THE GANDHIGRAM RURAL INSTITUTE
(DEEMED TO BE UNIVERSITY)
GANDHIGRAM

DIPLOMA IN AGRICULTURE

Syllabus

With effect from 2024-25

School of Agriculture and Animal Sciences
The Gandhigram Rural Institute
(Deemed to be University)
Gandhigram – 624302 Tamil Nadu

SCHOOL OF AGRICULTURE AND ANIMAL SCIENCES
DIPLOMA IN AGRICULTURE

INTRODUCTION

The School of Agriculture and Animal Sciences was offering a two year Certificate course in Agricultural Science from 1956 under the auspices of National Council for Rural Higher Education, Ministry of Education, Govt. of India, New Delhi till 1980. After the introduction of 10+2 pattern of education in Tamil Nadu in 1980, it was felt necessary to restructure the Certificate course in Agricultural Sciences with the object of giving higher training and admitting students with higher general educational qualification. Hence, the syllabus content of Certificate course was so modified to make it as Diploma course in Agriculture and the course was started in the academic year 1980-1981 and continues. The syllabus has been revised once in three years to accommodate the recent developments in the agriculture field.

DETAILS OF THE COURSE

Name of the course	:	Diploma in Agriculture
Duration of the course	:	2 years (4 semesters)
No. of students to be admitted during the year 2024-25	:	30
Eligibility	:	A Pass in H.Sc. examination with Biology / Botany in Academic stream or in vocational stream with Biology and Agriculture Practices.
***Admission Procedure**	:	Academic Stream 95% / Vocational Stream 5 % ** Community Reservation as per GRI Rules.*

OBJECTIVES

1. Impart skills on different agricultural and allied subjects
2. To create confidence among students to undertake farming on their own.
3. To assist them get employment in Government, Non Governmental and Private Organizations.

SYLLABUS PATTERN

The syllabus pattern is furnished in Annexure. The syllabus for individual subjects has been prepared semester wise. Choice Based Credit System (CBCS) is followed.

ASSESSMENT

Each theory-cum-practical course will have a maximum score of 150 with 100 for theory and 50 for practicals, the ratio between CFA and ESE for theory being 40:60 and practicals being 50:50.

EXPERIENTIAL LEARNING THROUGH FIELD EXPOSURE

The students would have to undergo experiential learning by placing them with farmers of Krishi Vigyan Kendra for individual crops for that season. The students will be attached to the farmers of Front Line Demonstration schemes of various crops. For getting exposure to cereals, millets, vegetables, fruits and flowers, progressive farmers of KVK will adopt them for practical field exposure, apart from attending the regular practical farm activities in the School's Farm, Orchard and Dairy. They should keep and update the records for their crop and animal based activities.

SCHOOL OF AGRICULTURE AND ANIMAL SCIENCES

Diploma in Agriculture Programme

Scheme of Examinations

Code No	Subject	Credit			Total Marks	Scheme			
						Theory		Practical	
		T	P	Total		CFA	ESE	CFA	ESE
	I Semester								
24AGRD0101	Soil and Nutrient Management	3		3	100	40	60		
24AGRD0102	Soil and Nutrient Management - Practical		1	1	50			25	25
24AGRD0103	Principles of Agronomy	3		3	100	40	60		
24AGRD0104	Principles of Agronomy - Practical		1	1	50			25	25
24AGRD0105	Agricultural Meteorology and Land Use Systems	3		3	100	40	60		
24AGRD0106	Agricultural Meteorology and Land Use Systems - Practical		1	1	50			25	25
24AGRD0107	Irrigation Agronomy	3		3	100	40	60		
24AGRD0108	Irrigation Agronomy - Practical		1	1	50			25	25
24AGRD0109	Dairy Cattle Production	3		3	100	40	60		
24AGRD0110	Dairy Cattle Production - Practical		1	1	50			25	25
24AGRD0111	Rural Development	3		3	100	40	60		
24AGRD0112	Rural Development - Practical		1	1	50			25	25
	Total	**18**	**6**	**24**	**900**				
	II Semester								
24AGRD0201	Agronomy of Field Crops - I	3		3	100	40	60		
24AGRD0202	Agronomy of Field Crops – I - Practical		1	1	50			25	25
24AGRD0203	Fundamentals of Plant Protection	3		3	100	40	60		
24AGRD0204	Fundamentals of Plant Protection - Practical		1	1	50			25	25
24AGRD0205	Introduction to Horticulture and Fruit Production	3		3	100	40	60		
24AGRD0206	Introduction to Horticulture and Fruit Production - Practical		1	1	50			25	25
24AGRD0207	Energy and Environment	3		3	100	40	60		
24AGRD0208	Energy and Environment - Practical		1	1	50			25	25
24AGRD0209	Farm Machinery and Post Harvest Technology	3		3	100	40	60		
24AGRD0210	Farm Machinery and Post Harvest Technology - Practical		1	1	50			25	25
24AGRD0211	Principles of Plant Breeding and Seed Science Technology	3		3	100	40	60		
24AGRD0212	Principles of Plant Breeding and Seed Science Technology - Practical		1	1	50			25	25
	Total	**18**	**6**	**24**	**900**				

	III Semester								
24AGRD0301	Agronomy of Field Crops – II	3		3	100	40	60		
24AGRD0302	Agronomy of Field Crops – II - Practical		1	1	50			25	25
24AGRD0303	Crop Disease Management	3		3	100	40	60		
24AGRD0304	Crop Disease Management - Practical		1	1	50			25	25
24AGRD0305	Vegetable Production	3		3	100	40	60		
24AGRD0306	Vegetable Production - Practical		1	1	50			25	25
24AGRD0307	Crop Pests and their Management	3		3	100	40	60		
24AGRD0308	Crop Pests and their Management - Practical		1	1	50			25	25
24AGRD0309	Bio inoculants in Agriculture	3		3	100	40	60		
24AGRD0310	Bio- inoculants in Agriculture - Practical		1	1	50			25	25
24AGRD0311	Agricultural Economics	3		3	100	40	60		
24AGRD0312	Agricultural Economics - Practical		1	1	50			25	25
24AGRD0313	Village Placement Programme*	0	4	4	100				
	Total	**18**	**6**	**24**	**900**				
	IV Semester								
24AGRD0401	Farm Management	3		3	100	40	60		
24AGRD0402	Farm Management - Practical		1	1	50			25	25
24AGRD0403	Management of Beneficial Insects	3		3	100	40	60		
24AGRD0404	Management of Beneficial Insects - Practical		1	1	50			25	25
24AGRD0405	Commercial Agriculture	3		3	100	40	60		
24AGRD0406	Commercial Agriculture –Practical		1	1	50			25	25
24AGRD0407	Floriculture, Plantation and Medicinal Plants	3		3	100	40	60		
24AGRD0408	Floriculture, Plantation and Medicinal Plants-Practical		1	1	50			25	25
24AGRD0409	Livestock and Chicken Production	3		3	100	40	60		
24AGRD0410	Livestock and Chicken Production - Practical		1	1	50			25	25
24AGRD0411	Extension communication for Transfer of technology	3		3	100	40	60		
24AGRD0412	Extension communication for Transfer of technology- Practical		1	1	50			25	25
	Total	**18**	**6**	**24**	**900**				

Note:* V.P.P. marks will not be considered for the calculation of GPA & CGPA.

I SEMESTER

24 AGRD 0101 SOIL AND NUTRIENT MANAGEMENT (3+1)

OBJECTIVES

- To impart basic knowledge about soil and its properties.
- To disseminate knowledge about the soil nutrient resources *viz.*, manures, fertilizers and bio-fertilizers.
- To provide hands on experience in nutrient management.

LEARNINGOUTCOME

- Describe the basics of soils and their influencing parameters with relevant to soil fertility
- Categorize the various nutrient sources to maintain soil fertility.
- Identify nutrient deficiencies in plants and corrective measures.
- Identify problem soils and describe management measures.
- Acquire knowledge and skill in soil nutrient management and fertilizer recommendation.

THEORY

UNIT I **Soil:** Definition – Composition of soil -Types of soils found in India and Tamil Nadu - Physical properties of soil – Texture, Structure, colour, particle density, Bulk density, Pore space, Consistency, Soil air, Soil water and Soil temperature –Significance of physical properties in plant growth - Chemical properties of soil- Soil colloids - ion exchange reactions - Soil pH and Electrical conductivity.

UNIT II **Soil-Fertility:** Definition and importance–Soil fertility and productivity –Organic matter – Influence on fertility - Decomposition of organic matter –Soil microorganisms - Problem soils – Physical constraints and their management - Soil reaction- Acid, Saline, Sodic and Salinesodic soils–their formation, reclamation, management and suitable crops.

UNIT III **Nutrient management:** Essential plant nutrients, sources and role in plant growth–Soil fertility evaluation–Foliar diagnosis- deficiencies and toxicity symptoms – corrective measures – Soil testing and fertilizer recommendations - Time and methods of fertilizer application – Handling and storage of fertilizers – FCO – Methods to improve fertilizer use efficiency – Integrated nutrient management (INM) – Irrigation water quality.

UNIT IV **Manures:** Definition–Classification–Composting – Principle -benefits- compost quality- Preparation of different types of compost including industrial waste, coir waste, press mud–Vermicompost–enriched FYM–Green manures(GM) and Green Leaf Manures(GLM)–their Benefits and significance - Bio - fertilizers and their types – Application of Bio –Fertilizers.

UNIT V **Fertilizers:** Fertilizers–classification – Straight, mixed and complex fertilizers–Nutrient content in fertilizers- nitrogenous fertilizers, phosphatic fertilizers and Potassic fertilizers–slow release N fertilizers– mixed fertilizers- preparation, advantages, disadvantages and precautions for preparation of mixed fertilizers–Micro nutrient mixtures-nano-fertilizers.

LECTURE SCHEDULE

1. Soil - Definition and composition of soil
2. Physical properties of soil – Soil Texture
3. Soil structure
4. Soil colour
5. Particle density, Bulk density, Pore space
6. Soil Consistency
7. Soil air - Composition, gaseous exchange,
8. Soil water – Classifications
9. Soil moisture constants and soil water movement
10. Soil temperature
11. Significance of physical properties in plant growth
12. Soil colloids – Classification and Soil pH, EC and Ion exchange reactions
13. Soil fertility and productivity- Definition and importance
14. Organic matter–Influence on fertility, Organic matter decomposition
15. Soil microorganisms
16. Problem soils – Physical constraints and their management,
17. Soil reaction- Acid soils – Characteristics, reclamation and management
18. Saline soils – Characteristics, reclamation and management
19. Sodic soils and saline sodic soils – Characteristics, reclamation and management
20. Essential plant nutrients, classification and their sources
21. Role of macro nutrients in plant growth
22. Role of micro nutrients in plant growth
23. Soil fertility evaluation and its methods
24. Deficiency and toxicity symptoms in crops – corrective measures
25. Soil Testing and fertilizer recommendation
26. Time and methods of fertilizer application
27. Handling and storage of fertilizers
28. Fertilizer control order
29. Methods to improve fertilizer use efficiency
30. Integrated nutrient management (INM).
31. Irrigation water quality parameters, indices, classification and Management.
32. Manures - Definition and classification
33. Bulky Organic Manures (BOM) and Concentrated Organic Manures (COM)
34. Composting – Definition, principle, benefits and compost quality
35. Different methods of composting
36. Composting of industrial waste
37. Composting of coir waste and Composting of press mud
38. Preparation of Vermicompost
39. FYM – Composition and enriched FYM
40. Green manures (GM) and Green Leaf Manures (GLM)–benefits and significance.
41. Bio – fertilizers, types and application of bio - fertilizers
42. Fertilizers– Definition and classification, Straight, mixed and complex fertilizers
43. Nitrogenous fertilizers - classification, nutrient content and soil reaction
44. Phosphatic fertilizers - classification, nutrient content and soil reaction

45. Potassic fertilizers - classification, nutrient content and soil reaction
46. Slow release N fertilizers and its types
47. Mixed fertilizers- preparation, precautions in preparation, Advantages and disadvantages of mixed fertilizers
48. Micro nutrient mixtures and Nano-fertilizers.

PRACTICALSCHEDULE

1. Soil sampling tools, methods of collection and processing of soil samples.
2. Determination of pH, EC and moisture in soils.
3. Analysis of available N.
4. Analysis of available P.
5. Analysis of available K.
6. Analysis of Organic carbon.
7. Interpretation of soil test results and Fertilizers recommendation.
8. Collection of irrigation water and determination of pH and EC.
9. Interpretation of soil water quality using analytical data.
10. Foliar diagnosis and its corrective measures.
11. Identification of manures, fertilizers and bio-fertilizers.
12. Preparation of different types of compost.
13. Preparation of slow release fertilizers (Neem, tar and lac coated urea).
14. Calculation of fertilizers through straight, complex and mixed fertilizers for some field crops.
15. Study of soil amendments, fertigation and foliar fertilizers application.
16. Visit to soil and fertilizer testing laboratory.
17. Final Practical Examination.

REFERENCES

Textbooks

1. Buckman,H.O.andN.C.Brady.1990.Nature and properties of soil, The Mc Millan Co, NewYork, Indian Publishers –Eurasia Publishing House(P)Ltd., Ram Nagar, NewDelhi.
2. Das,P.C.1993.ManuresandFertilizers,KalyaniPublishers,NewDelhi
3. Sahai, V.N. 2001. *Fundamentals of Soil*, Kalyani Publishers, Ludhiana.
4. Tisdale,S.L.,W.I.NelsonandJ.D.Beaton.1990.SoilFertilityand Fertilizers, The Mc Millan Company, NewYork.
5. WhiteH1989.IntroductiontothePrinciplesandPracticesofSoilScience, Oxfords Publishers, London.
6. Dilip Kumar Das. 2015. *Introductory Soil Science*. Kalyani Publishers, Ludhiana, India.
7. Biswas, T.D. and Mukherjee, S.K. Text book of Soil Science. Second edition. McGraw – Hill publications. Europe.
8. Arun Kumar Saha and Anuradha Saha. 2012. Textbook of Soil Physics. Kalyani Publishers,Ludhiana, India.
9. Shubhrata. R. Mishra. 2014. Soil and Nutrient Management. Discovery publishing House Pvt Ltd.

e- resources:

1. **www.agritech.tnau.ac.in**
2. **www.icar.org.in**
3. **www.agrimoon.com**

I SEMESTER

24 AGRD 0103 PRINCIPLES OF AGRONOMY (3+1)

OBJECTIVES

- To know about the principles and practices of crop production and management.

LEARNING OUTCOME

- Scope and importance of Agriculture in Indian economy
- To know about basic knowledge of crop adaption distribution, classification and economic importance of various crops.
- Basic knowledge about tillage objectives and modern concepts of tillage.
- To know about the cropping and farming system problems
- To know about characteristics of weed – weed dissemination and IWM.

THEORY

UNIT I **Introduction**: Agriculture – Definition scope of Agriculture in India and Tamil Nadu – Importance of Agriculture in Indian economy – Branches of Agriculture – History and Development of scientific Agriculture in World and India – Agronomy – Definition – Art, Science and Business of Crop Production -Relationship with other disciplines- role of an Agronomist-Use of Nano particles and Drones in Agriculture.

UNIT II **Crop adaptation and distribution**: Classification of crops – Their economic importance – Major crops of India and Tamil Nadu – Adaptation and distribution – Factors affecting crop production – Internal or Genetic factors, external or environmental factors - Agricultural seasons of India and Tamil Nadu.

UNIT III **Tillage**: Principles and practices of agricultural operations – Tillage and Tilth – Characteristics of good tilth, objectives of tillage – Types of tillage, primary and secondary tillage, special types of tillage and Intercultural operations. Implements and tools in Agriculture - Preparatory cultivation, after cultivation gap filling and thinning - Modern concepts of tillage – Seed and sowing – seed treatment Nursery and Transplanting. Harvesting, threshing drying and storage

UNIT IV **Cropping systems and Farming systems**: Systems of farming- Wet land, Garden land and dry Land Farming systems- Factors affecting choice of crop and varieties – Types of cropping systems – Mono cropping, multiple cropping, inter cropping, sequential cropping – Multi species and multi tier cropping – Crop rotation – Definition and advantages –Integrated Farming System (IFS) – Definition & types- Organic farming and precision farming- Definition and concepts

UNIT V **Weed Management:** Definition-classification of weeds - Characteristics of weeds – Dissemination of weeds – Harmful and beneficial effects of weeds - critical period of crop–weed competition - Principles of weed management - Methods of weed management – Cultural (mechanical, cropping and competition), chemical and biological methods – Chemical weed control - Classification of herbicides – Formulations – Mode of action - Time and methods of application – Control of

Parasitic, Problematic, Aquatic and Invasive weeds- Integrated weed management (IWM).

LECTURE SCHEDULE

1. Agriculture- Definition- Importance and scope- Branches of Agriculture.
2. Development of scientific Agriculture- National and International Agricultural Research Institutes.
3. Agronomy- Definition- meaning and scope- Role of an agronomist.
4. Use of Nano particles and Drones in Agriculture.
5. Classification of crops – Their economic importance – Major crops of India and Tamil Nadu.
6. Factors affecting crop production – Internal or Genetic factors.
7. Factors affecting crop production - external or environmental factors-climatic factors-precipitation, temperature, RH, Solar radiation, Wind velocity, Atmospheric gases.
8. Factors affecting crop production - external or environmental factors-Edaphic factors-Soil-Moisture, Air, temperature, mineral matter, organic matter, Organisms, pH.
9. Factors affecting crop production - external or environmental factors-Biotic factors-Physiographic factors-Socio economic factors.
10. Agro-climatic zones and Agricultural seasons of India and Tamil Nadu.
11. Principles and practices of agricultural operations – Tillage and Tilth – Characteristics of good tilth, objectives of tillage.
12. Tillage- primary and secondary tillage, Special types of tillage and Intercultural operations.
13. Implements and tools in Agriculture - Preparatory cultivation, after cultivation gap filling and thinning.
14. Modern concepts of tillage.
15. Seeds and sowing- seed rate- Nursery methods and transplanting.
16. Sowing methods- Broadcasting, Dibbling- Line sowing, sowing/planting on ridges- sowing by seed drill- merits and demerits.
17. Harvesting- Methods of harvesting- assessment of crop maturity- physiological maturity and harvest maturity- Symptoms of harvesting- Threshing, cleaning and drying-Post harvest processing.
18. Farming System-scope, importance, and concept.
19. Types and systems of farming system.
20. Crop rotation-Definition and advantages.
21. Factors affecting types of farming, Farming system components and their maintenance.
22. Cropping system and pattern, multiple cropping systems.
23. Efficient cropping system and their evaluation of Allied enterprises and their importance.
24. Tools for determining production and efficiencies in cropping and farming system.
25. Sustainable agriculture- Definition, importance, concept, significance and its impact on agriculture.
26. Problems and its impact on agriculture, indicators of sustainability adaptation and mitigation.

