B.Sc. (Hons) Agriculture

Syllabus

(With effect from July 2021)

School of Agriculture and Animal Sciences

The Gandhigram Rural Institute

(Deemed to be University)

Gandhigram – 624 302 Tamil Nadu

SCHOOL OF AGRICULTURE AND ANIMAL SCIENCE

B.Sc. (Hons) Agriculture (2021-2022 onwards) Scheme of Examination

S. No	Subject Code	Name of the Course	Credit		Scheme of Examination				
					Marks				Total
					Theory		Practical		
			T	P	CFA	ESE	CFA	ESE	
I Semester									
1	21AGRU0101	Fundamentals of Agronomy	3	1	24	36	24	16	100
2	21SACU0101	Fundamentals of Soil Science	2	1	24	36	24	16	100
3	21PBGU0101	Fundamentals of Genetics	2	1	24	36	24	16	100
4	21HORU0101	Fundamentals of Horticulture	1	1	24	36	24	16	100
5	21ACPU0101	Fundamentals of Crop Physiology	1	1	24	36	24	16	100
6	21AEXU0101	Rural Sociology & Educational Psychology	2	0	40	60	-	-	100
7	21ENGU01A1	Comprehension & Communication Skills in English	1	1	24	36	24	16	100
8	21AGBU0101 21AMMU0101	Introductory Biology*/ Elementary Mathematics*	2 (1+1) / 2 (2+0)		24 40	36 60	24 -	16 -	100
9	21AGRU0102	Agricultural Heritage*	1	0	40	60	-	-	100
10	21GTPU0001	Gandhi's Life, Thought and Work **	2	0	40	60	-	-	100
11	21NSSU0001 21APEU0001	NSS / Physical Education & Yoga Practices**	0	1	-	-	-	100	100
		Total *R: Remedial course; **NC: Non-gradial courses	**16+08/ 17+07**						**1100**
II Semester									
1	21APBU0201	Fundamentals of Plant Biochemistry and Biotechnology	2	1	24	36	24	16	100
2	21AGBU0202	Agricultural Microbiology	1	1	24	36	24	16	100
3	21AENU0201	Fundamentals of Entomology	3	1	24	36	24	16	100
4	21APPU0201	Fundamentals of Plant Pathology	3	1	24	36	24	16	100
5	21AGEU0201	Soil and Water Conservation Engineering	1	1	24	36	24	16	100
6	21AGRU0203	Introduction to Forestry	1	1	24	36	24	16	100
7	21AECU0201	Fundamentals of Agricultural Economics	2	0	40	60	-	-	100
8	21AEXU0201	Fundamentals of Agricultural Extension Education	2	1	24	36	24	16	100
9	21ENGU02A2	Communication Skills and Personality Development	1	1	24	36	24	16	100
10	21NSSU0001 21APEU0002	NSS / Physical Education & Yoga Practices**	0	1	-	-	-	100	100
Total			**(16+9)**						**1000**

S. No	Subject Code	Name of the Course	Credit		Scheme of Examination				
					Marks				Total
			T	P	Theory		Practical		
					CFA	ESE	CFA	ESE	
III Semester									
1	21AGRU0304	Crop Production Technology – I *(Kharif Crops)*	1	1	24	36	24	16	100
2	21PBGUO302	Fundamentals of Plant Breeding	2	1	24	36	24	16	100
3	21HORU0302	Production Technology for Vegetables and Spices	1	1	24	36	24	16	100
4	21AECU0302	Agricultural Finance and Cooperation	2	1	24	36	24	16	100
5	21AGEU0302	Farm Machinery and Power	1	1	24	36	24	16	100
6	21SACU0302	Environmental Studies and Disaster Management	2	1	24	36	24	16	100
7	21ACSU0301	Agri- Informatics	2	1	24	36	24	16	100
8	21AMMU0302	Statistical Methods	1	1	24	36	24	16	100
9	21LPMU0301	Livestock and Poultry Management	3	1	24	36	24	16	100
10.	21SHSU0102	Shanti Sena**	0	1	-	-	-	100	100
		Total **NC: Non-gradial courses	**(15+10)**						**1000**
IV Semester									
1	21AGRU0405	Introductory Agro-meteorology & Climate Change	1	1	24	36	24	16	100
2	21AGRU0406	Farming System & Sustainable Agriculture	1	0	40	60	-	-	100
3	21AGRU0407	Crop Production Technology –II *(Rabi Crops)*	1	1	24	36	24	16	100
4	21SACU0403	Problematic Soils and their Management	2	0	40	60	-	-	100
5	21PBGU0403	Principles of Seed Technology	1	2	24	36	24	16	100
6	21HORU0403	Production Technology for Fruit and Plantation Crops	1	1	24	36	24	16	100
7	21HORU0404	Production Technology for Ornamental Crops, MAP and Landscaping	1	1	24	36	24	16	100
8	21AGEU0403	Renewable Energy and Green Technology	1	1	24	36	24	16	100
9	21AECU0403	Agricultural Marketing Trade & Prices	2	1	24	36	24	16	100
10	21ELEU0401	Elective Course	2	1	24	36	24	16	100
Total			**(13+9)**						**1000**

S. No	Subject Code	Name of the Course	Credit		Scheme of Examination				
					Marks				Total
					Theory		Practical		
			T	P	CFA	ESE	CFA	ESE	
V Semester									
1	21SACU0504	Geo informatics and Nano-technology and Precision Farming	1	1	24	36	24	16	100
2	21AGRU0508	Practical Crop Production – I (*Kharif* crops)	0	2	-	-	-	100	100
3	21SACU0505	Manures, Fertilizers and Soil Fertility Management	2	1	24	36	24	16	100
4	21PBGU0504	Crop Improvement-I *(Kharif Crops)*	1	1	24	36	24	16	100
5	21AENU0502	Pests of Crops and Stored Grain and their Management	2	1	24	36	24	16	100
6	21APPU0502	Diseases of Field and Horticultural Crops and their Management -I	2	1	24	36	24	16	100
7	21AENU0503	Principles of Integrated Pest and Disease Management	2	1	24	36	24	16	100
8	21ARCU0503	Intellectual Property Rights	1	0	40	60	-	-	100
9	21AEXU0503	Entrepreneurship Development and Business Communication	1	1	24	36	24	16	100
10	21ELEU0502	Elective Course	2	1	24	36	24	16	100
Total			**(14+10)**						**1000**
VI Semester									
1	21AGRU0609	Principles of Organic Farming	1	1	24	36	24	16	100
2	21AGRU0610	Rainfed Agriculture & Watershed Management	1	1	24	36	24	16	100
3	21AGRU0611	Practical Crop Production –II (*Rabi* crops)	0	2	-	-	-	100	100
4	21AGRU0612	Study Tour – I	0	1	-	-	-	100	100
5	21PBGU0605	Crop Improvement-II *(Rabi crops)*	1	1	24	36	24	16	100
6	21AENU0604	Management of Beneficial Insects	1	1	24	36	24	16	100
7	21APPU0603	Diseases of Field and Horticultural Crops and their Management-II	2	1	24	36	24	16	100
8	21HORU0605	Post-harvest Management and Value Addition of Fruits and Vegetables	1	1	24	36	24	16	100
9	21AECU0605	Farm Management, Production & Resource Economics	1	1	24	36	24	16	100
10	21AGEU0604	Protected Cultivation and Secondary Agriculture	1	1	24	36	24	16	100
11	21AFSU0604	Principles of Food Science and Nutrition	2	0	40	60	-	-	100
12	21ELEU0603	Elective Course	2	1	24	36	24	16	100
Total			**(13+12)**						**1200**

S. No	Subject Code	Name of the Course	Credit		Scheme of Examination				
					Marks				Total
			T	P	Theory		Practical		
					CFA	ESE	CFA	ESE	
VII Semester									
1	21AEXU0704	Rural Agricultural Work Experience - RAWE (VSP+ADA/KVK+NGO+AgroIndustry)	0	20	-	-	-	100	100
2	21AGRU0713	Study Tour -II	0	1	-	-		100	100
Total			**(0+21)**						**200**
VIII Semester									
1	21AEXU0805	Project Work	0	4	-	-	-	100	100
2	21SDEU0801	Skill Development and Entrepreneurship-I	0	10	-	-	-	100	100
3	21SDEUO802	Skill Development and Entrepreneurship-II	0	10	-	-	-	100	100
Total			**(0+24)**						**300**

*** 50 % marks required each in practical and theory and aggregate of 60 % for pass**

ABSTRACT OF SEMESTER-WISE CREDITS

Semester	No. of Courses	Credit		
		Theory	Practical	Total
I	11	17	7	24
II	10	16	9	25
III	10	15	10	25
IV	10	13	9	22
V	10	14	10	24
VI	12	13	12	25
VII	2	0	21	21
VIII	3	0	24	24
	Total	**88**	**102**	**190**

B.Sc. (Hons.)Agriculture Programme

Discipline wise Distribution of courses – 2021-2022

I. AGRONOMY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21AGRU0101	Fundamentals of Agronomy	3	1	4
2	21AGRU0102	Agricultural Heritage *R	1	0	1
3	21AGRU0203	Introduction to Forestry	1	1	2
4	21AGRU0304	Crop Production Technology – I (*Kharif* crops)	1	1	2
5	21AGRU0405	Introductory Agro-meteorology & Climate Change	1	1	2
6	21AGRU0406	Farming System & Sustainable Agriculture	1	1	2
7	21AGRU0407	Crop Production Technology – II (*Rabi* crops)	1	0	1
8	21AGRU0508	Practical Crop Production - I *(Kharif* crops*)*	0	2	2
9	21AGRU0609	Principles of Organic Farming	0	2	2
10	21AGRU0610	Rainfed Agriculture & Watershed Management	1	1	2
11	21AGRU0611	Practical Crop Production - II *(Rabi* crops*)*	1	1	2
12	21AGRU0612	Study Tour –I	0	1	1
13	21AGRU0713	Study Tour –II	0	1	1
		Total	**11**	**13**	**24**

II. SOIL SCIENCE & AGRICULTURAL CHEMISTRY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21SACU0101	Fundamentals of Soil Science	2	1	3
2	21SACU0302	Environmental Studies and Disaster Management	2	1	3
3	21SACU0403	Problematic soils and their Management	2	0	2
4	21SACU0504	Geo informatics and Nanotechnology and Precision Farming	1	1	2
5	21SACU0505	Manures, Fertilizers and Soil Fertility Management	2	1	3
Total			**9**	**4**	**13**

III. GENETICS & PLANT BREEDING

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21PBGU0101	Fundamentals of Genetics	2	1	3
2	21PBGU0302	Principles of Seed Technology	1	2	3
3	21PBGU0403	Fundamentals of Plant Breeding	2	1	3
4	21PBGU0504	Crop Improvement-I (*Kharif* crops)	1	1	2
5	21PBGU0605	Crop Improvement-II (*Rabi* crops)	1	1	2
Total			**7**	**6**	**13**

IV. AGRICULTURAL ENTOMOLOGY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21AENU0201	Fundamentals of Entomology	3	1	4
2	21AENU0502	Pests of Crops and Stored Grain and their Management	2	1	3
3	21AENU0503	Management of Beneficial Insects	1	1	2
4	21AENU0604	Principles of Integrated Pest and Disease Management	2	1	3
Total			**8**	**4**	**12**

V. PLANT PATHOLOGY

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21APPU0201	Fundamentals of Plant Pathology	3	1	4
2	21APPU0502	Diseases of Field and Horticultural Crops and their Management-I	2	1	3
3	21APPU0603	Diseases of Field and Horticultural Crops and their Management-II	2	1	3
Total			**7**	**3**	**10**

VI. HORTICULTURE

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21HORU0101	Fundamentals of Horticulture	1	1	2
2	21HORU0302	Production Technology for Fruit and Plantation Crops	1	1	2
3	21HORU0403	Production Technology for Vegetables and Spices	1	1	2
4	21HORU0404	Production Technology for Ornamental Crops, MAP and Landscaping	1	1	2
5	21HORU0605	Post-harvest Management and Value Addition of Fruits and Vegetables	1	1	2
Total			**5**	**5**	**10**

VII. AGRICULTURAL ENGINEERING

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21AGEU0201	Soil and Water Conservation Engineering	1	1	2
2	21AGEU0302	Farm Machinery and Power	1	1	2
3	21AGEU0403	Renewable Energy and Green Technology	1	1	2
4	21AGEU0604	Protected Cultivation and Secondary Agriculture	1	1	2
Total			**4**	**4**	**8**

VIII.ANIMAL SCIENCES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21LPM0301	Livestock and poultry Management	3	1	4
		Total	**3**	**1**	**4**

IX. AGRICULTURAL ECONOMICS

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21AECU0201	Fundamentals of Agricultural Economics	2	0	2
2	21AECU0302	Agricultural Finance and Co-Operation	2	1	3
3	21AECU0403	Agricultural Marketing Trade & Prices	2	1	3
4	21AECU0504	Farm Management, Production & Resource Economics	1	1	2
5	21AECU0605	Intellectual Property Rights	1	0	1
		Total	**8**	**3**	**11**

X. AGRICULTURAL EXTENSION AND COMMUNICATION

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21AEXU0101	Rural Sociology & Educational Psychology	2	0	2
2	21AEXU0202	Fundamentals of Agricultural Extension Education	2	1	3
3	21AEXU0503	Entrepreneurship Development and Business Communication	1	1	2
4	21AEXU0704	Rural Agricultural Work Experience - RAWE (VSP+ADO/KVK+ NGO+ Agro Industry)	0	20	20
5.	21AEXU0805	Project Work	0	4	4
Total			**5**	**26**	**31**

COURSES OFFERED BY OTHER DEPARTMENTS OF GRI

XI. PHYSICAL SCIENCES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21AMMU0101/1 21AGBU0101	Elementary Mathematics / Introductory Biology *	2 (1+1) / 2 (2+0)		2
2	21ACSU0301	Agri- Informatics	2	1	3
3	21AMMU0302	Statistical Methods	1	1	2
		Total	**5**	**2**	**7**

*R: Remedial Course

XII. BIOLOGICAL SCIENCES (Biochemistry/Physiology/Microbiology)

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21ACPU0101	Fundamentals of Crop Physiology	1	1	2
2	21APBU0202	Agricultural Microbiology	1	1	2
3	21AGMU0203	Fundamentals of Plant Biochemistry and Biotechnology	2	1	3
4	21AFSU0604	Principles of Food Science & Nutrition	2	0	2
		Total	**6**	**3**	**9**

XIII. LANGUAGES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	21ENGU01A1	Comprehension & Communication Skills in English (Gradial course)	1	1	2
2.	21ENGU02A2	Communication Skills and Personality Development	1	1	2
		Total	**2**	**2**	**4**

XIV. GANDHIAN THOUGHT

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	21GTPU0101	Gandhi's Life, Thought and Work / Human Values & Ethics/	2	0	2
2.	21SHSU0102	Shanti Sena**	0	1	1
		Total	**2**	**1**	**3**

XV. OTHER COURSES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1.	21NSSU0001/ 21APEU0001	NSS/Physical Education & Yoga Practices	0	1	1
2.	21NSSU0001 21APEU0002	NSS/Physical Education & Yoga Practices	0	1	1
		Total	**0**	**2**	**2**

XVI. SKILL DEVELOPMENT & ENTREPRENEURSHIP

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21SDEU0801	Skill Development and Entrepreneurship-I	0	10	10
2	21SDEU0802	Skill Development and Entrepreneurship-II	0	10	10
		Total	**0**	**20**	**20**

XVII. ELECTIVE COURSES

S. No	Subject Code	Name of the Course	Credit		
			Theory	Practical	Total
1	21ELEU0401	Elective -I	2	1	3
2	21ELEU0502	Elective-II	2	1	3
3	21ELEU0603	Elective-III	2	1	3
		Total	**6**	**3**	**9**

DISCIPLINE-WISE SUMMARY OF CREDIT HOURS

S. No	Name of the Discipline	Credit		
		Theory	Practical	Total
1	Agronomy	11	13	24
2	Soil Science & Agricultural Chemistry	9	4	13
3	Genetics & Plant Breeding	7	6	13
4	Agricultural Entomology	8	4	12
5	Plant Pathology	7	3	10
6	Horticulture	5	5	10
7	Agricultural Engineering	4	4	8
8	Animal Sciences	3	1	4
9	Agricultural Economics	8	3	11
10	Agricultural Extension And Communication	5	26	31
11	Physical Sciences	5	2	7
12	Biological Sciences (Biochemistry/Physiology/Microbiology)	6	3	9
13	Languages	2	3	5
14	Gandhian Thought / Shanti Sena	2	1	3
15	Other Courses	0	2	2
16	Skill Development and Entrepreneurship	0	20	20
17	Elective Courses	6	3	9
	Total	**88**	**103**	**191**

ELECTIVE COURSES

The student can select **three** elective courses out of the following and offer during **4th, 5th and 6th semesters.**

S. No	Name of the Discipline	Credit		
		Theory	**Practical**	**Total**
1	Agribusiness Management	2	1	3
2	Agrochemicals	2	1	3
3	Commercial Plant Breeding	1	2	3
4	Landscaping	2	1	3
5	Food Safety and Standards	2	1	3
6	Biopesticides & Biofertilizers	2	1	3
7	Protected Cultivation	2	1	3
8	Micro propagation Technologies	1	2	3
9	Hi-tech. Horticulture	2	1	3
10	Weed Management	2	1	3
11	System Simulation and Agro-advisory	2	1	3
12	Agricultural Journalism	2	1	3

MODULES FOR SKILL DEVELOPMENT AND ENTREPRENEURSHIP

A student has to register 20 credits opting for two modules of (0+10) credits each total 20 credits) from the package of modules in the **VIII semester**

S.No	Name of the Discipline	Credit		
		Theory	**Practical**	**Total**
1	Production Technology for Bioagents and Biofertilizer	0	10	10
2	Seed Production and Technology	0	10	10
3	Mushroom Cultivation Technology	0	10	10
4	Soil, Plant, Water and Seed Testing	0	10	10
5	Commercial Beekeeping	0	10	10
6	Poultry Production Technology	0	10	10
7	Commercial Horticulture	0	10	10
8	Floriculture and Landscaping	0	10	10
9	Food Processing	0	10	10
10	Agriculture Waste Management	0	10	10
11	Organic Production Technology	0	10	10
12	Commercial Sericulture	0	10	10

OBE Elements for B.Sc (Hons). Agriculture Programme

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1: To make the students an all-round professional and successful entrepreneur in achieving sustainable agriculture.

