Apple, Pear, Plum Peach
5. Diseases of brinjal, tomato
6. Diseases of cucurbits & crucifers
7. Diseases of Bean, Peas, Potato, Tapioca, Sweet potato, Yam and Colacasia
8. Diseases of onion, garlic, chillies
9. Diseases of cardamom, Betelvine, Pepper, Coriander, Turmeric, Ginger
10. Diseases of Tea, Coffee, Rubber, Arecanut, Oilpalm, and vanilla
11. Diseases of rose, jasmine, crossandra, Chrysanthemum, Orchids, Carnation
12. Post harvest diseases of fruits and vegetables – Mango, Banana, Citurs, Grapes, Carrot, Potato, Tomato, Onion and Garlic.
13. Herbarium collection (25 Numbers)

Reference

1. Agrios. G.N. 1997. Plant Pathology, 4th Edn, Academic Press, New York.
2. Arjunan, G. Karthikeyan, G. Dinakaran, D. and Raguchander, T. 1999. Diseases of Horticultural Crops, AE Publications, Coimbatore.
3. Dickson, J.G. 1997. Diseases of Field Crops. Daya Publishing House, New Delhi.
4. Pathak, P.N. 2001. Diseases of Fruit Crops. Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi.
5. Singh, R.S. 1993. Plant Diseases. Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi
6. Singh, R.S. 1999. Diseases of Fruit crops. Oxford & IBH Publications. New Delhi. 350.

Learning out come		
Unit	Vague out come	Most precious out come
I.	Studying the Diseases of Fruit crops.	1.Understanding the basic symptoms of diseases of Fruit crops 2.Understanding the important disease management methods in Fruit crops
II.	Studying the Disease of Vegetables	1.Understanding the basic symptoms of diseases of Vegetables 2.Understanding the important disease management methods in Vegetables
III.	Studying the Diseases of Spices & Condiments	1.Understanding the basic symptoms of diseases of Spices & Condiments 2.Understanding the important disease management methods in Spices & Condiments
IV.	Studying the Diseases of Plantation crops	1.Understanding the basic symptoms of diseases of Plantation crops 2.Understanding the important disease management methods in Plantation crops
V.	Studying the Diseases of Ornamental crops	1.Understanding the basic symptoms of diseases of Ornamental crops 2.Understanding the important disease management methods in Ornamental crops

V SEMESTER
15HORU0512– PRODUCTION TECHNOLOGY OF VEGETABLES AND
SPICE CROPS (2+1)

Objectives:

1. To learn about the nursery practices, planting , maturity indices, harvesting techniques, grading, packaging, storage and seed production techniques of vegetable crops.
2. To learn about the production technology of spice crops

Tropical vegetables

Horticultural classification – area and production – export potential – nutritive value – production systems – vegetable forcing – climate and soil requirements – varieties – nursery practices and planting – after care – management of nutrients – irrigation and weed – intercropping – use of plant growth regulators – maturity indices – harvesting techniques – grading , packaging and storage – seed production techniques of:

Unit I: Production Technology of Solanaceous ,Malvaceous and Leguminous vegetables

Tomato, brinjal, chillies, bhendi, cucurbits, garden bean and cluster bean. , peas, beans,

Unit II: Production Technology Of Cucurbitaceous And Crucifers Vegetables

Gourds ,Melons,Chowchow,Pumpkin,Cucumber,Gherkin, Cabbage, Cauliflower,

Unit III: Production Technology of Bulb, Root and tuber vegetables,

Onion, Garlic, Radish, Carrot and Beetroot, Potato, Tapioca and Sweet Potato.

Unit IV: Production Technology of leafy and other vegetables

Amaranthus, Celery and Lettuce,Drumstick, curry leaf, and coccinea.

Unit V: Spice crops

Pepper, cardamom, turmeric, ginger.

Practical:

1. Identifying and description of varieties of solanaceous vegetables
2. Identifying and description of varieties of bhendi and leguminaceous vegetables
3. Identifying and description of varieties of cucurbits
4. Identifying and description of varieties of root and tuber crops
5. Identifying and description of varieties of amaranthus and leafy vegetables
6. practising nursery methods for vegetables crops
7. practising field preparation, sowing and planting of vegetables
8. practising nutrient, water and weed management for vegetables
9. acquiring knowledge about the special types of after cultivation practices followed in vegetable crops.
10. practising maturity indices followed for vegetables
11. practising post harvest handling and packaging methods followed for vegetables
12. acquiring knowledge about the nursery practices in spice crops
13. Visit to a vegetable market

Reference Books:

1. Bose, T.K. 1986. Vegetable Growing in India. Naya Prakash Publication, Calcutta.
2. Das, P.C., Vegetable Crops of India. Kalyani Publication, New Delhi.
3. Shanmugavelu, K.G. 1989. Production Technology of Vegetable Crops. Oxford India Publication, New Delhi.
4. Singh, S.P. 1989. Production Technology of Vegetable Crops. Universal Publication centre, Karnal.

5. Veeraraghavathatham, D., M. Jawaharlal and Seemanthini Ramadas. 1996. A Guide on Vegetable Culture. A.E. Publications, Coimbatore

6.

Learning out come		
Unit	Vague out come	Most precious out come
I	Studying the production technology of Solanaceous, Malvaceous and Leguminous vegetables	1. Understanding the production technology of Solanaceous, Malvaceous and Leguminous vegetables 2. Understanding the virus diseases and control measures for tomato and bhendi
II	Studying the Production technology of Cucurbitaceous and Crucifers vegetables	1. Understanding the Production technology of Cucurbitaceous and Crucifers vegetables 2. Understanding the importance of ethrel spray for cucurbitaceous vegetables
III	Studying the Production technology of Bulb, Root and tuber vegetables	1. Understanding the Production technology of Bulb, Root and tuber vegetables 2. Understanding the important after cultivation practices for root vegetables
IV	Studying the production technology of leafy and other vegetables	1. Understanding the production technology of leafy and other vegetables 2. Understanding the different species of amaranthus
V	Studying the Production technology of spice crops.	1. Understanding the Production technology of spice crops. 2. Understanding the processing technology of spice crops

V SEMESTER
15ANHU0521- DAIRY TECHNOLOGY (1+1)

Objectives

- To enlighten the students about the processing and marketing of milk.
- To gain an understanding of manufacturing methods and production of dairy products.

Theory

Unit I: Milk procurement and marketing

Market milk – market milk industry in India –Milk collection, reception, transportation of milk — clarification – grading of milk – clean milk production

Unit II: Milk processing and Marketing

Chilling – homogenization – sterilization – pasteurization – UHT processing of fluid milk —Standardized – toned – double toned – flavored milk.

Unit III: Diversified Milk Products -I

Fat rich dairy products – Cream, – butter, preparation – ghee, Fermented milk products– manufacture of Dahi-Yoghurt – Shrikhand –butter milk - therapeutic effects of fermented milk products – Concentrated and dried milk products – condensed milk – evaporated milk

Unit IV: Diversified Milk Products - II

Indigenous milk products – channa – channa based products – preparation of khoa and khoa based products – peda – gulab jamun – burfi – milk cake – preparation of paneer – kulfi – ice -cream .

Unit V: Packaging of Milk products – aseptic packaging – modified atmospheric packaging – scavengers – poly clip system- computed –aided designing – compatibility and toxicity of packaging materials.

Practicals

1. Sampling of milk.
2. Platform test
3. Determination of specific gravity of milk.
4. Analysis of fat in milk
5. Estimation of TS and SNF content in milk.
6. Detection of adulterants in milk.
7. Detection of preservatives in milk.
8. Preparation and analysis of dahi.
9. Preparation and analysis of khoa
10. Preparation and analysis of ice cream
11. Preparation and analysis of paneer and channa
12. Preparation and analysis of flavoured milk
13. Visit to milk processing unit

Reference Books

1. Anantha Krishnan, C.P., (1991), Technology of milk processing, Sri Lakshmi Publications, Chennai -10.
2. Banerjee G.C (1993) Text Book of Animal Husbandry, Oxford and IBH Publishing Co.Pvt. Ltd., New Delhi.
3. Aneja.R.P, B.N Mathur, R.C Chandra and A.K. Banerjee (2002).
4. Technology of Indian Milk Products, Dairy India year book 2007
5. Eeckless C.H, W.B Combs and H.Mecy (1955), Milk and Milk Products, Tata Mc Graw Hill Publishing Co.Pvt.Ltd., New Delhi.

6. Sukumar De (1980) Outlines of Dairy Technology, Oxford University Press, New Delhi.

LEARNING OUT COME

Vague outcome	Precious outcome
Students will learn about the Milk procurement and marketing	<ol style="list-style-type: none"> 1. From this content of the study, students will able to know the Market milk, market milk industry in India, Milk collection. 2. Learn about the details of clarification – grading of milk – clean milk production
Students will learn about the Milk processing and Marketing.	<ol style="list-style-type: none"> 1. From this content of the study students will able to know the milk. Chilling , homogenization , sterilization , pasteurization 2. Also learns about the details of UHT processing of fluid milk, Standardized, toned, double toned, flavored milk.
Students will learn about the production techniques of Diversified Milk Products I.	<ol style="list-style-type: none"> 1.From this content of the study will explain about the Fat rich dairy products – Cream, butter, preparation Fermented milk products, manufacture of Dahi,Yoghurt Shrikhand ,butter milk , therapeutic effects of fermented milk products 2. Also learns about the details of product storage, defects and their control measures. Concentrated and dried milk products , condensed milk , evaporated milk
Students will learn about the production techniques of Diversified Milk Products -II	<ol style="list-style-type: none"> 1. From the content of this course, student learns about the handling and manufacturing procedure of Indigenous milk products , channa , channa based products . 2.And also learn about the preparation of khoa and khoa based products , peda gulab jamun , burfi , milk cake , preparation of paneer , kulfi , ice -cream
Students will learn about the production details of various types of Packaging of Milk products.	<ol style="list-style-type: none"> 1. This content of the study will learn about the importance of packaging. 2. Also learn about the extension of shelf life of the dairy products

V SEMESTER

15AECU0502- PRODUCTION ECONOMICS AND FARM MANAGEMENT (2+1)

Unit I:

Product relationship - production function - definition & types - impact of technology. Law of diminishing returns – equi-marginal returns and opportunity cost – comparative advantage.

Unit II:

Farm management - definition and scope - relationship between farm management and other sciences - characteristics and significance. - Farm management decision making process – basic concepts in farm management.

Unit III:

Cost concepts & interrelations – optimum level of input use and optimum production. - Economies of scale – external and internal economies and diseconomies – returns to scale - economies of size. Factor – factor relationship – principle of substitution - isoquant, isocline. Expansion path, ridge line and least cost combination of inputs.

Unit IV:

Product – product relationship – types of products. Production possibility curve, iso revenue line and optimum combination of outputs - concepts of risk and uncertainty - types of uncertainty in agriculture - managerial decisions to reduce risks in production process.