27. LEISA- High External Input Agriculture (HEIA), Low External Input Agriculture (LEIA) and Low External Input Sustainable Agriculture (LEISA) and its techniques for sustainability.
28. Conservation agriculture strategies in agriculture.
29. Integrated farming system-Definition, objectives and characteristics, components of IFS.
30. Advantages of Integrated farming system.
31. IFS model for different agro-climatic zones, resource use efficiency and optimization techniques. Wet land, Garden land and Dry land IFS.
32. Weeds- Definition- Importance and Characteristics of weeds.
33. Weeds harmful and beneficial effects of weeds.
34. Weed biology and ecological adaptation to different eco-systems.
35. Classification of weeds of different agro ecosystems- lowland weeds, irrigated upland and dry land weeds.
36. Classification and characteristics of Aquatic, parasitic and obnoxious weeds.
37. Life cycle of weeds, weed migration, weed seed distribution, dormancy, germination, establishment and presentation of weeds in different ecosystems.
38. Crop weeds Interactions- critical period of crop weed competition, competitive and allelopathic effects of weeds and crops.
39. Principles and methods of weed management- Preventive, cultural and mechanical methods of weed control- merits and demerits.
40. Principles and methods of weed management- chemical, biological and alternative methods.
41. Integrated weed management (IWM)- Definition and its significance.
42. Herbicide- Definition, classification and Characteristics.
43. Herbicide formulations- History and Development of herbicides.
44. Methods of application of herbicides- herbicide use efficiency- adjuvants, surfactants, herbicide protectants and antidotes.
45. Advantages and limitations of herbicide usage in India.
46. Mode of action of herbicides and their selectivity- Mechanism of action of herbicides and their selectivity.
47. Concept of herbicide mixture and utility in agriculture- Herbicide resistant weeds and their management.
48. IWM in crops and cropping systems-Weed management in major field and horticultural crops.

PRACTICAL SCHEDULE

1. Identification of crops in wet land system of farming
2. Identification of garden land system of farming
3. Identification of dry land system of farming
4. Identification of tillage implements and acquiring skill in tillage operation
5. Identification of seeds of various field crops
6. Practicing Nursery bed preparation for low land and upland crops.
7. Practicing different methods of sowing and other cultivation practices in field crops
8. Practicing harvesting and processing of important crops

9. Practicing of different cropping systems and farming systems
10. Calculating the growth and the yield components of major crops.
11. Identification of weeds in wet, garden land and Arid and Semi Arid land areas.
12. Acquiring skill in mechanical and cultural methods of weed control, use of tools and implements
13. Practicing the methods of application of herbicide for different field crops and perennial and invasive weeds and aquatic weeds.
14. Practicing the methods of application of nano formulated fertilizers.
15. Acquiring skill in application of chemicals by the usage of drones.
16. Visit to Agriculture Research Station
17. Final Practical Examination.

REFERENCES

Text books

1. Yellamanda Reddy and G.H. Sankara Reddy,1998. Principles of Agronomy, Kalyani Publishers, Ludhiana.
2. Walia, S.S. and U.S. Walia. 2020. Farming System and Sustainable Agriculture.
3. Gupta, O.P. 1998. Weed management principles and practices, Agro botanical Publishers. Biloaneers.
4. Hosmani, M.M. 1995. Integrated weed management in field crops, Hosmani Publishers, Dharward.
5. Rao, V.S. 1983. Principles of weed science. Oxford and IBH, New Delhi.
6. Sankaran, S. V.T.Subbiah Mudaliar. 1997. Principles of Agronomy, The Bangalore Printing and Publication Company Pvt. Ltd., Bangalore.

I SEMESTER

24 AGRD 0105 AGRICULTURAL METEOROLOGY AND LAND USE SYSTEMS (3+1)

OBJECTIVES

- To make the students understand the Principles of Agricultural Meteorology
- To improve knowledge and skills in Dry land Agriculture and Wasteland management

LEARNING OUTCOME

- Creation of basic knowledge on role of agricultural meteorology in crop production
- Scope and practical utility of agricultural meteorology in crop production
- Basic knowledge of alternate land use systems especially dry farming
- Scope and practical utility in studying dry land agriculture involving soil and water conservation efforts, integrated nutrient management, alternate land use systems especially agro forestry and watershed management in dry lands
- Creation of basic knowledge on forestry and wastelands and their practical utility in agriculture especially in dry lands

THEORY

UNIT I **Introduction:** Meteorology – Agricultural meteorology – Branches – their scope and importance Crop production – atmosphere – composition - climate and weather – weather elements and their importance –monsoons of India Rainfall and its distribution in India and Tamil Nadu – Agro climatic zones of India and Tamil Nadu – Agro ecological zones.

UNIT II **Weather Forecasting:** Weather forecasting – Types of weather forecasting – synoptic chart, weather calendar – Climatic change and weather modification –El Niño and La Nina – Artificial rain making – automatic weather station – Remote sensing and its role in agriculture.

UNIT III **Principles of Dry Farming:** Significance of dry farming in Indian Agriculture Indices of Aridity – Distribution of dry farming regions – Major dry land crops and cropping systems in India and Tamil Nadu – Drought – Types and effect on crop production- Drought mitigation -Integrated Dry land Development Technology and its components – Soil moisture conservation methods – Principles and practices – pre-monsoon sowing – Mid season corrections – Soil fertility management in dry farming – Alternative land use system in dry farming areas –Watershed Management – water shed – definition and importance**.**

UNIT IV **Dry Farming Practices:** Dry Farming – Definition and Present Status in Tamil Nadu – Important Drought Events in Tamil Nadu and their effect on Crop Production - Soils of Dry Farming Tracts and their limitation to Crop Production –. Suitable Dry Land Technology for increased Crop Productivity — Conventional Crop Production Vs Alternate land Use in Dry Land – Integrated Farming Systems in dry lands – Cultivation Practices – Water Harvest – Farm Ponds – Percolation Ponds –Weather aberrations and Contingent Crop Planning.

UNIT V **Forestry and Wasteland Development :** Land use classification – Role of Forests – Indian forests – Disciplines in Forestry – Agroforestry – Definition – Differences between Agroforestry, Social Forestry, Urban Forestry – Advantages – Agroforestry Systems – Agrisilviculture, Silvipasture, Agrisilvipasture, Silvihorticulture – Shifting Cultivation – Taungya – Home Gardens – Alley cropping – Wind Break and Shelter Belts – Trees for Problem Soils– Social Forestry Projects in Tamil Nadu –Industrial Agroforestry – Waste land development – types of wastelands and management practices for Multi Purpose Trees (MPT) – Teak, Casuarina, Neem, Bamboo, Acacia.

LECTURE SCHEDULE

1 – 2	Introduction to agricultural meteorology, importance, its branches and definitions of different terms
3	Atmosphere – Definition, composition and different layers of atmosphere
4	Climate and weather – definition and significance of troposphere in agriculture
5-6	Different weather elements and their importance in crop production
7	Monsoons – importance of monsoon systems in Indian agriculture
8	Agro climatic zones – definition, classification – different zones in India
9	Agro climatic zones of Tamil Nadu
10	Agro ecological zone - definition, classification – different zones in India
11	Weather forecasting – introduction - definition – significance of weather forecasting
12	Types of weather forecasting, forecasted weather elements and their utility in crop production
13	Synoptic chart – introduction, definition, description about chart preparation
14	Weather calendar – Importance – preparation of weather calendar – model for crops – practical utility in decision making at times of contingencies
15	El Niño and La Nina
16	Weather modification – definition – types – artificial rain making, changing effects of winds, light and other weather parameters
17	Remote sensing – definition – methodology – practical utility in agriculture and allied sectors
18	Definitions – difference between dry farming and dry land agriculture significance of dry land agriculture in India
19	Indices of aridity – arid and semi arid climate – Koeppen, Thoorthwaite and Martonne's classifications
20	Distribution of dry regions in India, rainfall and cropping pattern
21	Major crops and cropping systems in dry land areas of India and Tamil Nadu
22	Drought – definition, history and its impact on Indian Agriculture
23	Classification of drought – meteorological, hydrological and agricultural droughts and effect of drought in crop production
24	Integrated dry land development technology – outline and components
25	Soil and moisture conservation methods – control of soil erosion by different mechanical structures
26	In situ soil moisture conservation measures- Seed hardening and mulching
27	Contingent crop production techniques and midseason correction measures in dry land crop production
28	Integrated nutrient management measures in dry lands

29 Integrated Farming Systems in dry lands – Cultivation Practices

30 Water Harvest – Farm Ponds – Percolation Ponds –Weather aberrations and Contingent Crop Planning

31 Important Drought Events in Tamil Nadu and their effect on Crop Production

32 Alternate land use systems – agro forestry –integrated farming systems and alley cropping in dry lands

33 Watershed management in dry lands – definitions – objectives and components of watershed management in dry lands

34 Forests and forestry – introduction – importance – extent of forest area in India and Tamil Nadu distribution of forest areas

35 Land use classification

36 Disciplines in Forestry – Agroforestry – Definition – Differences between Agroforestry,

37 Social Forestry, Urban Forestry – Advantages – Agroforestry Systems

38 Agrisilviculture, Silvipasture, Agrisilvipasture, Silvihorticulture

39 Shifting Cultivation – Taungya – Home Gardens – Alley cropping

40 Wind Break and Shelter Belts.

41 Trees for Problem Soils.

42 Social Forestry Projects in Tamil Nadu –Industrial Agroforestry

43 Waste land development – types of wastelands and management practices for Multi Purpose Trees (MPT) – Teak.

44– 45 Management practices for Multi Purpose Trees (MPT) Casuarina, Neem.

46- 48. Management practices for Multi Purpose Trees (MPT) Bamboo, Acacia.

PRACTICAL SCHEDULE

1. Visit and study of Agro meteorological observatory.
2-3 Site selection for Agro met observatory-Drawing layout sketch of the observatory.
4-5 Measurement of weather parameters – Acquiring skill and use of Meteorological Instruments-Thermometers.
6-7 Acquiring skill and use of Meteorological Instruments- Anemometer, rain gauge and open pan evaporimeter.
8. Pre-monsoon dry seeding for dry land crops.
9. Preparation of contingency crop planning for various aberrant weather situations.
10. Study of dry farming tools and implements.
11. Study of agro forestry options in Tamil Nadu.
12. Study of tree species suitable for Agro Forestry and Wastelands.
13. Seed collection and seed treatment for tree species.
14. Nursery Management of tree species and planting.
15. Visit to dryland Agriculture research station.
16. Visit to forest extension centre.
17. Final practical Examination.

REFERENCES

Text books

1. Gopalsamy,N. 1994. Agricultural Meteorology, Rawat Publications, Jaipur.
2. Griffiths, J.F. 1994. Hand Book of Agricultural Meteorology, Oxford University Press.

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E- Resources

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I SEMESTER

24 AGRD 0107 IRRIGATION AGRONOMY (3+1)

OBJECTIVES

- The students will be familiarized with the irrigation and crop water requirement concepts.
- The students will be taught with the drainage and problems in the usage of water sources.

LEARNINGOUTCOME

- The students are well known with the handling of crops with better water requirement and irrigation resources.

THEORY

UNIT I **Importance of Irrigation:** Definition—Water resources of India and Tamil Nadu-Need for irrigation- Sources of Irrigation- Natural streams and rivers, surface resources, underground resources- History and development of Irrigation in India and Tamil Nadu-Irrigation systems of India and Tamil Nadu- Groundwater- Aquifer- Well irrigation-Classification –open and bore well - Merits and demerits of tube wells-Role of water in plant growth

UNIT II **Irrigation and Crop Water requirement:** Irrigation Requirement-Net Irrigation requirement (NIR) and Gross Irrigation requirement (GIR)–Evapo transpiration-Evaporation, Transpiration, Potential Evapo Transpiration (PET) - Soil moisture constants – Crop Co-efficient – Effective rainfall - Factors affecting crop water requirement – Consumptive Use (Cu) – Methods of estimation of Crop water Requirement – Critical stages for irrigation –Water requirement of crop. Effect of water stress on crop yield.

UNIT III **Scheduling and methods of Irrigation**: When, how and how much to irrigate - different approaches – Methods of irrigation - Surface, sub-surface, sprinkler and drip irrigation – surge irrigation – Micro irrigation –layout, suitability, merits and scope-Fertigation – Water use efficiency (WUE) – Methods to improve WUE-Conjunctive use of surface and ground water- Water management for major field crops of Tamil Nadu.

UNIT IV **Water Shed Management and water harvesting structures;**--Definition, Principles, objectives and benefits; Watershed development methods, Water harvesting structures - Temporary gully control structures – Brush dam, Rock dam; Permanent gully control structures – Drop spillway, Chute spillway, Drop inlet spillway; Percolation pond, Farm pond and Sunken Pond Sand Storage dam– its merits and demerits.

UNIT V **Drainage and problems in water use**: Drainage – Definition - Effects of water logging, Benefits of Drainage – Classification of Drainage - Quality of irrigation water-Agronomic practices for management of poor Quality water (Saline, effluent and sewage water). Soil erosion due to water and control measures.

LECTURE SCHEDULE

1-2. Irrigation – Definition- Water Resources of India and Tamil Nadu- Need for irrigation-Source of irrigation- Natural streams and rivers – Surface resources and underground resources

3-4. History and Development of irrigation in India and Tamil Nadu- Irrigation systems of India and Tamil Nadu

5-6. Ground water, Aquifer- Well irrigation- Classification –open and bore wells- Merits and demerits of tube wells

7-8. Role of Water in plant growth- Functions of water in soils- Functions of soil – Role of organic matter in soil- Significance of Soil texture and Soil structure

9-10. Soil-Plant- water relationship- Soil factors- Infiltration and factors affecting Infiltration rate, permeability – Plant factors- Rooting characteristics, moisture extraction pattern and critical period of water requirement- Water factors- when to irrigate, how much water to apply and water application methods

11-12. Soil- plant Atmospheric continuum(SPAC)- Hydrologic cycle- Absorption of water by plants- Active absorption and passive absorption-Soil water movement- Saturated flow, unsaturated flow and vapour movement-

13-14. Soil moisture constants- Saturation capacity, Field capacity (FC), Permanent Wilting point (PWP)- Hygroscopic co-efficient, moisture equivalent and Available Soil moisture (ASM) – definition -Importance of soil moisture constants in Irrigation management

15-16. Soil physical characteristics – Soil texture, soil structure, porosity ,Bulk density and particle density in influencing irrigation- soil moisture estimation methods

17-18. Water stress and Plant growth- Causes of plant water stress- Effects of water stress on plant growth and methods to overcome.

19-20. Physical classification of Water- Gravitational water, capillary water and hygroscopic water- Biological classification of water- Superfluous water , available water and unavailable water

21-22. Irrigation requirement- Net irrigation requirement- Gross irrigation requirement- Evapo transpiration – Evaporation, Transpiration, Potential Evapo Transpiration (PET) - Reference crop Evapo transpiration- Crop co-efficient- Effective rainfall.

23-24. Crop Water requirement- Factors affecting Crop water requirement- Consumptive use- Seasonal consumptive use- Peak period consumptive use- Critical stages of irrigation

25-26. Methods of estimation of crop water requirement- Direct methods- Lysimeter, field experimental plots, Soil moisture depletion studies and water balance methods- Indirect methods- Modified blaney-criddle method, Thorthwaite formula, radiation method, Pan evaporation method.

27-28. Scheduling of irrigation- Criteria based on plant, soil moisture- Different approaches- Climatological approach, Empirical methods and crop co-efficient

29-30. Methods of irrigation- Surface irrigation- Flooding, beds and channels, border strip, ridges and furrows, broad bed and furrows (BBF)and surge irrigation- sub surface irrigation methods

31-32. Micro irrigation system- Drip and sprinkler irrigation- Lay out, suitability, components, operation, advantages and disadvantages- Fertigation

33-34. Water use efficiency (WUE)- Definition and concept- methods to improve WUE- Conjunctive use of water- Water budgeting

35-36. Water management for Cereals and Millets

37-38. Water management for Pulses and Oil seeds

39-40. Water management for commercial crops (Cotton, Sugarcane and Tobacco)

41-42. Drainage – Definition- Effects of water logging, Benefits of drainage

43-44. Classification of drainage- surface drainage- merits and demerits- Sub surface drainage

45-46. Quality of irrigation water- Irrigation management under limited water supply

47-48. Agronomic practices for the use of poor quality water (Saline, Effluent and sewage water)

PRACTICALSCHEDULE

1. Estimation of soil moisture by gravimetric method and Tensiometer.
2. Estimation of Soil moisture by Resistance blocks and Neutron probe and other improved devices.
3. Measurement of irrigation water with flumes and weirs
4. Calculation of irrigation water based on source, water flow, soil moisture status and depth of irrigation.
5. Land leveling and land shaping- beds and channels- Ridges and furrows.
6. Land leveling and land shaping for border strips– Broad Bed and furrow method of irrigation.
7. Operation and maintenance of drip and sprinkler irrigation systems.
8. Estimation of crop water requirement by direct and indirect methods.
9. Scheduling of irrigation based on indicator plants, soil-sand mini plot technique.
10. Scheduling of irrigation based on depletion of available soil moisture and IW/CPE ratio.
11. Calculations on Irrigation efficiency parameters.
12. Assessment of irrigation water quality parameters.
13. Observation of irrigation structures in wetlands and irrigated drylands.
14. Visit to Water Storage structures.
15. Visit to irrigation command area and study of command area development.
16. Visit to Water management and training Institutes.
17. Final practical Examination.

REFERENCES

Textbooks

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I SEMESTER

24 AGRD 0109 DAIRY CATTLE PRODUCTION (3+1)

OBJECTIVES:

- The General objective of this course is to establish basic knowledge of how to manage and operate dairy farm.
- 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.
- To provide hands-on experiences with handling and restraining of cattle, milking and other dairy husbandry practices.

LEARNING OUTCOME

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

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

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

- Describe the male and female reproductive organs.
- Identify the signs of heat and right time for insemination.
- Able to identify suitable method of breeding for improving the productivity of herd
- Able to determine the breeding efficiency of cows and bulls
- Acquire knowledge skills in semen collection, evaluation, dilution and insemination.
- Familiar with care and management of newborn calf, pregnant and lactating animals.

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

- Ability to handle and restrain animals safely.
- Acquired skill in putting nose ring, castration, dehorning tattooing, branding, tattooing and dentition and ageing of cattle.
- Acquired skill in various methods milking and cooling and pasteurization of milk
- 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

- Able to classify feeds according to their nutritive values
- Acquire knowledge in feeding value of locally available feed
- Able to list key nutrients for animals
- Able to outline how carbohydrates, lipids and proteins can be classified
- 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.
- Describe the functions of the parts of the digestive systems of cow
- 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

- Able to identify healthy and sick animals
- Able to take care of sick animals
- Able describe the basic physical examination of animals for health assessment
- Able to list and describe the common diseases of cattle
- Able to diagnose and treat mastitis, FMD, LSD, anthrax, black quarters and Hemorrhagic Septicemia
- Able to diagnose Tuberculosis, Johne's disease, Brucellosis and Rabies
- Able to diagnose and treat Bloat, Carbohydrate engorgement, Diarrhoea and Indigestion
- Able to control common Endoparasites and Ectoparasites
-

THEORY

UNIT I **Cattle breeds and selection**: Introduction – Role of dairying in Indian agriculture and economy - 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, Umbalacherry, Pulikulam – Exotic breeds – Holstein Friesian, Jersey, Brown Swiss. Breeds of buffalo – Murrah – Surti – Nili- Ravi – Toda. Selection of dairy cattle – objectives – dairy characters – selection of individual cows - Choice of breeds.