PEO2: To inculcate the spirit of continuing the learning further in all the fields of agriculture.

PEO3: To expose the students more to the practical field based learning in agriculture.

PEO4: To encourage the students to utilize the skills developed in the programme for obtaining a gainful employment either as employee or as employer.

PEO5: To equip the students as successful professionals in solving the field level problems of farmers and other stakeholders.

PEO6: To develop the students as successful leaders capable of working in diverse streams of knowledge dissemination regarding various farming techniques and commercial aspects of agriculture.

PROGRAMME OUTCOME (PO)

The students of B. Sc (Hons) Agriculture will be able to:

PO1: Apply the knowledge gained in solving the problems faced by farmers/society/industry.

PO2: Gain analytical skills in analyzing and interpreting the data/information in agriculture and allied subjects.

PO3: Develop skill in designing and conducting laboratory and field experiments for finding of solutions to problems and issues in agriculture.

PO4: Use knowledge gained from various quarters for the promotion of eco-friendly and sustainable agriculture for the benefit of farmers and other stakeholders.

PO5: Able to develop and execute projects with professional ethics by utilizing the knowledge gained for improving the socio-economic status of the farming community.

PROGRAMME SPECIFIC OUTCOME (PSO)

The students of B. Sc. (Hons) Agriculture should be able to:

PSO1: Apply their knowledge of agriculture in increasing the production of various farm produces and improving the food security.

PSO2: Utilize the techniques learnt and skills acquired from the programme in the laboratory and field settings.

PSO3: Use mathematical, statistical tools and other analytical techniques in interpreting the laboratory and fields data.

PSO4: Disseminate the knowledge and critically evaluate the current trends and advancements in agriculture and allied fields.

PSO5: Apply the conceptual and practical knowledge of agriculture to function effectively as an individual and as a team with multidisciplinary approach for the promotion of integrated farming systems with environmental sustainability.

OBE Template

Name of the Programme	**B.Sc., (Hons) Agriculture**										
Year of Introduction	2017				Year of Revision				2021		
Semester-wise Courses and Credit distribution	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
No. of Courses	11	10	10	10	10	12	2	3	-	-	68
No. of Credits	24	25	25	22	24	25	21	24	-	-	190

Semester	**I SEMSETER**	Course Code	**21AGRU0101**
Course Title	**FUNDAMENTALS OF AGRONOMY**		
No. of Credits	**3+1**	No. of contact hours per Week	**5.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • Impart knowledge on the basics of Agronomy from land preparation sowing up to harvest • Train and inculcate handling of tools and implements used for tillage operations • Provide knowledge on crop nutrition, manures and fertilizer and its application methods • Facilitate knowledge about irrigation and weed management practices in field crops with hands on training • Give basic knowledge about the fundamental principles and practices of Agronomy		
UNIT	Content		No. of Hours
I	**Introduction**: Definition of Agronomy- Scope and its importance- Role of an Agronomist- Branches of agriculture- Tillage and Tilth - Objective of Tillage- Types of tillage-		9.5

	Modern concept of Tillage- Tools and implements and machineries for different agricultural operations.	
II	**Seeds and Sowing:** Factors affecting germination- Seed rate and seed treatment- Nursery methods and transplanting- Methods of sowing- Plant population and geometry- Growth and development of crops- Factors affecting growth and development- Crop rotation and its principles- Adaptation and distribution of crops- Harvesting, threshing, drying and storage.	8
III	**Manures and Fertilizers:** Crop nutrition- Classifications of manures and fertilizer- Basic, primary, secondary and micro nutrients needed for crop growth- Nutrient use efficiency- slow release fertilizers- Neem coated urea, Sulphur coated urea, Coal tar coated urea- Methods of application of fertilizers- Basal dressing, top dressing- Foliar application of fertilizers- Fertigation – Integrated Nutrient Management (INM).	8.5
IV	**Irrigation**: Definition-Water resources- Soil-Plant-Water relationship, crop water requirement- Water use efficiency- Irrigation- Scheduling and methods of irrigation- Surface, sub surface and pressurized irrigation- Flooding, border irrigation, Check basin irrigation, Furrow irrigation, Sprinkler irrigation, Drip irrigation- Suitability of crops- Merits and demerits of each irrigation systems	9.5
V	**Weed Management-** Weed-Definition- Importance and classification of weeds- harmful and beneficial effects of weed crop weed competition- concepts of weed management- principles and methods of weed management- Cultural, mechanical, chemical and biological methods of weed control- merits and demerits of each methods- Herbicides- definition and classification – Selectivity and resistance- Allelopathy- time and methods of herbicide application- herbicide residue management-IWM.	9.5
Practical	Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro-climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Balasubramaniyan, P and S.P.Palaniappan, 2002. *Principles and practices of Agronomy*. Agro bios(India), Jodhpur 2. Reddy, S.R. 2017. *Principles of Agronomy*. Kalyani Publishers, New Delhi	

	Reference Books: 1. Gopal Chandra De, 1997.*Fundamentals of Agronomy.* Oxford and 2. IBH publishing Co. Pvt. Ltd., New Delhi 3. ICAR, 1996. *Hand book of Agriculture.* Indian Council of Agriculture Research, New Delhi
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.agrimoon 2. http:/icar.res.in 3. www.icar.org.in/nasm.html
Course Outcomes	CO1:Describe the scope and importance of agriculture, branches of agriculture, objectives of tillage and implements used for various tillage operations CO2:Develop skills in agricultural operations namely seed sowing and transplantation methods, including harvesting, processing of field crops, to narrate the principles of crop rotation CO3: Describe the importance of crop nutrition, essential plant nutrients for plant growth, recommend suitable manures and fertilizer and its application methods and practice INM. CO4 Calculate crop water requirement, identify and schedule suitable irrigation methods CO5: Identify weeds, identify suitable weed control measures and recommend appropriate herbicide and application methodology for weed control.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	3	3
CO2	3	3	3	3	3
CO3	3	2	3	1	3
CO4	2	3	1	2	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21SACU0101**
Course Title	**FUNDAMENTALS OF SOIL SCIENCE**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims to** • impart basic knowledge on the development of soil science, origin of earth, soil forming rocks and minerals. • give an understanding of the soil forming processes and types of soil in India • make the students learn and develop skills to analyze the properties of soil in relation to fertility and crop growth. • impart knowledge on the importance of organic matter in soil fertility for sustainable crop production. • teach the students about soil pollution and ways to mitigate it to maintain environmental quality.		

UNIT	Content	No. of Hours
I	**Soil forming rocks and Minerals:** History and development of Soil Science and its branches. Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: Origin of earth-Soil forming rocks and minerals-origin-classification. Weathering of rocks and minerals-physical, chemical and biological weathering.	5.0
II	**Soil forming processes:** Soil formation-Factors of soil formation-Soil forming processes-Profile development-Definition of soil- Soil composition-Types of soils found in India and Tamil Nadu - Soil taxonomy.	5.5
III	**Physical Properties of Soils:** Physical properties of soils-	6.5

	texture-mechanical components and structure, density and porosity, soil colour, soil air, composition, gaseous exchange, soil temperature - sources- amount and flow of heat in soil;, soil water-measurement-soil and water relationship moisture constants-soil water movement. Soil consistency and plasticity;. Significance of physical properties in relation to plant growth.	
IV	**Chemical properties of Soils:** Chemical properties of soils-Chemical composition-Soil reaction-pH, soil acidity and alkalinity -Buffering capacity of soils- effect of pH on nutrient availability; Soil colloids-Inorganic and organic - silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation -Organic colloids-Colloids in relation to fertility of soil and their effect on plant growth.	6.5
V	**Soil Organic matter and their Turn over:** Soil Organic matter - sources- chemical composition-decomposition- properties and its influence on soil properties; role and functions of organic matter in soil- humus formation- humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects; soil-nutrient availability-factors influencing the availability; Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.	6.5
Practicals	Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos methods. Studies of capillary rise phenomenon of water in soil column and water movement in soil. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Study of soil map. Determination of soil colour. Demonstration of heat transfer in soil. Estimation of organic matter content of soil.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Biswas, T.D. and Mukherjee, S.K. 1997. *Text book of Soil Science*. Tata McGraw Hill Publishing Co. Ltd., New Delhi 2. Brady, N.C. 1995. *The Nature and Properties of Soils*. Prentice Hall of India Pvt. Ltd., New Delhi 3. Daji, A.J. 1970. *A Text Book of Soil Science*. Asia Publishing House, Madras 4. Dhanasekaran,K.,Poonkodi,P.,Singaravel,Rand.Raghupathy,B2003,*Fundamentals of Soil Science*. Om Sakthi Pathippagam, Chidambaram 5. Dilip Kumar Das. 2015. *Introductory Soil Science*. Kalyani Publishers, Ludhiana, India. 6. Donahue, R.L., Miller, T.W. and Shickluna, J.C. 1987. *Soils – An introduction to Soils and Plant Growth*. Prentice Hall of India (P) Ltd., New Delhi.	

	Reference Books: 1. Kolay, A.K. 1993. *Basic concepts of Soil Science*. Wiley Eastern Limited, 4835/24 Ansari Road, Daryaganj, New Delhi 2. Rai, M.M. 1998. *Principles of Soil Science*. MacMillan India Limited, New Delhi 3. Sahai, V.N. 2001. *Fundamentals of Soil*, Kalyani Publishers, Ludhiana 4. Sehgal, J. 1997. *Pedology-Concepts and applications*. Kalyani Publishers, Ludhiana 5. Sekhon, G.S. Eds., 2002. *Fundamentals of Soil Science*. Indian Society of Soil Science, IARI, New Delhi.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org/ soils- portal 3. http.//nrcs.usda.gov 4. agrimoon.com
Course Outcomes	CO1: Identify and describe the soil forming rocks and minerals, explain weathering of rocks and minerals and its importance in soil formation CO2: Describe the fundamental and specific soil forming processes and the types of soil found in India. CO3: Analyze, evaluate and interpret the physical properties of soil in relation to soil fertility and crop growth. CO4: Analyze; evaluate and interpret the chemical properties of soil in relation to soil fertility and crop growth. CO5: Explain the role of organic matter in soil fertility and sustainability, discuss and assess soil pollution and demonstrate techniques to mitigate it.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	3	3	3	3
CO2	2	2	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21PBGU0101**
Course Title	**FUNDAMENTALS OF GENETICS**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	**The course aims to** • To understand the Pre Mendelian and Mendelian concepts and application of statistics in Genetics. • To know the modern concepts of genetics. • To know the architecture of chromosomes and significance of mitosis and meiosis for life. • To know the various ploidy level in a crop species and mutation (Natural and Artificial) in crop improvement. • To know modern/fine concepts of gene and its structure		

UNIT		No. of Hours
I	**History of Genetics**, Pre Mendelian concepts of heredity, Mendel work, Principles of heredity, Lethal genes, Pleiotropy with examples; phenocopy, penetrance and expressivity. Dominance relationships, Epistatic interactions with example. Probablity and chi–squares	5
II	**Multiple alleles** – characteristics and features,	7

	Pleiotropism and Pseudoalleles, study of blood group, Multiple factor hypothesis, Linkage and its Crossing over mechanisms, Chromosome mapping, Qualitative and Quantitative traits, Polygenes and Continuous variation, Sex determination and Sex linkage , Sex limited and Sex influenced traits , Cytoplasmic inheritance	
III	**Architecture of Chromosome**, Chromonemata, chromosome matrix, Chromomere, Centromere, secondary constriction and telomere: Special type of chromosomes, Cell cycle and cell division mitosis and meiosis	5
IV	**Structural and Numerical variations** in chromosome and their implications, use of haploids, diploids and double haploids in genetics. Mutation, classification, methods of including mutations &CIB technique, Mutagenic agents and induction of mutation, Genetic code	6
V	**Nature, Structure & Replication of genetic material** .Protein synthesis, Transcription and Translational mechanism of genetic material. Gene concept: Gene structure, Functions and regulation. Lac and Trp operons.	6
Practical	Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross and back cross, Practice on mitotic and meiotic cell division, Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two point test cross and three point test cross data). Study on sex linked inheritance in Drosophila. Study of models on DNA and RNA structures.	
References	Text Books 1. Gupta P.K.2004. *Cytology, Genetics and evolution*. Rastogi Publications, Meerut. (Hindi Edition) 2. Kaushik, M.P.2003. *A text Book of Modern Botany*. Prakash publications, Muzaffar Nagar (UP)	
	Reference Books: 1. Klug, W.W and Cummings, M.R.2005. *Concepts of genetics*. Pearson Education (Singapore) pvt. Ltd., Indian branch. Pratap Ganj. New Delhi. 2. Singh, B.D. 2001. *Genetics*. Kalyani Publishing House, New Delhi. 3. Strickberger, M.W.2001. *Genetics*. Prentice Hall of India. Pvt. Ltd., New Delhi. 4. Shekhawat, A.S.and Tripathi, B.K., 2009. *A practical manual on Element of Genetics*. Publish by College of Agriculture, Bikaner	

	E-Resources 1. www.nmsu.edu 2. www.biology200.gsu.edu
Course Outcomes	On completion of the course, the students should be able to CO1: Discuss the significance of the black box of genetic information transfer to next generation for continuity of life via mitosis and meiosis CO2: Explain the genetic principles in localizing the gene which controls major economic traits like grain yield and their application in crop improvement CO3: Work out the various classical examples in genetics, crossing over and their interactions CO4: Carryout cytological analysis in plant samples and appreciate the concept of Central Dogma of Life CO5: Demonstrate knowledge on crop evolution-selection, polyploidization and mutation (natural and artificial) and discuss its basic principles, phenomena, techniques and mechanisms involved in the crop improvement

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	2
CO2	3	2	2	3	3
CO3	3	3	2	3	2
CO4	3	3	1	3	3
CO5	3	2	2	3	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21HORU0101**
Course Title	**FUNDAMENTALS OF HORTICULTURE**		
No. of Credits	1+1	No. of contact hours per Week	3.5
New Course / Revised Course	Revised course	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Core course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • Enable to learn about the importance, branches, layout of an orchard, special horticulture techniques for horticultural crops. • Teach the sexual and asexual Propagation techniques. • Impart knowledge about the principles and methods of training and pruning • Enable to learn about the pollination and Medicinal and aromatic plants. • Impart knowledge on the importance of Plant growth regulators and fertilizer application, irrigation techniques.		