Unit V:

Management of resources – types of resources - land, labour, capital, and measurement of their efficiencies - mobilization of farm resources – farm financial analysis – balance sheet - income statement - cash flow analysis - ratio analysis. Farm investment analysis – time comparison principles - discounted and undiscounted measures. Farm planning and control – elements of planning - farm level management information systems- farm budgeting – partial, enterprise and complete budgeting.

Practical schedule

1. Farm layout - farm records and accounts.
2. Farm appraisal techniques – valuation and depreciation.
3. Factor - product relationship.
4. Cost curves, optimum input and output levels.
5. Factor – factor relationship – least cost combination of inputs.
6. Product - product relationship.
7. Preparation of interview schedule and visit to a farm for data collection.
8. Estimation of cost of cultivation and cost of production of annual and perennial crops.
9. Estimation of cost of production– dairy and poultry products.
10. Investment analysis – undiscounted and discounted methods.
11. Preparation of balance sheet, income statement, cash flow statement and ratio analysis.
12. Estimation of 3r's of credit.
13. Preparation of farm plan – enterprise budgeting, partial budgeting and complete budgeting.

References

1. Johl S.S. and Kapur T.R. 2001. Fundamentals of Farm Business Management, Kalyani publishers, Ludhiana.
2. Muniraj, R. 2000. Farm Finance for Development, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
3. Raju V.T., 2002. Essentials of farm management, oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
4. Sankhayan P.L., 2001. Introduction to Farm Management, Tata Mcgraw hill publishing Co. Ltd., New Delhi.
5. Subba reddy, S and P. Raghu Ram, 1996. Agricultural Finance and Management, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

V SEMESTER
15AEXU0504 – RAWE II – NGOs (0+2)

Objective:

- To expose the students to NGOs to know about the Agricultural activities
- To gain practical experience on NGOs organizational pattern, and their functions

The students should get exposed to continuous field experience through RAWE programme. In the RAWE programme – II, that students will be placed in reputed NGOs and stay with them for a month to understand their organization pattern, role and functions and other allied activities. A separate record note book should be maintained by the students to record their activities. The student should prepare a check list after observing the websites of the NGOs and then work with them to learn about their field activities. They should submit a report and present their activities through PowerPoint in front of team teachers. The evaluation will be made purely on internal basis by the Course teacher.

Outcome:

The students can gain practical experience about the Agricultural activities carried out by NGOs, their organization pattern and allied activities

VI SEMESTER
15AGR0608- PRINCIPLES AND PRACTICES OF CROPPING AND FARMING
SYSTEM (1+1)

Unit I:

Farming system – scope – classification – components of farming system – interaction between components. Cropping system – complementary and competitive interaction

Unit II:

Effect of preceding crops and associated crops. Indices for evaluation for cropping systems – agronomic requirements in management of cropping system – cropping scheme.

Unit III:

Sustainable agriculture – role of Integrated Farming System (IFS) in sustainable agriculture. Factors governing choice and size of enterprises and resource allocation in farming system

Unit IV:

Models of Integrated Farming System (IFS) for wet, garden and drylands. Organic farming – resource management under constraint situations

Unit V:

Low External input sustainable agriculture (LEISA) concepts and principles – low cost technology and non – monetary inputs.

Practical schedule

1. Collection of data on area, production and productivity of major crops in different regions of India and Tamil Nadu.
2. Preparation of cropping scheme – working out input requirements for crops, cropping system – preparation of calendar of operations for wetland cropping system.
3. Preparation of cropping scheme – working out input requirements for crops, cropping system – preparation of calendar of operations for garden land cropping system.
4. Preparation of cropping scheme – working out input requirements for crops, cropping system – preparation of calendar of operations for garden land cropping system.
5. Preparation of cropping scheme – working out input requirements for crops, cropping system – preparation of calendar of operations for dry land cropping system.
6. Visit to IFS in wetland, garden land and dry land areas
7. Visit to nearest different farming centers to observe cropping systems, component integration, constraints and impact of technology.
8. Visit to farmer's field to observe different component integration constraints and impact of technology.
9. Visit to dairy and poultry unit. (Animal husbandry)
10. Visit to sericulture unit. (Sericulture)
11. Visit to mushroom unit. (Pathology)
12. Visit to biogas unit. (Bio energy)
13. Visit to Agro Forestry Centre, Mettupalayam (FC & RI).

References

1. Chatterjee, b.n. And S.Maiti. 1993. Cropping system – theory and practice oxford and IBH publishing Co.Pvt. Ltd., New Delhi.
2. Palaniappan, SP and K. Sivaraman.1996. Cropping systems in the Tropics – Principles and Management. New Age International (P) Ltd., Publishers, New Delhi.
3. Jayanthi.C. *et.al*, 2002. Integrated farming system – A path to Sustainable Agriculture. TNAU Publication No.14/2002.
4. Rangasamy, A., K.Annadarai, P.Subbian and C.Jayanthi.2002. Farming systems in the Tropics Kalyani Publishers.
5. Panda, S.C. 2003. Cropping and Farming Systems. Agro bias, Jodhpur.

VI SEMESTER
15AGRU0609 - SHORT TOUR – II - North Tamilnadu (0+1)

Students will be taken to Tour with in North Tamil Nadu to study soils, crops, cropping pattern and cultivation practices for major crops in the various Agro climatic zones of the area. The duration of the tour will be 7 days. During the tour, the students will visit important Research stations / Institutes in Northern Zone of Tamil Nadu. Students will maintain a tour diary to record their observations at the places of visit. A tour record has to be submitted after the tour. The evaluation procedure will be as follows:

Evaluation procedure

Written test	50 marks
Attendance and behaviour	20 marks
Record and pocket note book	20 marks
Vivo - voce	10 marks
Total	100 marks

VI SEMESTER

15AGBU0605- PRINCIPLES OF SEED PRODUCTION TECHNOLOGY (2+1)

Objective

This course, aimed at to understand the impart theoretical knowledge and practical skills about seed physiology and seed classification, seed production, seed certification, seed testing and seed storage.

Unit I: Seed Physiology and Seed Classification

Seed – seed composition – seed structure-development varietal deterioration – causes and methods of maintenance- generation system of seed multiplication-nucleus – breeder – foundation – certified – truthfully labeled seed – factors affecting quality seed production, climatic, edaphic and biotic factors.

Unit II: Seed Production

Seed production- Principles and methods – self and cross pollinated crops – general seed production techniques in varieties – hybrids. Vegetatively propagated crops.

Unit III: Seed Certification

Seed certification – Importance – phases. Field inspection – Isolation – Removing off types, field standard-seed standard – Seed Act and Seed Rules – Seed Law enforcement.

Unit IV: Seed Testing

Seed testing objectives – importance – seed sampling procedure – seed moisture estimation – importance – dormancy – methods of breaking dormancy- Seed Viability germination requirements – media and methods – seedling evaluation – quick viability test-principle – important methods – seed health testing – principles – importance.

Unit – V Seed Storage

Seed storage- Factors affecting seed quality in storage – seed moisture, temperature, RH. Packing materials – seed godown sanitation, Fumigation.

Practical Schedule

1. Study of structure and morphology in important agricultural crops – I
2. Study of structure and morphology in important agricultural crops - II
3. Study of structure and morphology in important horticultural crops – I
4. Study of structure and morphology in important horticultural crops – II
5. Identification of off- types, rouges and pollen shedders in agricultural crops.
6. Identification of off- types, rouges and pollen shedders in horticultural crops.
7. Practicing emasculation and dusting and pollination.
8. Seed upgrading techniques in important crops – cob sorting, kapas grading, fruit grading, pod sorting.
9. Practicing seed extraction methods in different varieties and hybrids.
10. Visit to seed processing units- study of processing equipment for agricultural and horticultural crops.
11. Visit to seed certification agency.
12. Seed moisture estimation – principles – different methods of estimation – reporting results-
13. Visit to seed testing laboratory.

Reference Books

1. Bhaskaran, M., A. Bharathi, K. Vanagamudi, P. Natesan, N. Natarajan, R. Jerlin and K. Prabakar. 2003. "Principles of Seed Production and quality control" M/S. Kaiser graphics, Ganapathy, Coimbatore.
2. Agarwal. R. L. 1996. Seed Technology –Oxford and IBH publishing Co. New Delhi.
3. Bose, T.K., S.K. Mitra and N. K. Sathur. 1990. Propagation of tropical and sub tropical Horticultural crops, Nayaprakash, Kolkata.

Outcome:

The students will learn about seed physiology, seed production, seed testing and seed storage.

VI SEMESTER
15HORU0613 – PRODUCTION TECHNOLOGY OF FLOWER CROPS, MEDICINAL
AND AROMATIC CROPS (2+1)

Objectives:

1. To learn about the Production systems, Season of flowering, plucking methods, Grading, packaging, storage and techniques of floral concrete extraction of commercial flower crops and cut flowers.
2. To learn about the Production Technology of Medicinal and Aromatic Plants

Area and Production – Export potential – Commercial utility – Production systems – Flower forcing – climate and soil requirements – varieties – Propagation methods - Planting and after care – Management of nutrients, irrigation and weed – Training and pruning – Use of plant growth regulators – Season of flowering – plucking methods – Grading, packaging and storage – Techniques of floral concrete extraction of:

Unit I: Production technology of Commercial flower crops-I ;

Rose, jasmine

Unit II: Production Technology of Commercial flower crops -II

Chrysanthemum, Crossandra and marigold, Tuberose, Nerium, Marikolundu and Maruvu

Unit III: Production Technology of Cut flower crops

Cut Rose, cut Chrysanthemum ,caranation, gerbera, gladiolus,anthrium,chinaaster,orchids

Unit IV: Production Technology of Medicinal Plants

Senna, Periwinkle, Digitalis and Pyrethrum,glorsia,aloe,noni

Unit V: Production Technology of Aromatic Plants

Lemon grass, Citronella, Palmarosa and Geranium.

Practical:

1. Identifying and description of varieties in rose and jasmine
2. Identifying and description of varieties in chrysanthemum and tuberose
3. Identifying and description of varieties in crossandra and marigold
4. Practising in field preparation and planting of flower crops
5. Practising in pinching, Training and pruning in rose, jasmine, chrysanthemum and marigold
6. Practising in manuring and fertilizer application practices in flower crops
7. Practising in harvesting practices on flower crops
8. Identifying and description of medicinal plants
9. Identifying and description of aromatic plants
10. Visit to a medicinal and aromatic plants farm
11. Visit to a essential oil extraction unit
12. Visit to a Siddha medicine unit
13. Visit to a flower market

Reference Books:

1. Bose, T.K. and P. Yadav. 1989. Commercial flowers. Naya Prakash Publications, Calcutta.
2. Kumar, N. 1997. Introduction to Horticulture. Rajalakshmi Publication, Nagercoil.
3. Randhawa, G.S. and A. Mukhopadhyay. 1986. Floriculture in India. Allied Publishers (P) Ltd., New Delhi.
4. Robert Bentley and Henry Trimen. 2002. Medicinal plants, Omsons Publications, New Delhi.
5. Joseph Jose and Rajalakshmi R. 2005. Medicinal and aromatic plants, Discoverypublishing house, New Delhi.
6. Prajapati, Purohit, Sharma and Kumar. 2006. A Handbook of Medicinal plants-A complete source book. Agrobios, India
7. Nursadh Ali. 2008. Medicinal plants cultivation, Mittal publications, New Delhi.