UNIT II **Cattle breeding**: Reproductive system of bull and cow – 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. Care and management of new born calf, pregnant and lactating animals.

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 – Milk – Definition – clean milk production – methods of milking – hand and machine milking – Processing of milk – cooling - Pasteurization – Various methods – Low Temperature Long Time and High Temperature Short Time – advantages and disadvantages. 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 – calving pen – calf pen – quarantine and isolation shed.

UNIT IV **Feeds and Feeding**: Classification of feeds – Roughage – Concentrate – Grains – Mill by products – Molasses – Oil cakes – Nutrients - 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. Feeding of pregnant and lactating cows Challenge feeding – complete feeding.

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 – Lumpy Skin Disease - Anthrax – Black quarter – Tuberculosis – Johne's disease – Brucellosis – Rabies, Hemorrhagic Septicemia – Endoparasites – Ectoparasites.

LECTURE SCHEDULE

1. Introduction to dairying, advantages of dairying and role of dairying in Indian Economy.
2. Exploring origin and domestication of livestock, Livestock census, milk production and availability.
3. Meaning of commonly used terms, Zoological classification of bovine and name the parts of dairy cow.
4. Classification of breeds of cattle and distinguishing characteristics and production performance of indigenous breeds of cattle- Red Sindhi, Sahiwal, Gir and Kangayam.
5. Distinguishing characteristics and production performance of exotic breeds of cattle – Jersey, Holstein Friesian and Brown Swiss.
6. Distinguishing characteristics and production performance of buffalo breeds – Murrah, Surti and Nili-Ravi.
7. Objectives and dairy characteristics
8. Selection of individual cows and choice of breed.
9. Basic anatomy and physiology of reproductive system of bull
10. Basic anatomy and physiology of reproductive system of cow
11. Changes in female reproductive system during different phase of oestrous cycle
12. Signs of heat in cows and buffaloes

13. Concept and classification of cattle breeding systems, uses and consequences of inbreeding. Various methods of out breeding and its uses. Various methods used to measure the breeding efficiency of cows and bulls
14. Various steps involved in artificial insemination – semen collection, evaluation, dilution and insemination.
15. Frozen semen production and its advantages and disadvantages.
16. Care and management of new born calf, pregnant and lactating animals
17. Handling and restraining of dairy cow. Casting, putting nose ring and string.
18. Dehorning – various methods its advantages and disadvantages. Castration and its advantages
19. Dentition and ageing – classification of teeth, parts of tooth, dental formula and determining the age of the cow.
20. Identification of dairy cow – tattooing, tagging and branding.
21. Milk – Definition – clean milk production
22. Methods of milking – hand and machine milking
23. Processing of milk – cooling - Pasteurization – Various methods – Low Temperature Long Time and High Temperature Short Time – advantages and disadvantages.
24. Selection of site for the farm buildings, planning and designing.
25. Construction details – Foundation – wall, floor, roof, manager, drain etc.
26. Types of animal housing – conventional barn and loose housing. Calf and calving pen – Quarantine and isolation shed
27. Classification of feeds roughage and concentrates, hay and straw, legume and non-legume, pasture and cultivated fodder, tree leaves, root crops and tubers.
28. Feeding value of grains, mill byproducts tapioca, molasses and oil cakes.
29. Nutrients in the feeding stuff, Water content of animal body and factors influencing it, functions of water and factors affecting water intake.
30. Definition, classification and functions of carbohydrates, protein and fat in the animal body in animal body
31. Functions, deficiency symptoms and sources of fat soluble vitamins.
32. Functions, deficiency symptoms and sources of water soluble vitamins and minerals
33. Organs of digestive system – Alimentary canal - mouth - esophagus – stomach – intestine
34. Accessory digestive organs – salivary gland, liver and pancreas.
35. Digestion and absorption of carbohydrates, protein and fat.
36. Principles of urea feeding, NPN compounds and their protein values and various methods of feeding urea
37. Factors affecting urea utilization and urea toxicity and its treatment.
38. Calculating the DM, TDN and DCP requirements of dairy cattle for maintenance and milk production.
39. Improving the digestibility of roughage by urea treatment - feeding of pregnant and lactating animals.
40. Elementary principles of treatment and care of sick animals
41. Signs of health and ill health
42. Recording of temperature, Respiratory and Pulse rate in cattle
43. Etiology, clinical signs, treatment and control of Mastitis
44. Etiology, clinical signs and treatment of Bloat and Carbohydrate engorgement

45. Etiology, clinical signs and treatment of Diarrhea, Indigestion and Wounds.
46. Etiology, clinical signs, treatment and control of viral diseases viz. Foot and Mouth disease, LSD and Rabies,
47. Etiology, clinical signs, treatment and control of acute bacterial diseases viz. Anthrax, Black quarter and Hemorrhagic Septicemia
48. Etiology, clinical signs, treatment and control of chronic bacterial diseases viz. Tuberculosis, Johne's disease and Brucellosis. Control of Endoparasites and Ectoparasites.

PRACTICAL SCHEDULE

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. Demonstration of various methods of milking
11. Identification of feeds and fodder
12. Preparation of plans for animal housing
13. Calculations of nutrient requirements for maintenance and milk production
14. Preparation of projects for obtaining bank loan.
15. Demonstration of deworming and vaccination
16. Visit to livestock farm
17. Final Practical examination

REFERENCES

Text Books

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2. Banerjee, G.C., 2018. Text book of Animal Husbandry 8th Ed. Oxford and IBH Publishing Company Ltd., New Delhi.
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4. Sastry, N.S.R., C.K.Thomas and R.A.Singh, 2019. 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

I SEMESTER

24 AGRD 0111 RURAL DEVELOPMENT (3+1)

OBJECTIVES

- To teach the students about the basics and importance of rural development.
- To understand the rural development attempts over various decades
- To expose the students to various agricultural and rural development programmes of centre and state
- To impart knowledge about rural development institutions and their role and importance

LEARNING OUTCOME

- Studying the concepts of rural development and origin, objectives and functions of various rural development programmes
- Learning about the community development programme and panchayati raj system and their implementation
- Learning about the role of various agricultural development programmes in agricultural development of India
- Learning about the different rural development institutions and SHGs
- Studying the rural sociology and its application to extension education
- Studying the programme planning and evaluation in extension education

THEORY

UNIT I **Introduction:** Rural Development- meaning, objectives, and its importance in the development of Indian economy - Socio-economic conditions of and causes for poverty conditions in villages. Rural and Urban societies -differences and relationships. Rural Development Attempts in Pre and Post independent Era. CDP and Panchayati Raj: Community Development Programme- meaning, principles, objectives, history and administration. CDP and NES. Panchayati Raj- evolution, earlier efforts and setup in 1957-59. New Panchayati Raj- 73rd Constitutional amendment- Tamil Nadu Panchayati Raj Act-constitution, structure and functions of Panchayat bodies at three tiers in Tamil Nadu.

UNIT II **Agricultural Development programmes:**Origin, objectives and functions of IADP, IAAP, HYVP, NATP and IVLP. Govt. of India schemes- E-NAM, NMSA, PMFBY, PKVY, PKSY, PM- Kisan, NFSM, NHM, KAVIADP, MIDH, ISAM, SMAE, and Digital Agriculture. Soil Health card, Kisan Call Centre. Origin, objectives and functions of Training and Visit System and ATMA. TOT by ICAR- LLP, KVK, FLDs, OFTs, ATIC, Agri Clinics and Agri Business Centres. Kisan Credit Card Scheme,India's Initiatives in Rice Fortification and National Agricultural Insurance Scheme.

UNIT III **Rural Development Programmes**: Origin, objectives and functions of IRDP, SGSY, National Social Assistance Programme- NOAPS, NMBS, NFBS, Annaporna Scheme, PMGSY, MGNREGS, Namo Drone didi, RAD and PDMC. Rural Social Organizations: Origin, objectives and functions of DRDA, NABARD and NIRD. Self Help Groups-history, formation and functioning. TNCDW and its role in SHGs - Role of NGOs in the development of SHGs- role in linking SHGs to formal credit system- linkage models.

UNIT IV **Rural Sociology:** Meaning and importance. Significance of Rural Sociology in Agricultural Extension. Rural society- characteristics. Social structure- meaning and importance. Rural social institutions. Social control- meaning, types and agents. Motivation- meaning and types, motivating the rural people for agricultural development. Leaders- meaning, types, selection, training and use of local leaders in rural areas. Social change- meaning types and causes.

UNIT V **Programme Planning and PRA:** Needs- characteristics and assessment. Programme planning – meaning, principles, purposes, characteristics, limitations and steps in programme planning process. Evaluation in extension– meaning, objectives, types, importance, degrees, uses, steps and methods. PRA- meaning, scope and principles. Menu of PRA methods, and steps to conduct.

LECTURE SCHEDULE

1. Rural Development- meaning, objectives, characteristics
2. Importance in the development of Indian economy, Socio-economic conditions of rural population.
3. Causes for poverty conditions in villages. Rural and Urban societies, differences and relationships
4. Rural Development Attempts in the Pre-independent Era: Shantiniketan, Gurgaon Experiment, Etawah Pilot Project.
5. Marthandam Project, Gandhian Constructive Programme.
6. Firka Development Scheme of Madras State, Nilokheri Experiment
7. Community Development Programme- meaning, principles,
8. Objectives and administration.
9. Community Development and National Extension Service
10. Panchayati Raj- evolution, earlier efforts and setup in 1957-59
11. 73rd Constitutional amendment- New Panchayati Raj- Tamil Nadu Panchayati Raj Act
12. Constitution, structure and functions of Panchayat bodies at three tiers in Tamil Nadu
13. Origin, objectives and functions of IADP, IAAP, HYVP,
14. NATP and IVLP
15. Govt. of India schemes- E-NAM, NMSA, PMFBY
16. PKVY, PKSY
17. PM-Kisan, NFSM,
18. NHM, KAVIADP
19. MIDH, ISAM
20. SMAE and Digital Agriculture
21. Soil Health card, Kisan Call Centre
22. Origin, objectives and functions of Training and Visit System and ATMA
23. TOT by ICAR- LLP, KVK
24. FLDs, OFTs, ATIC
25. Agri Clinics and Agri Business Centres. Kisan Credit Card Scheme.
26. India's Initiatives in Rice Fortification, and National Agricultural Insurance Scheme.

27. Origin, objectives and functions of IRDP, SGSY.
28. National Social Assistance Programme- NOAPS, NMBS
29. Annaporna Scheme, PMGSY, MGNREGS
30. Namo Drone didi, RAD and PDMC
31. Rural Social Organizations: Origin, objectives and functions of DRDA
32. NABARD and NIRD
33. Self Help Groups- history, formation and functioning. TNCDW and its role in SHGs
34. Role of NGOs in the development of SHGs- role in linking SHGs to formal credit system- linkage models
35. Rural Sociology- Meaning and importance. Significance of Rural Sociology in Agricultural Extension
36. Rural society- characteristics. Social structure- meaning and importance
37. Rural social institutions. Social control- meaning, types and agents
38. Motivation- meaning and types, motivating the rural people for agricultural development
39. Leaders- meaning, types, selection
40. Training and use of local leaders in rural areas.
41. Social change- meaning, types and causes
42. Programme Planning and PRA- Needs- characteristics and assessment
43. Programme planning – meaning, principles, purposes
44. Characteristics, limitations and steps in programme planning process
45. Evaluation in extension– meaning, objectives
46. Types, importance, degrees, uses, steps and methods
47. PRA- meaning, scope and principles
48. Menu of PRA methods, and steps to conduct

PRACTICAL SCHEDULE

1. Study of tools of data collection.
2. Preparation of schedules to collect the village basic data.
3. Preparation of schedules to collect the socio-economic status.
4. Visit to nearby villages to collect village basic data.
5. Micro level survey to assess the Socio-economic status of people in nearby villages.
6. Study of attitude of villagers towards Agricultural Development programmes
7. Visit to a nearby Village Panchayat office and attending Gram Sabha Meeting.
8. Practicing PRA and RRA methods to identify the rural problems
9. Visit to Panchayat Union to learn its administrative setup, functions and programmes.
10. Visit and study of organizational structure, functions and programmes of DRDA.
11. Visit to KVK at GRI to learn its activities and programmes.
12. Interaction with SHG' members about their activities and experience.
13. Visit to an NGO and learning its activities and role in rural development.
14. Visit to Farmers training centre.
15. Visit to JDA office – Dindigul
16. Visit to Agriculture Extension Centre.
17. Final practical Examination

REFERENCES

Text books

1. Dahama, O.P. and O.P. Bhatnagar. (1996). Education and Communication for Development, Oxford & IBH Publishing Co., Ltd., New Delhi.
2. Ray, G.L.(1991). Extension Communication and Management. Naya Prakash, Calcutta.
3. Reddy, A.A. (1980) Extension Education. Shree Laxmi Press, Bapatla
4. Tripathi, N.K. (2000). Rural Sociology and Psychology in Extension Education.
5. Sundaramari. M. (2006). Agriculture and Dairying- A Rural Development Perspective, NCBH, Chennai.

e- Resources

1. https://agrimoon.com/agriculture-icar-ecourse-pdf-book

II SEMESTER

24 AGRD 0201 AGRONOMY OF FIELD CROPS-I (3+1)

OBJECTIVES

- To know the concept and classification of field crops and cropping systems
- To know the production technology of Cereal crops (Rice, Wheat, Maize) Millets (Sorghum, Pearl millet (Cumbu), Finger millet (Ragi) and other minor millets), Pulses (Red gram, Black gram, Green gram, Bengal gram and others) and Green / Green leaf manure (Daincha, Manila Agathi, Sun hemp and others) and Cover crops (Pillipesara, Kolingi, Kalapogonium).

LEARNING OUTCOME

- Knowing the concept and classification of field crops their importance and their distribution / Improved production technology of Rice, wheat, maize, major and minor millets, Major and Minor pulses, Green and Green leaf manure and Cover Crops and their incorporation.

THEORY

UNIT I **Cereals I**: Rice-Low land, Upland and Semi dry.

UNIT II **Cereals II**: Wheat and Maize

UNIT III **Millets**:

A. **Major millets**: Sorghum, Pearl millet (Cumbu), Finger millet (Ragi).

B. Minor millets: Foxtail millet (Tenai), Little millet (Samai), Kodo millet (Varagu), Common millet (Pani Varagu), Barnyard millet (Kudiraivali).

UNIT IV **Pulses**:

A. Major: Pigeon pea (Red gram), Black gram, Green gram, Bengal gram (Chickpea), Cowpea,

B. Minor: Soybean, Horse gram, Field bean

UNIT V **Green manure, Green leaf manure and Cover crops**:

A.Green manures – Daincha, Manila Agathi, Sunhemp,

B. Green leaf manure - Gliricidia, Pungam and Neem.

C. Cover crops – Pillipesara, Kolingi, Kalapogonium.

THEORY SCHEDULE:

1. Importance and area, production and productivity of major kharif cereals and millets of India and Tamil Nadu.
2. Rice – Origin, distribution-economic importance- varieties- soil and climatic requirements.
3. Rice- Nursery management- main field and other cultural practices and yield.
4. Rice- Special type of rice cultivation -Semi dry rice - Transgenic rice- Hybrid rice.
5. Rice- growing seasons of India and Tamil Nadu ,Upland rice- cultural practices,
6. SRI- Techniques and its advantages.
7. Wheat- Origin- distribution-economic importance-classification-Growth stages

8. Wheat- varieties- soil and climatic requirements and other cultural practices and yield.
9. Maize- Origin, distribution-economic importance- varieties- soil and climatic requirements.
10. Maize – Cultural practices – seed treatment and sowing, manuring, weed management , harvest and yield
11. Maize-Classification, Baby corn, sweet corn- Cultural practices.
12. Sorghum- Origin, distribution-economic importance- varieties- soil and climatic requirements.
13. Sorghum- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
14. Sorghum poisoning-Sorghum effect-Rattoon sorghum, Sweet sorghum-Cultural practices.
15. Pearl millet (Cumbu) - Origin, distribution-economic importance- varieties- soil and climatic requirements.
16. Pearl millet (Cumbu) - Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
17. Finger millet (Ragi) - Origin, distribution-economic importance- varieties- soil and climatic requirements.
18. Finger millet (Ragi) - Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
19. Fox tail millet (Tenai) - Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
20. Little millet (Samai) - Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
21. Kodo millet (Varagu) - Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
22. Common millet (Pani varagu)- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
23. Barnyard millet (Kudiraivali) - Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
24. Red gram- Origin, distribution-economic importance- varieties- soil and climatic requirements.
25. Red gram- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
26. Red gram-Classification-Transplanting technology.
27. Black gram- Origin, distribution-economic importance- varieties- soil and climatic requirements.
28. Black gram- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
29. Green gram- Origin, distribution-economic importance- varieties- soil and climatic requirements.
30. Green gram- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
31. Bengal gram- Origin, distribution-economic importance- varieties- soil and climatic requirements.

32. Bengal gram- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
33. Cowpea- Origin, distribution-economic importance- varieties- soil and climatic requirements.
34. Cowpea- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
35. Soybean- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
36. Horse gram- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
37. Field bean- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
38. Daincha- Origin, distribution-economic importance- varieties- soil and climatic requirements.
39. Daincha- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
40. Manila Agathi- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
41. Sunnhemp- Origin, distribution-economic importance- varieties- soil and climatic requirements.
42. Sunnhemp- Cultural practices – seed treatment and sowing, manuring, weed management, harvest and yield.
43. Gliricidia- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
44. Pungam- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
45. Neem- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
46. Pillipsera- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
47. Kolingi- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.
48. Kalapogonium- Origin, distribution-economic importance- varieties- soil and climatic requirements,Cultural practices and yield.

PRACTICAL SCHEDULE

1. Practicing different types of rice nursery, SRI Technique in rice.
2. Acquiring skill in nursery preparation for sorghum, cumbu and ragi
3. Practicing main field preparation, sowing and manuring of important cereals andmillets.
4. Practicing main field preparation, sowing of pulses under pure and inter croppingsystem.
5. Seed treatment practices in cereals and pulses
6. Assessing and estimation of plant population for important field crops.
7. Foliar application of nutrients.
8. Yield attributes and yield estimation in rice and maize

9. Yield attributes and yield estimation in sorghum.
10. Yield attributes and yield estimation in Ragi and other millets
11. Yield attributes and yield estimation in pulses
12. Yield estimation in green manure crops.
13. Working out cost of cultivation for Rice and Maize
14. Working out cost of cultivation for Millets
15. Working out cost of cultivation for Pulses
16. Visit to maize research station
17. Final Practical Examination

REFERENCES

Text books

1. Balasubramanian, R and B.Gururajan. 2009. Crop Production, Kalyani Publsihers, Ludhiana
2. Chatterjee, B.N. and S.Maiti. 1993. Cropping system – Theory and Practice, Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.
3. Chiddha Singh. 1997. Modern Techniques of raising field crops, Oxford and OBH Publishing Company Pvt. Ltd., New Delhi.
4. Singh, S.S. 1997. Crop Management under irrigation and rain fed conditions, Kalyani Publishers, New Delhi.
5. TNAU. 2020. Crop production Guide, TNAU and Directorate of Agriculture, Chennai.
6. Rajendra Prasad.2013.Text book of Field Crop Production- Volume-I.