UNIT	Content	No. of Hours
I	Horticulture - Its definition and branches, importance and scope, horticultural and botanical classification, climate and soil for horticultural crops, Horticulture zones in India.	5.00
II	Plant propagation- Sexual and Asexual propagation methods and propagating structures; Seed dormancy, Seed germination- Epigeal and Hypogeal germination, principles of orchard establishment.	3.00

III	Principles and methods of training and pruning, juvenility and flower bud differentiation, unfruitfulness.	2.00
IV	Pollination, pollinizers and pollinators, fertilization and parthenocarpy, Medicinal and aromatic plants.	2.00
V	Importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops	3.00
Practical	Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/ nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard. Training and pruning of fruit trees. Preparation of potting mixture. Fertilizer application in different crops. Visits to commercial nurseries/orchard.	35
References	Text Books 1. Kumar, N. 1997.Introduction to Horticulture. Rajalakshmi Publication, Nagercoil 2. Jitendra Singh. 2011. Basic Horticulture. Kalyani Publishers, New Delhi. 3. Kumaresan, V.2014 .Horticulture. Saras Publication. Nagercoil.	
	Reference Books: 1. K.V. Peter, 2009. Basic Horticulture. New India Publishing Agency 2. Kausal Kumar Misra and Rajesh Kumar, 2014. Fundamentals of Horticulture. Biotech Books. 3. Chadha, K.L. (ICAR), 2002. Hand book of Horticulture. ICAR, New Delhi	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http://aggie-horticulture,tamu.edu/propagation/propagation.html 2. http://www/britannica.com/ 3. http://www.horticulture.com.au/export/hmac.asp 4. http://www.horticultureworld.net/hort-india.html	
Course Outcomes	On completion of the course, students should be able to do CO1: demonstrate basic knowledge about the fundamental aspects of horticulture and its importance and scope CO2: demonstrate knowledge and skill in various methods of sexual and asexual propagation. CO3:show proficiency in understanding and performing the training and pruning techniques, growth habit of horticultural crops, flower and fruit bearing biology CO4: Discuss about various aspects of pollination, medicinal and aromatic plants. CO5: demonstrate expertise in using bio-regulators, irrigation methods and fertilizer application techniques.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21ACPU0101**
Course Title	**FUNDAMENTALS OF CROP PHYSIOLOGY**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To expose the students to the basic concepts and underlying application of Crop physiology • To understand about mechanism of nutrient uptake and physiological disorders. • To study about different types of growth analysis. • To study about Different growth regulator in crop plants. • To study about role of environment in Crop Physiology		

UNIT	Content	No. of Hours
I	**Introduction** - importance of crop physiology in agriculture. Water relations - role and its significance - diffusion - imbibition - osmosis and plasmolysis. Absorption and translocation of water and solutes. Transpiration - steward's theory of stomatal mechanism - guttation.	3.0
II	**Mineral nutrition** - mechanism of nutrient uptake - physiological role - nutritional and physiological disorders and their correction - foliar nutrition. Photosynthesis - light reaction - red drop - Emerson's enhancement effect - dark	3.0

	reaction - different pathways - factors influencing photosynthesis.	
III	**Photorespiration**. Respiration - mechanism - energy budgeting - respiratory quotient - factors affecting respiration. Flowering - photoperiodism - role of phytochrome - regulation of flowering in crops - vernalization. Growth - factors influencing growth - growth analysis.	3.0
IV	**Plant Growth regulators** - classification - physiological role - practical applications. Components of source and sink - yield components - Harvest index.	2.0
V	**Role of environment in Crop physiology** - water stress - temperature stress - light and salt stresses - physiological changes - alleviations. Global warming - physiological effects. Abscission and senescence - types - causes - physiological and biochemical changes - regulations.	4.0
Practical	Measurement of plant water status by different methods. Estimation of stomatal index and stomatal frequency. Measurement of leaf area by different methods. Measurement of root pressure and rate of transpiration Estimation of chlorophyll stability index and RWC to screen genotypes for drought tolerance. Separation of photosynthetic pigments through paper chromatography Determination of photosynthetic efficiency in crop plants. Estimation of soluble protein content in crops to assess the photosynthetic rate in crop plants. Measurement of photosynthetic CO_2 assimilation by Infra Red Gas Analyser (IRGA). Rapid tissue tests for: A) Nitrogen (b) Phosphorus (c) Potassium (d) Calcium (e) Iron.	
References	Text Books (with chapter number & page number, wherever needed): 1. Arvind Kumar and Purohit, S.S., 1996. *Plant Physiology*. Agrobotanical Publishers, India. 2. Bidwell, R.G.S.1974. *Plant Physiology*. Macmillan Publishing Co., Inc. New York. Collier Macmillan Publishers, London. 3. Jain, V.K., 1996. *Fundamentals of Plant Physiology*. S. Chand and Company Limited, New Delhi. *4.* Kramer, P.J., 1969. *Plant and soil water relationships, a modern synthesis.* McGraw Hill Book Company, New York. 5. Nickell, L.G., 1981. *Plant Growth Regulators*: Agricultural Uses. Springer - Verlag, New York, Heidelberg, Berlin. 6. Pandey, S.N. and B . K . Sinha, 1972. *Plant Physiology*. 3rd Edition-Vikas Publishing House Private Limited, New Delhi	

Course Outcomes	On completion of the course, students should be able to do CO1: acquire basic knowledge on various functions and processes related to crop productivity CO2: identify and evaluate mineral nutrient deficiency and toxicity symptoms and communicate measures to correct it. CO3: develop skills to analyze crop growth using various growth parameters CO4: recommend appropriate growth regulators to improve yield CO5: identify plant stress due to the environment and prescribe management measures

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	2
CO2	3	2	2	3	3
CO3	3	2	2	3	2
CO4	3	3	2	3	3
CO5	3	3	3	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21AEXU0101**
Course Title	**RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY**		
No. of Credits	**2+0**	No. of contact hours per Week	**2.0**
	Revised course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The Course aims to • develop Foundational Knowledge in Rural Sociology. • understand Social Groups and Social Stratification in Agricultural Extension • identify Social Institutions and Importance in Agricultural Extension • create skills in Psychology in learning situation for Extension Teaching. • apply theoretical knowledge in Agricultural Extension.		

UNIT	Content	No. of Hours
I	**Introduction:** Sociology and Rural Sociology- Meaning, Definition and Scope- Significance of Rural sociology in Agricultural Extension - Social Ecology - Rural Society- Characteristics, Differences between Rural and Urban societies.	**6**
II	**Social Groups**: Classification, Characteristics, Formation and organization of groups – Role of social groups in Agricultural Extension - Social Stratification: meaning, forms, class system and cast systems - Culture -concept: their	**8**

	role in Agricultural Extension.	
III	**Social Institution**- Meaning, types and importance in Agricultural Extension - Social Change and Development. Educational Psychology: meaning, scope and importance in Agricultural Extension.	**5**
IV	**Behaviour**: Cognitive, Affective, Psychomotor domain, Personality, Learning-Learning, learning experience and learning situation – meaning and definition – Elements of learning situation and its characteristics – Steps in Extension teaching.	**7**
V	**Motivation**- Meaning and types, Theories of Motivation, Intelligence -Meaning, types, factors and importance in Agricultural Extension.	**4**
References	Text Books (with chapter number & page number, wherever needed): *1.* Tripathi, N.K. (2000). *Rural Sociology and Psychology in Extension Education.* 2. Chitamber, J.B. (1997). *Introducing Rural Sociology***,** Wiley Eastern Ltd., New Delhi. 3. Mangal, S.K. (2000). *Educational Psychology*, Prakash Brothers, Ludhiana.	
	Reference Books: 1. Annamalai, R.(1998). *Extension Education and Programme Planning***.** Palaniappa Printers, Tirunelveli. 2. Dahama, O.P and O.P. Bhatnagar. (2008). *Education and Communication for Development*, Oxford & IBH Publishing Co., Ltd., New Delhi. 3. Ray, G.L.(2006*). Extension Communication and Management***.** Naya Prakash, Kolkata. 4. Reddy, A.A. (2001*). Extension Education*. Shree Laxmi Press, Bapatla 5. Supe, S.V. (1983). *An Introduction to Extension Education*. Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1.Agrimoon.com	

Course Outcomes	On completion of the course, students should be able to do CO1: Demonstrate knowledge in the significance of Rural Sociology CO2: Analyze the role of social groups in Agricultural Extension CO3: Discuss the role of social institution in change and development. CO4: Demonstrate extension teaching CO5: Explain the importance of Agricultural Extension.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	3	2	3
CO2	3	3	2	3	3
CO3	2	2	3	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21ENGU01A1**
Course Title	**COMPREHENSION & COMMUNICATION SKILLS IN ENGLISH**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Language (I / II / III)		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives	The Course aims to • teach spoken English • enrich the vocabulary of students • make the students learn functional grammar • impart skills on writing • prepare students for professional writing		

UNIT	Content	No. of Hours
I	**Raymond B. Fosdick -** War Minus Shooting- The sporting Spirit. - A Dilemma- A layman looks at science. G.B. Shaw - You and Your English– Spoken English and broken English.	**4**
II	**Reading Comprehension,** Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words. (Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations.)	**3**
III	**Functional grammar:** Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis.	**3**

IV	**Direct and Indirect Narration. Written Skills:** Paragraph writing, Precise writing, Report writing and Proposal writing.	**2**
V	**The Style: Importance of Professional writing**. Preparation of *Curriculum Vitae* and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.	2
Practical	Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness &Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussions.	32.5
References	Text Books (with chapter number & page number, wherever needed): 1. Sahaneya Wandy, et.al., *IELTS, Preparation and Practice,* Oxford University Press. 2005. 2. Greebaum Sidney, *Oxford English Grammar,* New Delhi, Oxford University Press.Peregoy, 2009.	
Course Outcomes	On completion of the course, students should be able to do CO1: Speak English fluently CO2: Develop reading skills and get enriched in English vocabulary CO3: Demonstrate understanding of grammatical structures and in addition practice it in writing CO4: Take part confidently in group discussions and demonstrate effective communication skills CO5: Prepare and edit *curriculum vitae* for job applications and face job interviews confidently.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	2	2
CO2	1	1	1	2	2
CO3	1	1	1	2	2
CO4	1	1	1	2	2
CO5	1	1	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21AGBU0101**
Course Title	**INTRODUCTORY BIOLOGY**		
No. of Credits	**1+1**	No. of contact hours per Week	3.5
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Foundation course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The Course aims to • Introduce the diversity and characteristics of the living world • Impart knowledge on the origin and evolution of life • Teach classification of flowering plants • Impart knowledge on morphology of flowering plants • Give an understanding on the characteristics and economic importance of selected families of plants		

UNIT	Content	No. of Hours
I	**Introduction to the living world**. Diversity and characteristic features of plant, animal and microbes	**3**
II	**Origin and Evolution of life.** Theories supported for the evolution of life. Eugenics: positive and negative structure, cell division.	**4**
III	**Classification of Flowering plants**. Natural and artificial systems. ICBN principles and recommendation	**2**
IV	**Morphology of Flowering plants**. Rose, stem leaf, flower and fruits. Seed morphology and germination.	**3**
V	**Characteristics features and economic importance of** the following families. Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.	**3**

Practical	Morphology of flowering plants – root, stem and leaf and their modifications. Inflorescence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants - Brassicaceae, Fabaceae and Poaceae.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Sharma, O.P.2013. *Plant Taxonomy*, McGraw Hill education Pvt Ltd., New Delhi 2. Pandey, S.W and Sinha , B.K. *Plant Physiology* , Narosa Publishing House, New Delhi 3. Verma, P.S and Agarwal , V.K. *Cell biology, Genetics and Molecular Biology, Evolution and Ecology* , S. Chand and company , New Delhi.	
Course Outcomes	On completion of the course, students should be able to do CO1: Describe the diversity of living things CO2: Explain the evolution of life CO3: Describe the scientific principles behind the classification of flowering plants CO4: Classify flowering plants based on its morphological characters such as root, shoot, leaf, flower etc. CO5: Classify the plant species based on its economic importance	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	1	1	2
CO2	1	2	1	1	2
CO3	1	2	1	1	2
CO4	1	2	1	1	2
CO5	1	2	1	1	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21AMMU0101**
Course Title	**ELEMENTARY MATHEMATICS**		
No. of Credits	**2+0**	No. of contact hours per Week	**2**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Foundation course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The Course aims to • To impart basic knowledge about solving problems in matrices and determinants • To teach about straight lines • To impart knowledge on circles and their equation • To give an understanding on the fundamental concepts of differential calculus • To teach the basics of integral calculus		

UNIT	Content	No. of Hours
I	**Matrices and Determinants:** Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation**.**	**5**

II	**Straight lines:** Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral.	**7**
III	**Circle:** Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2), Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$.	**4**
IV	**Differential Calculus :** Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n, e^x, sin x & cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it).	**6**
V	**Integral Calculus** : Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it).	**5**

References	Text Books (with chapter number & page number, wherever needed): 1. Manickavasagam Pillai T.K., T. Natarajan and K.S. Ganapathy. *Algebra, Vol. II*, S.Viswanathan Printers, 2006 2. Manickavasagam Pillai T.K., T. Natarajan, *Analytical Geometry – Part I, Two Dimensions*, S.Viswanathan Printers, 2011 3. Manickavasagam Pillai T.K., T. Natarajan, *Calculus, Vol. I & II*. S. Viswanathan Printers, 2014
Course Outcomes	On completion of the course, students should be able to do CO1: Perform matrix operations of addition, multiplication and transposition and evaluate determinants CO2: Calculate the distance between straight lines, determine equation of straight lines, parallel and perpendicular lines CO3: Define and explain the concept of circle and determine equations of circle CO4: Define function, limit and continuity and solve problems in differential calculus CO5: Perform integration of simple functions, product of two functions, solve problems in definite integrals

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	2	1	1
CO2	1	2	2	1	1
CO3	1	2	2	1	1
CO4	1	2	2	1	1
CO5	1	2	2	1	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21AGRU0102**
Course Title	**AGRICULTURAL HERITAGE**		
No. of Credits	**1+0**	No. of contact hours per Week	**1.0**
New Course / Revised Course		If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • Understand the importance of Agricultural heritage • Know about the value of Indigenous knowledge in agriculture • Familiarize the students about current scenario of Indian Agriculture		

UNIT	Content	No. of Hours
I	**Agricultural heritage-** Introduction, definition of agricultural heritage- Need and importance of Agricultural heritage- Historical facts- Relevance of heritage to present day Agriculture.	5
II	**Ancient agricultural practices-** Past and present status of agriculture- Vedic civilization- Agriculture and Kaudilya's Artha sasthra- Agriculture in sangam literature- Tholkappium, Thirukkural and Avvaiyar.	3
III	**Journey of Indian agriculture** and its development from past to modern era- History of agriculture- Development of agriculture in World and India- National Agriculture setup in India- Current scenario of Indian agriculture- Indian Agricultural concerns and future prospects Important International Institutions for Agricultural research . Classifications of crops- Major crops of India and Tamil Nadu-	2

IV	**Indigenous Traditional Knowledge (ITK):** Plant production and Plant protection through Indigenous traditional knowledge- Crop voyage in India and World- Agricultural scope-Importance of Agriculture- Branches of Agriculture- Agricultural resources available in India.	3
V	**Human Values and Ethics**-An Introduction. Goal and Mission of Life. Vision of Life. Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination.	2
References	Text Books 1. Utpal Giri, 2020 Text book of Agricultural Heritage. Scientific publishers 2. ICAR, 2011. *Hand book of Agriculture*. Indian Council of Agriculture Research, New Delhi	
	Reference Books: 1. Reddy, S.R. 2011. *Principles of Agronomy*. Kalyani Publishers, New Delhi. 2. Sankaran , S and V.T.Subbiah Mudaliar, 1997. *Principles of Agronomy*. The Bangalore Printing and Publishing Company ltd., Bangalore	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.agrimoon 2. www.webcast.gov.in	
Course Outcomes	On completion of the course, students should be able to do CO1: Correlate basic aspects of agricultural heritage with present day agriculture. CO2: Explain about ancient agricultural practices in Vedic and Sangam periods CO3: Narrate the development of agriculture and agricultural research in the world and India CO4: Effectively apply ITK in agricultural practices and demonstrate knowledge on agricultural resources in India CO5: Discuss the current scenario and future prospects of Indian agriculture	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	2	3	2	3	3
CO4	2	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21GTPU0001**
Course Title	**GANDHI'S LIFE, THOUGHT AND WORK**		
No. of Credits	**2+0**	No. of contact hours per Week	**2.0**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Others (Non-gradial)		
Scope of the Course (may be more than one)	• Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • To enrich the knowledge of students on the life of Gandhi • To teach the students on Gandhi's philosophy • To impart knowledge about institutions that emerged from Gandhi's philosophy • To give an understanding about Gandhian vision • To make the students understand about Gandhian dimension of education		

UNIT	Content	No. of Hours
I	**Life of Gandhi in brief**: Early life in India – London Phase – South African Adventure – Struggle for total freedom in India – Martyrdom	**8**
II	**Concepts of Gandhi's Philosophy**, Truth and Nonviolence, Ends and Means, Rights and Duties, Simple Living and High Thinking	**5**
III	**Gandhi's concepts** and their applications: Sarvodaya, Satyagraha, Shanti Sena Constructive Work	**5**
IV	**Gandhian Vision of Society**: Self and society – Communal harmony, removal of untouchability and Equality of sexes – Politics: Decentralization of power, Gram Swaraj (Panchayati	**7**

	Raj) and good governance – Economics of Swadeshi, Trusteeship, Bread Labour and Self-employment.	
V	**Gandhian Dimensions of Education**: Basic Education, Adult Education, Pluralism – Multilingualism, Religions and interfaith relations- Health; Diet, Nature Cure, Education on Health, Sanitation and Hygiene.	**8**
References	Text Books (with chapter number & page number, wherever needed): 1. M.K. Gandhi: (1983), *An Autobiography or the Story of My Experiments with Truth*, Navajivan Publishing House, Ahmadabad. 2. M.K. Gandhi: (1951), *Satyagraha in South Africa*: Navajivan Publishing House, Ahmadabad. 3. M.K. Gandhi: (1983), *Constructive Programme" Its Meaning and Place*. Navajivan Publishing House, Ahmadabad. 4. M.K. Gandhi: (1948) *Key to Health*, Navajivan Publishing House, Ahmadabad. 5. M.K. Gandhi: (1949), *Diet and Diet Reform*, Navajivan Publishing House, Ahmadabad. 6. M.K. Gandhi: *Basic Education*, Navajivan Publishing House, Ahmadabad. 7. M.K. Gandhi: (2004), *Village Industries*, Navajivan Publishing House, Ahmadabad. 8. M.K. Gandhi: (1962), *Hind Swaraj, Navajivan Publishing House*, Ahmadabad. 9. M.K. Gandhi: (2004), *Trusteeship*, Navajivan Publishing House, Ahmadabad. 10. M.K. Gandhi: (2001), *India of my Dreams*, Navajivan Publishing House, Ahmadabad. 11. M.K. Gandhi: *Self Restraint vs. Self Indulgence*, Navajivan Publishing House, Ahmadabad. 12. K. Arunachalam: Gandhi: (1985), *The Peace Maker*, Gandhi Samarak Nidhi, Madurai. 13. R.K. Prabhu & UR Rao. *The Mind of Mahatma Gandhi*, Navajivan Publishing House.	
Course Outcomes	On completion of the course, students should be able to do CO1: Get enlightenment on the life of Gandhi CO2: Understand Gandhi's philosophy and practice it in their life CO3: Discuss the applications of Gandhi's concept CO4: Explain the Gandhian Vision of Society CO5: Elaborate the Gandhian dimensions of education	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	1
CO4	1	1	1	1	1
CO5	1	1	1	1	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21NSSU0001**
Course Title	**NATIONAL SERVICE SCHEME**		
No. of Credits	**0+1**	No. of contact hours per Week	**2.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Others (Non- Gradial)		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • impart knowledge for students on cooperation, developing leadership among them and inculcating knowledge on helping others		