Learning out come		
Unit	Vague out come	Most precious out come
I	Studying the Production Technology of Rose and Jasmine	1. Understanding the Production Technology of Rose and Jasmine 2. Understanding the pruning techniques followed for of Rose and Jasmine
II	Studying the Production Technology of. Chrysanthemum, Crossandra and marigold, Tuberoze, Nerium, Marikolundu and Maruvu	1. Understanding the Production Technology of Chrysanthemum, Crossandra and marigold, Tuberoze, Nerium, Marikolundu and Maruvu 2. Understanding the floral concrete extraction From tuberoze
III	Studying the Production Technology of Cut Rose, cut Chrysanthemum ,caranation, gerbera, gladiolus,anthrium,chinaaster,orchids	1. Understanding the Production Technology of Cut Rose, cut Chrysanthemum ,caranation, gerbera, gladiolus,anthrium,chinaaster,orchids 2. Understanding the suitable rose and caranation varities for cut flowers
IV	Studying the Production Technology of Senna, Periwinkle, Digitalis ,Glorisa,Aloe and Noni	1. Understanding the Production Technology of Senna, Periwinkle, Digitalis ,Glorisa,Aloe and Noni 2. Understanding the economic parts of medicinal plants.
V	Studying the Production Technology of Lemon grass, Citronella, Palmarosa and Geranium.	1. Understanding the Production Technology of Lemon grass, Citronella, Palmarosa and Geranium. 2. Understanding the oil extraction methods.

VI SEMESTER
15AGMU0601- AGRICULTURAL MICROBIOLOGY (2+1)

Unit 1

History of Soil Microbiology & Occurrence of Microorganisms; Historical developments in agriculture microbiology – Contributions of Beijerinck, Winogradsky, Fleming and Waksman Distribution and importance of soil microorganism – Factors affecting the occurrence and activities of soil microorganisms.

Unit II

Transformation of Carbon & Nitrogen in Soil; Carbon and nitrogen cycle in nature – Mineralization – Ammonification – Nitrification – Denitrification and biological nitrogen fixation: Symbiotic and non symbiotic microorganism – Process of nitrogen fixation.

Unit III

Rhizosphere Microorganisms and its Importance; Microbial transformation of phosphorous – Rhizosphere and its importance in crop plants RS ratio-Microbial interrelationship in soil-Beneficial and harmful relationships.

Unit IV

Biofertilizers – Production & Quality Control; Bacterial biofertilizers: Rhizobium, Azospirillum, Azotobacter, Glucanoacetobacter, Azorhizobium and Phosphobacteria-Plant growth promoting rhizobacteria (PGPR) – Fungal biofertilizers Ecto and Endomycorrhizae-Algal biofertilizers: Blue green algae and Azolla – Production and quality control of biofertilizers.

Unit V

Composting Technology and its uses; Composting – Types of composting – Composting of agroresidues – Types of agroresidues – Enrichment of compost using Rhizobium, Azospirillum, Azotobacter, Phosphobacteria and Plant growth promoting rhizobacteria.

Practical

1. Measurement of microorganisms using Micrometry.
2. Sterilization techniques and Preparation of growth media for bacteria, fungi and actinomycetes.
3. Isolation, purification and preservation of bacterial and fungi
4. Staining techniques, Simple, differential, and spore staining.
5. Pure culture, physiological and biochemical tests for bacteria.
6. Conn's direct microscopic count of estimating soil microbial population.
7. Standard plate count of soil microorganisms or Dilution plate technique.
8. Isolation of Root nodule bacterium – Rhizobium ,
9. Isolation and purification of Azotobacter, Azospirillum, Phosphobacteria.
10. Biofertilizer inoculant production
11. Compost making and testing quality
12. Different methods of Biofertilizer application to crops
13. Growth response of Crops to biofertilizers application

Reference:

1. K.R.Aneja. (1993). Experiments in Microbiology Plant Pathology and Tissue Culture. Wishwa Prakashan, New Delhi India.
2. Dubey R.C and Maheswari D.K. (2002). Practical Microbiology 1st Ed. Chand and Company Ltd. India.
3. James.G. Cappuccino and Natabe Sherman (2004). Microbiology-A Laboratory Manual VI Ed., CI Indian Reprint. Pearson Education (Singapore) Pvt.Ltd.India.

VI SEMESTER

15AGSU0606- FUNDAMENTALS OF ENVIRONMENTAL SCIENCES (1+1)

Objective:

1. To orient environment, ecology and ecosystem concepts of broad based solid and liquid waste management
2. To impart knowledge on environmental pollution and its management

Unit I: Introduction to Ecology and Environment

Introduction – Ecology – Environment: components, segments(hydrosphere atmosphere, lithosphere and biosphere)- Ecosystem concepts – Species, Population, Community and Succession, Species interaction- Energy efficiencies and Energy flow – Food chain, food web and ecological pyramids, cropping pattern.

Unit II: Natural Resources and Biodiversity

Natural resources – Soil, Water, Air, Mineral, Energy, Forest resources; Bio diversity importance, hot spots and conservation.

Unit III: Environmental Pollution

Pollution: Problems, types and sources – Soil, Water and Air pollution: Sources, effects and control measures – Radioactive thermal and nuclear pollution – Global warming and climate change: GHG emission, GH effect - Impact on environment and agriculture – mitigation strategies.

Unit IV: Soil and Liquid Waste Management

Types of wastes – Industrial wastes, Agricultural wastes, Domestic wastes and e wastes Characteristics and Environmental Impact – Soil wastes management techniques: Principles and practices.

Unit V: Environmental Protection

Waste water treatment Techniques – Physical, chemical and biological methods. Environmental Laws and Acts – Environmental Education.

Practical:

1. Estimation of population and its indices of species in an agro-ecosystem.
2. Characterization of waste water: Collection and sampling methods.
3. Estimation of pH, EC in waste water samples.
4. Estimation of Biological oxygen demand in waste water samples.
5. Estimation of Chemical oxygen demand in waste water samples.
6. Estimation of acidity and alkalinity of waste water samples.
7. Estimation of hardness in waste water samples.
8. Estimation of chlorides and sulfates in waste water samples.
9. Interpretation of waste water analytical results.
10. Treatment of waste water
11. Visit to Common effluent treatment plant & Degraded Ecosystem.

12. Solid waste management – Composting methods (Vermicomposting / Coir composting)
13. Estimation of Heavy metals contamination in soil - water ecosystem.

References

1. Balakrishnamoorthy 2005. Environmental Management. Prentice – Hall of India Private Ltd. New Delhi.
2. P. D. Sharma, 2009, Ecology and Environment, Rastogi Publication, Meerat, India.
3. William P. Cunningham and Mary ann Cunnungham, 2007. Principles of Environmental Sciences, Tata McGraw hill Publication company, new Delhi.
4. Stanley E.Manhan. 1997. Environmental Sciences and Technology. Lewis Pubilcation New York.
5. Sharma P.D. 2006. Environmental Microbiology. Narosa Publishers,New Delhi.

Outcome:

Students can acquire skills by this subject in terms of ecology management, treating of wastes by adopting 4Rs strategies in clear cut way and can be used for further studies

VI SEMESTER
15AGEU0603 – SOIL AND WATER CONSERVATION (2+1)

Objectives:

- To study different types of soil erosion due to water and wind and their control methods
- To study soil conservation structures and watershed management practices suitable for different field condition

Unit I: Soil Erosion

Definition – Factors affecting soil erosion by water – climate, topography, vegetation and soil; Classification of erosion – geological and accelerated erosion; Types of erosion – rain drop erosion, rill erosion, sheet erosion, gully erosion, stream channel erosion; Results of erosion by water.

II: Wind Erosion

Soil movement by wind erosion – soil particle movement - saltation, suspension and surface creep; Factors influencing erodibility, Measures of control wind erosion- Tillage practices and machinery to control soil blowing; Surface roughness; wind break and shelter belts,

Unit III: Field structure and practices to control erosion by water

Land use capability classification; , Terracing – types of terraces- broad base ridge type and bench terraces – specification, location, soil suitability; bunds – Graded bunds, contour bund- specifications; contour trenches.

Unit IV: Gully Control Structures

Temporary gully control structures – Brush dam, Rock dam; Permanent gully control structures – Drop spillway, Chute spillway, Drop inlet spillway – their functions, components and selections of site.

Unit V: Water Shed Management

Definition, Principles, objectives and benefits; Water shed development methods – basic land treatment, crop and animal husbandry practices and alternate land use system; Insitu soil conservation methods in watershed area; Integrated watershed management – activities involved.

Practical

1. Chain survey – Direct ranging, indirect ranging methods -
2. Obstacles found in chaining and methods to overcome
3. Cross staff survey measuring the irregular area
4. Measuring irregular area by ordinate methods
5. Finding out level difference between two stations by using dumpy level
6. Field problems in simple leveling and compound leveling.
7. Field study of different kinds of erosion
8. Scale drawing of terraces
9. Scale drawing of contour bund and graded bunds
10. Scale drawing of gully control structures.
11. Visit to soil and water conservation training centers.
12. Watershed management practices adopted in black soil and red soil areas
13. Visit to Nilakottai Watershed area

Reference books

1. Singhal, O.P. 1998. Agricultural Engineering, Aman Publishing house, Meerut.
2. Dr.Bimal Chandra Mil. 1995. Introduction to soil and water conservation engineering, Kalyani Publishers, Calcutta.
3. Saini, G.S. 1996. A textbook of soil and water conservation, Amman Publishing house, Meerut.
4. Zamir Alvi. 1994. A text book of surveying, Vikas Publishing House Pvt. Ltd., New Delhi.
5. Murthy, V.V.N and Madan K.Jha.2009. Land and water Management Engineering, Kalyani Publishing, New Delhi

Outcome: The students can learn different types of erosion due to water and wind and able to identify suitable soil conservation methods to arrest erosion and they can also understand the different activities involved in promoting watershed development under different field conditions

VI SEMESTER
15AECU0603 – AGRICULTURAL FINANCE, BANKING AND
CO-OPERATION (1+1)

Unit I: Agricultural Finance

Definition of Agricultural Finance- Nature- scope-meaning-significance- micro & macro finance. Credit needs in Agriculture- meaning and definition of credit-classification of credit based on time, purpose, security, lender and borrower. Credit analysis