II SEMESTER

24 AGRD0203 FUNDAMENTALS OF PLANT PROTECTION (3+1)

OBJECTIVES

- To facilitate the students to learn and understand basic principles of Agricultural Entomology and Plant Pathology.
- To familiarize students with bio agents and pesticides for crop plants.

LEARNING OUTCOME

- Studying the brief history of Indian Agricultural Entomology.
- Studying the methods of pest control.
- Studying the brief history of plant pathology.
- Studying the plant diseases and symptoms.
- Studying the plant protection chemicals.

THEORY

UNIT I **Brief history of Indian Agricultural Entomology**: Insects – Definition -Systematic position of class insecta in animal kingdom – Characters of class insecta - Reasons for the dominance of class insecta –Causes for Insect Pest outbreak. Important insect mouth Parts, Wings and Legs - Metamorphosis in insects - Classification of class Insecta upto Orders. Types of damages caused by insects to plants. Pest – Definition – Categories of Pests.

UNIT II **Methods of Pest Control:** Pest Surveillance – Forecasting – Economic Threshold Level – Economic Injury Level - Pest Management Components – Cultural, Physical, Mechanical, Legal, Chemical and Integrated Methods – Use of Resistant Varieties, Biological Control – Parasitoids, Predator and Microbial Agents. Pheromones, its uses in insect pest control. Resurgence and insecticides application.

UNIT III **Brief history of Plant Pathology:** Elementary classification of fungi – Basic knowledge on disease causing Fungal, Bacterial, Viral, MLO's, Nematode and Algal agents. Infectious and Non infectious agents of plant diseases – Flowering parasites like Cuscuta, Striga, Loranthus and Orobanche.

UNIT IV **Study of plant diseases and symptoms** – Mode of spread of plant diseases – Brief study of sulphur, copper, systemic groups of fungicides Principles of Plant disease management - Importance of seed treatment with fungicides – Basic biological agents for disease control.

UNIT V **Study of Plant Protection Chemicals:** Different pesticide formulations and their Active Ingredients – Preparation of spray fluid – Compatibility of pesticides - Incompatibility, Physical/ Chemical and Phytotoxic – Storage and handling of plant protection chemicals and appliances- Biotechnological approaches in Plant disease management

THEORY SCHEDULE

1. Brief history of Indian Agricultural Entomology.
2. Insects, definition, systematic position of class insecta in animal kingdom.
3. Characters of class insecta.
4. Reasons for the dominance of insecta.
5. Causes for Insect Pest outbreak.
6. Important insect mouth Parts.
7. Insect Wings and Legs.
8. Metamorphosis in insects.
9. Classification of class insecta upto Orders.
10. Types of damages caused by insects to plants.
11. Pest definition, categories of Pests.
12. Methods of Pest Control, pest Surveillance.
13. Pest Forecasting.
14. Economic Threshold Level, Economic Injury Level.
15. Pest Management Components, Cultural control.
16. Physical control.
17. Mechanical control.
18. Legal control.
19. Chemical control.
20. Integrated Methods – Use of Resistant Varieties.
21. Biological Control, Parasitoids.
22. Predator and Microbial Agents.
23. Pheromones, its uses in insect pest control.
24. Resurgence and insecticides application.
25. Important events in Plant Pathology.
26. Elementary classification of fungi.
27. Basic knowledge on disease causing Fungal, Bacterial, Viral, MLO's, Nematode and Algal agents.
28. Somatic structure and reproduction of fungi.
29. Symptoms of fungal diseases.
30. Symptoms of bacterial diseases.
31. Symptoms of viral diseases.
32. Causes and classification of plant diseases.
33. Flowering parasites like Cuscuta, Striga, Loranthus and Orobanche.
34. Mode of spread of plant diseases.
35. Classification of fungicides based on the mode of action and general uses.
36. Classification of fungicides based on the chemical composition - Copper fungicides, Sulphur fungicides.
37. Systemic groups of fungicides.
38. Importance of seed treatment with fungicides by physical, chemical and mechanical methods
39. Basic biological agents and its mechanism.

40. Biocontrol agents against plant pathogens.
41. Method of application of biocontrol agents.
42. Principles of plant disease management avoidance and exclusion.
43. Eradication, Protection and Immunization.
44. Different pesticide formulations and their Active Ingredients.
45. Preparation of spray fluid and related problems.
46. Compatibility and incompatibility of pesticides - Physical/ Chemical and Phytotoxic.
47. Storage and handling of plant protection chemicals and appliances.
48. Biotechnological approaches in plant disease management.

PRACTICALSCHEDULE

1. Study of external structures of an insect.
2. Study of insect mouthparts.
3. Study of insect wings and legs.
4. Study of metamorphosis in insect.
5. Study of types of damage caused by insects on crops.
6. Study of Pesticide formulations.
7. Methods of pesticide application.
8. Study of Storage and handling of plant protection chemicals and appliances.
9. Preparation of Bordeaux mixture.
10. Symptoms of plant diseases in crop plants.
11. Simple calculation on Pesticide requirements.
12. Study of seed treatment.
13. Study of biological agents for disease control.
14. Evaluation of insect damage symptoms in plants.
15. Evaluation of disease symptoms in plants.
16. Visit to Agricultural Research station
17. Final practical Examination.

REFERENCES

Textbooks

1. Dhaliwal, G.S. and R. Arora. 2014. *Integrated Pest Managem*ent. Kalyani publishers.
2. David,B.V. and T. Kumarasamy. 1995.Elements of Economic Entomology, Popular Book Depot, Chennai.
3. Govindasamy, C. V. and M. N. Alagianagalingam. 1990. Plant Pathology, Popular Book Depot, Chennai.
4. Panwar, V. P. S. 2000. Agricultural Insect Pests of Crops and their control. Kalyani Publishers, New Delhi.
5. Singh, R.S. 2000. Introduction to Principles of Plant Pathology, Oxford & IBH Publishing Company, New Delhi.
6. Srivastava, H. N. 1996. Plant Pathology, Pradeep Publications, Jalandhar.

e- resources

1. https://agrimoon.com/insect-ecology-integrated-pest-management-pdf-book/
2. https://www.agrimoon.com/wp-content/uploads/Insect-Ecology-Integrated-Pest-Management.pdf
3. https://agrimoon.com/wp-content/uploads/Insect-Morphology-and-Systematics.pdf

II SEMESTER

24 AGRD 0205 INTRODUCTION TO HORTICULTURE AND FRUIT PRODUCTION (3+1)

OBJECTIVES

- To learn about importance, climatic zones, establishment of orchard, Systems of cropping, and propagation techniques of horticultural crops.
- To learn about production technology of tropical, subtropical, arid, humid and temperate fruit crops.

LEARNINGOUTCOME

- Studying the importance of horticulture and layout of orchard.
- Studying the Systems of cropping, training and pruning, harvest, Postharvest management
- Studying the vegetative Propagation techniques and tissue culture
- Studying the Production Technology of tropical fruit crops, subtropical, arid, humid and temperate fruit crops.

THEORY

UNIT I **Fundamentals of Horticulture**: Definition – Importance in Indian economy and nutrition – Climatic zones and Horticulture zones of India – Establishment of orchard – Selection of site, preliminary operations – Planning and layout – Planting systems and methods of planting.

UNIT II **Orchard Management**: Orchard soil management – Systems of cropping, training and pruning and Canopy management– Harvest, Post harvest management.

UNIT III **Propagation techniques:** Definition – Advantages and limitations - Stem cuttings – Simple layering, compound layering, serpentine layering, and Air layering – Inarching and Epicotyl grafting – Shield and Patch budding, T-budding, Specialized plant parts used in propagation and Micro-propagation or Tissue Culture.

UNIT IV **Cultivation of Major Tropical Fruits**: Cultivation of Mango, Banana, Citrus and Grape vine.

UNIT V **Cultivation of Other Fruits: C**ultivation of Guava, Sapota, Papaya, Ber, Jack, fig, Pineapple, Pomegranate, Custard Apple, Indian goose berry- Temperate Fruits- Apple, Pear, Peach and Plum.

LECTURE SCHEDULE

1. Definition, Importance in Indian economy and nutrition
2. Branches of horticulture.
3. Agro- Climatic zones for horticultural crops.

4-5. Establishment of orchard – Selection of location and site

6. Planning and layout of orchard

7. Planting systems
8. Methods of planting
9. Orchard soil management
10. Systems of cropping – Intercropping and mixed cropping.
11. Multitier system of cropping.
12. Principles and methods of training in horticultural crops
13. Principles and methods of pruning in horticultural crops
14. Canopy management of horticultural crops
15. Harvest, Post harvest management of horticultural crops
16. Definition – Advantages and limitations of asexual propagation.
17. Cuttings- Root cuttings and stem cuttings.
18. Layering and its advantages.
19. Ground layering and its types.
20. Air layering.
21. Grafting- Methods of grafting.
22. Inarching and Epicotyl grafting
23. Budding- Shield and Patch budding

24-25. Tissue Culture and its applications.

26. Production Technology of Mango
27. Physiological disorders in Mango.
28. Production Technology of Banana.
29. After cultivation practices in banana.

30-31. Production Technology of Citrus.

32-33. Production Technology of Grapes.

34. After cultivation practices in Grapes.
35. Production Technology of Guava.
36. Production Technology of Pineapple.
37. Production Technology of Sapota.
38. Production Technology of Papaya
39. Papain extraction and crop regulation in Guava.
40. Production Technology of Ber
41. Production Technology of Jackfruit
42. Production Technology of Pomegranate
43. Bahar treatment in pomegranate
44. Production Technology of Custard apple
45. Production Technology of Apple
46. Production Technology of Pear
47. Production Technology of Peach
48. Production Technology of Plum

PRACTICAL SCHEDULE

1. Acquiring knowledge about the college orchard and identification of fruit plants.
2. Acquiring knowledge about the tools and implements.
3. Practicing nursery methods for horticultural crops.

4. Acquiring knowledge about the physiological and nutritional disorders in horticultural crops.
5. Practicing Preparation of pits, planting and after care of horticultural crops.
6. Practicing Manuring and fertilizer application methods.
7. Practicing Irrigation and irrigation methods.
8. Practicing training methods.
9. Practicing Pruning methods.
10. Special pruning techniques in horticultural crops.
11. Acquiring knowledge about the Simple layering and air layering.
12. Acquiring knowledge about the Inarching and epicotyl grafting.
13. Practicing Harvesting of fruits and preparing for the market.
14. Visit to major orchard and fruit farms.
15. Visit to micro propagation unit.
16. Visit to Horticulture research Station.
17. Final practical examination.

REFERENCES

Textbooks

1. Kumar, N. 2021. Introduction to Horticulture, Medtech Science Press (A Division of Scientific International), New Delhi.
2. Jitendra Singh, 2020. Basic Horticulture, Kalyani Publishers.
3. Chadha, K.L. 2019, Hand Book Horticulture, ICAR Publications, New Delhi.
4. Shanmugavelu, K.S.1989.Viticulture in India. Agro Botanical Publishers.
5. Bose,T.K. 1986. Fruits of India–Tropical and subtropical, Nayaprakash, Calcutta.
6. Hartmann, H.T. and D.E. Kester. 1975. Plant propagation, Englewood cliffs, New Jersey, Printice Hall.

II SEMESTER

24 AGRD 0207 ENERGY AND ENVIRONMENT (3+1)

OBJECTIVES

- To impart knowledge about the biosphere, its components, resources with importance to energy resources and utilization.
- To facilitate understanding on environmental pollution, management and ecofriendly agricultural technologies.

LEARNING OUTCOME

- The students should be able to describe about biosphere, natural resources, energy resources and its utilization.
- Acquire knowledge on environmental pollution and management
- Practice ecofriendly agricultural technologies.

THEORY

UNIT I **Introduction to Energy:** Energy resources – Classification of Energy Resources – Renewable and Non-renewable Energy – Scope – Solar Energy – Applications – Advantages and Limitations – Hydro energy - Wind Energy – Applications - Merits and Limitations- Wind energy conversion- Classification of WECS.

UNITII **Bio energy:** Biomass energy – Technologies – Smokeless chulhas – -Gasification – Biofuels – Biogas Generation Technology- Classification and Types of Biogas Plants – Merits and Limitations - Biogas from Plant Wastes – Utilization of Biogas – Other Alternative Renewable Energy Technologies.

UNIT III **Ecology:** Biosphere – Components - Ecosystems –Types - Components – Functions - Biogeochemical cycles -Hydrological cycle – Carbon – Oxygen – Nitrogen - Sulphur and Phosphorous cycles -Natural Resources - Soil, water, mineral, forest, wildlife resources.

UNIT IV **Environmental Pollution:** Atmospheric pollution - Sources- Impact – Management - Smog - Acid rain – Ozone layer depletion – Global Warming – Causes, Effects and Control measures- Noise pollution – Sources- effect and prevention- Water pollution – Sources – Impacts on environment – Waste water treatment.

UNIT V **Soil pollution:** Sources- Impact on the environment – Management - Environmental Acts and Standards - Ecofriendly Agriculture Methods –Need- Scope- Characteristics – Principles - Advantages – Limitations of organic farming -ITK-Importance - Types – Ecofriendly Management Technologies in Agriculture–Organic certification.

LECTURE SCHEDULE

1. Introduction to energy and classification of energy resources.
2. Non-renewable energy resources.
3. Renewable energy resources.
4. Scope and importance.
5. Introduction to Solar Energy and its applications.
6. Solar Thermal systems.
7. Photovoltaic systems.
8. Advantages and Limitations of solar energy.
9. Hydro energy.
10. Wind energy and its applications.
11. Merits and Limitations.
12. Wind energy conversion and Classification of WECS.
13. Introduction to biomass energy and its technologies.
14. Smokeless chulhas.
15. Gasification.
16. Pyrolysis.
17. Biofuels.
18. Biogas Generation Technology.
19. Classification and Types of Biogas Plants.
20. Merits and Limitations of Biogas.
21. Biogas from Plant Wastes and Utilization of Biogas.
22. Geothermal energy.
23. Ocean energy – Wave, tidal and ocean thermal energy.
24. Biosphere and its Components namely atmosphere, hydrosphere and lithosphere.
25. Ecology, Components and Functions of Ecosystems.
26. Types of ecosystems.
27. Biogeochemical cycles - Hydrological cycle, Carbon cycle and Oxygen cycle.
28. Nitrogen cycle, Sulphur and Phosphorous cycles.
29. Natural Resources- Soil resources.
30. Water resources.
31. Mineral resources.
32. Forest resources.
33. Wildlife resources.
34. Environmental Pollution – Atmospheric pollution, Sources, Impact and Management.
35. Smog, Acid rain and Ozone layer depletion.
36. Global Warming – Causes, Effects and Control measures.
37. Noise pollution, its Sources, effect and prevention.
38. Water pollution – Sources and Impacts on the environment.
39. Waste water treatment.
40. Soil pollution – Sources, Impact on the environment.
41. Solid waste management.
42. Environmental Acts and Standards.
43. Various methods Ecofriendly Agriculture.

44. Organic Farming, its need, Scope and Characteristics.
45. Principles, Advantages and Limitations of organic farming.
46. ITK, its importance and types.
47. Ecofriendly Management Technologies in Agriculture.
48. Organic certification.

PRACTICAL SCHEDULE

1. Study of solar cooker, solar water heater, solar dryer and solar pumping system.
2. Production of biogas.
3. Study of biomass gasification.
4. Visit to centre for renewable energy, GRI.
5. Study of biodiversity in the farm.
6. Collection, sampling and preservation of waste water.
7. Determination of pH and EC in waste water samples.
8. Determination of BOD and COD in waste water samples.
9. Determination of total solids in the waste water sample.
10. Estimation of hardness in the waste water sample.
11. Study of waste water treatment plant.
12. Preparation of vermicompost.
13. Preparation of Organic nutrient solution.
14. Preparation of Bio pesticides formulations.
15. Identification of sources for collection and documentation of ITKs.
16. Field Visit to Organic farmer's field.
17. Final practical Examination

REFERENCE

Text books

1. Ravindranath NH, Usha Rao, Natrajan B, Monga P, 2000. Renewable Energy and Environment-A Policy analysis for India, Tata McGraw hill.
2. Fowler, J m, Energy and Environment, 2nd edition, McGraw Hill, New York
3. Dhaliwal, G.S. and D.S. Kler. (2000). Agricultural Ecology, Himalaya Publishing Company, Mumbai.
4. Sharma, Arun K. (2002). A Hand Book of Organic Farming Agrobios (India), Jodhpur.
5. Sundaramari, M. (2003). Indigenous Agricultural Practices for Sustainable Farming, Agrobios (India), Jodhpur.

II SEMESTER

24 AGRD 0209 FARM MACHINERY AND POST HARVEST TECHNOLOGY (3+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 pump sets

LEARNING 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 pump sets.

THEORY

UNIT I **Farm power**: Farm power sources – Man, animal, mechanical, Solar, Wind and electrical – Farm Structures-Tractors and power tillers – its major functions;-Combine Harvester-Renewable sources of energy – bio gas, wind and solar energy – Application and limitation, tapping and limitations in Agriculture.

UNIT II **Farm Machinery**: Tillage –Classification - Primary tillage implements – Country plough, mould board plough, disc plough, chisel plough, secondary tillage implements – Harrows, cultivators, weeders, basinlister, puddler, green manure trampler; Different sowing methods – its merits and demerits – sowing machinery – broadcasting device, seed planter, seed cum fertilizer drill, direct paddy seeder, paddy transplanter. Harvesting machinery – Sickles –Reapers - Calculation of draft, field capacity and power required for the farm implements.

UNIT III **Pumping Machinery**: Oil engine coupled with centrifugal pumpset – four and all wheel drive mechanism – study of the parts, working principles and repair and maintenance of oil engine ; Electric motor – types of AC three phase induction motor – monoblock, motor coupled with centrifugal pumpset –-Submersibles- study of parts, working principles, repair and maintenance of electric motor – AI assisted irrigation systems.

UNIT IV **Plant protection machinery**: Sprayers and dusters – Bucket type sprayer - Knapsack sprayer – Rocker arm sprayer – Engine powered sprayer – study of parts and its working principles; Power duster – Rotary hand duster – study of parts and its working principles; Repairs and maintenance of sprayers and dusters- Drone sprayers.

UNIT V **Post harvesting machinery:** Post harvest losses- Moisture content Determination- Methods- EMC- Engineering properties of agricultural materials- Drying theory- Natural drying- Mechanical dryers-cleaning and grading-Cleaning and grading equipments- Threshing- Threshing machines-Hulling and shelling machines- Milling and milling machinery – Seed processing- Seed Processing equipments- Grain storage structures. Materials handling equipments. Machinery for fruits and vegetables processing.