UNIT	Content	No. of Hours
National Service Scheme I	**Introduction and basic components of NSS** **Orientation**: History, objectives, principles, symbol, badge; Regular programmes under NSS, NSS volunteers' awareness about health **NSS programmes and activities** Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, 35obilizat guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary **Understanding youth** Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change **Community mobilization** Mapping of community stakeholders, designing the message	37.5

	as per problems and their culture; identifying methods of mobilization involving youth-adult partnership **Social harmony and national integration** Indian history and culture, role of youth in nation building, conflict resolution and peace-building **Volunteerism and shramdan** Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism **Citizenship, constitution and human rights** Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information **Family and society** Concept of family, community (PRIs and other community based mobilizations) and society	
National Service Scheme II	**Importance and role of youth leadership** Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership **Life competencies** Definition and importance of life competencies, problem-solving and decision- making, inter personal communication **Youth development programmes** Development of youth programmes and policy at the national level, state level and voluntary sector; youth-focused and youth-led mobilization **Health, hygiene and sanitation** Definition needs and scope of health education; role of food, nutrition, safe drinking water, water born diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programmes and reproductive health. **Youth health, lifestyle, HIV AIDS and first aid** Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid **Youth and yoga** History, philosophy, concept, myths and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method	

References	Text Books (with chapter number & page number, wherever needed): 1. *National Service Scheme Manual*, 1997. Department of Youth Affairs and Sports, Ministry of Human Resource Development, Government of India. 2. Supe, S.V. 1995, *Extension Education*, Sterling Publications, Madras 3. Advi Reddy, 1996, *Extension Education* , Babatal Publications, Hyderabad 4. Narayanasamy N, M.P. Boraian and R. Ramesh. 1997. *Participatory Rural Appraisal*, GRU, Gandhigram
Course Outcomes	On completion of the course, students should be able to do CO1: Volunteer readily for shramdan and other social activities and exhibit leadership qualities CO2: Actively participate in nation building as a responsible individual being fully aware of citizenship, constitutional and human rights CO3: Practice eco friendly measures to conserve the environment in day to day CO4: Demonstrate vocational skills to gain employment or start business enterprises CO5: Demonstrate additional life skills in day to day activities

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	2	2
CO2	1	1	1	2	2
CO3	2	1	1	2	2
CO4	1	1	1	1	2
CO5	1	1	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**I SEMESTER**	Course Code	**21APEU0001**
Course Title	**PHYSICAL EDUCATION AND YOGA PRACTICES**		
No. of Credits	**0+1**	No. of contact hours per Week	**2.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Others (Non-gradial)		
Scope of the Course (may be more than one)	• Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • To gain knowledge about the major games and Athletic track and field events. • To expertise about indigenous games. • To expertise on various Yogic techniques especially in Asanas, Pranayamas, Mudras , Bandhas and Meditation. • To understand the different types of sports training methods and Calisthenics		
UNIT	Content		No. of Hours
Practicals	1. Teaching of skills of Hockey – demonstration practice of the skills and correction. And involvement of skills in games situation 2. Teaching of advance skills of Hockey – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game. 3. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of the skills in games situation. 4. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game.		37.5

	5. Teaching of different track events – demonstration practice of the skills and correction. 6. Teaching of different field events – demonstration practice of the skills and correction. 7. Teaching of different asanas – demonstration practice and correction. 8. Teaching of weight training – demonstration practice and correction. 9. Teaching of circuit training – demonstration practice and correction. 10. Teaching of calisthenics – demonstration practice and correction.	
References	Text Books (with chapter number & page number, wherever needed): 1. *Track and Field* by C. Thirunarayanan and S. Harihara Sharma 2. *Track and Field* by Mariyyah 3. *Essentials of Exercise Physiology* by Larry G. Shaver 4. *Organization of Physical Education* by J.P. Thomas 5. *Methods in Physical Education* by S. Harihara Sharma 6. *Principles of Physical Education* by R.C. Sathiyanesan 7. *The Complete Book of First Aid* by John Handerson 8. *The Official Rules book of Basketball, Football, Hockey, volley ball, Kabbadi Federations of India.*	
Course Outcomes	On completion of the course, students should be able to do CO1: Demonstrate the skills related to Hockey and Track and Field events CO2: Demonstrate the skills related to Kho- Kho CO3: Demonstrate the difference between various types of asanas, pranayamas, Mudras, Bandhas and Meditation. CO4: Realize the different types of sports training methods. CO5: Demonstrate the freehand exercises / formal exercises	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	2
CO4	1	1	1	1	1
CO5	1	1	1	1	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21APBU0201**
Course Title	**FUNDAMENTALS OF PLANT BIOCHEMISTRY AND BIOTECHNOLOGY**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate**)**		
Course Objectives (Maximum: 5)	**The Course aims to** • know the significance of bio-molecules and various cycle involved in synthesis of bio-molecules that driven any life cycle. • understand the structure and functions of proteins and amino acids and its importance • understand the structure and character of DNA, RNA and Enzymes. • impart knowledge on various concepts and techniques of tissue culture. • access the knowledge on recent biotechnological inventions in Gene Transformation.		

UNIT	Content	No. of Hours
I	**Importance of Biochemistry**. Properties of water, pH and Buffer. Carbohydrate: importance and classification. Structure of Monosaccharides, Reducing and oxidizing properties of monosaccharides, Mutarotations; Structures of Disacchaarides and polysaccharides. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain	7

II	**Lipid: Importance and classification**; Structures and properties of fatty acids; storage lipids and membrane lipids. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids. Proteins: Importance of proteins and classification. Structure of proteins. Properties and reactions of proteins. Structural organization of proteins Amino acids - classification and structure. Essential amino acids, properties of amino acids.	6
III	**Enzymes – classification and nomenclature**. Mechanism of enzyme action. Factors affecting enzyme action. Introduction to allosteric enzymes. Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure.	4
IV	**History and concepts of plant biotechnology**, morphogenesis-organogenesis and embryogenesis, tissue culture techniques-callus and suspension cultures, Micro-propagation methods; shoot tip and meristem tip culture, anther and pollen culture, ovule and embryo culture and protoplast culture. Somatic hybridization and Cybrids, *In vitro* germplasm conservation – Cryopreservation	8
V	**Recombinant DNA methods** :Physical (Gene gun Method) , chemical (PEG mediated) and *Agrobacterium* mediated gene transfer methods; PCR techniques and its applications ; RFLP, RAPD ,SSR; Marker assisted breeding in crop improvement	5
Practical	Preparation of solution, pH & buffers, Qualitative tests of carbohydrates and amino acids. Quantitative estimation of glucose/ proteins. Titration methods for estimation of amino acids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paper chromatography/ TLC demonstration for separation of amino acids/ Monosaccharides. Sterilization techniques. Composition of various tissue culture media and preparation of stock solutions for MS nutrient medium. Callus induction from various explants. Micro-propagation, hardening and acclimatization. Demonstration on isolation of DNA. Demonstration of gel electrophoresis techniques and DNA finger printing.	37.5

References	Text Books (with chapter number & page number, wherever needed): 1. Chesworth, JM., Stuchbury, T. and Scaife, JR. 1998. *An Introduction to Agricultural Biochemistry*. Chapman and Hall. 2. Sadasivam, S. and Manickam, A. 1996. *Biochemical Methods* – New Age Internationals, New Delhi. 3. Voet D, Voet JG and CW Pratt. 2002. *Biochemistry*. John Wiley & Sons, Inc, Singapore. 4. Bojwani, S.S. and Razdon, M.K. 1983 .*Plant tissue culture*. Theory and Practicals 5. Malacinski, M. and D. Friefelder. 2003. *Essentials of molecular biology*. IV Ed.Jones and Bartlett publishers, Boston 6. Singh, B.D. 2004. *Frontier areas in Biotechnology*. Kalyani Publications, New Delhi.
	Reference Books: 1. Nelson DL, Cox MM. 2000. Lehninger *Principles of Biochemistry* Third (Indian) edition Macmillian, Worth Publishers.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.ncbi.nlm.nih.gov www. khan academy.com www. Agrimoon.com
Course Outcomes	On completion of the course, students should be able to do CO1: Analyze and estimate biochemical components in crops CO2: Explain the importance of carbohydrates, proteins, fats, enzymes and other bio molecules and their metabolism CO3: Demonstrate skill in tissue culture techniques CO4 Demonstrate skill in biotechnological methods like DNA isolation and quantification CO5: Discuss the use of recent biotechnological tools in transformation of desired genes for ultimate use in crop improvement, protection and management.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	3	3	2	3
CO2	2	3	3	2	3
CO3	3	3	3	2	2
CO4	3	3	2	3	2
CO5	2	3	3	3	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21AGBU0202**
Course Title	**AGRICULTURAL MICROBIOLOGY**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • help students acquire an overall knowledge on the morphology and functions of the structures in prokaryotic and eukaryotic organisms. • give an overview of microbial metabolism and bacterial genetics. • make students knowledgeable on the various bio-geochemical cycles • impart knowledge on biological nitrogen fixation. • give an in depth knowledge on the application of microbes in human welfare.		

UNIT	Content	No. of Hours
I	**Introduction:** Microbial World: Prokaryotic and Eukaryotic microbes. Bacteria: Cell structures	2
II	**Chemo Autotrophy:** Photo autotrophy, Growth. Bacterial Genetics: Genetic recombination, transformation, conjugation and transduction, plasmids, transposon.	4
III	**Role of microbes in Soil fertility and Crop production:** Carbon, Nitrogen, Phosphorus and Sulphur cycles.	3
IV	**Biological Nitrogen Fixation**: Symbiotic, Associative and Asymbiotic. Azolla, Blue Green Algae and Mycorrhizae,	3

	Rhizosphere and Phyllosphere.	
V	**Microbes in Human welfare:** Silage production, Biofertilizer, Biopesticides, Biofuel production and Biodegradation of agro waste.	3
Practical	Introduction to microbiology laboratory and its equipments; Microscope- parts, principles of microscopy, resolving power and numerical aperture. Methods of sterilization. Nutritional media and their preparations. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes. Methods of isolation and purification of microbial cultures. Isolation of *Rhizobium* from legume root nodule. Isolation of *Azotobacter* from soil. Isolation of *Azospirillum* from roots. Isolation of BGA. Staining and microscopic examination of microbes.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Jamaluddin et al 2013 *Microbes and Sustainable Plant Productivity*, Scientific Publishers, Jodhpur, India 2. Subba Rao, N.S. 1997. *Biofertilizers in Agriculture and Forestry*, III Ed., Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi 3. Subba Rao, N.S. 1995. *Soil Microorganisms and Plant Growth*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi 4. Martin Alexander 1983. *Introduction to Soil Microbiology*. Wiley Eastern Ltd., New Delhi 5. Newton, W.E and Orme, Johnson, W.H. 1980. *Nitrogen Fixation Vol. II*: Symbiotic Associations and Cyanobacteria. University Park Press Baltimore, USA. 6 Gaur, A.C., 1999. *Microbial Technology for Composting of Agricultural Residues by Improved Methods*, 1st print, ICAR, New Delhi 7 Purohit, S.S., Kothari, P.R and Mathur. *Basic and Agricultural Biotechnology*, Agro botanical Publishers, India. Bikaner.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. https://searchworks.stanford.edu/view/9246633 2. http://www.elibrary.icrisat.org/Agri_Web_files/Agricultural_Websites_on_the_N et.htm 3. https://www.journals.elsevier.com/agriculture-and-natural-resources/ https://www.microbes.info/resource-topic/agricultural-microbiology	

Course Outcomes	On completion of the course, students should be able to CO1: Identify and differentiate prokaryotic microbes from eukaryotic microbes CO2: Analyze the important aspects of genetic transformations and recombinant processes CO3: Discuss the role of microbes in soil fertility and crop production CO4: Categorize the role of various microbes in transformation of Carbon, Nitrogen, Phosphorus and Sulphur compounds in the environment. CO5: Gain technical and theoretical knowledge in bio fertilizer and bio pesticides

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	3	3	3
CO2	2	1	2	3	3
CO3	3	2	2	2	3
CO4	2	1	2	2	3
CO5	3	2	3	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21AENU0201**
Course Title	**FUNDAMENTALS OF ENTOMOLOGY**		
No. of Credits	**3+1**	No. of contact hours per Week	**5.5**
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • Introduce the economic importance of insect and explain about characteristics. • Describe and analyze the role of biotic and abiotic factors in insect habitats • introduce pesticide classification, their formulations and proper maintenance of pesticide appliances • describe the taxonomy, importance, history and classification of class insecta up to order level • introduce the basic groups of present day insects with special emphasis to orders and families of agricultural importance		

UNIT		No. of Hours
I	**History of Entomology in India.** Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling	7

	apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.	
II	**Insect Ecology**: Introduction, Environment and its components. Effect of abiotic factors–temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance.	6
III	**Categories of pests**. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control importance, hazards and limitations. Recent methods of pest control, repellents, antifeedants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes	6
IV	**Systematics:** Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae;.	7
V	**Neuroptera**: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae, Trichogrammatidae, lchneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae,Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.	7
Practicals	Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle; Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae; Dissection of digestive system in insects (Grasshopper); Dissection of male and female reproductive systems in insects (Grasshopper); Study of characters of orders Orthoptera, Dictyoptera, Odonata,	14

	Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance. Insecticides and their formulations. Pesticide appliances and their maintenance. Sampling techniques for estimation of insect population and damage.	
References	Text Books (with chapter number & page number, wherever needed): 1. Borror, D.J., D.M. Delong and C.A. Triple Horn. 1976. *An Introduction to the Study of Insects (IV Edition)*. Holt, Rinehart and Winston, New York, 852 p. 2. Saxena, S.C. 1992. *Biology of Insects*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 366 p. 3. Selvanarayanan, V. and S. Arivudainambi. 2004. *Introductory Entomology*, Manivasagar Padhippagam, Chennai. 262 p.	
	Reference Books: 1. Chapman, R.F. 1981. *The Insects: Structure and Function.* Edward Arnold (Pub.) Ltd., London. 919 p. 2. Nayar, K.K., T.N. Ananthakrishnan and B.V. David. 1976. *General and Applied Entomology*, Tata McGraw Hill Publishing Company Limited, New Delhi, 589 p. 3. Pedigo, L.P. 1999. *Entomology and Pest Management. III Edition*. Prentice Hall, New Jersey, USA, 691 p. 4. Romoser, W.S. 1988. *The Science of Entomology*, Macmillan Pub., New York, 449 p.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.agrimoon.com	
Course Outcomes	On completion of the course, students should be able to CO1: Recognize and single out insects of economic importance and do techniques such as collecting and preserving insects and to interpret the morphological and physiological characteristics of various insects. CO2: Discuss and analyze the role of biotic and a biotic factors in insect habitats CO3: Discuss pesticide classification, their formulations and proper maintenance of pesticide appliances CO4: Elaborate the taxonomy, importance, history and classification of class insecta upto order level CO5: Discuss the basic groups of present day insects with special emphasis to orders and families of Agricultural importance	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	3	2	2
CO2	2	2	2	3	2
CO3	3	2	3	2	3
CO4	2	2	3	3	2
CO5	2	3	3	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21APPU0201**
Course Title	**FUNDAMENTALS OF PLANT PATHOLOGY**		
No. of Credits	3+1	No. of contact hours per Week	5.5
New Course / Revised Course	Revised course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To facilitate the students to learn and understand the plant disease causing agents, their properties and management practices of crop plants		

UNIT	Content	No. of Hours
I	**Introduction:** Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis. Causes / factors affecting disease development: disease triangle and tetrahedron and classification of plant diseases.	9
II	**Important Plant Pathogenic Organisms**, different groups**:** fungi, bacteria, fastidious vesicular bacteria, phytoplasmas,	9

	spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes.	
III	**Fungi:** general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes	8
IV	**Bacteria and Mollicutes:** general morphological characters. Basic methods of classification and reproduction. *Viruses*: nature, structure, replication and transmission. Study of phanerogamic plant parasites. *Nematodes:* General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (*Heterodera, Meloidogyne, Anguina, Radopholus* etc.) Growth and reproduction of plant pathogens. Liberation / dispersal and survival of plant pathogens.	10
V	**Types of parasitism and variability in Plant pathogens**. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants**.** Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics	9
Practical	Acquaintance with various laboratory equipments and microscopy. Collection and preservation of disease specimen. Preparation of media, isolation and Koch's postulates. General study of different structures of fungi. Study of symptoms of various plant diseases. Study of representative fungal genera. Staining and identification of plant pathogenic bacteria. Transmission of plant viruses. Study of phanerogamic plant parasites. Study of morphological features and identification of plant parasitic nematodes. Sampling and extraction of nematodes from soil and plant material, preparation of nematode mounting. Study of fungicides and their formulations. Methods of pesticide application and their safe use. Calculation of fungicide sprays concentrations**.**	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Agrios, G.N.1997 *Plant Pathology – 4th Edition*. Academic Press, New York. 2. Alexopoulos, C.J. Mims, C.W. and Blackwell, M. 1996, 1989. *Introductory Mycology, 4thEdn.*, Wiley Eastern Ltd., New Delhi. 3. Mehrotra, R.S.1990. *Plant Pathology*, Wiley Eastern Ltd., New Delhi. 4. Dasgupta, M.K. 1988. *Principles of Plant Pathology*. Allied Publishers Pvt. Ltd., Bangalore.	