Unit II: Five Cs of credit – Methods and mechanics of processing loan application, Repayment plans, Recent trends in Agricultural finance, Lead Bank Scheme, Crop Loan System, Schemes for financing weaker sections, Crop insurance,

Unit III: Banking

Higher financing Agencies - Reserve Bank of India (RBI) – Origin – Objectives and functions – Role of RBI in Agricultural development and finance. National Bank for Agricultural and Rural Development (NABARD) –Origin, Functions, activities and its role in Agricultural Development. International Bank for Reconstruction and Development (IBRD), International Monetary Fund (IMF), International Development Agency (IDA), Asian Development Bank (ADB), Insurance and Credit Guarantee Corporation

Unit IV: Co-operation

Co-operation-Meaning-Scope, Importance and definition- Principles and objectives. Origin and History of Indian cooperative movement – Shortcomings of Indian cooperative movement and remedies- Classification of cooperative credit institutions

Unit V: Entrepreneurship Development

Concept of Entrepreneurship -Entrepreneur and Entrepreneurship - definition, meaning, characteristics of ideal entrepreneurs - Types of entrepreneurs. Training programmes for entrepreneurship development

Practical schedule

1. Credit analysis – Economic feasibility tests
2. Visit to commercial bank to study their functions
3. Visit to lead bank
- 4 Study on unorganized financial institution
5. Visit to NABARD district office
6. Visit to Self Help Group and study their activities
7. Preparation of agricultural development projects – Agriculture
8. Preparation of agricultural development projects – Animal Husbandry
9. Preparation of agricultural development projects - Horticulture
10. Preparation of rural development projects – Fisheries
- 11 .Preparation of bankable business project – Sericulture
12. Preparation of bankable business project- Irrigation
13. Preparation of bankable business project – Forestry

References

1. Ghosal, SN., Agricultural Financing in India, Asia Publishing House, Bombay, 1996
2. Johi, S.S. and C.V. Moore., Essentials of Farm Financial Management, Today and Tomorrow's Printers and Publishers, NewDelhi, 1970
3. John, J. Hamptson., Financial Decision Making: Concepts, Problems and cases, Prentice-Hall of India, NewDelhi, 1983
4. Subba Reddy, S., P.Raghu ram., P. Sastry, T.V.N and Bhavani Devi, I. 2010. Agricultural Economics., Oxford & IBH Publishing Company private Ltd., NewDelhi, 2010.
5. William, G. Murray and Nelson Aaronson, G., Agricultural Finance, The Iowa State University Press, Ames, Iowa, 1960.

VI SEMESTER
15AEXU0605 – AGRICULTURAL EXTENSION FOR TRANSFER OF
TECHNOLOGY (1+1)

Objective:

1. To inculcate knowledge on how the Agricultural Extension programme helps in transfer of technology
2. To learn the farmers category in adoption of innovations

Unit I: Extension Education

Education – Formal, Non-formal and Informal. Extension Education – Meaning, Definition, Concepts, Characteristics, Terminology in Extension. Extension Education – Objectives, Principles, Scope and Importance.

Unit II: Programme Planning

Meaning of planning, Programme, Importance. Principles and steps in programme development process. Monitoring – meaning and types. Evaluation – meaning, definition, objectives, types and importance.

Unit III: New Approaches in Extension

PRA, NATP, ATMA, Agriclincs, PPP, FFS. Privatization of Extension, Market led Extension, Commodity Interest Groups.

Unit IV: Diffusion and Adoption of Innovations

Adoption, Diffusion – Adoption process and Innovations – meaning, models of adoption process – Attributes of Innovations – Innovation decision process – meaning and stages – Concepts dissonance and rejection – over adoption – rate of adoption and innovativeness – Adopter categories and their characteristics – Factors influencing adoption process.

Unit V: Training

Capacity building of extension personnel and farmers – Training- meaning- types of training- farmers training centers (FTC), Krishi Vigyan Kendra (KVK), Agricultural Technology Management Agency (ATMA) – Objectives and salient features

Practicals

1. Terminology in Extension methodologies
2. Study on Programme Planning
3. Visit to village to study development programmes
4. PRA/PLA Techniques in a village to identify agricultural problems
5. Visit to ATMA and study on SREP in the district
6. Study on Agriclincs centres
7. Study on Private Extension in the nearby area
8. Study on Commodity Interest Groups and observe the activities
9. Study on Farmers Entrepreneurs in the nearby villages
10. Study and observe the different levels of adopters
11. Attending and observing Farmers Training done by KVKs
12. Attending and observing Farmers Training done by ATMA
13. Visiting Information Village/ Knowledge Centers of MSSRF

Reference books

1. Dahama, O.P. and Bhatnagar, O.P. (1996). Education and Communication for Development. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Ganesh, R., Mohammad Iqbal, I. and Anandaraja, N. (2003). Reaching the Unreached- Basics of Extension Education. Associated Publishing Company, New Delhi.
3. Ray, G.L. (2006). Extension Communication and Management Naya Prakashan, Kolkatta.
4. Adivi Reddy, A. (2005). Extension Education. Sri Lakshmi Press. Bapatla
5. Rogers, E.M. (2003). Diffusion of Innovations. Free Press, New Delhi.
6. Yella Reddy, N. (1998). Audio-Visual Aids for Teaching, Training and Extension. Haritha Publishing House, Hyderabad.

Outcome:

The students can learn the training and capacity building programmes which will help for transfer of Agricultural technology and how best the course will help in doing research in Agricultural Extension.

VI SEMESTER
15AGRU0610-EXPERIENTIAL LEARNING- I (0+5)

The students will be placed in three different agricultural enterprises in groups and they will be exposed to that particular enterprise and allowed to practice themselves from seed to seed. The produce obtained out of this learning experience will be marketed by themselves and the profit will be shared among them.

VII SEMESTER

15AGR0711 – FORESTRY AND WATERSHED MANAGEMENT (2+1)

Objective:

- To conceptualize the importance of Forests and Agroforestry system
- To impart knowledge on watershed and wasteland management

Unit I: Forestry

Forests and Forestry- Forests in India and Tamil Nadu – Distribution – Status – Importance – their use and conservation – Forest influences – Classification – Role and functions – Production forestry – Plantation forestry – Non Timber Forest Produces.

Unit II: Silviculture

Definition – Natural and Artificial regeneration – Silvicultural practices – Seed and Nursery – Planting – Choice of species – Tending operations – Energy plantation – Strip plantation – Industrial plantation.

Unit III: Agro Forestry

Definition – Scope - Concept – Benefits – System in AF – Classification- Choice of species – Suitability characteristics of tree sp. – Multi Purpose Trees and Nitrogen Fixing Tree sp. for Agro Forestry – Management practices.

Unit IV: Watershed Management

Introduction – Definition – Characteristics of watershed – Effects – Concept and objectives – Types- Watershed Management – Criteria for selection – Components of Watershed treatment plan – Soil and Water Conservation practices – Forage farming – Alternate land use systems.

Unit V: Wasteland Development

Land use planning – Concepts and objectives – Modern techniques for land use planning – Land capability – classification – Land suitability – Sustainable land management practices – Concepts, Principles, Assessment and Evaluation – Land degradation – Physical, Chemical, Biological – Extent- Causes-Management - Wastelands – Types and Management.

Practical

1. Non-Timber Forest Produces and their uses
2. Acquiring skills in preparation of nursery for forest plantation.
3. Seed collection Seed treatment and storage of forest tree sp.
4. Planting methods and In situ conservation of soil moisture in plantation.
5. Study of systems of Agro-forestry and tree sp. suitable for multipurpose uses.
6. Study of Nitrogen fixing trees and multipurpose trees
7. Study of Agro forestry options in Tamil Nadu
8. Study on micro watershed and selection
9. Study on Components of watershed Treatment plan
10. Study on Land use in India and planning.
11. Classification of Wastelands and suitable measures to develop them.
12. Visit to Agro-forestry, watershed and wasteland development areas and observe the
13. activities.
14. Study on Forest tree Certification.

References

1. Rajesh Rajora, (2008). Integrated Watershed Management
2. Luna,R.K. (1998). Plantation Forestry in India , International Book Distributors, Dehradun
3. FAO, (1991). Agroforestry in Asia and Pacific, RAPA Publications, Bangkok.
4. Moorthy J,V,S. (1998). Watershed Management, New Age International, New Delhi.
5. Nair,PKR (2008). An Introduction to Agro forestry, Sprinage (P) Ltd. New Delhi.
6. David M, Smith. (1989). The Practice of Silviculture, EBD Educational Pvt. Ltd., Dehradun.

Outcome:

The students can learn the principles and practices of Forestry, Agroforestry, Watershed management and Wasteland development.

VII SEMESTER

15AGBU0706- PRINCIPLES AND APPLIED PLANT BIOTECHNOLOGY (2+1)

Objective

This course, aimed at to understand to impart knowledge and practical skills to use biotechnological tools in crop improvement and molecules like proteins and nucleic acids and their functions.

Unit I:

Concepts and scope of Biotechnology – history and development of Biotechnology – history of plant culture – totipotency-sterilization techniques - explants

Unit II:

Organogenesis and embryogenesis – callus culture – cell suspension culture and secondary metabolite production – micropropagation – meristem culture and production of virus free plants – anther and microspore culture

Unit III:

Protoplast isolation – fusion – somatic hybrids – somaclones- synthetic seeds. Invitro germplasm conservation – cryopreservation – achievements of tissue culture in agriculture

Unit IV:

Structure of nitrogenous bases, nucleotides, nucleosides and nucleic acids – chromatin structure and organization – organelle DNA. Satellite and repetitive DNA – replication and repair – transcription and translation-regulation of gene expression.

Unit V:

Recombinant DNA technology – achievements and recent developments of genetic engineering in agriculture. Antigens and antibodies. Production of monoclonal antibodies and its applications – ELISA.

Practical

1. Visit to Biotechnology laboratory, observation of molecular biology equipments
2. Preparation of reagents for plasmid isolation
3. Isolation of plasmid
4. Preparation of reagents for DNA extraction
5. Extraction of DNA from plant tissues
6. Quantification of DNA
7. Electrophoresis of plasmid
8. Electrophoresis of DNA
9. Preparation of stock solutions for MS Medium
10. MS medium preparation
11. Inoculation of explants (shoot tip/meristem tip/embryo)
12. Preparation of reagents for anther and microspore culture
13. Anther culture and microspore culture

References

1. Dodds, H.J. and Robers, L.W. 1982. Experiments in palnt tissue culture Cambridge University
2. Thorpe, T.A. 1981. Plant tissue culture – Methods and applications in Agriculture. Academic Press.
3. Bojwani, S.S. and Razdon, M.K. (1983). Plant tissue culture. Theory and Practicals
4. George, E.F. and Sherrington, P.D., 1984. Plant propagation by tissue culture. Hnadbook and Dictionary of commercial operators. Mahalakshmi Enterprises. Bangalore.
5. R.L.M. Pierik. 1987. Invitro culture of higher palnts. Maritune nithoff Publisher, Netherlands.