LECTURE SCHEDULE:

1. Farm power: Farm power sources – Man, animal and mechanical
2. Solar, Wind and electrical power sources.
3. Farm Structures- Farm house, Threshing floor, Drying floor, storage structures and Pump house.
4. Tractors and power tillers – its major functions;
5. Renewable sources of energy – bio gas, wind and solar energy – Application, tapping and limitations in Agriculture.
6. Farm Machinery: Tillage –Classification - Primary tillage implements – Country plough, mould board plough, disc plough and chisel plough,
7. secondary tillage implements – Harrows, cultivators, weeders, basinlister, puddler, green manure trampler;
8. Wind turbine- Parts and working principle-calculations on energy requirements.
9. Solar powered irrigation systems.
10. Sowing machinery – broadcasting device and seed planter.
11. Seed cum fertilizer drill, direct paddy seeder and paddy transplanter.
12. Harvesting machinery – Sickles and Reapers
13. Combine harvester- Parts and working principle.
14. Calculation of draft, field capacity and power required for the farm implements.
15. Engine Parts and working principle of an I.C engine.
16. Two stroke and four stroke engine.
17. Hydraulic and hitch systems of tractor.
18. Cooling systems of a tractor
19. Lubrication systems of a tractor.
20. Clutch systems of a tractor.
21. Gearing systems of a tractor.
22. Differential and final drive of a tractor.
23. Electric motor – types of DC, three phase induction motor
24. Monoblock, motor coupled with centrifugal pumpset,
25. Different types of pumps and construction and working principle
26. Submersibles-study of parts, working principles, repair and maintenance.
27. Plant protection machinery: Sprayers and dusters
28. Knapsack sprayer – Rocker arm sprayer
29. Engine powered sprayer – study of parts and its working principles;
30. Power duster – Rotary hand duster – study of parts and its working principles; Repairs and maintenance of sprayers and dusters-
31. Overview of drone sprayers.
32. **C**onstruction and working principle of drone sprayer.

33. Post harvesting machinery: Post harvest losses
34. Moisture content Determination-Methods
35. psychrometry
36. Natural drying and Mechanical drying.
37. Solar dryers.
38. LSU and other columnar dryers.
39. Cleaning and grading-Cleaning and grading equipments
40. Threshing-Threshing machines-types.
41. Hulling and shelling machines- Milling and milling machinery
42. Seed processing-Seed Processing equipments.
43. Materials handling equipments
44. Peeling machineries for fruits.
45. Fruit pulper.
46. Washers for fruits and vegetables.
47. Material handling equipments.
48. Form – Fill – Pack machinery.

PRACTICAL SCHEDULE

1. Study and identification of different parts of solar drier, solar cooker, solar water heater, windmill and bio gas plant
2. Identification of different parts of tractor, power tiller
3. Study the operation of different primary tillage implements
4. Study the operation of different secondary tillage implements
5. Study the operation of bullock drawn planters and seed drills
6. Assessment of machinery power and cost of operation
7. Study the operation of different parts of hand operated sprayers and duster & power operated sprayers and dusters
8. Study the operation of different parts and types of electric motors and pumps
9. Study of post harvesting machineries - Paddy thresher cum winnower, paddy drier and seed cleaner cum grader

10-13. Study of post harvesting machineries – Groundnut decorticator, maize Sheller and Dhal Mill.

14. Machinery for fruits and vegetable processing
15. Field visit to College of Agriculture Engineering, TNAU, Coimbatore
16. Field visit to SRFMTTI, Govt. of India, Ananthapur.
17. Final practical Examination

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Text books

1. Anonymous. 1997. Directory of Rural Technologies. Vol.I, Council for advancement of rural technology, New Delhi.
2. Ghose, R.K. and S.Swain. 1990 Practical Agrl. Engg., Nayaprakash Publishing Ltd., Calcutta
3. Michael, A.M. and T. P. Ojha. 1987. Principles of Agricultural Engineering. Vol. I, Jain Brothers, New Delhi

4. Nakra, C.P. 2006, Farm Machineries and Equipment.
5. Shippen, J.M. and J.G.Turner. 1996. Basic farm machinery, Pergamon Press, Oxford.

e- resources:

eagri.org
ecourseonline.iasri.res.in
agrimoon.com

II SEMESTER

24 AGRD 0211 PRINCIPLES OF PLANT BREEDING AND SEED SCIENCE TECHNOLOGY (3+1)

OBJECTIVES

- This course aimed at understanding to impart theoretical knowledge and practical skills about plant breeding objectives, modes of reproduction and genetic consequences, breeding methods for crop improvement and seed physiology, seed certification, seed testing and seed storage.

LEARNING OUTCOME

- The students will understand about breeding objectives, breeding methods for crop improvement, tissue culture techniques, seed physiology, seed testing and seed storage.

THEORY

UNIT I **Crop physiology and introduction to plant breeding:** Plant Photosynthesis – Respiration – Translocation of Assimilates. Chemical Composition of Economic Parts in the Crops - Cereals, Millets, Pulses, Oilseeds, Fibres, Sugar and Starch Crops. History of plant breeding, pollination mechanisms - Methods of plant breeding - Apomixis – Breeding Techniques for Self Pollinated Crops – Pure line selection – Mass Selection – Hybridization and Selection – Pedigree Method – Bulk Method - Plant genetic resource.

UNIT II **Breeding Techniques for Cross Pollinated and Often Cross Pollinated Crops:** Mass Selection- Heterosis Breeding – Development of Hybrids – Single Cross – Double Cross and Poly Cross. Use of Male Sterile and self incompatibility– Synthetics and composites.

UNIT III **Breeding Methods for vegetatively propagated crops:** Tissue culture – Meristem, Anther, ovary, Embryo culture- Mutation in crop improvement – Polyploid in Crop Improvement – Inter Specific Hybridization- Hybridization and selection.

UNIT IV **Seed science and technology:** Fertilization – embryo genesis and seed formation – development and maturation – seed structure and composition – seed quality characteristics - difference between seed and grain- selection, Seed Farm Management – Seed Certification and standards –classes of seed.Seed germination and seed testing -Types – Requirements – Factors affecting germination – Seed dormancy – Seed and seedling vigour – Seed storage –Seed storability – Seed sampling – Seed purity analysis – seed viability and seed health.

UNIT V **Seed Production Technology:** Seed Production Techniques for Varieties and Hybrid in Rice, Sorghum, Maize, Cumbu, Pulses, Cotton, Oilseeds and Important Vegetables: Tomato, Brinjal, Chillies, Bhendi, Lablab and Cucurbits. – variety release committee and steps involved in release of crop varieties and hybrids

LECTURE SCHEDULE

1. Chemical composition of economic parts in the crops.
2. Plant photosynthesis, respiration and translocation of assimilates
3. History of plant breeding, Objectives and scope of plant breeding.
4. Modes of reproduction.
5. Mechanisms promoting self pollination.
6. Mechanisms promoting cross pollination.
7. Apomixis and their classification.
8. Importance of plant genetic resources.
9. Centre of origin: mega gene centres and micro gene centres
10. Breeding of self pollinated crops, genetic makeup of self pollinated crops - introduction, selection and hybridization.
11. Methods of breeding –pure line concept in autogamous crops
12. Methods of breeding-mass selection in autogamous crops
13. Methods of breeding–population improvement, mass selection in allogamouscrops.
14. Heterosis and inbreeding depression – exploitation of heterosis, types of heterotic hybrids and their uses
15. Development of hybrids single cross, double cross and polycross.
16. Development of synthetics, composites and multilines.
17. Mechanisms of pollination control: self incompatibility systems.
18. Mechanisms of pollination control: sterility systems.
19. History of plant tissue culture and Plant tissue culture: general techniques.
20. Concepts and scope of biotechnology.
21. Totipotency-sterilization techniques- explant.
22. Tissue culture media and culture establishment.
23. Meristem and embryo culture.
24. Anther culture, Ovary and ovule culture.
25. Microspore culture methods, production of virus free plants and their applications.
26. Embryo and endosperm culture.
27. Mutation breeding.
28. Variety release committee and steps involved in release of crop varieties and hybrids.
29. Seed-definition - characteristics of quality seed - significance - difference between seed and grain.
30. Seed formation, development and structure - importance.
31. Climatic, edaphic and biotic factors affecting quality seed production.
32. Quality seed production-land requirement-isolation distance - rouging - other seed management practices.
33. Seed farm management.
34. Seed certification -importance-phases.

35. Different seed certification procedures.
36. General certification standard – classes of seed.
37. Seed viability - vigour - germination - types and events.
38. Seed Dormancy - types - causes - methods of breaking dormancy.
39. Factors affecting seed germination.
40. Seed testing objectives – importance – seed sampling procedure.
41. Seed treatment – types - pre-sowing treatment -hardening - pelleting.
42. Seed testing – objectives – importance of seed testing.
43. Sampling - equipments - physical purity importance.
44. Seed viability Germination requirements - media and methods.
45. Quick viability test- seed health test- importance.
46. Seed processing – principle - importance - sequence of seed processing for different crops.
47. Seed storage – need- factors influencing seed storage.
48. Seed packing materials - types - moisture pervious and resistant - moisture vapour proof containers.

PRACTICAL SCHEDULE

1. Breeders Kit & its components.
2. Pollination and reproduction in plants.
3. Selfing and crossing techniques in different crops.
4. Fertility & Sterility in A, B, R & TGMS lines and their maintenance.
5. Study of instruments used in biotechnology laboratory.
6. Laboratory organization and sterilization techniques.
7. Preparation of stock solutions for MS medium.
8. MS media preparation.
9. Meristem tip culture and Anther culture.
10. Identification of seed and its structure.
11. Purity analysis – reporting results
12. Seed germination tests.
13. Seed dormancy breaking treatments.
14. Seedling evaluation – tetrazolium test and evaluation.
15. Seed farm visit and Seed Certification agency.
16. Visit to tissue culture unit.
17. Final practical exam.

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III SEMESTER

24 AGRD 0301 AGRONOMY OF FIELD CROPS - II (3+1)

OBJECTIVES

- To know the concept and classification of field crops and cropping systems
- To know the production technology of oilseeds, sugar crops, Fibre crops, Tobacco and fodder crops.

LEARNING OUTCOME

- The student will gain knowledge on the cultivation of oilseeds sugar crops, Fibre crops, Tobacco and fodder crops.

THEORY

Agronomy of the field crops with reference to economic importance, origin, soil and climatic requirement area, production and productivity in India and Tamil Nadu – systems of cultivation, crop management – season, varieties, seed rate, seed treatment, sowing, spacing, Integrated nutrient and weed management – irrigation – after cultivation – harvest- by product utilization. Latest developments in oilseeds sugar crops, Fibre crops, Tobacco and fodder crops.

UNIT I **Major Oil seeds**: Groundnut, Gingelly and Sunflower

UNIT II **Minor Oil seeds:** Rapeseed and Mustard, Safflower and Castor.

UNIT III **Sugar crops**: Sugarcane, Sugar beet and Sweet sorghum

UNIT IV **Fibre crops and narcotics**:

a) Major Fibre crops : Cotton, Jute

b) Minor Fibre crops : Silk cotton, Mesta and Agave,

c) Narcotics : Tobacco.

UNIT V **Forage crops**

a) Forage cereals- Sorghum, Maize and cumbu

b) Forage grasses - Guinea grass, Bajra Napier, Kolukkattai grass and Deena nath grass.

c) Forage legumes - Lucerne, Cow Pea, Stylo, Siratro and Desmanthus.

d) Forage trees - Subabul (saundal), Sesbania (Agathi) and Gliricidia.

e)Less Known - Erythrina (Mulmurugai), Thespesia (Poovarasu), Cultivation of Mulberry crop

LECTURE SCHEDULE

1-2	Importance of oil seeds like Groundnut, Gingelly, Sunflower
3	Area, production and productivity of major oil seeds of India and Tamil Nadu
4	Groundnut - importance – origin - distribution - soil and climatic requirement, season and varieties
5	Groundnut - growth stages – manuring - weeding – irrigation- after cultivation - harvesting and Storage
6	Gingelly – Origin – distribution - soil and climatic requirement – season- varieties
7	Gingelly– manures and manuring - time and method of fertilizer application – Weeding and after cultivation.

8 Sunflower – Origin – distribution - soil and climatic requirement – season- varieties

9 Sunflower – manures and manuring - time and method of fertilizer application – Weeding and after cultivation.

10-11 Sunflower - weed control – IWM - irrigation - after cultivation - cropping system- harvesting, threshing, drying and storage - by-products.

12 Rapeseed- origin and distribution - soil and climatic requirements - season, varieties

13 Rapeseed - field preparation - seeds and sowing, seed treatment - manures and manuring - weed control - irrigation - after cultivation - harvest, threshing, drying and storage - cropping system

14 Mustard - origin and distribution - soil & climatic requirements - season, varieties – Types of maize - field preparation - sowing – manures & manuring - weed Control

15 Mustard- irrigation - after cultivation - harvest, threshing, drying and storage - Agronomic practices for Baby corn - cropping system

16 Safflower- origin and distribution - soil and climatic requirements - season, varieties

17 Safflower - field preparation - seeds and sowing, seed treatment - manures and manuring - weed control - irrigation - after cultivation - harvest, threshing, drying and storage - cropping system

18 Castor - origin and distribution - soil & climatic requirements - season, varieties – types of maize - field preparation - sowing – manures & manuring - weed control

19-20 Castor - irrigation - after cultivation - harvest, threshing, drying and storage – Agronomic practices for Baby corn - cropping system

21 Sugarcane - importance - origin and distribution - soil and climatic requirements – season, varieties -seeds and sowing – nursery preparation

22-23 Sugarcane - main field preparation – manures and manuring - weed control – after cultivation – irrigation - harvesting

24-25 Sugarcane - Agronomic practices for ratoon sugarcane - cropping system

26 Sugarbeet- importance - origin and distribution - soil and climatic requirements – season, varieties - seeds and sowing – main field preparation and planting

27-28 Sugarbeet - manures and manuring - weed control - after cultivation - irrigation - harvesting

29-30 Sweet sorghum - importance - origin and distribution - soil and climatic requirements - season, varieties - - seeds and sowing - main field preparation and planting - manures and manuring - weed control - after cultivation - irrigation – harvesting

31-32 Cotton– importance - origin and distribution - season, varieties - field preparation – seeds and sowing - manures and manuring - weed control - after cultivation – irrigation - harvest and storage - cropping system

33-34 Jute - importance - origin and distribution - season, varieties - field preparation – seeds and sowing - manures and manuring - weed control - after cultivation – irrigation - harvest and storage

35-36 Mesta &Agave - importance - origin and distribution - season, varieties - field preparation - seeds and sowing - manures and manuring - weed control – after cultivation – irrigation - harvest and storage

37-38 Tobacco - importance - origin and distribution - season, varieties - field preparation - seeds and sowing - manures and manuring - weed control - after cultivation - irrigation - harvest and storage

39-40 Silk cotton- importance - origin and distribution - season, varieties - field preparation - seeds and sowing - manures and manuring - weed control - after cultivation - irrigation - harvest and storage

41-42 Forage crops – importance/benefits of growing forage crops.

43-44 Importance - soil and climatic requirement for forage cereals and Forage grasses.

45-46 Importance - soil and climatic requirement for Forage legumes.

47 Forage trees - importance – Cultivation of Mulberry crop

48 Importance – Erythrina and Thespesia

PRACTICAL SCHEDULE

1. Study of field management in groundnut and other oil seeds
2. Cultivation techniques of sugarcane
3. Cultivation techniques of sweet sorghum
4. Study of sowing and manuring of oilseeds
5. Study of sowing and manuring of sugarcane
6. Study of sowing and manuring of cotton
7. Tobacco nursery management
8. Growth and Yield estimation in oil seeds
9. Growth and Yield estimation in sugarcane.
10. Growth and Yield estimation in fibre crops
11. Cost of cultivation in oil seeds.
12. Cost of cultivation in sugarcane.
13. Cost of cultivation in cotton.
14. Cost of cultivation in forage crops.
15. Visit to CTRI, Vedasandur
16. Field visit to Research Station
17. Final practical Examination.

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Text books

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4. Yadava, R.L. 1993. Agronomy of sugarcane – Principles and Practices, International book distribution Company, Lucknow.
5. Gururajan, B.R.Balasubramanian and V.Swaminathan, 2008 . recent stratigies on crop production.

III SEMESTER

24 AGRD 0303 CROP DISEASE MANAGEMENT (3+1)

OBJECTIVE

- To facilitate the students to learn and understand about the crop diseases and management.

LEARNING OUTCOME

- Students can able to Identify and Manage Diseases of Cereal and Pulses Crops
- Students can able to Identify and Manage Disease of Oilseeds and Cash Crops
- Students can able to Identify and Manage Diseases of Vegetable Crops
- Students can able to Identify and Manage Diseases of Fruit Crops
- Students can able to Identify and Manage Diseases of Plantation and Flower Crops

THEORY

- Study of major and Common Crop diseases (including nutritional disorders) symptoms, mode of spread and management practices of following crops.

UNIT I **Diseases of Cereals and Pulses:** Rice, Wheat, Cholam, Maize, Cumbu, Ragi, Red gram, Green gram, Black gram, Bengal gram and Cowpea.

UNIT II **Diseases of Oilseeds and Cash Crops:** Coconut, Groundnut, Castor, Gingelly, Sunflower, Cotton, Sugarcane and Tobacco
.

UNIT III **Diseases of Vegetable Crops:** Brinjal, Bhendi, Chillies, Potato, Tomato, Cucurbits, Crucifers, Garlic, Coriander, Onion and Tapioca.

UNIT IV **Diseases of Fruit Crops:** Citrus, Mango, Banana, Grapes, Apple, Pomegranate and Papaya and sapota.

UNIT V **Diseases of Plantation and Flower Crops:** Coffee, Tea, Cardamom, Pepper, Betel vine, Turmeric, Rose, Crossandra and Jasmine.

LECTURE SCHEDULE

1-3. Common diseases of Rice.
4-5. Common diseases of wheat
6-7. Common diseases of Sorghum and Maize
8-9. Common diseases of Cumbu and Ragi,
10. Common diseases of Red gram,
11. Common diseases of Bengal gram,
12-13. Common diseases of Black gram, Green gram and cowpea
14-15. Common diseases of Coconut
16. Common diseases of Groundnut
17. Common diseases of Gingelly

18. Common diseases of Sunflower
19. Common diseases of Castor
20-21. Common diseases of Cotton
22-23. Common diseases of Sugarcane
24. Common diseases of Tobacco
25. Common diseases of Mango
26. Common diseases of Banana
27. Common diseases of Grapevine
28. Common diseases of Citrus
29. Common diseases of Sapota
30. Common diseases of Pomegranate
31. Common diseases of Papaya
32-33. Common diseases of Tomato
34. Common diseases of Chillies
35. Common diseases of Brinjal
36. Common diseases of Bhendi
37. Common diseases of Cucurbits
38. Common diseases of Crucifers
39. Common diseases of Onion and Garlic
40-41. Common diseases of Potato and Tapioca
42. Common diseases of Coffee and Tea
43. Common diseases of Arecanut
44. Common diseases of Betel vine
45. Common diseases of Turmeric and Pepper
46. Common diseases of Cardamom and Coriander
47-48. Common diseases of Rose, Jasmine and Crossandra.