	Reference Books: 1. Dube, H.C. 1978. *A Text Book of Fungi, Bacteria and Viruses*. Vikas Publishing House Pvt. Ltd., New Delhi. 2. Govindasamy, C.V. and M.N. Alagianagalingam. 1981. *Plant Pathology*. Popular Book Depot, Madras. 3. Prakasam.V., V.Valluvaparidasan, T. Raguchander and K. Prabakar. 1997. *Field Crop Disease*s. AE Publication, Coimbatore.
Course Outcomes	On completion of the course, students should be able to CO1: Identify and discuss various plant pathogenic fungi and their symptoms CO2: Identify and discuss various plant pathogenic nematodes and their symptoms CO3: Manage important crop diseases of Wheat, Sugarcane and Sunflower, Apple, Strawberry, Potato, Cucurbits Mango, Citrus and other important crops CO4: Discuss the transmission of plant viruses and various phanerogamic plant parasites CO5: Discuss and perform proper application of fungicides, nematicides and pesticides

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	3
CO2	3	2	2	3	3
CO3	3	2	2	3	3
CO4	3	2	2	3	3
CO5	3	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21AGEU0201**
Course Title	**SOIL AND WATER CONSERVATION ENGINEERING**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Field projects		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • Understand the different types of erosion and its control measures • Learn Suitable soil conservation measures under different land slopes • Identify suitable vegetative species to control soil erosion as well as wind erosion.		

UNIT	Content	No. of Hours
I	**Introduction to Soil and Water Conservation** – History of soil erosion, Soil Conservation Programmes in India- Causes of soil erosion; Definition and Agents of soil erosion; Types of erosion – Raindrop, Sheet, Rill, Gully and Stream channel erosion.	2.0
II	**Gully classification**; Gully control methods – Vegetative control method - sod flume, sod check, shrub check, trees and shrubs ; Temporary gully control structures – brush dam , loose rock dam, plank or slab dam and log and pole dams; Permanent gully control structures – drop spill way, chute spill way and drop inlet spill way.	3.0
III	**Soil erosion:** Soil loss estimation by Universal soil loss equation - Application of USLE– Assessment of erosion hazard; Measurement of soil loss – Runoff plots - Multi slot divisor and Coshocton wheel silt sampler.	2.0
IV	**Principles of Erosion control** – Land capability classification -Contour farming, Contour bunding and Graded	4.0

	bunding, Broad-base ridge type terrace, Bench terrace; Vegetated water ways- Functions, location and design.	
V	**Wind erosion** – causes of wind erosion - different phases of soil movement Types of soil movement; Control of wind erosion – cultivated crops, field and contour stripping, wind-break, shelter belt, tillage practices and formation and stabilization of sand dunes.	4.0
Practicals	General status of soil conservation in India. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss. Preparation of contour maps. Design of grassed water ways. Design of contour bunds. Design of graded bunds. Design of bench terracing system. Problem on wind erosion.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Singhal, O.P. 1998. *Agricultural Engineering*, Aman Publishing house, Meerut. 2. Dr. Bimal Chandra Mil. 1995. *Introduction to Soil and Water Conservation Engineering*, Kalyani Publishers, Calcutta. 3. Saini, G.S. 1996. *A Textbook of Soil and Water Conservation*, Amman Publishing house, Meerut.	
	Reference Books: 4. Zamir Alvi. 1994. *A Text book of Surveying*, Vikas Publishing House Pvt. Ltd., New Delhi. 5. Murthy, V.V.N and Madan K. Jha. 2009. *Land and Water Management Engineering*, Kalyani Publishing, New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.agrimoon.com	
Course Outcomes	On completion of the course, the students should be able to CO1: Discuss the basic principles of soil and water conservation and to determine the field area by using chain survey CO2: Demonstrate knowledge on the basic principles of wind erosion and its control measures CO3: Communicate the construction details of engineering measures and agronomical practices to control erosion by water and to determine the land slope by using leveling methods CO4: Identify the suitability, functions and components of temporary and permanent gully control structures and construct contours and determine level difference between stations. CO5: Explain the principle, objectives and benefits of water shed management and activities involved in watershed development methods.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	2	2	2	3	3
CO4	2	3	2	3	3
CO5	2	3	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21AGRU0203**
Course Title	**INTRODUCTION TO FORESTRY**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • impart basic knowledge of Forest resources and their aspects. • educate the need and importance of Forestry and the needed operations. • impart knowledge on Objectives and Morphological Characters of Tree species. • educate the students about the importance and concepts of Forestry and their agricultural aspects • impart students on Cultivation aspects and their classifications		

UNIT	Content	No. of Hours
I	**Introduction**: Definitions of basic terms- Forest, Forestry- Role and Functions of Forests- Forest classification- Social forestry, Farm forestry, Agro forestry, Community forestry, Industrial forestry and Urban forestry – Forest Influences- Scope of forestry- Types of forest in World, India and Tamil Nadu. Salient features of National Forest Policies**.**	4
II	**Forest Regeneration**: Objectives- Natural regeneration and artificial regeneration - **Natural** regeneration from seed and vegetative parts, coppicing, pollarding, root suckers. **Artificial** regeneration-Man made plantations- Factors determining Regeneration. Nursery Technique – Forest	4

	Plantation-. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning	
III	**Forest Mensuration**: Objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method; Instrumental methods of height measurement - geometric and trigonometric principles, instruments used in height measurement; -Measurement of Tree Diameter, Tree Height, Age and Growth rate and Tree stand.	2
IV	**Agroforestry**: Concept, Definitions, Importance, benefits, limitations - Criteria of selection of trees in Agroforestry- Classification of different agro forestry systems prevalent in the country, Shifting cultivation, Taungya, Alley cropping, Wind breaks and Shelter belts, Home gardens- Criteria for selection of AF Trees.	2
V	**Silviculture-** Definition, Objectives- Plant classification – Crown, Stem, Roots Locality, Plant succession- Cultivation practices for importance trees**.** Silviculture practices for important fast growing tree species of the region. TBO's, MPTS and NFTS- Ailanthus, Neem, Pungam, Prosopis, Casuarina, Silk cotton, Bamboo and Acacias.	2
Practical	Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer. Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.	
References	Text Books (with chapter number & page number, wherever needed): 1. SR. Reddy, C.Nagamani.2017 Introduction to forestry. kalyani publishers, New Delhi 2. Khannan, L.S. 2000. *Principles and practices of Silviculture*. Khanna Bhandu, Dehra Dun. 3. Lal, J.B. 2002. *India's forest – Myth and Reality*. Natraj Publishers. Dehra Dun.	
	Reference Books: 1. Srivastava, M.B.1997. *Introduction to Forestry*. Vikas publishing Pvt.Ltd., New Delhi. 2. Chundawat, B.S., and S.K. Gautam, 2005. Text Book of Agro-forestry. Oxford and IBH Publishing company Pvt. Ltd., New Delhi	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http:/icar.res.in 2. WWW.Webcast.gov.in
Course Outcomes	On completion of the course, students should be able to CO1: Discuss about forest resources and the theoretical aspects of forestry CO2: Analyze the importance of forestry and other needed operations to improve forests CO3: Demonstrate knowledge on the morphological characters of tree species. CO4: Select trees for agro forestry and classify various agro forestry systems. CO5: Apply the silvicultural practices

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	2	3	3
CO2	3	2	2	3	3
CO3	2	2	2	3	3
CO4	2	3	2	3	3
CO5	3	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21AECU0201**
Course Title	**FUNDAMENTALS OF AGRICULTURAL ECONOMICS**		
No. of Credits	**2+0**	No. of contact hours per Week	**2**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply)		
Course Objectives (Maximum: 5)	The Course aims to • introduce basic concept of economics and to know about the fundaments of microeconomics • give introduction of economic laws and principles • provide basics of production economics and principles applied to agricultural production process • facilitates the knowledge about marketing conditions and pricing • give basic knowledge about the macroeconomic concepts of economics		
UNIT	Content		No. of Hours
I	**Introduction and Basics:** Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.		6

II	**Economic Laws:** Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply.	6
III	**Production Economics:** Production: process, creation of utility, factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. Cost: concepts, short run and long run cost curves. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit.	5
IV	**Market:** Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points.	4
V	**Macroeconomics:** National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socioeconomic determinants, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT. Economic systems.	6
References	Text Books (with chapter number & page number, wherever needed): 1. Ahuja, H.L. 2001. *A Text Book of Modern Economics*, Sultan Chand and sons Co. Ltd., New Delhi. 2. Dewett, K.K. 2001. *Modern Economic Theory*, Syamlal Charitable Trust, New Delhi. 3. Diwvedi, D.N. 2000. *Principles of Economics*, Vikas Pub. House Pvt. Ltd., New Delhi. 4. Samuelson, P.A. 1998. *Economics*, McGraw Hill Kogakuisha Ltd., New Delhi. 5. Sankaran, S. 2000. *Principles of Economics*, Progressive Corporation Pvt. Ltd., Madras. 6. Sen, K.K. 2000. *An Introduction to Economics*, Sultan Chand and Sons Co. Ltd., New Delhi.	

	7. Seth, M.L. 2000. *Principles of Economics*, Lakshmi Narain Agarwal Co., Agra
	Reference Books: 1. Samuelson, P.A. 1998. *Economics*, McGraw Hill Kogakuisha Ltd., New Delhi. 2. Sankaran, S. 2000. *Principles of Economics*, Progressive Corporation Pvt. Ltd., Madras. 3. Sen, K.K. 2000. *An Introduction to Economics*, Sultan Chand and Sons Co. Ltd., New Delhi. 4. Seth, M.L. 2000. *Principles of Economics*, Lakshmi Narain Agarwal Co.,Agra
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.agrimoon.com
Course Outcomes	On completion of the course, students should be able to CO1:Explain the basic concepts of economics and fundamental theory of economics CO2: Discuss about the economic laws and principles and the realistic market forces like demand and supply CO3: Apply the economic concepts in agricultural production process CO4: Analyze the various structures and conditions of market and price determination in different types of market CO5: Compare the concepts and theories related to macroeconomics

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	1	2	2	2
CO2	2	2	2	3	2
CO3	1	2	2	2	3
CO4	1	2	3	2	2
CO5	3	2	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21AEXU0201**
Course Title	**FUNDAMENTALS OF AGRICULTURAL EXTENSION EDUCATION**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Value-Added Courses imparting transferable and life skills • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • impart students with knowledge about basic extension education and extension efforts in India • teach the concepts of rural development and programmes, leadership and transfer of technology concepts • impart students with knowledge about various ICT applications in TOT, communication strategies, innovation and adapter categories		

UNIT	Content	No. of Hours
I	**Extension Education**: Education- Meaning, definition and Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning-meaning, process, principles and steps in Programme Development. Extension systems in India	5.0
II	**Extension efforts and Agricultural Development Programmes in India**: Pre-independence Era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon	5.5

	Experiment) and Post-independence Era (Etawah Pilot Project, Nilokheri Experiment, various Extension/ Agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, L L P , KVK, IVLP, ORP, ND, NATP. New trends in agricultural extension: Privatization of extension, Cyber extension/ E-extension, Market-led extension, Farmer- led extension, Expert systems.	
III	**Rural Development:** Concept, meaning, definition, importance. Rural society and its characteristics. **Community Development** - meaning, definition, objectives, principles, evolution and administration. Philosophy of Community Development. Various rural development programmes launched by Govt. of India- IRDP, SGSY, MGNREGS, RSVY, PMGSY, Bharat Nirman, PURA, NSAP, Annapurna scheme and DRDA.	6.5
IV	**Rural Leadership:** Concept and definition, Types, selection and use of local leaders in rural context; Extension Administration: meaning and concept, principles and functions. **Monitoring and Evaluation**: Concept and definition. Evaluation- objectives, types and steps. **Transfer of Technology:** Concept and models- Training and Visit system, Broad Based Extension system, ATMA, IVLP. Capacity building of extension personnel.	6.5
V	**Extension teaching methods:** Meaning, classification- individual, group and mass contact methods, ICT Applications in TOT (New and Social Media) - Media mix strategies; **Communication** - meaning and definition; Principles and Functions of Communication, models and barriers to communication. **Agricultural journalism**; Diffusion and Adoption of innovation; Concept and meaning, Process and stages of adoption, Adopter categories.	6.5
Practical	To get acquainted with university extension system. Group discussion- exercise; handling and use of audio visual equipments and digital camera and LCD projector; preparation and use of AV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories; Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA and other development departments at district level; visit to NGO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media: visit to community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television.	37.5

References	Text Books (with chapter number & page number, wherever needed): 1. Annamalai, R.1993. *Extension Education and Programme Planning*. Palaniappa Printers 2. Chaubey, B.K. *et.al.*1999. *Extension Education*. Aman Publishing House, Meerut 3. Dahama O. P and O.P. Bhatnagar. 1996. *Education and Communication for Development*,Oxford & IBH Publishing Co., Ltd., New Delhi. Pvt. Ltd., New Delhi 4. Reddy, A.A. 2005. *Extension Education*. Shree Laxmi Press, Bapatla. 5. Ahuja, B.N. 1997. Theory and Practice of Journalism, Surjeet Publications, New Delhi. 6. Benor Daniel, Q. James Harrison and Baxter Michael. 1984. *Agricultural Extension – The Training and Visit System*, A World Bank Publication, Washington, USA. 7. Dipak de, Basavaprabhu Jirli. 2010. *A Handbook of Extension Education*, Agrobios, India. *8.* Katar Singh. 1999. *Rural Development – Principles, Policies and Management,* Sage Publications India Pvt. Ltd., New Delhi. 9. Kelsey, L.D and C.C. Hearne. 1967. *Cooperative Extension Work*, Cornell University Press, New York. 10. Manoharan Muthiah, P. and R. Arunachalam. 2003. *Agricultural Extension*, Himalaya Publishing House, Mumbai. 11. Pandey, B.K. 2005. *Rural Development*, ISHA Books, New Delhi. 12. Pandey, V.C. 2003. *Information Communication Technology and Education* (The Changing World ICT Governance), Isha Publishers. 13. Ray, G.L. 1999. *Extension Communication and Management*, Naya Prokash, 206, Bidhan Sarani, Calcutta. 14. Reddy Adivi, A. 1993. *Extension Education*, Shree Lakshmi Press, Bapatla, Andhra Pradesh. 15. Rishipal. 2011. *Training and Development Methods*, S.Chand and Co. Ltd., New Delhi. 16. Rogers, E.M. 1995. *Diffusion of Innovations,* The Free Press, New York. 17. Sagar Mondal and Ray, G.L. 2007. *Text book of Rural Development*, Kalyani Publishers, New Delhi. 18. Sandhu, A.S. 1996. *Agricultural Communication: Process and Methods*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi. 19. Sandhu, A.S. 1996. *Extension Programme Planning*, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi. 20. Sanjay Prakash Sharma. 2006. *Panchayat Raj,* Vista International Publishing House, New Delhi. 21. Singh, A.K. 2012. *Agricultural Extension,* Agrobios, New Delhi. 22. Sivasudevaro, B and Rajannikanthu, G. 2007.*Rural Development and Entrepreneurship Development,* The Associated Publications, Ambala.	