Outcome:

The students will learn about use of biotechnological tools in crop improvements and their functions.

VII SEMESTER
15H0RU0714- LANDSCAPE GARDENING (1+1)

Objectives

1. To learn about the History, Importance, Principles of Landscape Horticulture and Garden components
2. To learn about the Lawn making and Landscape Designs

Unit I : History, Importance and Principles of Landscape Horticulture

History – Importance of gardening – Gardens in India – Types of gardens – Hindu, Buddhist, Persian, Moghul, Japanese, English, French and Italian Formal, Informal and Picturesque types – Bio-aesthetic planning - Definition and needs – Principles of landscape gardening.

Unit II: garden – plant components-1

Components of garden – Raising - Training, pruning and maintenance of Trees, Shrubs, Annuals, Climbers, Creepers, herbaceous perennials - palms, cacti and succulents – Establishment of topiary, trophy, hedge, edge, flower and foliage beds

Unit III: Garden- Non plant components - II

Components of garden – rock garden-water garden-fountains- statues-pillars-trellies-tubs and urns

Unit IV: Lawn making

Establishment of lawns – Lawn grasses – Laying - Maintenance.

Unit V: Landscape Designs

Landscape designing - tools – landscape survey and site analysis – Planning and designing of Home, Institutional, Industrial, school, road side and traffic gardens - Avenue planting, public parks.

Practical:

1. Identifying and description of ornamental trees
2. Identifying and description of ornamental shrubs
3. Identifying and description of ornamental climbers and creepers
4. Identifying and description of ornamental hedges and edges
5. Identifying and description of ornamental flowering annuals
6. Acquiring knowledge about the description and designing of garden structure
7. practising collection and identification and description of lawn grasses
8. practising Lawn making
9. practising Lawn maintenance
10. Identifying suitable plants for topiary work
11. Visit to nursery
12. Visit to park
13. Visit to different type of gardens

Reference books:

1. Bose, T.K. and D. Mukherjee. 1977. Gardening in India. Oxford and IBH Publishers and Co., Calcutta.
2. Gopalsamy Iyengar, 1990. Complete Gardening in India. IBH, Bangalore.
3. John Ainsworth. 1988. The Art of Indoor Bonsai. Wardlock Publishing Ltd., London.
4. John Ravenscroft. 1996. Gardeners Diary. Marshall Cavendish Publishers Italy.
5. Lancaster, P. 1991. Gardening in India. Oxford and IBH publishers Pvt. Ltd., Calcutta.
6. Nambisan, K. M. P. 1992. Design Elements of Landscape Gardening. Oxford and IBH Publications Co., (P) Ltd, New Delhi.
7. Peter McHoy. 1997. The A-Z Guide to House Plants. Marshall Cavendish publishers, Italy.

Learning out come		
Unit	Vague out come	Most precious out come
I	Studying the History – Importance of gardening – Gardens in India – Types of gardens – Hindu, Buddhist, Persian, Moghul, Japanese, English, French and Italian Formal, Informal and Picturesque types – Bio-aesthetic planning - Definition and needs – Principles of landscape gardening.	1. Understanding the history, importance and types gardens 2. Understanding the Principles of landscape gardening
II	Studying the Components of garden –Raising - Training, pruning and maintenance of Trees, Shrubs, Annuals, Climbers, Creepers, herbaceous perennials - palms, cacti and succulents – Establishment of topiary, trophy, hedge, edge, flower and foliage beds	1. Understanding the Components of garden – plant Components 2. Understanding the topiary work
III	Studying the Components of garden – rock garden-water garden-fountains-statues-pillars-trellies-tubs and urns	1. Understanding the Components of garden –Non plant Components 2. Understanding the suitable plants for rock and water garden.
IV	Studying the Establishment of lawns – Lawn grasses – Laying - Maintenance.	1. Understanding the lawn making methods and grasses 2. Understanding the lawn maintenance.
V	Studying the Landscape designing - tools – landscape survey and site analysis – Planning and designing of Home, Institutional, Industrial, school, road side and traffic gardens - Avenue planting, public parks	1. Understanding the landscape designs. 2. Understanding the planning and designing of various gardens.

VII SEMESTER

15AGEU0704 – ENERGY MANAGEMENT IN AGRICULTURE (1+1)

UNIT -I

Source of radiation – Solar constant – Measurement of solar radiation – Solar Flat plate collector – Classification -Construction details – Concentrating solar collectors – Solar drier – Solar Still – Solar Cooker – Solar Pond – advantage – Limitations – Solar PV – applications.

UNIT – II

Wind Energy – Measurement – wind farms – Horizontal and vertical axis wind machines – applications – electric power generation – water pumping – limitations – Solar & Wind Hybrid System.

UNIT – III

Biomass sources – Energy plantation – Biodegradable Feed stock – organic matter and animal residues – Factors influencing biogas production – Dry and wet fermentation – Digester types.

UNIT – IV

Combustion of Biomass – Briquetting – Thermo chemical principles – Pyrolysis – Gasification – fixed and fluidized bed gasifier – Bio fuels – Transesterification.

UNIT – V

Small Hydro Power – OTEC – Tidal Energy – Geothermal – MHD – Thermionic – Thermoelectric energy conversion system – Fuel Cells.

Practical

1. Study and identification of parts of Solar drier, Solar cooker
2. Study and identification of parts of Solar water heater, Solar lantern
3. Study and identification of parts of Solar Still
4. Study and identification of PV – Solar panel, PV – Solar pump
5. Study and identification of Solar pond
6. Study and identification of parts of wind mill
7. Study and identification of parts of Deenabandu biogas plant/ KVIC biogas plant/ Janata biogas plant
8. Study and identification of parts of Gassifier
9. Study and identification of parts of Briquetting machine
10. Study and identification of parts of Bio fuel
11. Study and identification of parts of Biomass- Stove
12. Field visit to College of Agricultural Engineering, TNAU, Coimbatore.
13. Field visit to Agricultural College & Research Institute, TNAU, Madurai.

Reference Books:

1. Koushika M.D., “Solar Energy Principles and Applications”, IBT publications, 1988.
2. Anna Mani & Nooley “Wind Energy Data for India”, 1983
3. Mital K.M, “Biogas systems: Principles and Applications”, New Age International Publishers (P) Ltd., 1996
4. Venkata Ramana P and Srinivas S.N., “Biomass Energy Systems”, TERI, 1996.
5. Rai, G.D., “Non-Conventional Sources of Energy”, Khanna Publishers, Delhi 1995.

VII SEMESTER
15ANHU0722- LIVESTOCK AND CHICKEN PRODUCTION (2+1)

Objectives:

1. The General objective of this course is to establish basic knowledge of how to manage and operate sheep, goat, pig, and rabbit farms.
 2. This course is designed to impart basic technical knowledge and skills required to successfully run livestock and chicken farm enterprise by developing competencies concerning the selection and breeding of livestock, management of animals of different physiological status, feeding, housing and health care.
 3. To impart scientific knowledge and skills required to run broiler and layer chicken farm successfully.
- I. **Sheep:** Introduction – Zoological classification – Advantages of sheep farming – breeds classification – Indigenous breeds – Hissardale, chokla, Nali, Nellore, Mandya – Breeds of Tamil Nadu – Mecheri, Madras red, Ramnad White, Trichy black, Kilakarsal, Vembur – Exotic breeds – Merino, Rambouillet, Dorest- Suffolk – South Down – Breeding – Selection of breeding stocks - Reproduction in sheep – Breeding system – Breeding policy for improving mutton and wool production — Feeding – Nutrient requirements – Feed resources – Pasture management – Flushing – Feeding of pregnant and lactating ewes – Housing of sheep – Common diseases – Sheep pox – Blue tongue – PPR – Anthrax – Hemorrhagic septicemia – Foot root – Pregnancy toxemia.
- II. **Goat:** Introduction – Meaning of commonly used terms – Advantages of goat farming – Breeds – Indigenous breeds – Jamunapari – Tellicherry – Barbari – Exotic breeds – Saanen – Toggenberg – Nubian – Breeding – Selection of breeding animal – Reproduction - Mating systems – Feeding – Feeding habits of goat – Nutrient requirement – Stall fed system of goat rearing – Control of ecto and endo parasites – Common complaints – Carbohydrate engorgement – HCN poisoning – Tetanus.
- III. **Swine:** Advantages and disadvantages of pig farming – Utility – Breeds – Large White Yorkshire – Middle White Yorkshire – Landrace – Berkshire – Breeding – Selection of breeding stocks – Reproduction - symptoms of heat – Care of pregnant sows – Management at the time of farrowing – Weaning – Feeding – Creep feeding – Starter ration – Grower ration – Finisher ration – quantity to be feed – Housing of pigs - Common diseases – Swine fever – Swine pox – Foot and mouth disease – Swine erysipelas – Brucellosis.
- IV. **Rabbit:** Advantages and disadvantages of rabbit farming – Breeds – New Zealand White – Californian - Giant Blanc – Chinchilla Giganta – Dutch – Angora – Breeding – selection of breeding stocks – Reproduction – Mating – Pregnancy – Fostering – Care of young rabbits – Handling of rabbits – Feeding – Concentrate – Roughage – Coprophagy – Time of feeding – Housing – Objectives – Rabbit hutches – Common diseases – Coccidiosis – Hemorrhagic septicemia – Ecto and endo parasites – Pneumonia.

- V. **Poultry:** Advantages of poultry farming – Role of egg and chicken meat in human nutrition – Parts of a fowl – Classification of poultry – American – English – Asiatic – Mediterranean classes – Management – Chick – Grower – Layer – Broiler – Housing – Location – Housing requirements – Construction details – Deep litter system – Cage system – Feeding – Nutrient requirement for different classes of chicken – Feed formulation – Common diseases – Ranikhet disease – Infectious bursal disease – Coccidiosis – Vaccination – Dressing of bird for table purpose.