PRACTICAL SCHEDULE

1. Study of cereal crops disease symptoms.
2. Study of pulses crops disease symptoms.
3. Study of Cotton crop disease symptoms.
4. Study of Sugarcane crop disease symptoms.
5. Study of Vegetable crops disease symptoms (Brinjal, Bhendi and Tomato).
6. Study of Vegetable crops disease symptoms (Chillies, Potato and Tapioca).
7. Study of Vegetable crops disease symptoms (Cucurbits, and Crucifers).
8. Study of Fruit crops disease symptoms (Citrus, Mango and Banana).
9. Study of Fruit crops disease symptoms (Grapes and Apple).
10. Study of Fruit crops disease symptoms (Onion and Papaya).
11. Collection and Preservation of diseased specimens.
12. Study of Micro nutrient deficiencies and their rectifications.
13. Study of Importance of seed treatment

14-16. Field Visits and Collection and preservation of diseased specimens.

17. Final practical Examination.

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1. Govindasamy, C.V. and M.N. Alagianagalingam. 1990. Plant Pathology, Popular Book Depot, Chennai.
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III SEMESTER

24 AGRD 0305 VEGETABLE PRODUCTION (3+1)

OBJECTIVES

- To learn about Importance, classification and types of vegetable gardens.
- To learn about Production Technology of greens, salads, crucifers, cucurbitaceous, bulb, root, tuber, solanaceous, malvaceous and leguminous vegetables.

LEARNING OUTCOME

- Studying the importance, classification, types and maturity index and Tissue culture of vegetables.
- Studying the Production technology of Drumstick, Curry leaf, Amaranthus and Coccinea and Salad vegetables.
- Studying the Production technology of Cabbage, Cauliflower, Chow-chow, Pumpkin, Water melon, Snake gourd, Bitter gourd and Ribbed gourd.
- Studying the Production technology of Onion, Garlic, Carrot, Radish, Turnip, Knol-khol, Beetroot, Potato, Tapioca and Sweet Potato.
- Studying the Production technology of Brinjal, Tomato, Chillies, Bhendi, Garden bean, Cluster bean, Peas and French beans.

THEORY

UNIT I **Introduction**: Importance – Classification and types of vegetable gardens –Cultural aspects of vegetables- Handling and maturity index - Tissue culture in vegetables.

UNIT II **Solanaceous vegetables, peas and beans:** Cultivation of Brinjal, Tomato, Chillies, Bhendi, Garden bean, Cluster bean, Peas and French beans.

UNIT III **Cole crops and cucurbits**: Cultivation of Cabbage, Cauliflower, Chow-chow, Pumpkin, Water melon, Snake gourd, Bitter gourd, Ridge gourd, bottle gourd.

UNIT IV **Bulb, root and tuber vegetables**: Cultivation of Onion, Garlic, Carrot, Radish, Turnip, Knol-khol, Beetroot, Potato, Tapioca and Sweet Potato.

UNIT V **Perennial vegetables, greens and salad crops**: Cultivation of Drumstick, Curry leaf, Amaranthus and Coccinea, Celery, Palak, Spinach, lettuce.

LECTURE SCHEDULE

1. Definition and Importance of vegetables.
2-3. Classification of vegetable crops.
4. Types of vegetable gardens –Kitchen garden and its advantages.
5-6. Kitchen garden – selection of site, Model kitchen garden and cropping arrangements.
7. Market garden, truck garden, growing vegetables for processing,

8. Vegetable forcing and vegetable seed industry.
9. Cultural aspects of vegetables.
10. Post harvest handling of vegetables.
11. Maturity indices of vegetables.
12. Production technology of Curry leaf.
13. Production technology of Drumstick.
14. Production technology of Amaranthus.
15. Production technology of Coccinea
16. Production technology of Celery
17. Production technology of Palak
18. Production technology of spinach
19. Production technology of lettuce
20. Production technology of Cabbage
21. Production technology of Cauliflower
22. Production technology of Chow-chow
23. Production technology of Pumpkin
24. Production technology of Water melon.
25. Production technology of Snake gourd
26. Production technology of Bitter gourd
27. Production technology of Ribbed gourd.
28. Production technology of Onion.
29. Production technology of Garlic
30. Production technology of Carrot
31. Production technology of Radish
32. Production technology of Turnip
33. Production technology of Knol-khol
34. Production technology of Beetroot
35. Physiological disorders of Carrot
36. Production technology of Potato
37. Production technology of Tapioca
38. Production technology of Sweet Potato.
39. Production technology of Brinjal.
40. Production technology for Tomato.
41. Production technology of Chillies
42. Production technology of Lady's finger
43. Production technology of Garden bean
44. Production technology of Cluster bean
45. Production technology of Peas
46. Production technology of French beans.
47. Physiological disorders in vegetable crops.
48. Application of plant growth regulators in vegetable crops.

PRACTICAL SCHEDULE

1. Identification of different vegetable varieties
2-3. Practicing preparation of nursery beds, seeds and sowing
4. Acquiring knowledge about propagation through specialized vegetative structures.
5. Practicing grafting in vegetables.
6-7. Practicing Field preparation for vegetables
8. Practicing transplanting of vegetables
9. Practicing manuring and fertilizer application methods
10. Acquiring knowledge about plant protection measures
11. Practicing harvesting and grading of vegetables
12. Practicing in packing and marketing of vegetables
13. Conducting kitchen garden campaigns
14. Preparing cost of cultivation for important vegetables
15. Visit to vegetable gardens
16. Visit to Vegetable Research Station.
17. Final practical Examination

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2. Narendra Singh, S., Thamburaj, 2014 Text Book of Vegetable, tuber crops and Spices, ICAR Publications, New Delhi.
3. Dhaliwal, S.M., 2020. Hand book of Vegetable Crops, Kalyani Publishers.
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III SEMESTER
24 AGRD 0307 CROP PESTS AND THEIR MANAGEMENT (3+1)

OBJECTIVES

- To impart detailed knowledge on damage symptoms, life stages and management practices of key insect pest and non – insect pests on major crops.

LEARNINGOUTCOME

- Studying the Pests of Cereals, Pulses and Cash crops.
- Studying the Pests of Oilseeds and Plantation Crops.
- Studying the Pests of Vegetables, Tubers and Flower crops.
- Studying the Pests of Fruits, Spices and Condiments.
- Studying the Pests of Stored Products.

THEORY

Damage symptoms, life cycle and management practices of insect and non insect pests of the following crops.

UNIT I **Cereals, Pulses and Cash crops:** Rice, Maize, Sorghum, Cumbu, Ragi, Redgram, Black gram, Green gram, Bengal gram, Cotton and Sugarcane.

UNIT II **Oilseeds and Plantation Crops:** Coconut, Groundnut, Castor, Sesamum, Sunflower, Coffee, Tea, Betelvine, Arecanut.

UNIT III **Vegetables, Tubers and Flower crops:** Brinjal, Tomato,Bhendi,Curcurbits, Crucifers, Moringa, Curry leaf, Potato,Tapioca, Rose and Jasmine.

UNIT IV **Fruits, Spices and Condiments:** Mango, Citrus, Banana, Grapes, Sapota, Guava, Pomegranate, Papaya, Pepper, Cardamom, Chillies, Onion, Turmeric.

UNIT V **Stored Products**: Insect pests, mites, rodents, and microorganisms associated with stored grain and their management.

THEORY SCHEDULE

1. Pests of Rice
2. Pests of Maize, Sorghum, Cumbu, Ragi
3-4. Pests of Red gram, Black gram, Green gram, Bengal gram
5-6. Pests of Cotton
7-8. Pests of Sugarcane
9-10. Pests of Coconut
11-12. Pests of Groundnut
13. Pests of Castor
14. Pests of Sesamum

15. Pests of Sunflower
16. Pests of Coffee
17. Pests of Tea
18. Pests of Betelvine, Arecanut
19. Pests of Brinjal
20. Pests of Tomato
21. Pests of Bhend
22. Pests of Curcurbits
23. Pests of Crucifers
24. Pests of Moringa, Curryleaf
25. Pests of Potato, Tapioca
26. Pests of Rose and Jasmine
27. Pests of Mango
28. Pests of Citrus
29. Pests of Banana
30. Pests of Grapes
31. Pests of Sapota
32. Pests of Guava
33. Pests of Pomegranate, Papaya
34. Pests of Pepper
35. Pests of Cardamom
36. Pests of Chillies
37. Pests of Onion
38. Pests of Turmeric

39-40. Insect pests of stored grain

41-43. Mites, rodents, and microorganisms of stored grain

44-46. Management practices of storage pest (preventive measures)

47-48. Management practices of storage pest (curative measures)

PRACTICALSCHEDULE

1. Identification of Pests of Rice
2. Identification of Pests of Millets
3. Identification of Pests of Pulses
4. Identification of Pests of Cotton
5. Identification of Pests of Sugarcane
6. Identification of Pests of oilseeds pests (Coconut and Groundnut)
7. Identification of Pests of oilseeds pests (Castor,SesamumandSunflower)
8. Identification of Pests of Coffee, Tea, Betelvine, Arecanut
9. Identification of Pests of Vegetables (Brinjal, Tomato and Bhendi)
10. Identification of Pests of Vegetables (Crucifers, Cucurbits, Moringa, Curryleaf, Potato and Tapioca)
11. Identification of Pests of Fruits (Mango, Citrus and Banana)
12. Identification of Pests of Fruits (Grapes, Sapota, Guava Pomegranate, Papaya)
13. Identification of Pests of Pepper, Cardamom, Chillies, Onion, Turmeric

14. Identification of pests of stored grain
15. Visit to Farmer's field to identify pests in crops.
16. Visit to warehouse to study the methods of grain storage and pest control
17. Final practical Examination

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III SEMESTER

24 AGRD 0309 BIO- INOCULANTS IN AGRICULTURE (3+1)

OBJECTIVES

- To learn and understand about the importance of bio-inoculants in Agriculture
- To familiarize students with bio fertilizers for various crop plants
- To give hands on training on the production of bio fertilizers

LEARNING OUTCOME

- The students will be able to isolate various microbes used in Bioinoculants in Agriculture and its mass multiplications.
- The students will be able to demonstrate the methods of application of biofertilizers.
- The students will be able to apply quality control procedures to check the quality of biofertilizers

THEORY

UNIT I **Introduction**: General introduction of the microbes used as bioinoculants for crop plants. Scope and Importance of Biofertilizers- History of Bioinoculants - Types of bioinoculants – Bacterial, Fungal, Algal and Actinorhizal- Nitrogen fixation – Biological nitrogen fixation- symbiotic and non symbiotic nitrogen fixation- Uses of Biofertilizers

UNIT II **Bacterial Nitrogen Fixation:** Bacterial nitrogen fixers - Types - Nodule formation and Nitrogen fixation – Benefits in Agriculture- Strain selection, Sterilization, Growth, Batch and continuous culture, Fermentation - Mass production of carrier based and liquid biofertilizers

UNIT III **Fungal & Cyanobacterial Bioinoculants:** Mycorrhizae- types of mycorrhizae- Benefits - Phosphorus mobilizers – Phosphorus solubilizers – Mechanism of Phosphorus mobilization and solubilization - Mass inoculum production of AM fungi - Cyanobacterial Biofertilizers – Types and characteristics - Association with Azolla - Isolation, characterization, mass multiplication - Benefits and role in rice cultivation - Field application

UNIT IV **Other Biofertilizers:** Importance and uses of Silicate, Potassium and Zinc solubilizers – Microorganisms involved, Plant Growth Promoting Rhizobacteria, Composting bioinoculants

UNIT V **Quality control of Biofertilizers**: Selection and application of biofertilizer in seeds, seedlings, tubers, sets etc. Properties of good quality biofertilizer formulation- Biofertilizers -Storage, shelf life, quality control, FCO specifications- Recommendation and dosage for various crops- Factors influencing the efficacy of biofertilizers.

LECTURE SCHEDULE

1. Introduction of the microbes as bioinoculants and their advantages

2. History of bioinoculants
3. Scope and importance of biofertilizers
4. Uses of biofertilizers
5. Types of bioinoculants
6. Bacterial and fungal bioinoculants
7. Algae and actinorhizal bioinoculants
8. Nitrogen fixation and its types
9. Biological nitrogen fixation and its mechanism
10. Symbiotic and non-symbiotic nitrogen fixation
11. Biological nitrogen fixers and types
12. Nodule formation and nitrogen fixation
13. Mass production of carrier based biofertilizers
14. Mass production of Liquid based biofertilizers
15. Phosphorus mobilizers
16. Phosphorous solubilizers
17. Mechanism of Phosphorus mobilizers
18. Mechanism of Phosphorus solubilizers
19. Association with azolla
20. Small scale cultivation of Azolla
21. Cyanobacterial biofertilizers- types
22. Characteristics of Cyanobacteria
23. Isolation and characterization of cyanobacterial biofertilizers
24. Mass multiplication of cyanobacterial biofertilizers
25. Benefits and role of cyanobacterial biofertilizers in rice cultivation
26. Field application of cyanobacterial biofertilizers
27. Field application of azolla biofertilizers
28. Symbiotic relationship ofAnabaena and Azolla
29. Mycorrhizae - types of mycorrhizae
30. Mass inoculum production of AM fungi
31. Benefits of mycorrhizae
32. Importance and uses of silicate, potassium and zinc solubilizers
33. Plant Growth Promoting Rhizobacteria (PGPR)
34. Mechanism involved in PGPR
35. Composting bioinoculants
36. Types of composting bioinoculants
37. Strain selection, sterilization, growth and fermentation of bioinoculants
38. Properties of good quality biofertilizer formulation
39. Biofertilizers- storage
40. Shelf life and quality control of biofertilizers
41. Factor influencing the efficacy of biofertilizers
42. FCO specifications
43. Specifications of Symbiotic and non symbiotic biofertilizer
44. Specifications of free living biofertilizer
45. Specifications of PSB biofertilizer
46. Specifications of potassium and zinc solubilizing bacterial biofertilizer

47. Different methods of application of seeds, seedlings, tuber and sett etc.,
48. Recommendation and dosage of various crops

PRACTICAL SCHEDULE

1. Isolation and identification of *Rhizobium* from root nodules
2. Inoculum production of bacterial biofertilizers
3. Preparation of carrier based formulation
4. Preparation of liquid formulation
5. Requirements for a biofertilizer production unit
6. Isolation of AM fungi -Wet sieving method
7. Isolation of AM fungi - sucrose gradient method
8. Mass production of AM inoculants
9. Percent colonization of roots by AM fungi
10. Isolation of blue green algae from soil and water samples
11. Small scale cultivation of Azolla
12. Plant growth promoting Rhizobacteria
13. Compost accelerators
14. Evaluation of growth and quality criteria of Biofertilizers
15. Practicing various methods of application of biofertilizers
16. Visit to biofertilizers production unit
17. Practical examination

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III SEMESTER

24 AGRD 0311 AGRICULTURAL ECONOMICS (3+1)

OBJECTIVES

- The students will impart knowledge on concepts of economics and familiarize with economic laws.
- The students will be taught with marketing concepts and role of finance in agriculture.
- The students will be familiarized with the Gandhian approach to economics.

LEARNING OUTCOME

- The students have learnt with the production, Financial and Marketing concepts of Economics.

THEORY

UNIT I **Economics** - Meaning of Economics – Definitions of economics. and agricultural economics. Basic concepts of economics - Goods, Wants, etc., - characteristics and classification. Different Economic systems. Division of economics, Approaches to study economics, law of diminishing marginal utility.

UNIT II **Production Economics -** Production process, creation of utility, factors of production, input output relationship - Laws of returns, Law of variable proportions and returns to scale. Cost concepts. Causes of low productivity and remedial measures, Land Tenure system, Land reforms - consolidation of holdings, organization of cooperative framings. Agricultural labour - causes of the poor economic condition of farm labour, suggestion for the improvements of the condition of agricultural labour and Government measures.

UNIT III **Market** - Marketing, Agricultural marketing – Definition, Significance of agricultural marketing and Characteristics of agricultural commodities. Basic concepts of marketing, Classification of markets, Price support programs. Approaches to study marketing – Structural approach,Functional approach, Institutional approach: Regulated markets, cooperative marketing, Direct Retail Market, Corporate Retail Market, Warehousing Corporation, CACP, NAFED, TANFED, FCI, CCI, APEDA etc. Services of different market functionaries, present systems of agricultural marketing in India.

UNIT IV **Agricultural Finance**- meaning, scope and significance, credit needs and its role in Indian agriculture. Rural indebtedness - causes of indebtedness and relief measures. Classification of agricultural credit, factors responsible for successful agricultural credit. Agencies supplying agricultural credit- Institutional and Non-Institutional source and Micro Credit, EXIM bank

UNIT V G**andhian approach to economics:** Means of production, Swadeshi and Bread labour– Village economy– Khadi and Village Industries and Appropriate Technology – J.C Kumarappa concept of economy, Economics of permanence. Constructive programmes of Gandhiji. Institutions related to Gandhian thoughts

THEORY SCHEDULE

1. Meaning of Economics – Definition – Economics and Agricultural Economics
2. Basic concepts of economics – Utility, Desire, Demand, Supply – Types and characteristics
3. Cost, Price, Wealth, Capital, Elasticity – Classification and characteristics
4. Goods, Services, Wants – Classification and Characteristics
5. Economic systems – Capitalistic, Socialistic and mixed economy
6. Division of economics, Approaches to study economics
7. Law of Diminishing marginal utility
8. Production process, function – Factors of production
9. Input output relation - Law of Variable proportion
10. Laws of returns, Returns to scale
11. Cost concepts – Long run and short run
12. Causes of low productivity and remedial measures
13. Land tenure system – Zamindari, Mahalwari and Ryotwari systems
14. Land reforms – Objectives and different measures
15. Re-organization of agriculture – redistribution of land, Consolidation of holdings, organization of cooperative framings
16. Agricultural labour – causes of the poor economic condition of farm labour
17. Suggestion for the improvements of the condition of agricultural labour
18. Government measures – Programs for the improvements of the condition of agricultural labour
19. Minimum wage act, MGNREGA and other welfare measures
20. Market, Marketing, Agricultural marketing – Definition, Significance of agricultural marketing and Characteristics of agricultural commodities
21. Basic concepts of marketing – marketing channel, margin, integration, price spread, cost, producer surplus
22. Classification of markets
23. Price support programs – Buffer stock, Issue price, Procurement price, MSP
24. Approaches to study marketing – Market structure
25. Marketing functions
26. Marketing institution - Regulated markets, cooperative marketing, direct retail market, corporate retail market
27. CACP, Warehousing Corporation – CWC, SWC
28. NAFED, TANFED, FCI, CCI and APEDA
29. Services of different market functionaries
30. Present agricultural marketing system in India – Food grains, Egg, Milk, Fruits and Vegetables
31. Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture.
32. Rural indebtedness, causes of indebtedness and relief measures
33. Classification of agricultural credit, factors responsible for successful agricultural credit.
34. Agencies supplying agricultural credit- Institutional sources – RBI, NABARD – Establishment, Role and objectives
35. RRB, Commercial banks - Establishment, Role and objectives

36. Cooperatives – Role, structure and objectives
37. Non-Institutional sources
38. Important schemes related to agricultural finance – Bank nationalization, Lead bank scheme, multiple agency approach, KCC
39. Micro credit and EXIM bank
40. Gandhian approach to economics
41. Means of production
42. Swadeshi and Bread labour
43. Village economy– Khadi and Village Industries and Appropriate Technology
44. J.C Kumarappa concept of economy
45. Economics of permanence.
46. Constructive programmes of Gandhiji
47. Institutions of Gandhian thoughts – Gandhi Niketan, Gandhi Aashram, Gandhigram
48. Institutions of Gandhian thoughts–Gandhi seva sadan, Kasturba Ashram, Kadhi vidyalaya

PRACTICAL SCHEDULE

1. Socio economic survey
2. Micro level study of Farm Labour household
3. Visit to Farmer's market
4. Visit to Regulated market
5. Visit to Corporate Retail Market
6. Visit to RUDSET
7. Study of Cooperative banks
8. Study of commercial banks and loaning pattern
9. Visit to Gandhigram KVIC Trust
10. Visit to Constructive Programme of Gandhi Museum.
11. Visit to Village Industries.
12. Preparation of Farm Layout.
13. Visit to NABARD regional office
14. Study on Agro service centre
15. Study on export of Agricultural commodities
16. Visit to Lead Bank.
17. Final Practical Examination.