	23. Supe, S.V. 1997. *An Introduction to Extension Education*, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agricoop.nic.in 2. rural.nic.in 3. www.panchayat .gov. in 4. wcd.nic.in 5. moud.nic.in 6. mhupa.gov.in 7. www.i4d.com 8. www.panasia.org 9. www.joe.org
Course Outcomes	On completion of the course, students should be able to CO1: Communicate the importance and functioning of various rural development programmes launched by the ICAR and Govt of India CO2: Demonstrate skills in extension teaching methods CO3: Apply PRA technique for village development planning. CO4: Apply management principles for transfer of technology in the rural set up CO5: Utilize the communication concepts and their importance in the dissemination of technologies and to study their adoption status.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	1	2	2
CO2	2	2	3	2	3
CO3	2	2	1	2	2
CO4	2	3	2	3	2
CO5	3	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21ENGU02A2**
Course Title	**COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	**Revised**	If revised, Percentage of Revision effected **(Minimum 20%)**	**Minimum**
Category	• Language (I / II / III)		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • develop inter-personal skills and be an effective communicator. • develop professionals with idealistic practical and problem-solving skills. • construct attitude, skill and understand it influence on behaviour		

UNIT	Content	No. of Hours
I	**Communication Skills**: Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication;	3
II	**Listening and note taking,** writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures**.**	4
III	**Reading and comprehension** of general and technical articles, precise writing, summarizing, abstracting.	1
IV	**Individual and group presentations**, impromptu presentation, public speaking; Group discussion.	4
V	**Organizing seminars** and conferences.	1

References	Text Books (with chapter number & page number, wherever needed): 1. Krishna Mohan and Meera Banerjee 1990. *Developing communication skills*, Macmillam India Ltd. New Delhi. 2. AIR CMDE P.C. Sharma. 2008. *Communication skills and Personality Development*, Nirali Prakashan, Arihant Printers, Pune.
Course Outcomes	On completion of the course, students should be able to do CO1: Communicate in English effectively in the oral and written modes CO2: Demonstrate skill in note-taking, précis writing and summarizing CO3: Confidently take part in group discussions CO4: Deliver speeches CO5: Emerge as better personalities

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	1	1	2
CO2	2	2	3	2	2
CO3	1	1	1	2	2
CO4	1	2	1	1	1
CO5	1	1	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21NSSU0001**
Course Title	**NATIONAL SERVICE SCHEME**		
No. of Credits	**0+1**	No. of contact hours per Week	**2.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Others (Non- Gradial)		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • impart knowledge for students on cooperation, developing leadership among them and inculcating knowledge on helping others		

UNIT	Content	No. of Hours
National Service Scheme III	**Vocational skill development** To enhance the employment potential and to set up small business enterprises skills of volunteers, a list of 12 to 15 vocational skills will be drawn up based on the local conditions and opportunities. Each volunteer will have the option to select two skill-areas out of this list **Issues related environment** Environmental conservation, enrichment and sustainability, climatic change, natural resource management (rain water harvesting, energy conservation, forestation, waste land development and soil conservations) and waste management **Disaster management** Introduction and classification of disaster, rehabilitation and management after disaster; role of NSS volunteers in disaster management. **Entrepreneurship development** Definition, meaning and quality of entrepreneur; steps in opening of an enterprise and role of financial and support service institution.	37.5

	Formulation of production oriented project Planning, implementation, management and impact assessment of project **Documentation and data reporting** Collection and analysis of data, documentation and dissemination of project reports	
National Service Scheme IV	**Youth and crime** Sociological and psychological factors influencing youth crime, cyber crime, pear mentoring in preventing crime and awareness for juvenile justice **Civil/Self defence** Civil defence services, aims and objectives of civil defence; needs and training of self defence **Resource mobilization** Writing a project proposal of self fund units (SFUs) and its establishment **Additional life skills** Positive thinking, self confidence and esteem, setting life goals and working to achieve them, management of stress including time management.	
References	Text Books (with chapter number & page number, wherever needed): 4. *National Service Scheme Manual*, 1997. Department of Youth Affairs and Sports, Ministry of Human Resource Development, Government of India. 5. Supe, S.V. 1995, *Extension Education*, Sterling Publications, Madras 6. Advi Reddy, 1996, *Extension Education* , Babatal Publications, Hyderabad 5. Narayanasamy N, M.P. Boraian and R. Ramesh. 1997. *Participatory Rural Appraisal*, GRU, Gandhigram	
Course Outcomes	On completion of the course, students should be able to CO1: Volunteer readily for shramdan and other social activities and exhibit leadership qualities CO2: Actively participate in nation building as a responsible individual being fully aware of citizenship, constitutional and human rights CO3: Practice eco friendly measures to conserve the environment in day to day CO4: Demonstrate vocational skills to gain employment or start business enterprises CO5: Demonstrate additional life skills in day to day activities	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	2	2
CO2	1	1	1	2	2
CO3	2	1	1	2	2
CO4	1	1	1	1	2
CO5	1	1	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**II SEMESTER**	Course Code	**21APEU0002**
Course Title	**PHYSICAL EDUCATION AND YOGA PRACTICES**		
No. of Credits	**0+1**	No. of contact hours per Week	**2.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Others (Non-gradial)		
Scope of the Course (may be more than one)	• Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • gain knowledge about the major games and Athletic track and field events. • expertise about indigenous games. • expertise on various Yogic techniques especially in Asanas, Pranayamas, Mudras , Bandhas and Meditation. • understand the different types of sports training methods and Calisthenics		

UNIT	Content	No. of Hours
Practicals	1. Teaching of skills of Football – demonstration, practice of the skills, correction, involvement in game situation (For girls teaching of Tennikoit) 2. Teaching of advance skills of Football – involvement of all the skills in game situation with teaching of rules of the game 3. Teaching of skills of Basketball – demonstration, practice of the skills, correction of skills, involvement in game situation 4. Teaching of skills of Basketball – involvement of all the skills in game situation with teaching of rule of the game Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation	37.5

	5. Teaching of skills of Kabaddi – demonstration, practice of the skills, correction of skills, involvement in game situation 6. Teaching of advance skills of Kabaddi – involvement of all the skills in game situation with teaching of rule of the game 7. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction of skills, involvement in game situation 8. Teaching of skills of Ball Badminton – involvement of all the skills in game situation with teaching of rule of the game 9. Teaching of some of Asanas – demonstration, practice, correction and practice 10. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation with teaching of rules of the game 11. Teaching – Meaning, Scope and importance of Physical Education 12. Teaching – Definition, Type of Tournaments 13. Teaching – Physical Fitness and Health Education 14. Construction and laying out of the track and field (*The girls will have Tennikoit and Throw Ball).	
References	Text Books (with chapter number & page number, wherever needed): 1. *Track and Field* by C. Thirunarayanan and S. Harihara Sharma 2. *Track and Field* by Mariyyah 3. *Essentials of Exercise Physiology* by Larry G. Shaver 4. *Organization of Physical Education* by J.P. Thomas 5. *Methods in Physical Education* by S. Harihara Sharma 6. *Principles of Physical Education* by R.C. Sathiyanesan 7. *The Complete Book of First Aid* by John Handerson 8. *The Official Rules book of Basketball, Football, Hockey, volley ball, Kabbadi Federations of India.*	
Course Outcomes	On completion of the course, students should be able to CO1: Realize the importance of physical fitness and health education CO2: Demonstrate skills related to foot ball, basket ball, kabaddi, Ball Badminton and table Tennis CO3: Demonstrate and practice various types of asanas CO4: Describe various types of tournaments. CO5: Construct and lay out track and field	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	1	1
CO2	1	1	1	1	1
CO3	1	1	1	1	2
CO4	1	1	1	1	1
CO5	1	1	1	1	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III Semester**	Course Code	**21AGRU0304**
Course Title	**CROP PRODUCTION TECHNOLOGY - I (Kharif crops)**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • impart basic knowledge on the economics importance and cultivation of crops, different types of nursery preparation in wet land crop. • give an understanding of the different soil types and suitable variety of millets. • make the students learn and develop skills in different methods of field preparation and establishment of crop and analyzed crop growth. • impart knowledge on the importance of cultural practices of oilseed. • teach the students about different types of fiber and fodder crops economic importance and cultural practices and export in *Kharif* season.		

UNIT	Content	No. of Hours
I	**Cereals:** Rice, Maize – Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield	6
II	**Millets:** Major millets- Sorghum, Pearl millet (Cumbu) and Finger millet (Ragi) Minor millets- Fox tail millet (Tenai), Little millet (Samai), Kodo millet (Varagu), Barn yard millet (Kudiraivali) and Proso millet (Pani varagu): Origin, geographical distribution, economic importance , soil and	6

	climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield.	
III	**Pulses:** Pigeon pea (Red gram), Black gram (Urd bean), Green gram (Mung bean) and Cowpea: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield.	6
IV	**Oil Seeds:** Groundnut, Castor- Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield.	5
V	**Fibre and Fodder crops:** Cotton and Jute- importance, origin, soil and climatic requirement, Forage crops- Definition-classification of fodder crops- Fodder sorghum , Fodder cumbu, Cumbu- Napier grass, Fodder cowpea, Cluster bean, Desmanthus , Stylo and Siratro- Origin, geographical distribution, economic importance , soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield	6
Practicals	Rice nursery preparation, transplanting of rice, sowing of maize, pigeon pea, mung bean, groundnut and cotton- Effect of seed size on germination and seedling vigour of *kharif* season crops, effect of sowing depth on germination of *kharif* crops- Identification of weeds in *kharif* season crops- Top dressing and foliar feeding of nutrients – Study of yield contributing characters and yield calculation of *kharif* season crops- study of crop varieties and important agronomic experiments at experimental farm- study of forage experiments, morphological description of *kharif* crops- Visit to research centres of related crops.	37.5
References	Text Books 1. Ahlawat, I.P.S., Om prakash and G.S. Saini, 1998. *Scientific Crop production in India.* Rama publishing House, Meerut 2. Chiddasingh, 1997. *Modern Techniques of raising Field crops*. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.	
	Reference Books: 1. Singh, S.S. 1997. *Crop Management under Irrigated and Rainfed conditions*. Kalyani publishers, New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.crida.org 2. www.cgiar.org 3. www.tnau.ac.in/agriportal	

Course Outcomes	On completion of the course, students should be able to do CO1: Identify and classify cereal crops and describe cultivation practices of various crops grown under *kharif* season CO2: Describe the different types of soil and suitable variety of crops for *kharif* season CO3: Develop skills to analyze and evaluate crop growth to improve yield in *kharif* season CO4: Develop skills to raise seedlings in nursery and record of bio metric observation CO5: Work out cost of cultivations for various crops

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	2	3	3	2
CO4	2	2	3	2	3
CO5	2	3	3	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21PBGU0302**
Course Title	**FUNDAMENTALS OF PLANT BREEDING**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • impart knowledge on history of plant breeding and origin of plant genetics. • describe the principle involved in heritability and genetic advances • impart knowledge on genetic structures. • impart knowledge on students about the propagation techniques and mutation. • describe breeding for biotic and abiotic stress resistance.		

UNIT	Content	No. of Hours
I	**History and objective of plant breeding**, Mode of pollination Mode of reproduction and apomixes, self incompatibility and male sterility. Centre of origin /diversity, Domestication, Acclimation and Introduction, Plant genetic resources	5.0
II	**Heritability and genetic advance**, Genetic basis and	5.5

	breeding methods in self pollinated crops, Pure line Selection, Mass Selection, Hybridization, Pedigree method, bulk pedigree method, Mass pedigree method, SSD, Backcross method and Multilines	
III	**Genetic structure** of a population in cross pollinated crop and Hardy Weinberg law, Heterosis and Inbreeding depression Hybrids and Development of Inbred, Ear to row method, Modified Ear to Row , Recurrent Selection , Composite and Synthetic varieties	6.5
IV	**Breeding methods** in asexually propagated crops, Clonal selection and hybridization, Wide hybridization, Polyploidy and their applications, Mutation breeding: mutation types, mutagens breeding procedure, applications.	6.5
V	**Breeding for biotic and abiotic stress resistance**. Introduction to markers – Morphological – Biochemical-DNA markers, uses of marker assisted selection. Participatory plant breeding, Intellectual Property Rights, Plant Breeders and Farmer's Right	6.5
References	Text Books (with chapter number & page number, wherever needed): 1. Alard, R.W. 2000.*Principles of Plant Breeding*. John Willey & Sons, New York. 2. Chahel, G.S. and S.S. Ghosal.2002.*Principles and Procedures of Plant Breeding, Biotechnological and conventional Approaches*. Narosa Publishing House, New Delhi. 3. Singh, B.D. 2005. *Plant Breeding*. Kalyani Publishing House, New Delhi. 4. Singh, P. 2001.*Essentials of Plant Breeding-Principles and Methods*. Kalyani Publishing House, New Delhi. 5. Jain, H.K. and M.C. Kharackwal.2004. *Plant Breeding- Mendelian to Molecular approach*. Narosa Publishing House, New Delhi	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http://www.edugreen.teri.res.in/explore/bio/breed.htm 2. http://cuke.hort.ncsu.edu/gpb/ 3. http://www.stumbleupon.com/tag/plant-breeding 4. http://www.iaea.org/	

Course Outcomes	On completion of the course, students should be able to do CO1: Identify various self and cross pollinated crops CO2: Develop expertise in the various crossing and emasculation techniques in various crops CO3:Develop capacity to carry out independent plant breeding experiments CO4: Multiply and modify economically important crops. CO5: Understand the basic principles behind DNA markers and other novel breeding strategies.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	3	1	3	2
CO2	3	3	1	3	3
CO3	3	3	2	3	2
CO4	3	3	2	3	2
CO5	3	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21HORU0302**
Course Title	**PRODUCTION TECHNOLOGY FOR VEGETABLES AND SPICES**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Employability • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • learn about the scope and importance of vegetables in human nutrition and national economy learn about the production technology of solanaceous vegetables • learn about the production technology of cucurbitaceous and leguminous vegetables • learn about the production technology of cole crops and bulb crops. • learn about the production technology of root crops, tuber crops and leafy vegetables. • learn about the major spices crops		

UNIT	Content	No. of Hours
I	**Solanaceous vegetables:** Importance of vegetables & spices in human nutrition and national economy- kitchen gardening. Solanaceous vegetables: Tomato, Brinjal, Chilli, and Capsicum.	3.00
II	**Cucurbitaceous and leguminous vegetable** Cucumber, Melons – Watermelon and Musk melon Gourds, Pumpkin. French bean, and Peas.	4.00
III	**Cole crops and Bulb crops:** Cabbage, Cauliflower, Knol-khol. Bulb crops - Onion, and Garlic.	3.00

IV	**Root crops & Tuber crops and leafy vegetables:** Root crops -Carrot, Raddish, Beetroot. Tuber crops- Potato. Leafy vegetables -Amaranth, Palak, and Perennial vegetables.	4.00
V	**Major spice crops:** Pepper, Cardamom, Turmeric, and Ginger.	2.00
Practical	Identification of vegetables & spice crops and their seeds. Nursery raising. Direct seed sowing and transplanting. Study of morphological characters of different vegetables & spices. Fertilizers applications. Harvesting & preparation for market. Economics of vegetables and spices cultivation.	35.00
References	Text Books (with chapter number & page number, wherever needed): 1. Bose, T.K. 1986. Vegetable Growing in India. Naya Prakash Publication, Calcutta. 2. Thamburaj. S. and N.Singh 2004. Vegetables, Tuber Crops and Spices. ICAR. 3. Vishnu Swarup, 2006. Vegetable science and technology in India. Kalyani publishers, New Delhi.	
	Reference Books: 1. Veeraraghavathatham, D., M. Jawaharlal and Seemanthini Ramadas. 1996. A Guide on Vegetable Culture. A.E. Publications, Coimbatore 2. Das, P.C., Vegetable Crops of India. Kalyani Publication, New Delhi. 3. Shanmugavelu, K.G. 1989. Production Technology of Vegetable Crops. Oxford India Publication, New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http://www.informaworld.com/smpp/title~db=all~content=g904622674 2. http://www.ces.ncsu.edu/depts/hort/hil/hil-32-a.html 3. http://attra.ncat.org/attra-pub/manures.html 4. http://ucanr.org/freepubs/docs/8129.pdf 5. http://www.sus-veg-thai.de/ 6. http://agritech.tnau.ac.in/	
Course Outcomes	On completion of the course, students should be able to CO1: The students will acquire basic knowledge about importance and scope of vegetables and spices crops and their cultivation practices of solanaceous vegetables. CO2: The students will gain in depth knowledge about the latest production technologies and the importance of ethrel spray for cucurbitaceous vegetables CO3: The students will understand the Production technology of cole crops and Bulb crops. CO4: The students will understand the production technology and intercultural operations of root crops, tuber crops and leafy vegetables. CO5: The students will acquire basic knowledge about nursery techniques, cultivation details and processing of different spices.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	2	3	3	3
CO3	3	3	3	3	3
CO4	2	3	3	2	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21AECU0302**
Course Title	**AGRICULTURAL FINANCE AND CO-OPERATION**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.50**
New Course / Revised Course	**Revised**	If revised, Percentage of Revision effected **(Minimum 20%)**	**Minimum**
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • give basic introduction concepts in agricultural credit and to facilitate the recent developments in agricultural credit • assess the importance of organization involved in providing agricultural credit and to analyze its importance • analyze the role of higher financing institution involved in mobilization of credit • discuss the cooperation and its impact on agricultural credit • promote entrepreneurship development and to provide knowledge on development of bankable agricultural projects.		