Practical

1. Identification of breeds of sheep
2. Preparation of project for a sheep unit
3. Identification of breeds of goat
4. Preparation of project for a goat unit
5. Preparation of plans for housing of sheep and goats
6. Preparation of project for a piggery unit
7. Preparation of plans for housing of pigs
8. Visit to commercial sheep, goat, piggery, rabbitry and poultry farm
9. Debeaking and vaccination of poultry
10. Dressing of birds for table purpose
11. Preparation of project for a broiler chicken unit
12. Preparation of project for a layer chicken unit

References

1. ICAR, 2013. Hand book of Animal Husbandry, 4th Ed. ICAR Publication, Pusa, New Delhi.
2. Banerjee, G.C. 1998. Poultry, 8th edition, Oxford and IBH Publishing Company Ltd., New Delhi.
3. Sastry, N.S.R., C.K. Thomas and R.A. Singh. 2003. Livestock production management, Third edition, Kalyani Publishers, New Delhi.
4. Panda, B. and S.C. Mohapatra. 1989. Poultry Production. ICAR Publications, New Delhi.
5. C. P. Peacock, 1996. Improving Goat Production in the Tropics: A Manual for Development Workers, Oxfam

Learning Outcome

Unit I: Instruction in lessons in Unit I should result in students achieving the following objectives

1. Describe the size and contribution of sheep farming to Indian agriculture, economy and rural livelihood.
2. Know and identify different main breeds of sheep giving their origin and breed characteristics.
3. Develop a knowledge of the genetic diversity and versatility of sheep
4. Describe the characteristics of a good mutton sheep
5. Select desirable breeding and production animals.
6. Understand and explain the reproductive cycle of the ewe.
7. Describe the different sheep breeding systems.
8. Describe the principles of genetic improvement of mutton production.

9. Explain the basic concepts of sheep nutrition
10. Be able to list and describe the common diseases of sheep viz. sheep pox, blue tongue, PPR, anthrax, hemorrhagic septicemia, foot rot and pregnancy toxemia.

Unit II: Instruction in lessons in Unit II should result in students achieving the following objectives

1. Describe the size and contribution of goat farming to Indian agriculture, economy and rural livelihood.
2. Know and identify different main breeds of goat giving their origin and breed characteristics.
3. Develop a knowledge of the genetic diversity and versatility of goat
4. Be able to select desirable breeding and production animals.
5. Understand and explain the reproductive cycle of the doe.
6. Describe the different goat breeding systems.
7. Describe the principles of genetic improvement of goat milk and chevon production.
8. Gain insight into feeding habits of goat, the nutrient requirements for animals of different physiological status and feeding programs
9. Be able to diagnose and treat common complaints like acute carbohydrate engorgement, HCN poisoning, and diseases like tetanus and ecto and endo parasitic infestations.
10. Students will experience hands-on training in everyday management practices.

Unit III: Instruction in lessons in Unit III should result in students achieving the following objectives

1. Students will gain an insight into status of swine production in India
2. Students will gain knowledge about swine breeds, their classification, type and utility.
3. Students will gain knowledge in various swine production systems their advantages and disadvantages.
4. Able to select good breeding stocks of gilt and boar.
5. Gain skill in the management of piglets from birth to weaning
6. Gain knowledge in the management of pregnant sow.
7. Able to take care of farrowing sow.
8. Gain knowledge in general principles of swine feeding, nutritional requirements of different age groups and feeding of different categories of pigs in detail.
9. Gain knowledge in location and layout of piggery, space requirement, and construction details of pig sty.
10. Be able to list and describe the common diseases of pig viz. swine fever, swine pox, FMD, swine erysipelas and brucellosis.

Unit IV: Instruction in lessons in Unit IV should result in students achieving the following objectives

1. Able to identify common breeds of rabbit giving their origin and breed characteristics.
2. Able to describe the advantages and disadvantages of rabbit farming.
3. Understand and explain the reproductive cycle of the rabbit.
4. Know how to select a best breeding rabbit, and most suitable reproduction method.

5. Gain knowledge in pregnancy diagnosis, management of pregnant does, taking care at the time of kindling.
6. Able to determine the sex of young rabbit,
7. Gain skill handling of rabbit and fostering.
8. Able to design and construct rabbit hutches.
9. Gain knowledge in general principles of rabbit feeding, nutritional requirements of different age groups and feeding of different classes of rabbit.
10. Able to list and describe the common diseases of rabbit viz. coccidiosis, hemorrhagic septicemia, Ecto and endo parasites and pneumonia.

Unit V: Instruction in lessons in Unit V should result in students achieving the following objectives

1. Able to identify different types of chicken and describe common breeds of each type.
2. Describe the Purpose of Brooding, how to keep chicks in a brooder and types of Brooding Equipment
3. Acquire skill in the management of grower and layer chicken
4. Acquire knowledge in broiler chicken production
5. Acquire knowledge in essentials of good housing
6. Acquire knowledge in design and layout of poultry house
7. Acquire knowledge in different systems of poultry housing
8. Acquire knowledge in nutrients of the feeding stuff.
9. Acquire knowledge in nutrient requirement, feed ingredients and feed formulation.
10. Able to diagnose and control common viral, bacterial and protozoan diseases of chicken.
11. Gain knowledge and skill in vaccinating layers and broilers.
12. Acquire skill in Slaughtering of chicken

VII SEMESTER

15AECU0704- AGRICULTURAL MARKETING, TRADE AND PRICES (1+1)

Unit I

Agricultural Marketing - Definition, Concepts, Producer's Surplus ; Definition – market – marketing – importance of marketing – classification of markets. Characteristics of agricultural marketing.

Unit II

Marketing Function, Efficiency, Structure and Institution; Grading and standardization – methods of quality control – market research – market information and intelligence – market finance – risk in agricultural marketing.

Unit III

Role of Government in Agricultural Marketing; Role of government in promoting agricultural marketing – state marketing boards – commodity boards, viz., Coffee Board, Tea Board, Spices Board, Rubber Board, National Medicinal Plants Board (NMPB) and private marketing agencies.

Unit IV

Prices – fluctuations – stabilization – price fixation – Commission on Agricultural Costs and Prices – price policy of the government – concept of parity price. Marketing of inputs – fertilizers, seeds, pesticides and agricultural implements. Export of Agricultural Products

Unit V

India's foreign trade policy - balance of trade and balance of payments – analysis of trends in India's exports and imports – export potential for agricultural sector – share of agricultural commodities in export. WTO and its Impact.

Practicals

1. Visit to unorganized markets
2. Study on FCI, CWC
3. Visit to Civil Supply Corporation
4. Visit to Agri export units
5. Study on cooperative marketing institution
6. Visit to regulated market
7. Agmark, standardization and grading
8. Visit to agro processing units
9. HACCP – ISO
10. WTO and trade liberalization.
11. Case studies in agricultural marketing related to WTO
12. Visit to commodity boards
13. Visit to Chinnalapatti Uzhavar sandhai

Reference Books

1. Acharya, S.S. and Agarwal, N.K. (1992). Agricultural Marketing in India, IBH, Publishing Ltd., New Delhi.
2. Jhingan, J.L. (1998). International Economics, Vrinda Publications, New Delhi.
3. Francis Cherunilam, (2000). International Economics, Oxford & IBH, New Delhi.

VII SEMESTER
15AEXU0706- INSTRUCTIONAL METHODS FOR EXTENSION
COMMUNICATION (1+1)

Objective:

- To impart knowledge on communication and extension methods for effective transfer of technology
- To inculcate the use of various Audio visual aids for effective communication

Unit I: Communication

Communication – Definition, meaning elements and their characteristics. Models of communication process, Types and functions – Barriers/problems in communication, Concepts relating to Communication – Communication fidelity

Unit II: Extension methods

Extension methods – meaning, purpose and classification according to form and use, functions and stages of ID process and cone of experience. Audio-visual aids – meaning, importance, advantages and disadvantages. Classification of audio-visual materials according to evolution, senses involved and contribution to learning. Planning, preparation, presentation and evaluation of audio-visual aids.

Unit III: Individual Group and Mass contact methods:

Farm & Home visit, Office call, Telephone call, Personal letter, Observation plots, Result demonstration. Method demonstration, General meetings, Group discussion, Brainstorming, Seminar, Workshop and Field trips. Farm journalism- Scope and functions. Publications- leaflet and folder, Extension journals, Newspaper, Extension bulletins, Newsletter and Circular letter. Radio, Television, Exhibition, Campaign, Farmers' fairs, Agri. Film shows, Extension talk, Distance learning methods.

Unit IV Audio-visual aids: Audio-recording- tape recorder, CDs and public address system. Literature, symbolized- charts and graphs. Three dimensional- models, specimens and objects. Two-dimensional-non-projected- photographs, still pictures, chalk board, bulletin board, flash cards and flannel graph. Projected- slides, power point, LCD and Over Head and Opaque projectors. Audio-visual- television, film shows, video projections, drama and puppet show, folk dance, folk songs and story telling. Computer and multimedia.

Unit V: Information Sources:

Electronic Communication - E-mail - Internet browsing - Search engines- Directories, On line journals, websites and computer networks. MS Access - creating and working with Databases - Tables - Queries - Forms - Reports. MS Power Point - Creating Presentations and Slides - Working with Power Point Objects - Putting Text on Slides - Adding Visuals to Slides - Notes, Handouts, Slide Shows, and Printing.

Practicals

1. Simulated exercises on communication and distortion in communication
2. Non-verbal communication and nonverbal behaviour
3. Organizing group discussion and conducting method demonstration/skill teaching
4. Teaching skills division in to steps
5. Audio-visual Aids – meaning , classification and importance in Agricultural Extension
6. Planning, preparation, presentation and evaluation of visual aids
7. Planning and preparation of Information materials – Leaflets, folders and pamphlets
8. Planning and preparation of posters and charts
9. Planning and preparation of OHP Transparencies and Powerpoint slides

10. Planning and preparation of news stories and success stories
11. Planning and preparation of script for radio and television programmes
12. Operation and handling of PA equipment, LCD Projector
13. Operation and handling of video camera and suiting a field demonstration

References:

1. Adivi Reddy, A. (2005). Extension Education, Sree Lakshmi Press, Bapatla.
2. Dahama, O.P. and O.P.Bhatnagar. (1996). Education and Communication for Development, Oxford & IBH Co., Ltd., New Delhi.
3. Leon, A and M. Leon. (2004). Introduction to Information System. Vijay Nicol (P) Ltd., Chennai.
4. Chennai.
5. Ray, G.L. (2006). Extension Communication and Management, Nayapraksh, Kolkata.
6. Saxena, S. (2003). MS.OFFICE 2000 for everyone. Vikas Publishing House, New Delhi.
7. Seetharaman, Netaji. R., et.al. (1990). A Manual on Audio-visual Aids.
8. Rayuclu, C.S. (2997). Communication, Himalaya Publishing House, Hyderabad.
9. Rugers, E.M. (2003). Diffusion of Innovations, Free Press, New Delhi.
10. Yella Reddy, N. (1998). Audio Visual Aids for Teaching, Training and Extension. Haritha Publishing House, Hyderabad.

Outcome:

The students can obtain greater knowledge in using of Audio visual aids for effective communication of Agricultural technologies

VII SEMESTER
15ASTU0701- AGRICULTURAL STATISTICS (1+1)

Unit I:

Data collection diagrams and graphs; Different kinds of data, Primary, Secondary, Quantitative and Qualitative data- Presentation of Data - Purpose and Uses – Bar diagrams, Comparative bar diagram, percentage bar diagram, Pie-diagram and Uses, Histogram frequency curve, frequency polygon Ogive curves.

Unit II:

Measures of Central Tendency and Measures of Dispersion; Mean, Geometric Mean, Median, Mode. Range, Standard deviation, Co-efficient of variation.