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2. S.S.AcharyaandN.LAgarwal, 2004 Agricultural Marketing in India, Fourth Edition, Oxford & IBH Publishing Co. Pvt. Ltd.
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6. M.K.Gandhi,1990,Village Industries, Navajivan Publishing House, Ahemedabad

IV SEMESTER

24 AGRD 0401 FARM MANAGEMENT (3+1)

OBJECTIVES

- To improve knowledge and skills about the farm management and decision making and problems solving the successful farm to get maximum profits.

LEARNING OUTCOME

- Basic Knowledge about farm management in maximizing the profits.
- Scope and practical utility in study of farm selection, farm layout and importance of fencing
- To study the labour problems, how to improve the labour efficiency, crop calendar and calendar of operation.
- Basic knowledge about preparation of farm planning and farm budgeting
- To Study about basic knowledge on storage, Marketable produce and concept of warehouse.

THEORY

UNIT I **Introduction**: Farm Management - Definition and importance – Farming System – Definition, classification - Cropping system – Definition – difference between farming system and cropping system – Systems of farming and types of farming – Advantages and disadvantages – mechanized farming and its possibilities in India – Integrated farming systems (IFS) – definition - types of IFS, Suitable for different situations.

UNIT II **Selection and layout of Farm**: Factors to be considered in selection and layout of a farm – Physical, climatic, economic and social factors –Ideal farm layout – Fencing – need and types, merits and demerits.

UNIT III **Farm labour and Management:** Definition of labour -Criteria for selection of labour – Types of labour –Factors affecting labour efficiency - methods for improving labour efficiency – Wages - Systems of payment of wages – Cropping scheme – Forecast and execution, Crop Calendar and Calendar of Operations

UNIT IV **Farm planning and budgeting**: Assessment of resources – Planning for land use and Livestock use and marketing – Factors affecting farm profits – Objects of farm budget – Balance sheet – Farm accounts and types records and registers, records Need, maintenance depreciation – types and methods of calculation – condemnation – disposal of unserviceable materials.

UNIT V **Storage and marketing of farm products**: Importance of storage – factors affecting storage of food grains – methods of storage - rat and moisture proof storage godowns – warehouse concepts – Marketing of farm products –Quality Management- AGMARK, ISO, ISI, BIS, HALMARK, HACCP & FSSAI – Supply Chain Management -Consumer preference-Rural godowns – Concept and implementation strategies.

LECTURE SCHEDULE

1. Introduction to Farm Management
2. Definitions of Farm Management
3. Importance of Farm Management
4. Farming System - Definitions
5. Farming System classification
6. Cropping system - Definitions
7. Cropping system - importance
8. Difference between farming system and cropping system
9. Systems of farming
10. Types of farming
11. Advantages and disadvantages – mechanized farming
12. Mechanized farming and its possibilities in India
13. Integrated farming systems (IFS) – definition - types of IFS
14. Factors to be considered in selection and layout of a farm
15. Physical factors – farm layout
16. Climatic factors – farm layout
17. Economic factors – farm layout
18. Social factors – farm layout
19. Ideal farm layout
20. Fencing – need and types
21. Fencing - merits and demerits
22. Labour - Definition - Introduction
23. Criteria for selection of labour
24. Types of labour
25. Factors affecting labour efficiency
26. Methods for improving labour efficiency
27. Wages – introduction
28. Systems of payment of wages
29. Cropping scheme – Introduction
30. Forecast and execution
31. Crop Calendar and Calendar of Operations.
32. Assessment of resources
33. Planning for land use
34. Factors affecting farm profits
35. Objects of farm budget
36. Balance sheet
37. Farm accounts and types records and registers
38. Records Need, maintenance
39. Depreciation – types and methods of calculation
40. Condemnation – disposal of unserviceable materials.
41. Importance of storage
42. Factors affecting storage of food grains
43. Methods of storage

44. Warehouse concepts – Marketing of farm products
45. Quality Management – AGMARK, ISO, etc.,
46. Supply Chain Management
47. Consumer preference
48. Rural godowns – Concept and implementation strategies.

PRACTICAL SCHEDULE

1. Preparing cropping scheme for wet land areas
2. Preparing cropping scheme for garden land areas
3. Preparing cropping scheme for dry land areas
4. Preparation of crop calendar
5. Preparation of calendar of operations
6. Working out input requirement and cost for unit area of important wet land crops
7. Working out input requirement and cost for unit area of important garden and dry land crops
8. Integrated farming systems model for wet land areas
9. Integrated farming systems model for garden land areas
10. Integrated farming systems model for dry land areas
11. Visit to farm section and dairy section of our faculty
12. Visit to a Government farm
13. Field visit to an organic farm
14. Study of important records in farm and their maintenance
15. Working out a balance sheet for a farm
16. Visit to warehouse and observing the storage pattern
17. Final practical Examination

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1. Indian Social Institute. 1996. Agricultural labour, Indian Social Institute, Issue No.501, New Delhi.
2. Johl,S.S. and T.R.Kapur, 1992, Fundamentals of Farm Business management, Kalyani publishers, Lundhiana.
3. Kahlon, A.S. and Karam Singh. 1980. Economic of farm management in India – Theory and Practice. Allied Publishers Pvt. Ltd., Chennai.
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IV SEMESTER

24 AGRD 0403 MANAGEMENT OF BENEFICIAL INSECTS (3+1)

OBJECTIVES

- To study the importance of beneficial insects
- To study the techniques in rearing honey bees, silkworm, lac insects
- To know about minor productive and helpful insects.

LEARNINGOUTCOME

- Understanding the basic techniques in rearing honey bees
- Studying the apiary management
- Understanding the basic techniques in rearing silkworms
- Understanding the basic techniques in rearing lac insects
- Identifying the major Predators, Parasitoids, entomopathogens and other helpful insects.

THEORY

UNIT - I **Beneficial Insects and beekeeping –** Introduction, importance and classification- Introduction to apiculture- Beekeeping-bee biology - Castes of bees - Honey bee species- - Beekeeping appliances - Commercial methods of rearing.

UNIT - II **Apiary management** – Bee pasturage, bee foraging and communication -Some important bee flora and their general characters - Seasonal management of honey bees. Honey extraction & handling - Properties of honey –- Quality control standards - Processing of honey – Other valuable by products of honey bees. Insect pests and diseases of honey bee.

UNIT - III **Sericulture**– Introduction -Types of silkworm - Biology of silkworm. Moriculture – propagation methods of mulberry plant – Pruning and training methods - Methods of harvesting and preservation of leaves. Rearing appliances of mulberry silkworm and methods of disinfection - Types of disinfectants - Rearing, mounting and harvesting of cocoons - Pest and diseases of silkworm and its management -Byproducts of sericulture.

UNIT - IV **Lac culture and other useful insects-** Introduction to lac insect**–** Morphology – Biology - Host plant - Lac production – Seed lac, button lac, shellac - Lac products - Uses of lac - Minor productive insects Cochineal insect - Gall insect- Food and Medicinal value of insects - Aesthetic and Scientific value of insets.

UNIT - V **Biocontrol agents -** Parasitoids and Predators and Entomopathogens- Identification of important parasitoids, predators and entomopathogens commonly used in biological control - Types of predators and parasitoids used in pest management - Mass multiplication techniques of important predators and parasitoids and entomopathogens - Important pollinators, weed killers and scavengers in agriculture.

LECTURE SCHEDULE

1. Beneficial Insects and beekeeping- Introduction, importance and classification
2-3. Introduction to apiculture, Beekeeping
4. Bee biology
5-6. Castes of bees
7. Honey bee species
8-9. Beekeeping appliances - commercial methods of rearing.
10. Apiary management – Beepasturage, bee foraging
11. Bee communication
12-13. Some important bee flora and their general characters
14-15. Seasonal management of honey bees
16. Honey extraction & handling, Properties of honey
17. Quality control standards, Processing of honey
18. Other valuable by products of honey bees
19-20. Insect pests and diseases of honey bee
21. Sericulture, introduction, types of silkworm
22-23. Biology of silkworm.
24. Moriculture, propagation methods of mulberry plant, pruning and training methods
25. Methods of harvesting and preservation of leaves.
26-27. Rearing appliances of mulberry silkworm
28. Methods of disinfection, types of disinfectants
29-31. Rearing, mounting and harvesting of cocoons
32-34. Pest and diseases of silkworm, management
35. Byproducts of sericulture
36. Lac culture and other useful insects**,** introduction tolac insect
37. Morphology, biology of lac insect
38. Host plant, lac production, seed lac, button lac, shellac
39. Lac products, uses of lac
40. Minor productive insects Cochineal insect, Gall insect
41. Food and Medicinal value of insects, Aesthetic and Scientific value of insets
42. Biocontrol agents -Parasitoids and Predators and Entomopathogens
43. Identification of important parasitoids, predators and entomopathogens commonly used in biological control
44. Types of predators and parasitoids used in pest management
45-47. Mass multiplication techniques of important predators and parasitoids and entomopathogens
48. Important pollinators, weed killers and scavengers in agriculture

PRACTICAL SCHEDULE

1. Study of castes of bees, Honey bee species
2. Beekeeping appliances and seasonal management
3. Bee pasturage, bee foraging and communication

4. Bee enemies, Insect pests and diseases of honey bee
5. Types of silkworm and biology of silkworm
6. Propagation methods of mulberry, pruning and training, methods of harvesting and preservation of leaves
7. Identification of pests of silkworm
8. Identification of diseases of silkworm
9. Lac insect morphology and biology and host plant
10. Identification of important predators and parasitoids
11. Mass multiplication techniques of important predators
12. Mass multiplication techniques of important parasitoids
13. Mass multiplication techniques of important entomopathogens
14. Identification of important pollinators, weed killers and scavengers
15. Visit to research and training institutions devoted to beekeeping and sericulture
16. Visit to bio-control laboratory
17. ESE Practical Examination

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4. De Bach P. 1964. *Biological Control of Insect Pests and Weeds*. Chapman and Hall, NewYork.
5. Dhaliwal GS and Arora R. 2001. *Integrated Pest Management: Concepts and Approaches*. Kalyani Publ., New Delhi.
6. Atwal AS. 2006. *The World of the Honey Bee*. Kalyani Publ., New Delhi.
7. Ganga G. 2003. *Comprehensive Sericulture. Vol. II. Silkworm Rearing andSilk Reeling.* Oxford & IBH, New Delhi.

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IV SEMESTER

24 AGRD 0405 COMMERCIAL AGRICULTURE (3+1)

OBJECTIVES

- This course aimed at understanding to impart theoretical knowledge about hybrid seed production of self pollinated and cross pollinated crop
- To understand the basics of mushroom production technology and to establish small mushroom production unit
- To learn about fruits and vegetables processing technology and preservation methods
- To impart scientific knowledge and skills required to run a broiler chicken farm successfully.
- A complete technical know-how about the protected cultivation practices and greenhouse technology has been facilitated

LEARNING OUTCOME

- The student will gain knowledge about general morphology and its selfing and crossing technique for hybrid seed production.
- The students will be able to understand the process and steps involved in mushroom production.
- The students will be able to understand the importance, fruits and vegetables processing technology and preservation methods and its value addition.
- To create impart scientific knowledge and skills required to run a broiler chicken farm successfully.
- A clear understanding on construction and maintenance procedure forprotected structure and cultural practices for hygienic agricultural production has been facilitated.

THEORY

UNIT I **Hybrid seed production:** General Morphology of Root, inflorescence, flower and fruits. Manual emasculation and / or Pollination – maintenance of male sterility lines - Chemically induced male sterility-LD 50 — Production of single cross hybrids – Production of double cross hybrid varieties - Merits and demerits of hybrid varieties. – Floral biology, anthesis, pollination, selfing, emasculation and crossing technique in Rice, Sorghum, Pearl millet, Red gram, Castor, Sunflower, Cotton, Tomato, Bhendi. Harvesting – Physical and chemical indices.

UNIT II **Principles of Mushroom cultivation-** Vegetative characters of mushrooms, Difference between edible and poisonous mushroom, Structure and construction of mushroom house, Sterilization of glasswares and substrates, Selection and production of good quality spawn and its storage, Cultivation of Button mushroom (*Agaricus bisporous*), Milky mushroom (*Calocybe indica*) and Oyster mushroom (*Pleurotus sajorcaju),* Major pest and diseases of mushroom cultivation, Uses of mushrooms.

UNIT III **Fruits and Vegetable Processing –** Principle and methods of preservation: Preparation of Jam, Jelly, Squash, Nectar, Ready to serve (RTS), Marmalade and candy - Drying/dehydration and canning of fruit and vegetables – Tomato products – Preservation Pickles – Preservation by low temperature –Evaluation of frozen fruit & vegetables.

UNIT IV **Commercial broiler farming-** Commercial broiler strains – broiler house construction – broiler house equipments – drinkers – feeders – house preparation – chick placement - brooding management – litter management – lighting management – nutrition and feeding managements – catching procedure – bio-security measures – vaccination - Economic traits in commercial broilers – record keeping – slaughtering of broiler chicken.

UNIT V **Protected Cultivation-** Introduction-types of green houses:based on shape, utility, construction, covering materials, suitability and cost-design principles: site selection, orientation, size, spacing and height of green house; components of green house; - cooling, heating, Ventilation, movable insulation– Direct solar gain, indirect solar gain, Equipments for Green house , Temperature, radiation, photosynthesis and Leaf Area Index measurement-Hydroponics, Aeroponics and vertical farming-plant response to Green house environment parameter for plant growth in a green house – light, temperature, soil temperature, air exchange rate and humidity-Desirable environmental conditions for growth of a plant- Plant production, protection and other cultural practices-cost estimation and break-even analysis.

LECTURE SCHEDULE

1. General morphology of root and shoot.
2. General morphology of inflorescence.
3. General morphology of flower arrangement and fruits.
4. Selfing and crossing techniques in different crops.
5. Maintenance of male sterility lines – GMS, CMS, CGMS and TrGMS.
6. Chemically induced male sterility in hybrid seed production.
7. Production of single and double cross hybrid varieties.
8. Floral biology, anthesis, pollination mechanism in different crop.
9. Harvesting, physical and chemical indices.
10. Vegetative characters of mushrooms
11. Difference between edible and Poisonous mushroom
12. Structure and construction of mushroom house
13. Sterilization of glasswares and substrates
14. Selection and production of good quality spawn and its storage

15. Cultivation of Button mushroom (*Agaricus bisporous*) and Milky mushroom (*Calocybe indica*)
16. Cultivation of Cultivation of Oyster mushroom (*Pleurotus sajorcaju)*
17. Major pest and diseases of mushroom cultivation
18. Nutritional and Medicinal value of mushrooms
19. Principles and methods of preservation.
20. Value addition concepts.
21. Preservation of Jam & Jelly
22. Preservation of Marmalade & Squash
23. Preservation of candy & RTS
24. Tomato products- Concepts and Standards.
25. Drying/ Dehydration of fruits & vegetables
26. Osmotic drying
27. Canning – concepts and Standards
28. Preservation of Pickles
29. Preservation by low temperature
30. Evaluation of frozen fruits & vegetables
31. Describe the Purpose of Brooding, how to keep chicks in a brooder and types of Brooding Equipment
32. Acquire knowledge in essentials of good housing
33. Acquire knowledge in design and layout of poultry house
34. Acquire knowledge in litter and lighting management for broiler chicken
35. Acquire knowledge in nutrients of the feeding stuff
36. Acquire knowledge in nutrient requirement, feed ingredients and feed formulation.
37. Gain knowledge and skill in vaccinating broiler chicken
38. Gain knowledge in bio-security measures to minimize outbreak of diseases
39. Gain knowledge in economic traits of commercial broiler chicken and record keeping
40. Acquire skill in Slaughtering of chicken
41. Introduction-Types of Green houses: Based on shape, utility, construction, covering materials, suitability and cost
42. Site selection, orientation, size, spacing and height of green house; components of Green house; cooling, heating, Ventilation, movable insulation
43. Direct solar gain, indirect solar gain, Equipments for Green house, Temperature, radiation, photosynthesis and Leaf area Index measurement
44. Hydroponics, aeroponics and vertical farming
45. plant response to Green house with respect to environmental parameters environment parameter for plant growth in a Green house– light, temperature, air exchange rate and humidity
46. Desirable environmental conditions for growth of a plant
47. Plant production, protection and other cultural practices
48. Cost estimation and Break-Even Analysis

PRACTICAL SCHEDULE

1. Emasculation and kinds of emasculation and pollination techniques
2. Prediction of performance of double cross hybrids
3. Assessing the physiological and harvestable maturity in different crops
4. Sterilization and sanitation of mushroom house, instruments and substrates
5. Cultivation of Oyster mushroom
6. Cultivation of Milky mushroom and Button mushroom
7. Preparation of jam & jelly
8. Preparation of fruit bar & candy
9. Preparation of tomato products
10. Preparation of pickles & sauce
11. Brooding of broiler chicks
12. Slaughtering of broiler chicken
13. Preparation of project report for starting a broiler unit
14. Determination of air exchange rate of greenhouse
15. Calculation of heating/cooling load in greenhouse
16. Cost estimation and break-even analysis for greenhouse
17. Practical examination

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Text books

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2. http://ecoursesonline.iasri.res.in/course/view.php?id=150
3. logy/ Vedams Ebooks Pvt Ltd., New Delhi (2000)
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5. e-agri.org
6. ecourseonline.iasri.res.in
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IV SEMESTER

24 AGRD 0407 FLORICULTURE, PLANTATION AND MEDICINAL PLANTS (3+1)

OBJECTIVES

- To learn about importance, history, styles and types of garden and garden components.
- To learn about production technology of commercial flower crops, spices and plantation crops and Medicinal plants.

LEARNING OUT COME

- Studying importance, History and development of gardening Hindu style, Moghul garden, Japanese garden, British garden, flower arrangement and dry flower decoration.
- Studying the Arboretum, Lawn, Shrubs, Climbers and Creepers, Flowering annuals, Hedges, Edges, Rock garden and water garden.
- Studying the Production technology of Jasmine, Rose, Tuberose, Chrysanthemum, Marigold and Crossandra, Cockscomb and Cut flowers.
- Studying the Production technology of Cardamom, Pepper, Turmeric, Ginger, Nutmeg, Allspice, Clove and Fennugreek.
- Studying the Production technology of Coffee, Tea, Rubber, Cocoa, Cashew nut Areca nut and Medicinal plants.

THEORY

UNIT I **Ornamental gardening**: Introduction, importance – History and development of gardening – Hindu style – Moghul garden – Japanese garden – British garden.