UNIT	Content	No. of Hours
I	**Agricultural Finance:** Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification Recent developments in agricultural credit. Credit analysis and cost of Credit.	5.0
II	**4 R's and 3 C's of credits:** Sources of agricultural finance: Institutional and Non-institutional sources: Commercial banks, RRBs and Co- operatives- social control and nationalization of commercial banks. Micro financing including KCC. Lead bank scheme - Crop loans systems	5.5

	Scale of finance and unit cost	
III	**Banking:** An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, World Bank, Insurance and Credit Guarantee Corporation of India	6.5
IV	**Co-operation:** Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives Farmers' service cooperative societies, Processing cooperatives, Farming cooperatives, Cooperative warehousing Role of ICA, NCUI, NCDC, NAFED.	6.5
V	**Entrepreneurship Development:** Concept of Entrepreneurship –Entrepreneur and Entrepreneurship – definition, meaning, characteristics of ideal entrepreneurs – Types of entrepreneurs. Training programmes for entrepreneurship development. Basic guidelines for preparation of project reports – Bank norms – SWOT analysis. Preparation and analysis of financial statements – Income Statement and Balance Sheet.	6.5
Practical	Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures. Estimation of credit requirement of farm business – A case study. Preparation and analysis of balance sheet – A case study. Preparation and analysis of income statement – A case study. Appraisal of a loan proposal – A case study. Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural produces and its value added products. Seminar on selected topics.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Subba Reddy, S., P.Raghu Ram., P. Sastry, T.V.N and Bhavani Devi, I. 2010. Agricultural Economics. Oxford & IBH Publishing Company private Ltd., New Delhi, 2010. 2. William, G. Murray and Nelson Aarson, G., Agricultural Finance, The Iowa State University Press, Ames, Iowa, 1960.	
	Reference Books: 1. Ghosal, S.N., Agricultural Financing in India, Asia Publishing House, Bombay, 1996 2. Johi, S.S. and C.V. Moore., Essentials of Farm Financial Management, Today and Tommorow's Printers and Publishers, New Delhi, 1970 3. John, J. Hamptron., Financial Decision Making: Concepts, Problems and Cases, Prentice-Hall of India, New Delhi, 1983	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.agrimoon.com
Course Outcomes	On completion of the course, students should be able to do CO1: Identify and describe concepts and the recent developments in agricultural credit CO2: Describe the importance of organization involved in providing agricultural credit CO3: Discuss the role of higher financing institution involved in mobilization of credit CO4: Describe the cooperation and its impact on agricultural credit CO5: Apply knowledge on entrepreneurship development and bankable agricultural projects.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	2	3	2
CO2	2	3	2	3	2
CO3	3	2	2	2	2
CO4	2	2	2	2	3
CO5	2	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21AGEU0302**
Course Title	**FARM MACHINERY AND POWER**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • identify the different sources of farm power, its application and limitations • differentiate the working principles of two stroke and four stroke IC engine and learn the construction of paddy reaper and multi crop thresher. • learn the functions, suitability and components of selected primary tillage implements and secondary tillage implements. • learn different methods of sowing and the related sowing equipment's, its functions, suitability and components of the equipment. • learn the working principles of different types of sprayers and dusters, its application rate, suitability and capacity.		

UNIT	Content	No. of Hours
I	**Status of Farm power in India**: Sources of Farm power-man, animal, electrical, mechanical; IC engines – Working principle and different components of IC engines.	2.0
II	**Comparison of Two stroke and Four stroke cycle engines**; Different systems of IC engines – air cleaning, cooling, lubrication, fuel supply and combustion system	3.0

III	**Tractor types**: Power transmission system – clutch, gear box, differential and final drive; Hydraulic control system; cost estimation – Fixed cost and Variable cost.	4.0
IV	**Tillage** – Objectives, classification; Primary tillage implements – Mould board plough, disc plough, chisel plough; Secondary tillage implements – cultivator, disc harrows; sowing machinery – Happy seed drill, Broad based bed furrow cum seed planter, Calibration of seed drill; Transplanter - self propelled Rice transplanter.	4.0
V	**Sprayers**: Compressed lever operated knap sack sprayer, power sprayer; Duster – hand rotary type; Paddy reaper and Multi crop thresher – its components, functions and specification	2.0
Practicals	Study of different components of I.C. engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow Familiarization with seed cum- fertilizer drills their seed metering mechanism and calibration, planters and transplanter, Familiarization with different types of sprayers and dusters Familiarization with different inter cultivation equipment, Familiarization with harvesting and threshing machinery.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Nakra .C.P 2006, *Farm Machinery and Equipment*; Dhanapat Rai Publishing Company (P) Ltd, New Delhi. 2. Bindra, O.S. and Harcharan Singh, 1971. *Pesticide Application Equipment.* Oxford and IBH Pub Co., New Delhi.	
	Reference Books: 3. Srivastava, A.C., 1990. *Elements of Farm Machinery*. Oxford and IBH Pub. Co, New Delhi 4. Jagadishwar Sahay, 2004. *Elements of Agricultural Engineering*. Standard Publishers Distributors, New Delhi. – 4th Edition.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 5. www.agrimoon.com	
Course Outcomes	On completion of the course, the students should be able to CO1: Identify the different sources of power, its applications and limitations and describe the components, working principle of two stroke and four stroke cycle engines.	

	CO2: Identify the functions of different tractor systems and its components and work out the cost of operation of tractor CO3: Classify tractor drawn tillage implements based on functions and describe about different types of tillage implements, its functions, suitability, coverage and components. CO4: Identify different types of sowing machineries under wet land and dry land conditions and calibrate the seed drill. CO5: Discuss the construction, function and application rate of sprayers, dusters, paddy reaper and multi crop thresher.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	3	3	2
CO2	3	2	2	2	3
CO3	2	3	2	3	3
CO4	3	2	2	2	3
CO5	2	3	2	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21SACU0302**
Course Title	**ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • impart basic knowledge on Environmental Science and Ecology • give an understanding of the natural resources and biodiversity • impart knowledge on Environmental pollution • impart knowledge on disasters, severity, damage caused and management • teach the students about disaster risk reduction and policies for disaster management.		
UNIT	Content		No. of Hours
I	**Introduction to Environmental Science and Ecology:** Environmental Science - definition, scope and importance; Ecosystems - Structure and function of an ecosystem. Energy flow in the ecosystem. Ecological succession. Food chains - food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)		5

II	**Natural Resources and biodiversity:** Natural Resources: Renewable and non-renewable resources. Status, degradation, over exploitation, management and conservation of Land resources, Water resources, forest resources, Mineral resources and Energy resources. Biodiversity – definition and types. Hot-spots of biodiversity. Threats to biodiversity: Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	5
III	**Environmental Pollution:** Environmental Pollution: definition, cause, effects and control measures of soil, water, air pollution. Green House effect - Global warming and Climate change - Impact on agriculture and other natural resources. Environmental protection- National and state level organizations. Global treaties – Conventions. Legislation to protect the environment.	5
IV	**Disaster and Impact Assessment:** Definition, introduction to natural and manmade disaster, Levels of disasters, History on natural disasters in India, Disaster phenomena and events (global national and regional), Concept of risk, hazard, and vulnerability.) -Severity, extent of damage on agricultural production systems, economic losses affecting livelihood, social and economic perspective. Disaster preparedness for crops, livestock and fisheries, hazard and risk reduction strategies. Role of IT, remote sensing, GIS and GPS in disaster preparedness. weather forecasting and early warning systems, flood forecasting agricultural drought monitoring and forecasting.	7
V	**Disaster Risk Reduction and policies for Disaster Management:** Contingency Planning for Disaster Risk Reduction: agronomic, engineering other non-engineering interventions for drought, flood, cyclone and heat/cold waves, agro- met advisories, crop advisories, community nursery, contingent seed bank, mini-kit availability, strategies for fisheries management in flood prone areas, livestock shelters, feed and fodder banks, mass vaccination of livestock, etc Disaster Management Act and Policies in India, Organizational structure for disaster management at national, state and district levels, Existing schemes and government policies to tackle agricultural disasters. Insurance and loan schemes: criteria and constraints of crop/animal insurance and credit guarantee schemes	8
Practical	Environmental sampling and preservation - Biodiversity assessment in Agricultural system, Water quality analysis: pH, EC and TDS, Acidity, Alkalinity, Water hardness, DO and BOD, COD, *E. coli*, Assessment of Air pollution: Suspended Particulate Matter (SPM) - Assessment of heavy	37.5

	metal pollution in soil – Field Visits: Contaminated site, Common Effluent Treatment Plant - Agro meteorology on weather forecasting and predictions through modeling - RS-GIS for disaster management - Impact assessment of Earth quake / flood / Tsunami affected areas - Visit to flood /Tsunami / Earth quake affected areas	
References	Text Books (with chapter number & page number, wherever needed): 1. P.D. Sharma, 2009, *Ecology and Environment*, Rastogi Publications, Meerat, India 2. De. A.K., 2010. *Environmental chemistry*. Published by New Age International Publishers, New Delhi. ISBN:13–978 81 224 2617 5. 384 pp 3. Dhar Chakrabarti. P.G., 2011. *Disaster management & climate change - India's risk management policy frameworks and key challenges*. Published by Centre for Social Markets (India), Bangalore. 36 pp	
	Reference Books: 1. Tyler Miller and Scot Spoolman. 2009. *Living in the Environment* (*Concepts, Connections, and Solutions).* Brooks/cole, Cengage learning publication, Belmont, USA 2. *Proceedings of 2nd India disaster management congress*, New Delhi. Organized by National Institute of Disaster Management, New Delhi	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.agrimoon.com	
Course Outcomes	On completion of the course, students should be able to CO1: Describe the principles of Environmental Sciences and basic concepts of Ecology CO2: Elaborate on natural Resources and biodiversity. CO3: Explain the impact of environmental pollution on human beings and natural resources CO4: Classify disasters, explain about the modern tools in forecasting and impact assessment CO5: Communicate disaster risk reduction and policies for disaster management.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	2
CO2	3	2	2	2	3
CO3	2	2	2	3	2
CO4	2	3	2	3	2
CO5	2	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21ACSU0301**
Course Title	**AGRI-INFORMATICS**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • Understand the fundamental concept of computer and Internet • Develop applications using MS Word, MS Excel and MS Power point • Enable the students to understand the use of ICT for Agriculture activities		

UNIT	Content	No. of Hours
I	**Computer and Internet concepts:** Computer: Definition- Anatomy of a Computer- Generations of a Computer - Introduction to Input and Output Devices -Operating System: Features and Functions-Types of Operating System - Types of programming languages- Computer Networks- Introduction- Applications and Types- Internet: Concepts and Applications - Browsing the Internet- Electronic Mail (E-Mail).	6
II	**MS-Word:** MS-Word: Introduction-Features – Creation and Save of Document - Document editing and formatting a document-Page setup and Print Preview- Table creation- Mail Merge and its importance- Brainstorming Session	6
III	**MS-Excel:** MS-Excel :Introduction - Advantages & applications - Organization of workbook - Editing and	5

	Saving a spreadsheet - Designing different types of Charts – Built-in functions and its applications-Brainstorming Session..	
IV	**MS- Power Point and MS- Access:** MS- Power Point: Introduction – Creating presentation - saving and close presentation- Changing Layout - Changing Designs – Custom Animation - Slide transition- Applying Animation effects-Inserting table, charts, pictures in presentation- MS-Access: Database Concepts- Creating and Editing Database- Brainstorming Session - RDBMS-Introduction-Advantages and Applications- Agricultural Projects	6
V	**ICT in Agriculture:** ICT in Agriculture- Introduction and Scope - Role of communications in ICT- Practices of ICT – Mobile Communications: Farmer Call Centre-SMS Broadcast Service- Web Communications: Agricultural web sites and portals -Web Conferencing- Knowledge management, Information kiosks - Video and Tele conference, Kissan call centres -Expert systems on agriculture- Multimedia: Concepts- Self learning CDs on package of practices, diseases and pest management	7
Practical	Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introduction to World Wide Web (WWW). Introduction of programming languages. Hands on Crop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost; Computation of water and nutrient requirements of crop using CSM and IT tools. Introduction of Geospatial Technology for generating valuable information for Agriculture. Hands on Decision Support System. Preparation of contingent crop planning.	37.5

References	Text Books (with chapter number & page number, wherever needed): 1. Alexis Leon and Mathews Leon. 2008. *Introduction to Computers*. Leon Techworld 2. Andrew S. Tanenbaum, 2013 *Computer Networks*, 5/e, PHI Private Ltd. 3. Deitel. 2009. *Internet and world wide web- How to program*, 4/e, Pearson Prentice Hall 4. Saravanan and Shanthi. 2002. *Computer Concepts, Windows & MS Office*, Vikas Publishing House 5. Willem Zijp, 1994. *Improving the Transfer and Use of Agricultural Information - A Guide to Information Technology*, World Bank Publications,. 6. Saravanan. R and C. Kathiresan, 2011. *Information & Communication Technology for Agriculture and Rural Development*, New India Pub. Agency.
Course Outcomes	On completion of the course, students should be able to do CO1:Describe the basic components of the computer and working of each device CO2: Explain the representation of data in computer. CO3:Demonstrate knowledge in fundamentals of computer networking and database. CO4:Perform common basic functions like editing, formatting, printing, scanning etc using tools CO5: Use ICT in Agriculture and allied fields

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	2	1	1
CO2	1	2	1	2	1
CO3	1	2	1	1	2
CO4	1	2	2	1	1
CO5	3	1	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21AMMU0302**
Course Title	**STATISTICAL METHODS**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • enable students to understand basic concepts and terms and uses of Statistics in agricultural data analysis. • develop skills among the students to analyze data using appropriate Statistical tools.		

UNIT	Content	No. of Hours
I	**Introduction to Statistics** and its Applications in Agriculture, Types of data and frequency distribution. Graphical and diagrammatic Representation of data, Measures of Central value & Dispersion.	3
II	**Definition of Correlation**, Scatter Diagram, Karl Pearson's Coefficient of Correlation and its interpretation and Liner Regression Equations	2
III	**Definition of Probability**, Addition and Multiplication Theorems (without proof). Simple Problems based on Probability; Introduction to Theoretical Distributions – Binomial & Poisson Distributions and simple problems...	3
IV	**Introduction to sampling** – Sampling versus complete enumeration, simple random sampling with and without replacement, use of random number tables and lottery	3

	method for selection of random samples; Determination of sample size.	
V	**Introduction to Test of Significance**, Parametric and Non-parametric Tests, Chi-Square Test for Independence of Attributes in 2 x 2 contingency table; Introduction of analysis variance, Analysis of Variance in one way and two way classifications; Design of experiments	3
Practical	Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Dispersion (Ungrouped Data). Measures of Dispersion (Grouped Data). Moments, Measures of Skewness & Kurtosis (Ungrouped Data). Moments, Measures of Skewness & Kurtosis (Grouped Data). Correlation & Regression Analysis. Application of One Sample t-test. Application of Two Sample Fisher's t-test. Chi-Square test of Goodness of Fit. Chi-Square test of Independence of Attributes for 2 ×2 contingency table. Analysis of Variance One Way Classification. Analysis of Variance Two Way Classification. Selection of random sample using Simple Random Sampling.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Sampath Kumar V.S. 1997 .*Bio-Statistics*, Manomaniam Sundaranar University Publication, Tirunelveli,. 2. Gurumani, N., 2004. *An Introduction to Bio-Statistics*, Chennai, MJP Publication, 3. Arora P.N, Malhan P.K, 1996.*Bio-Statistics*, Himalaya Publishing House, New Delhi,. 4. Vijayalakshmi G and Sivapragasam C. 2009. *Research Methods: Tips and Techniques*, MJP Publishers Chennai, 5. Gupta, S.P. 1992. *Statistical Methods*, Sultan and Chand Publishers, New Delhi 6. Gupta, C.B. 1992. *An Introduction to Statistical Methods*, Vikas Publishers, New Delhi, 7. Krishnanswamy, O.R, 2002. *Methodology of Research in Social Sciences*, Himalaya Publishing House, Bombay,	
Course Outcomes	On completion of the course, students should be able to do CO1: Explain the fundamental concept of statistical applications in agriculture CO2: Work out various statistical measures CO2: Work out various statistical measures CO3: (Discuss the theoretical concept of descriptive statistics, testing of hypothesis and perform correlation and regression analysis CO4: Gain expertise in test of attributes CO5: Perform analysis of variance in agricultural experiments	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	3	1	1
CO2	1	2	3	2	1
CO3	1	1	3	1	2
CO4	1	2	1	1	1
CO5	1	2	1	2	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21LPMU0301**
Course Title	**LIVESTOCK AND POULTRY MANAGEMENT**		
No. of Credits	**3+1**	No. of contact hours per Week	**5.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • The General objective of this course is to establish basic knowledge of how to manage and operate livestock and poultry farms. • This course is designed to impart basic technical knowledge and skills required to successfully run livestock 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 acquaint the students with important breeds of dairy cattle, buffaloes, sheep, goat, pig and chicken and breeds suitable to his location. • To familiarize the students with the principles of animal nutrition and optimum feeding based on locally available feedstuffs • To impart scientific knowledge and skills required to run broiler and layer chicken farm successfully.		