Unit III:

Census Vs. Sampling methods. Characteristics of a good sample, sampling frame and sample size. Probability and Non-probability samples, sampling and Non-sampling errors. Kinds of Sampling: SRS (WR) and (WOR), Stratified Random Sampling, Systematic Sampling.

Unit IV:

Correlation and Regression; Direct and indirect correlation – scatter diagram -Karl Pearson's Correlation Co-efficient - Meaning and uses of simple linear regression equation – prediction using the equations.

Unit V:

Tests of Significance: Meaning and various steps involved in Tests of Significance. Tests based on 't' and χ^2 -Statistics: 't' test for mean, difference of means-Chi-square test for association of attributes – 2x2 contingency only limitations of Chi-square test. ANOVA and Design of experiments and Basic Designs

Practical Schedule

1. Bar diagram, frequencies curve, frequencies polygon.
2. Mean, Geometric mean, median and mode.
3. Standard deviation and co-efficient of variation.
4. Test based on t-for-mean and difference of mean.
5. Chi-square test for independence of attributes.
6. Correlation Co-efficient.
7. Regression equation.
8. Completely randomized design.
9. Randomized complete block design.
10. Latin square design.
11. Split plot design.
12. Factorial Experiments with 3 factors

References

1. Cochran, W.G. and Cox. G.M, 1962. Experimental Designs, Asia Publishing House, New Delhi.
2. Croxton, F.E and Cowden, D.J. 1986. Applied General Statistics, Prentice Hall of India, New Delhi.
3. Federer, W.T. 1983. Experimental Design (Theory and Application), Oxford & IBH Publishing Co., New Delhi.
4. Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedures for Agricultural Research, John Wiley and Sons, New York.
5. Panse, V.G. and Sukhatme, P.V. 1961. Statistical methods for Agricultural Workers, ICAR, New Delhi.

VII SEMESTER
15AEXU0707- RAWE III – Industrial Tie up (0+2)

Objective:

- To offer knowledge on role and objectives of Agroindustries
- To give the matters pertaining to the production of agroproduces their marketing trend

The students should get exposed to continuous field experience through RAWE programme. In the RAWE programme – III, students will get attached with industries which are dealing agro products either manufacturing or exporting for a month to understand the roles and objectives of them. A separate Record note book should be maintained by the students to record the activities going on in the industries. Each student should take up a case study and working out the manufacturing process, trade, marketing and fluctuation in prices of the particular product. The evaluation will be made purely on internal basis by the Course teacher.

Outcome:

The wards can understand the activities of agro industries, their product, development, and marketing features

VIII SEMESTER

15AGRU0812- ORGANIC AGRICULTURE AND CLIMATE CHANGE (2+1)

Unit I: Introduction

History and genesis of Organic farming in India and around the world – Status of organic farming – Impact of Green Revolution – Agro chemical pollution – Concept – Definition – Essential characteristics – Advantages – Components.

UNIT II: Organic Farming

Organic Agriculture Vs Conventional Agriculture – Concept – Basic components in Organic farming – Management of Eco system in Organic farming – Production of compost and composting – Management –Nutrient management in Organic farming - Ecological Pest Management – Environmental benefit – Maintenance of soil health.

UNIT III: Other Eco-friendly Farming Practices

- i. Natural Farming – No nothing farming – Concept and Principles
- ii. Permaculture – Guidelines, principles, elements
- iii. Bio dynamic farming – Principles – Rules and Preparations
- iv. Biological farming – Eco-Agriculture – Concept, Principles and Objectives
- v. Zero budget farming – Principles and methods
- vi. Conservation agriculture – Principles and methods
- vii. Climate smart agriculture – Principles and methods

UNIT IV: Sustainable Agriculture

Concept – Economic and Ecological aspects – Focus of conventional agricultural research and extension – Usage of external input in low input farming – Common traits of Indigenous farming – Participatory Technology Development – Basic ecological principles of LEISA. Indigenous Knowledge- Definition– Indigenous Vs. Western Knowledge Forms and Types of IK – Characteristic feature – Collection and Documentation of IK – Sources and methods of collection of IK – Family Farming.

Unit V

Climate Change and Agriculture; Climate change - Need for adaptation – Potential effects of climate variability in agriculture – Adaptations, strategies, plans and programmes plans and local copy strategies climate promoting sustainable development planning and practices.

Practical Schedule

1. Study on impact of Green revolution, Nutrients removal and management
2. Composting Techniques in Organic farming
3. Observe and Document Do nothing farming practices in farmer's field.
4. Study on mulches and organic enrichment in soil
5. Study on crop rotation and mixed cropping techniques.
6. Development standards, Inspection and Verification, Certification and Accreditation of Organic farming products
7. Bio dynamic preparations and practices
8. Visit to Organic farming farmer's field and take observations.
9. Identification of sources for collection of IKs
10. Practicing different methods for collecting IKs.
11. Documentation of IKs on Field crops
12. Preparation of Panchakavya and other ecofriendly bioproducts
13. Study and preparation of Zerobudget farm bio preparations

Reference Books

1. Swaminathan M.S (1996) Sustainable Agriculture – Towards Food Security, Konark Publishers Pvt. Ltd., Chennai.
2. Bill Mollison (1996) Permaculture, The Other India Press, Goa
3. Robert Chambers et.al (1990) Farmers First, Intermediate Technology Publications, London.
4. Jules N. Pretty. (1995) Regenerating Agriculture, Vikas Publishing House Pvt.Ltd., New Delhi
5. Coen Reinjetics et.al (1992) – An Introduction to Low External Input and Sustainable Agriculture, ILEA, The Netherlands
6. Dhaliwal, G.S. and D.S. Kler (2000) Agricultural Ecology – Himalaya Publishing Company, Mumbai.
7. IIRR (1996), Recording and Using Indigenous Knowledge - A Manual, International Institute of Rural Reconstruction, Silang, Cavite, Philippines.
8. Sundaramari M (2003) Indigenous Agricultural Practices for Sustainable Farming, Agrobios (India), Jodhpur.
9. Sharma K. Arun, 2002, A Hand Book of Organic Farming Agrobios (India) Jodhpur.
10. Palaniappan.S.P and K. Annadurai (1999), Organic Farming. Scientific Publishers (India),Jodhpur
11. Dahama, A.K. 2002. Organic Farming for Sustainable Agriculture, Agrobios (India), Jodhpur pp 301.
12. Lampkin, N. 1990. Organic farming, Ipswich, U.K. Farming Press Books pp. 710.
13. Palaniappan, SP. and K. Annaduari. 1999. Organic farming: Theory and Practice, Scientific Publishers, Jodhpur.
14. Thampan, P.K. 1995. Organic Agriculture, Peekay Tree Crops Development Foundation, Cochin pp. 354.
15. Vyas, S.C., Smriti Vyas, Sameer Vyas and H.A. Modi. 1998. Biofertilizers and Organic farming, Akta Prakashan, Nadiad, pp. 252.
16. Balekar, Subash (2011). Zerobudget Farming
17. FAO (2012), Climate Smart Agriculture, FAO Publications.

VIII SEMESTER
15AGSU0807-CROP AND PESTICIDE CHEMISTRY (2+1)

Objective:

To give an effective information about the chemical composition of crops and pesticides

Unit I: Composition of Agricultural Crops

Chemical constituents of plants – Proximate and ultimate constituents – Chemical composition and nutritional quality of cereals, pulses, oilseeds, sugarcane, fibre and forage crops. Post harvest changes in Sugarcane.

Unit II: Composition of Horticultural Crops

Chemical composition and nutritional quality of fruits, vegetables, spices, condiments, narcotics and beverages. Post harvest changes in fruits.

Unit III: Alkaloids and Essential oils

Chemistry of essential oils and alkaloids – medicinal and aromatic crops.

Unit IV: Pesticide Formulations

Pesticide formulation – dusts, wettable powders, emulsifiable concentrate, granules
Classification of pesticides – mode of action – characteristics – uses.

Unit V: Pesticides and Environment

Fate of pesticides in soil and plants – Impact of pesticides on environment – Safety measures in the analysis and handling of pesticides – Insecticide Act and Insecticide Rules – Compatibility of pesticides with other agrochemicals.

Practical schedule

2. Sampling, processing and storage of plant materials for chemical analysis.
3. Estimation of moisture and ash content.
4. Preparation of di and tri acid extraction of plant samples
5. Estimation of P and K in plant samples.
6. Estimation of crude protein.
7. Estimation of crude fiber.
8. Estimation of reducing and non- reducing sugars in jaggery.
9. Estimation of total solids, ascorbic acid and titratable acidity in fruit samples.
10. Visit to pesticide manufacturing/ testing laboratory.
11. Identification of pesticides and label – storage – mixing – application methods
12. Sieving test and determination of bulk density in dust formation.
13. Wettability and suspensibility test in wettable powder formulations.
14. Estimation of acidity and alkalinity of pesticides.

References

1. Handa.S.K.2004.Principles of Pesticide chemistry. Agrobios
2. Cremlyn, R.J. 1991. Agrochemicals – Preparation and mode of action. John Wiley and sons Inc., New York.
3. Ditcher R.A., Jensen C.O. and Alttiouse P.M. 951.Introduction to Agricultural Biochemistry - John Wiley and sons Inc., New York.
4. Friend J. And Rhodes M.J.C., 1981. Recent Advances in the Biochemistry of Fruits and Vegetables – Academic Press, London.
5. George W.Ware, 1986. Fundamentals of Pesticides – A Self Instruction Guide – Thomas Puplication, PO Box.9335, Freno, California 93791.
6. Hulme A.C., 1970. The Biochemistry of Fruits and their Products Vol. I & II – Academic Press, London.
7. Hulse j.H., Laing E.M. and Peasson C.E., 1980. Sorghum and Millets, their Composition and Nutritive Value – Academic Press, London.
8. Rameshwar A., 1993. Outlines of Plant Biochemistry – Noya Prakash, Calcutta.
9. Robert White, Stevens, 1971. Pesticides in the Environment Vol. & Part I – Mark Dekker Inc., New York.
10. Sree Ramulu, U.S. 1979. Chemistry of Insecticides and Fungicides – Oxford and India Publishing Co., New Delhi.
11. Gupta,A. @006.Pesticide Residue in Food commodities. Agrobios.

Outcome :

This course paves a way to the students to know about the post harvest losses of crops and how to increase the shelf life of the produce, pesticide formulations and compatibility of pesticides with other agrochemicals

VIII SEMESTER

15AENU0805 – FUNDAMENTALS OF NEMATOLOGY (1+1)

Unit I: Nematodes – history and morphology

Nematology – its history and development in India and abroad – Position of nematodes in animal kingdom – Economic importance of nematodes

Unit II: Morphology and Anatomy

External morphology and internal anatomy of a typical nematode (Alimentary, excretory, nervous, reproductive system and sense organs),

Unit III: Taxonomy

Taxonomy of important phytonematodes – Classification of plant parasitic nematodes and classification based on feeding habits. Economically useful nematodes.