UNIT II **Garden Components** Arboretum – Lawn – Shrubs – Climbers and Creepers – Flowering annuals – Hedges – Edges – Rock garden-Cacti and Succulents and water garden-Flower arrangement-dry flower decoration.

UNIT III **Commercial Floriculture**: Cultivation of Jasmine, Rose, Tuberose, Chrysanthemum, Marigold and Crossandra, Cockscomb and Cut flowers.

UNIT IV **Spices**: Cultivation of Cardamom, Pepper, Turmeric, Ginger, Nutmeg, Allspice, Clove and seedspices.

UNIT V **Plantation crops, Medicinal and Aromatic crops**: Cultivation of Coffee, Tea, Rubber, Coconut, Cashewnut and Arecanut, Ashwagandha, Glori lily, Coleus, Senna and Aloe, mint, vetiver and lemon grass.

LECTURE SCHEDULE

1. Definition, Introduction of ornamental gardening.
2. Importance of ornamental gardening.
3. History and development of gardening.
4. Hindu style of garden
5. Moghul garden and Japanese garden
7. British garden.
8. Arboretum
9. Lawn – Methods of lawn making.

10. Maintenance of lawn.
11. Lawn grasses, Description of lawn grasses.
12. Shrubs, Climbers and Creepers
13. Flowering annuals and its classification
14. Edges and Hedges, Classification of hedges
15. Flower arrangement
16. Dry flower decoration
17. Rock garden
18. Water garden.
19. Cacti and Succulents.
20. Production technology of Jasmine.
21. Production technology of Rose.
22. Production technology of Tuberose.
23. Production technology of Chrysanthemum.
24. Production technology of Marigold.
25. Production technology of Crossandra.
26. Production technology of Cockcomb
27. Production technology of Cut flowers
28. Production technology of Cardamom
29. Production technology of Pepper
30. Production technology of Turmeric
31. Production technology of Ginger
32. Production technology of Nutmeg
33. Production technology of Allspice
34. Production technology of Clove.
35. Production of seed spices
36. Production technology of Coffee
37. Production technology of Tea
38. Production technology of Rubber
39. Production technology of Cashew nut
40. Production technology of Areca nut.
41. Production technology of Ashwagandha
42. Production technology of Glori lily
43. Production technology of Coleus
44. Production technology of Senna
45. Production technology of Aloe
46. Production technology of mint
47. Production technology of vetiver
48. Production technology of lemon grass

PRACTICAL SCHEDULE

1. Practicing of planning and layout for home and public gardens, lawn making and maintenance.

2-3. Identification of ornamental trees and shrubs and annual, herbaceous and perennials.

4. Identification of climbers and creepers, edges & hedges and other ornamental species
5. Practicing nursery managements for ornamental plants
6. Practicing cultivation of marigold and chrysanthemum
7. Practicing cultivation of Jasmine flowers, Rose
8. Practicing cultivation of tuberose and crossandra
9. Practicing cultivation of cut flowers
10. Special horticultural practices such as pruning, nipping, netting, bending etc.
11. Preparing pot mixture, potting and repotting in ornamental plants
12. Practicing display of ornamental plants
13. Identification of spices and plantation crops
14. Processing of turmeric
15. Visit to plantation – Research station
16. Visit to Botanical garden & parks.
17. Final practical Examination

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IV SEMESTER

24 AGRD 0409 LIVESTOCK AND CHICKEN PRODUCTION (3+1)

OBJECTIVES

- The General objective of this course is to establish basic knowledge of how to manage and operate sheep, goat, pig, rabbit and poultry farms.
- 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.
- To impart scientific knowledge and skills required to run broiler and layer chicken farm successfully.

LEARNING OUTCOME

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

- Describe the size and contribution of sheep farming to Indian agriculture, economy and rural livelihood.
- Know and identify different main breeds of sheep giving their origin and breed characteristics.
- Develop a knowledge of the genetic diversity and versatility of sheep
- Describe the characteristics of a good mutton sheep
- Select desirable breeding and production animals.
- Understand and explain the reproductive cycle of the ewe.
- Describe the different sheep breeding systems.
- Describe the principles of genetic improvement of mutton production.
- Explain the basic concepts of sheep nutrition.
- 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

- Describe the size and contribution of goat farming to Indian agriculture, economy and rural livelihood.
- Know and identify different main breeds of goat giving their origin and breed characteristics.
- Develop a knowledge of the genetic diversity and versatility of goat
- Be able to select desirable breeding and production animals.
- Understand and explain the reproductive cycle of the doe.
- Describe the different goat breeding systems.
- Describe the principles of genetic improvement of goat milk and chevon production.
- Gain insight into feeding habits of goat, the nutrient requirements for animals of different physiological status and feeding programs

- Be able to diagnose and treat common complaints like acute carbohydrate engorgement, HCN poisoning, and diseases like tetanus and ecto and endo parasitic infestations.
- 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

- Students will gain an insight into status of swine production in India.
- Students will gain knowledge about swine breeds, their classification, type and utility.
- Students will gain knowledge in various swine production systems their advantages and disadvantages.
- Able to select good breeding stocks of gilt and boar.
- Gain skill in the management of piglets from birth to weaning.
- Gain knowledge in the management of pregnant sow.
- Able to take care of farrowing sow.
- Gain knowledge in general principles of swine feeding, nutritional requirements of different age groups and feeding of different categories of pigs in detail.
- Gain knowledge in location and layout of piggery, space requirement, and construction details of pig sty.
- 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

- Able to identify common breeds of rabbit giving their origin and breed characteristics.
- Able to describe the advantages and disadvantages of rabbit farming.
- Understand and explain the reproductive cycle of the rabbit.
- Know how to select a best breeding rabbit, and most suitable reproduction method.
- Gain knowledge in pregnancy diagnosis, management of pregnant does, taking care at the time of kindling.
- Able to determine the sex of young rabbit,
- Gain skin skill handling of rabbit and fostering.
- Able to design and construct rabbit hutches.
- Gain knowledge in general principles of rabbit feeding, nutritional requirements of different age groups and feeding of different classes of rabbit.
- 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

- Able to identify different types of chicken and describe common breeds of each type.
- Describe the Purpose of Brooding, how to keep chicks in a brooder and types of Brooding Equipment
- Acquire skill in the management of grower and layer chicken
- Acquire knowledge in broiler chicken production
- Acquire knowledge in essentials of good housing

- Acquire knowledge in design and layout of poultry house
- Acquire knowledge in different systems of poultry housing
- Acquire knowledge in nutrients of the feeding stuff.
- Acquire knowledge in nutrient requirement, feed ingredients and feed formulation.
- Able to diagnose and control common viral, bacterial and protozoan diseases of chicken.
- Gain knowledge and skill in vaccinating layers and broilers.
- Acquire skill in Slaughtering of chicken

UNIT 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.

UNIT II **Goat**: Introduction – Meaning of commonly used terms – Advantages of goat farming – Breeds – Indigenous breeds – Jamunapari – Tellicherry – Barbari – Exotic breeds – Saanen –Toggenberg – Nubian – Varaiaadu (Nilgiri Tahr / *Nilgiritragus hylocrius*) - 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.

UNIT 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 furrowing – 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.

UNIT 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 – Corprophagy – Time of feeding – Housing – Objectives – Rabbit hutches – Common diseases – Coccidiosis – Hemorrhagica septicemia – Ecto and endo parasites – Pneumonia.

UNIT 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 – Chicks – Growers – Layers – Broilers – 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

LECTURE SCHEDULE

1. Introduction to sheep farming, meaning of commonly used terms, Zoological classification and advantages of sheep farming
2. Breeds of sheep, classification based on origin, utility and agro-climatic conditions.
3. Distribution, characteristics and production performance of indigenous breeds – Hissardale, chokla, Nali, Nellore and Mandya
4. Distribution, characteristics and production performance of breeds of Tamil Nadu – Mecheri, Madras red, Ramnad White, Trichy black, Kilakarsal, Vembur
5. Distribution, characteristics and production performance of exotic breeds – Merino, Rambouillet, Dorest, Suffolk and South Down
6. Sheep Breeding – Selection of breeding stocks, Reproduction in sheep, sheep breeding systems and breeding policy for improving mutton and wool production.
7. Feeding of sheep – Nutrient requirements for different class of sheep, Feed resources, Pasture management, Flushing, Feeding of pregnant and lactating ewes.
8. Housing of sheep – space requirement, construction details of shed and yard
9. Cause, mode of transmission, clinical signs, treatment, prevention and control of common viral diseases viz. sheep pox, blue tongue and PPR.
10. Cause, mode of transmission, clinical signs, treatment, prevention and control of common bacterial diseases viz. anthrax, hemorrhagic septicemia and foot root and metabolic disease pregnancy toxemia.
11. Introduction, meaning of commonly used terms and advantages of goat farming.
12. Distribution, characteristics and production performance of indigenous goat breeds – Jamunapari, Tellicherry and Barbari.
13. Distribution, characteristics and production performance of breeds of exotic breeds – Saanen, Toggenberg Anglo Nubian and Boer.
14. Goat Breeding – Selection of breeding stocks, reproduction in goat, goat breeding systems and breeding policy for improving meat and milk production.
15. Feeding of goat – feeding habits of goat, dry matter requirements for different class of goat, Feeding schedule, feeding of different classes of goat
16. Stall fed system of goat rearing
17. Cause, mode of transmission, clinical signs, treatment, prevention and control of Common complaints – Carbohydrate engorgement, HCN poisoning and tetanus.
18. Introduction to swine farming, meaning of commonly used terms, advantages and disadvantages of pig farming
19. Breeds pig – Large White Yorkshire, Middle White Yorkshire, Landrace, Berkshire and Duroc.
20. Breeding of pigs – Selection of breeding stocks, reproduction in pigs, symptoms of heat, care of pregnant sows and management at the time of and farrowing.
21. Systems of swine rearing.
22. Management of piglets from birth to weaning.

23. Feeding of pigs– creep feed, starter ration, grower ration, finisher ration and quantity to be feed
24. Housing of pigs – space requirement, pen and yard accommodation construction details.
25. Cause, mode of transmission, clinical signs, treatment, prevention and control of common viral diseases viz. swine fever, swine pox, foot and mouth disease.
26. Cause, mode of transmission, clinical signs, treatment, prevention and control of common bacterial diseases viz. swine erysipelas and brucellosis.
27. Introduction to rabbit husbandry, meaning of commonly used terms, advantages and disadvantages of rabbit farming.
28. Common breeds of rabbit – New Zealand White, Californian, Giant Blanc, Chinchilla Giganta, Dutch and Angora
29. Breeding of rabbits – selection of breeding stocks, reproduction, mating, pregnancy, and fostering.
30. Care and management of kindling animals and Kindling
31. Care of young rabbits and handling and restraining of rabbits.
32. Identification of rabbits
33. Feeding of rabbits – nutrient requirement, feeding schedule, concentrates, roughages, corprophagy.
34. Housing – objectives, climatic requirement, deep litter system, rabbit hutches
35. Common diseases – Coccidiosis, hemorrhagic septicemia, Ecto and endo parasites and pneumonia.
36. Economics of rabbit production.
37. Introduction to poultry farming, meaning of commonly used terms, advantages of poultry farming, role of egg and chicken meat in human nutrition.
38. Parts of a fowl, classification of poultry breeds on the basis of origin and utility
39. Characteristics of American, English, Asiatic and Mediterranean classes of chicken.
40. Broiler production and management
41. Management of layer chicks.
42. Management of growers
43. Management of layer chicken
44. Housing – location, housing requirements and construction details deep litter house and cage system.
45. Feeding of chicken – nutrient requirement for different classes of chicken feed ingredients and feed formulation.
46. General measures to control outbreak of diseases in a poultry farm and vaccination schedule for broiler and layer chicken.
47. Cause, mode of transmission and clinical signs of common diseases – Ranikhet disease, infectious bursal disease and coccidiosis.
48. Slaughtering of chicken for table purpose.

PRACTICAL SCHEDULE

1. Identification of breeds of sheep
2. Preparation of project for a sheep unit
3. Identification of breeds of goat

4. Preparation of plans for housing of sheep and goats
5. Preparation of project for a goat unit
6. Preparation of plans for housing of pigs
7. Preparation of project for a piggery unit
8. Preparation of plans for housing of rabbit
9. Preparation of project for a rabbit unit
10. Visit to commercial sheep, goat, piggery, rabbitry and poultry farm
11. Debeaking and vaccination of poultry
12. Dressing of birds for table purpose
13. Preparation of plans for poultry housing
14. Preparation of project for a broiler chicken unit
15. Preparation of project for a layer chicken unit
16. Field visit to poultry farm
17. Practical examination

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IV SEMESTER

24 AGRD 0411 EXTENSION COMMUNICATIONS FOR TRANSFER OF TECHNOLOGY (3+1)

OBJECTIVES

- To teach the students about the basics of extension education
- To impart skill in the application of extension methods and audio-visual aids to specific situations and subjects
- To impart skill in the planning, preparation and use of various visual aids and modern gadgets

LEARNING OUTCOME

- Studying the basics of extension education
- Learning about the communication and its process and models
- Learning about the diffusion and adoption of innovations
- Learning about the different extension methods belonging to individual, group and mass contact
- Learning about various audio- visual aids and modern gadgets

THEORY

UNIT I **Introduction:** Education-meaning and types. Differences between formal and extension education. Extension Education–Meaning, Concepts, Characteristics, Terminology in extension. Extension Education–Scope, Importance, Principles, Philosophy and Objectives. Agricultural Extension Education - Meaning, nature - Process. Qualities of a good Extension worker. History and development of extension service and extension systems. Concept of extension Pluralism.

UNIT II **Communication of Innovations:** Communication – definition, types, scope, importance, models and elements. Problems and barriers in communication. Teaching-learning situation and Steps in extension teaching. Training- meaning and types. Innovations- Diffusion, Adoption and their Perceived Attributes. Adoption Process- demerits. ID Process of adoption. Innovativeness- Adopter categories and their characteristics. Consequences of adoption of innovation. Adoption stages and information sources. Factors affecting adoption of innovations. Farmer Field Schools. Privatization of Extension, Market led Extension.

UNIT III **Extension teaching methods** - meaning, functions and classification. Individual and group contact methods: Farm & Home visit, office call, telephone call, personal letter, e-mails, observation plots, result demonstration and agri -clinics. Method demonstration, General meetings- lecture, debate, symposium, panel, forum, buzz session, brainstorming, seminar and workshop. Group discussion and field trips. Mass contact methods: Farm journalism- scope and functions. Publications- leaflet and folder, extension journals, newspaper, extension bulletins, newsletter and circular letter. Radio, television, exhibition, campaign, farmers' fairs, role play, mass meeting, farmers rally, street theatre, Agrl. Film shows, extension talk, drama, puppet show and folk songs.

UNIT IV **Audio-visual aids**- definition, purpose, merits and demerits and classification. Planning, preparation, presentation and evaluation of audio-visual aids. Audio aids-Radio, types of audio-recording, CDs, DVDs, and public address system. Visual aids-Literature, symbolized. Three dimensional and two-dimensional-non-projected- photographs, still pictures, colour still photographs, chalk board, flash cards and flannel graph. Projected-power point. Over Head and Opaque projectors.Audio-visual aids: television, film shows, Movie projector. Video projectors- CRT, LCD DLP, interactive white board and video camera. Drama, puppet show, folk dance and folk songs.

UNIT V **Modern information technology**-E- mail, Internet browsing, Information kiosks, Teleconferencing, Search engines, Directories, online journals, websites and computer networks. MS Power Point - Creating Presentations and Slides. Agri portals, VKC, Mobile phones, Video conferencing, Expert systems, social media, Whats App and Mobile Applications. Factors to be considered in the selection and combination of extension methods and audio-visual aids. Influence of extension teaching methods.

LECTURE SCHEDULE

1. Education-meaning and types. Differences between formal and extension education
2. Extension Education–Meaning, Concepts, Characteristics, Terminology in extension
3. Extension Education–Scope, Importance, Principles, Philosophy and Objectives
4. Agricultural Extension Education - Meaning, nature, Process, Qualities of a good Extension worker.
5. History and development of extension service and extension systems. Concept of extension Pluralism
6. Communication – definition, types, scope, importance
7. Models and elements.
8. Problems and barriers in communication.
9. Teaching-learning situation and Steps in extension teaching.
10. Training- meaning and types
11. Innovations- Diffusion, Adoption and their Perceived Attributes.
12. Adoption Process- demerits. ID Process of adoption.
13. Innovativeness- Adopter categories and their characteristics.
14. Consequences of adoption of innovation.
15. Adoption stages and information sources.
16. Factors affecting adoption of innovations.
17. Farmer Field Schools. Privatization of Extension, Market led Extension.
18. Extension teaching methods - meaning, functions and classification.
19. Individual and group contact methods: Farm & Home visit, office call, telephone call, personal letter,
20. E-mails, observation plots, result demonstration and agri -clinics.
21. Method demonstration, General meetings- lecture, debate, symposium,
22. Panel, forum, buzz session, brainstorming,
23. Seminar and workshop, Group discussion and field trips.
24. Mass contact methods: Farm journalism- scope and functions.

25. Publications- leaflet and folder, extension journals
26. Newspaper, extension bulletins, newsletter and circular letter.
27. Radio, television, exhibition, campaign, farmers' fairs,
28. Role play, mass meeting, farmers rally, street theatre
29. Agrl. Film shows, extension talk, drama, puppet show and folk songs.
30. Audio-visual aids- definition, purpose, merits and demerits and classification.
31. Planning, preparation, presentation and evaluation of audio-visual aids.
32. Audio aids-Radio, types of audio-recording
33. CDs, DVDs, and public address system.
34. Visual aids-Literature, symbolized, three dimensional and two-dimensional-non-projected.
35. Photographs, still pictures, colour still photographs
36. Chalk board, flash cards and flannel graph.
37. Projected- power point. Over Head and Opaque projectors.
38. Audio-visual aids: television, film shows, Movie projector.
39. Video projectors- CRT, LCD DLP, interactive white board and video camera
40. Drama, puppet show, folk dance and folk songs.
41. Modern information technology- E- mail, Internet browsing, Information kiosks
42. Teleconferencing, Search engines, Directories
43. Online journals, websites and computer networks.
44. MS Power Point - Creating Presentations and Slides.
45. Agri portals, VKC, Mobile phones, Tele conferencing, Video conferencing
46. Expert systems, social media, Whats App and Mobile Applications.
47. Factors to be considered in the selection and combination of extension methods and audio-visual aids.
48. Influence of extension teaching methods.

PRACTICAL SCHEDULE

1. Practicing with lecture, debate and symposium methods.
2. Steps to be followed in the conduct of result and method demonstrations.
3. Organizing and conducting group discussions.
4. Preparation of Poster.
5. Preparation of flash cards and still pictures.
6. Preparation of charts.
7. Preparation of graphs.
8. Writing for leaflet, folder and news articles.
9. Planning and preparation of news stories and success stories
10. Script writing for Radio and Television
11. Practicing with the use of different projectors.
12. Operation and handling of digital and video camera.
13. Participating in farmers' day celebrations.
14. Visit to Information kiosk and Kissan call centres
15. Preparation of power point presentations.
16. Internet browsing and E-mail communication- practice
17. Final practical Examination

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