Unit V: Nematode damage

Symptoms of nematode damage – Association with other microorganisms (fungi, bacteria and virus) – Biology and ecology of important plant parasitic nematodes (*Meloidogyne*, *Heterodera*, *Rotylenchulus*, *Tylenchulus* and *Radopholus*).

Unit V: Nematode management

Principles of nematode management. Control measures of nematodes in agricultural crops. Integrated Nematode Management.

Practical

1. Soil and root sampling and extraction of nematodes by sieving and Baermann funnel method
2. Extraction of nematodes by sugar floatation and cyst by Fenwick can techniques
3. Preservation of nematodes and preparation of temporary and permanent slides
4. Staining of roots infested with endo-parasitic and semi-endoparasitic nematodes
5. Nematode diseases of citrus
6. Calculation of dosage and application methods
7. Types of nematicides and application techniques
8. Damage caused by root-knot nematodes in different crops
9. Symptoms of damage caused by reniform nematode in different crops
10. Symptoms of damage caused by the lesion nematode and the burrowing nematodes on Banana
11. Study of life stages of nematodes
12. Field visit
13. Herbarium collection (25 Nos. Nematode attacked plant parts)

References

1. Bhatti, D.S., R.K. Walia, 1992. Nematode pests of crops. CBS Publishers & Distributors. New Delhi.
2. Dasgupta. M.K. 1997. Phytonematology. Nayaprakash, Calcutta.
3. Goodey, J.B., Technical Bulletin No.2. 1963. Laboratory Methods for work with plant and soil nematodes – Ministry of Agriculture, Fisheries and food, London, 72 p.
4. Gopal Swarup and D.R. Dasgupta, 1986. Plant Parasitic Nematodes of India – Problems and Progress – ICAR, New Delhi. 576p.
5. Maggenti, A. 1981. General Nematology – Springer Verlag. Newyork Inc. 372 p.

VIII SEMESTER

15AGEU0805 – POST HARVEST TECHNOLOGY (1+1)

Unit I: Threshing and Winnowing: Thresher for multicrops –Paddy thresher, Maize sheller, Sunflower sheller, Castor sheller, Groundnut stripper, Groundnut decorticator, Arecanut dehusker, – its principles and operation; Paddy winnower – Principles of Winnowing, .

Unit II: Cleaning and Grading: Seed cleaner cum grader – Crippen model – their operation and maintenance ; Groundnut grader, potato grader, lemon grader – their operation and maintenance; Pneumatic separators, Centrifugal separator and Cyclone separator – their operation, merits and demerits.

Unit III: Drying:Principles of drying; Dryers – Rectangular metal bin dryer, LSU type dryer, Agricultural waste fired furnace dryer, Solar dryer and vegetable seed dryer – their operation merits and demerits.

Unit IV: Storage; Different types of storage methods, storage structures – Plastic silo, Polythene lined double wall bamboo bin, Hopper bin, Plywood bin, Coal tar drum bin, Impregnated gunny bags – its application, merits and demerits .

Unit V: Material Handling; Engineering properties of grains – shape size, volume, density, porosity, moisture content, angle of repose ,hardness and coefficient of friction; Material handling equipments – Belt conveyor, Chain conveyor, pneumatic conveyor, screw conveyor, gravity conveyor and Bucket Elevator – its characteristics, capacity and horse power requirement.

Practical

1. Study and identify different parts of a) Threshers and b) Winnowers
2. Study and identify different parts of a) Shellers and b) Decorticators
3. Study and identify different parts of a) Dehusker and b) Seed Extractors
4. Study and identify different parts of seed cleaner cum grader
5. Study of different types of separators
6. Study of Rectangular metal bin dryer and LSU type dryer.
7. Study of Agricultural waste fired furnace type dryer, solar dryer and Vegetable seed dryer.
8. Study of different storage structures.
9. Study of engineering properties of grains
10. Study of material handling equipments
11. Exercises on location analysis and selection preparation of plant
12. Visit to modern Rice Mill.
13. Visit to IICPT - Tanjore

References

1. Sahay, K.M and K.K. Singh 1997, Unit Operations of Agricultural Processing, Vlikas Publishing House, New Delhi.
2. Gosh, R.K and S. Swain 1990 Practical Agricultural Engg Naya Prakash Publishing Ltd, Calcutta.
3. Kachru, R.P., P.K Srivastava., B.S Bisht, and T.P. Ojha 1995- Bankable Post Harvest Equipments developed in India-Central Institute of Agricultural Engg. Bhopal.
4. Pandey, P.H 1996. Principles of Agricultural Processing, Kalyani Publishers, Calcutta
5. Chakraverty, a 2000. Third Edition. Post Harvest Technology of cereals, pulses and oil seeds. Oxford and IBH publishing and co Pvt Ltd., New Delhi.

VIII SEMESTER

15AECU0805- FUNDAMENTALS OF AGRI BUSINESS MANAGEMENT (1+1)

Unit I: Introduction to Agri Business Management

Agri business – definition, scope, characteristics. Management – definition. Entrepreneur – small business – characteristics and stages of growth.

Unit II: Introduction to Principles of Management

Management functions – planning, organizing – departmentation, forms of agri business organization - staffing, directing, supervision and motivation, controlling – types, performance, evaluation and control techniques. Management approaches – Profit centre approach, Management By Objectives (MBO) and Quality Circles (QC). Strength Weakness Opportunities and Threats (SWOT) analysis.

Unit III: Production and Personal Management

Functional areas of agri business – production and operations management – functions, planning, physical facilities and managing quality. Inventory management– raw material procurement, inventory types, costs. Personnel management – recruitment, selection and training.

Unit IV: Financial and Marketing Management

Marketing management – marketing environment, marketing mix. Financial management – balance sheet and working capital management – financial ratio analysis.

Unit V : Input Marketing, Distribution and WTO.

Input marketing firms-types and distribution channels. Processing firms-types, size and managerial problems. Management Information System (MIS) – concept and applications. Business standards – ISO – Government policies for agri business. WTO and its impact on agri business - Intellectual property rights and patenting.

Practical Schedule

1. Raw material procurement in Agro-industries – visit to firm.
2. Business plan preparation – identification and business opportunities.
3. Market potential assessment for agro-inputs and agro products.
4. Agricultural inputs - marketing promotional activities.
5. Food products - marketing promotional activities.
6. Product pricing methods.
7. Visit to District Industries Centre.
8. Presentation and discussion on consumer survey reports.
9. Management of agricultural inputs marketing firm- visit to firms.
10. Management of small agro-processing firm – visit to firms.
11. Discussion with lead bank on agribusiness finance.
12. Documents preparation to obtain Agriculture loan from banks
13. Discussion with successful farmers about economics of crop cultivation

Reference Books

1. Broadway, A.C. (2003). Text Book of Agri Business Management, Atlas Books and Periodicals, New Delhi.
2. Kapur, S.K. (1994). Principles and Practice of Management, S.K. Publishers, New Delhi.
3. Prasad, L.M. (1993). Principles and Practice of Management, Sultan Chand & Sons, New Delhi.

VIII SEMESTER
15AGLU0802- PARAMBARIYA VELANMAI (1+0)

myF - I

Ntshz;ik nrhy; tpsf;fk;> njhy;fhg;gpak; - epyk;> nghOJ> rq;f ,yf;fpaq;fspy; Ntshz;ikj; njhopy; El;gr; nra;jpfisj; njhFj;jy;.

myF - II

mwE}y;fs; fhl;Lk; Ntshz;ikr; nra;jpfs;>; jpUf;Fwspy Ntshz;ikr; nra;jpfs; gjpndz;fPo;f;fzf;F E}y;fspy; Ntshz;ikr; nra;jpfisr; Nrfhpj;jy;

myF – III

fhg;gpa ,yf;fpaq;fspy; Ntshz;ikr; nra;jpfs;
rpyg;gjpfhuk; – fk;guhkhazk> nghpaGuhzk; E}y;fspy; cs;s Ntshz;ikr; nra;jpfisf; fl;Liuahf;Fjhy;.

myF - IV

rpw;wpyf;fpaq;fspy; Fwpg;gpLk; Ntshz;ik El;gr; nra;jpfs; gs;S ,yf;fpaq;fs; fhl;Lk; ney;tiffs;> coth; tho;tpay; Kiwfis ntspf;nfhzh;jy;

myF - V

tha;nkhop ,yf;fpaq;fs; czh;j;Jk; Ntshz;ikj; njhopy; El;gq;fisj; njhFj;J vOJjy; ehl;Lg;Gwg;ghly;fspy; Ntshz;ikf; fUj;Jfs;.

VIII SEMESTER

15AGLU0802- DEVELOPMENT EDUCATION FOR NON TAMIL STUDENTS (1+0)

Basic principles of learning – Taxonomy of educational objectives – career development. Success stories of Entrepreneurs – group learning – brainstorming - Simulation, role play, icebreakers – Transactional communication – readability scales – types of ego. Interpersonal communication – writing- fax and e-mail, applying for a job interviews. Project report – strategies and skill – basic principles of scientific article – editing.

VIII SEMESTER
15AGRU0813-EXPERIENTIAL LEARNING-II (0+5)

The students will be placed in three different agricultural enterprises in groups and they will be exposed to that particular enterprise and allowed to practice themselves from seed to seed. The produce obtained out of this learning experience will be marketed by themselves and the profit will be shared among them.

VIII SEMESTER
15AEXU0808 STUDY TOUR - ALL INDIA (0+1)

Students will be taken to Tour in National and International Institutions related to Agriculture, Horticulture, Forestry and other allied fields in various regions of the country. The students will gain first and hand knowledge about different Agro – climatic zones, crops grown, cultivation practices, socio – cultural and economic status of the farming communities in different parts of the country. The duration of the tour will be 14 days (Institutional visits and intermediate journey) exclusive of onwards and return journey.

Students will maintain a Tour diary to record their observations at the places of visit. A Tour Record has to be submitted after the tour. The evaluation procedure will be as follows:

Evaluation procedure

Written Test	50 Marks
Attendance and Behaviour	20 Marks
Record and Pocket Note book	20 Marks
Vivo - Voce	10 Marks
Total	100 Marks

VIII SEMESTER
15AECU0806- PROJECT WORK (0+4)

Introduction to thrust areas of research – Identification of research problem – Review of literature – Research methodology – conduct of study – data collection – Analysis and interpretation of data – preparation of research report and submission.

References

1. Kothari, C.R. 1997. Research Methodology, Wishawa Prakasam, New Delhi.
2. Rangaswamy, R. 1995. A Hand Book of Agriculture Statistics, Wiley Eastern Ltd., New Delhi.
3. Robert A.D.2001. How to write and publish scientific paper, Cambridge University Press, Cambridge.