UNIT	Content	No. of Hours
I	**Dairy Cattle**: Introduction - Meaning of commonly used terms - Origin and domestication of livestock - Livestock census – Role of livestock in Indian economy - Milk production and availability. Cattle breeds – Indigenous	12

	breeds – Red Sindhi, Sahiwal, Gir, Kangayam – Exotic breeds Holstein Friesian, Jersey, Brown Swiss. Breeds of buffalo – Murrah – Surti – Nili - Ravi – Selection of dairy cattle. Male and Female reproductive system – Oestrous cycle - Signs of heat. Care of calf at birth - Heifer management - Management of pregnant animals. Housing - Selection of site for the farm buildings - Types of animal housing – Conventional barn – Loose housing - construction details of cattle shed. Classification of feeds – Nutrients and their function. Digestive system of ruminants – Digestion of feed - Common ailments – Bloat – Carbohydrate engorgement – Diarrhoea – Indigestion. Common diseases – Mastitis - Foot and Mouth disease – Anthrax – Black quarter – Endoparasites – Ectoparasites. .	
II	**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	10
III	**Goat**: Introduction – Meaning of commonly used terms – Advantages of goat farming – Breeds – Indigenous breeds – Jamunapari – Tellicherry – Barbari – Exotic breeds – Saanen –Toggenberg – Nubian – Breeding – Selection of breeding animal – Reproduction - Mating systems – Feeding- Feeding habits of goat – Nutrient requirement – Stall fed system of goat rearing – Control of ecto and endo parasites – Common complaints – Carbohydrate engorgement – HCN poisoning – Tetanus.	8
IV	**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.	8
V	**Poultry**: Advantages of poultry farming – Role of egg and chicken meat in human nutrition – Parts of a fowl –	10

	Classification of poultry – American – English – Asiatic – Mediterranean classes – Management – Chick – Grower – Layer – Broiler – Housing – Location – Housing requirements – Construction details – Deep litter system – Cage system – Feeding – Nutrient requirement for different classes of chicken – Feed formulation – Common diseases – Ranikhet disease – Infectious bursal disease – Coccidiosis – Vaccination – Dressing of bird for table purpose.	
Practical	External body parts of cattle, buffalo, sheep, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit to IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo and poultry. Culling of livestock and poultry. Planning and layout of housing for different types of livestock. Computation of rations for livestock. Formulation of concentrate mixtures. Clean milk production, milking methods. Hatchery operations, incubation and hatching equipments. Management of chicks, growers and layers. Debeaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat, swine and poultry production.	
References	Text Books (with chapter number & page number, wherever needed): 1. Banerjee, G.C., 2018. Text book of Animal Husbandry 8th Ed. Oxford and IBH Publishing Company Ltd., New Delhi. 2. Ranjhan, S.K., and N.N. Pathak, 2003. Text book on buffalo production, 4 Ed. Vikas Publishing House Pvt. Ltd., New Delhi.	
	Reference Books: 1. ICAR, 2014. Hand book of Animal Husbandry, 4th Ed. ICAR Publication, Pusa, New Delhi. 2. Jagadish Prasad, 2016. Principles and practices of Dairy Farm Management, 8th Ed. Kalyani Publishers, Ludhiana. 3. Sastry, N.S.R., C.K. Thomas and R.A. Singh, 2019. Livestock Production Management, 4th Ed. Kalyani Publishers, New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) http://lms.tanuvas.ac.in/course/view.php?id=19 https://agritech.tnau.ac.in/	

Course Outcomes	On completion of the course, students should be able to CO1: Identify various breeds of livestock and poultry CO2: Understand the general principles in design and construction of livestock buildings, selection of site and preparation of housing plan. CO3: Understand about care and management of livestock especially young and adult animals as well as broiler and layer chicken CO4: Gain insight the nutrient requirements for animals of different physiological status and feeding programs CO5: Be able to list and describe the common diseases of livestock and poultry

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**III SEMESTER**	Course Code	**21SHSU0102**
Course Title	**SHANTI SENA**		
No. of Credits	**0+1**	No. of contact hours per Week	**2.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Others (Non-Gradial Course)		
Scope of the Course (may be more than one)	• Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • introduce the Concept of Shanti Sena (Peace Brigades) to the students • give exposure and training to students in the skills needed for Shanti Sena		

UNIT	Content	No. of Hours
I	**Shanti Sena**: Meaning and conceptual frame work– historical development.	7.5
II	**Shanti Sena in India and abroad**: Contributions of Mahatma Gandhiji, Khan Abdul Ghaffar Khan, Vinoba Bhave and Jeyaprakash Narayan.	7.5
III	**Organisation and functions of Shanti Sena**: Shanti Kendras, All India Shanti Sena Mandal; Peaceful resolution of conflicts, Peace Making, Alternative to Defense and Violence.	7.5
IV	**Experiments in Modern times**: World Peace Brigade, Peace Brigade International, U.N. Peace Keeping Force, Truth and Reconciliation Commission and Experiments of Gandhigram Rural Institute.	7.5
V	**Skills and Training for Shanti Sena**: Skills of First Aid and Skills for disaster management, Peace Making Skills (Conflict Resolution and Counseling) and Transforming	7.5

	oneself into a Shanti Saink.	
References	Text Books (with chapter number & page number, wherever needed): 1. Vinoba Bhave (1961), *Shanti Sena*, Akhil Bharat Sarva Seva Sangh Prakashan, Varanasi. 2. K. Arunachalam (1985), *Gandhi – The Peace Maker*, Gandhi Smarak Nidhi, Madurai. 3. Suresh Ram, *Vinoba and his Mission*, Sarva Seva Sangh Prakashan, Varanasi. 4. Narayana Desai, (1972), *Towards Non-Violent Revolution*, Sarva Seva Sangh Prakashan, Varanasi. 5. Naraya Desai, (1963), *A Hand Book for Shanti Sainiks*, Sarva Seva Sangh Prakashan, Varanasi. 6. Naraya Desai, (1962), *Shanti Sena in India*, Sarva Seva Sangh Prakashan, Varanasi. 7. Dr. N. Radhakrishnan, (1989), *Gandhi and Youth*: The Shanti Sena of GRI, Gandhigram Rural Institute, Gandhigram. 8. Dr. N. Radhakrishnan, (1997), *Gandhian Nonviolence: A Trainer's Manual*, Gandhi Smiriti and Darshan Samiti, New Delhi.	
Course Outcomes	On completion of the course, students should be able to CO1: Comprehend the concept of Nonviolence, Shanti Sena and Methods of Peaceful Resolution of conflicts in their personal and social life. CO2: Shape and evolve themselves as peace makers and promoters of harmony and good will. CO3: Explain the organization and functions of Shanti Sena CO4: Communicate the experiments in peace making in recent times CO5: Demonstrate skills in giving first aid, disaster management	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	1	2
CO2	1	1	1	1	2
CO3	1	1	1	1	1
CO4	1	1	1	1	1
CO5	1	2	1	1	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21AGRU0405**
Course Title	**INTRODUCTORY AGRO-METEOROLOGY AND CLIMATE CHANGE**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • impart basic aspects and general principles of climate and weather in agriculture and allied areas. • enable students learn about climate change and its consequence. • make the students learn and develop skills to different instrument in use. • impart knowledge on the importance of wind and temperature in climate change and effect on crop production. • teach the students about important instruments in the observatory and preparation of crop weather calendars and weather forecasting climate change and its effect on crop production.		

UNIT	Content	No. of Hours
I	**Introduction:** Agricultural Meteorology- Definition of Meteorology – Agro-climatology- Weather and Climate-	5

	Factors affecting weather and climate- Scope of Agricultural Meteorology-Co-ordinates of India and Tamil Nadu- Earth atmosphere – its composition, extent and structure.	
II	**Atmospheric pressure and precipitation:** Atmospheric weather variables- Atmospheric pressure , its variation with height- Clouds- classification and characteristics- Rainfall (Precipitation)- Types of precipitation such as rain, snow, sleet and hail-Hydrological cycle- Monsoon- mechanism and importance in agriculture – Monsoons of India- onset and withdrawal and effect on crop production- Isohytes- Artificial rain making.	4
III	**Solar radiation and Temperature:** Solar radiation- Light and heat energy- Intensity , quality, day length and direction of light- effect on crop production, measurement- Nature and properties of solar radiation- solar constant-depletion of solar radiation, Short wave, long wave and thermal radiation, Albedo-Temperature effect on crop growth, cardinal temperature, diurnal and seasonal variations- Isotherm- Soil temperature and effect on crop growth.	3
IV	**Atmospheric humidity and Wind:** Atmospheric humidity-concept of saturation, vapour pressure, process of condensation, formation of dew, fog , mist, frost and cloud-Wind-Types of wind, daily and seasonal variation of wind speed, cyclone, anti cyclone, land breeze and sea breeze-Evaporation- Transpiration, evapotranspiration (ET)- Potential evapotranspiration (PET)- Definition and their importance in Agricultural production.	3
V	**Weather aberrations, Forecasting and Climate change:** Weather hazards- drought, floods, frost, tropical cyclones and extreme weather conditions such as heat wave and cold wave-modifications of crop micro climate, climatic normal's for crop and livestock production- weather forecasting- types of weather forecast and their uses- climate change, climatic variability-global warming, causes of climatic change and its impact on regional and national Agriculture.	2
Practical	Visit to Agro meteorological Observatory, site selection of observatory, exposure of instruments and weather data recording. Measurement of total, short wave and long wave radiation and its estimation using Planck's intensity law. Measurement of albedo and sunshine duration, computation of	35

	Radiation Intensity using BSS. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis. Measurement of soil temperature and computation of soil heat flux. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions. Measurement of wind speed and wind direction, preparation of wind rose. Measurement, tabulation and analysis of rain. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.	
References	Text Books 1. S.R. Reddy, 2016. Fundamentals of Agronomy and Agrometeorology. Kalyani publications, New Delhi 2. Krishnamurthy, U.R.1995. *Practical manual on Agricultural Meteorology*. Kalyani Publishers, Ludhiana	
	Reference Books: 1. Gopalaswamy, N.1994. *Agricultural Meteorology*. Rawat publications, Jaipur 2. Harbal singh, M.1974. *Agricultural Meteorology*, Punjab Agricultural University, Ludhiana.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.tawn.tnau.ac.in www.usbr.gov/pn/agri.met www.imd.gov.in	
Course Outcomes	On completion of the course, students should be able to CO1: Describe about climate, weather and its effect on crop production CO2: Describe about climate and weather aberrations, weather forecasting and prepare crop weather calendars CO3 Apply the knowledge of climate change and its effect on crop production CO4: Handle the agro-meteorological equipments and use recorded data for further analysis CO5:Gain skill in land shaping and mapping of weather and climate and its effect on crop production	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	2	3	3	3
CO4	2	2	3	3	3
CO5	3	3	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21AGRU0406**
Course Title	**FARMING SYSTEM AND SUSTAINABLE AGRICULTURE**		
No. of Credits	**1+0**	No. of contact hours per Week	1.0
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • impart basic knowledge on the scope and importance and types of farming system and its components • provide information on the types of cropping system and tools for determining the efficiencies of cropping system • gain knowledge on Sustainable Agriculture concept, significance and indicators of sustainability • inculcate knowledge on LEISA and its significance in Agriculture • obtain information and knowledge on Integrated Farming system advantages, types and models suited for various situations		

UNIT	Content	No. of Hours
I	**Farming system**: Definition-scope, importance and concept. Types and systems of farming system and factors affecting types of farming. Farming system components and their maintenance.	5

II	**Cropping System** : Definition- Cropping pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping system	3
III	**Sustainable agriculture:** Definition, importance, concept, significance and its impact on agriculture. Economic and ecological aspects- Indicators of sustainability, adaptation and mitigation	2
IV	**LEISA:**. High External Input Agriculture (HEIA), Low External Input Agriculture(LEIA) and Low External Input Sustainable Agriculture (LEISA) and its techniques for sustainability. Conservation agriculture- Definition and strategies	3
V	**Integrated Farming System**- Definition, objectives and characteristics, components of IFS and its advantages. Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques. .	2
References	Text Books 1. Palaniappan, SP and K. Sivaraman.1996. *Cropping systems in the Tropics – Principles and Management.* New Age International (P) Ltd., Publishers, New Delhi. 2. Jayanthi. C. *et.al,* 2002. *Integrated farming system –A path to Sustainable Agriculture*. TNAU Publication No.14/2002.	
	Reference Books: 1. Auberach, R. (1993): *Farming with Nature: Sustainable Agriculture and Biodiversity,* New Ground, Autumn; pp. 24-26. *2.* Chaterjee, B.N. And S.Maiti. 1993. *Cropping system – Theory and Practice.*	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.tawn.tnau.ac.in www.usbr.gov/pn/agri.met www.agrimoon.com	
Course Outcomes	CO1: Discuss the basic principles and components of Farming system CO2: Discuss about different types of cropping system CO3: Perform sustainable agricultural practices CO4: Apply the tools for determining production and efficiencies in cropping and farming system CO5: Analyze and evaluate various models of Integrated Farming system for different agro-climatic zones	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	2	3
CO3	3	2	2	3	2
CO4	2	3	3	2	3
CO5	2	3	3	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**17AGRU0407**
Course Title	**CROP PRODUCTION TECHNOLOGY-II (RABI CROPS)**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • impart knowledge on the cultivation of rabi cereals like Wheat, barley and Rye • train and inculcate the cultivation of rabi pulses like Bengal gram, Lentil and peas and its importance • provide knowledge on the cultivation of rabi oil seeds such as Rapeseed and Mustard, Sunflower and Gingelly • facilitates the knowledge about cultivation and management of sugar and medicinal plants like Sugarcane and Sugar beet- Medicinal and Aromatic crops- Mentha, Lemon grass and Citronella – • give knowledge on Fodder crops and its preservation such as Fodder legumes- Berseem, Lucerne and Oats- Tree fodder crops- Agathi, Subabul and Acacia including its preservation		

UNIT	Content	No. of Hours
I	**Cereals:** Wheat, Barley and Rye- Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield.	5
II	**Pulses:** Bengal gram (Chick pea), Lentil and Peas: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield.	4
III	**Oil Seeds:** Rape seed and Mustard**,** Sesame (Gingelly) and Sunflower - Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield..	3
IV	**Sugar Crops:** Sugarcane, Sugar beet-sweet sorghum -Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield.	3
V	**Forage crops and Fodder preservation** - Fodder legumes- Berseem, - Lucerne - Tree fodder crops- Agathi, Subabul and Acacia -Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and Yield- Classification of feed- Green fodder, hay and silage (Preserved fodder) - hay and silage making methods.	2
Practical	Sowing methods of wheat and sugarcane- Identification of weeds in *rabi* season crops- study of morphological characteristics of *rabi* crops- study of yield contributing characters of *rabi* season crops- yield and juice quality analysis of sugarcane- study of important agronomic experiments of *rabi* crops at experimental farms- study of *rabi* forage experiments- Oil extraction of medicinal crops- Visit to research stations of related crops.	35
References	Text Books 1. Ahlawat, I.P.S., Om Prakash and G.S. Saini, 1998. *Scientific Crop production in India.* Rama publishing House, Meerut 2. Chidda Singh, 1997. *Modern techniques of raising Field crops*. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.	
	Reference Books: 1. Singh, S.S. 1997. *Crop management under Irrigated and Rainfed conditions*. Kalyani publishers , New Delhi	

	E-Resources www.cgiar.org , www.tnau.ac.in/agriportal
Course Outcomes	On completion of the course, students should be able to CO1: Cultivate crops in the field with practical exposure CO2: Acquire skill in raising crops from land preparation up to harvest. CO3: Acquire skill in Plant protection measures CO4: Record and analyze growth and yield attributes. CO5 Workout the cost of cultivation and BCR for a crop per unit area.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	3	3	3
CO2	2	3	2	2	2
CO3	3	2	3	3	3
CO4	2	1	3	2	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21SACU0403**
Course Title	**PROBLEMATIC SOILS AND THEIR MANAGEMENT**		
No. of Credits	**2+0**	No. of contact hours per Week	**2**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	**The course aims to** • impart knowledge on soil quality and soil pollution • impart knowledge on wastelands and land use classification • teach methods to analyze and evaluate problem soils and impart knowledge on mitigation measures • develop skills on water quality appraisal and management • teach the role of remote sensing and GIS in problem soil management.		

UNIT	Content	No. of Hours
I	**Soil Quality:** Soil quality and health; Indices of soil quality; Long term effect of application of toxic organic and inorganic wastes viz., fertilizers, pesticides, sewage, industrial effluents on soil properties and crop growth.	5.0
II	**Wastelands and land use classification:** Distribution of waste land and problem soils in India. Their categorization based on properties. Problematic soils under different Agro-ecosystems. Land capability and classification, land	6.5

	suitability classification.	
III	**Soil physical and chemical problems:** Soil physical constraints - Highly permeable, Impermeable and ill drained soils, Soil crusting, sub soil hardening, fluffy paddy soils- characteristics and their management. Eroded and Compacted soils, Flooded soils, Polluted soils. Soil Chemical problems – Acid soils, Acid sulphate soils, saline soils, sodic soils and saline sodic soils – Genesis, characteristics - Reclamation and management techniques of chemical problem soils..	6.5
IV	**Irrigation water quality:** Quality of irrigation waters – water quality parameters - water quality appraisal – effect of poor quality waters on soil and crop growth and management – utilization of saline water in agriculture	6.5
V	**Remote sensing and GIS in problem soil management:** Remote sensing and GIS in diagnosis and management of problem soils. Multipurpose tree species, bio remediation of soils through MPTs.	5.5
References	Text Books (with chapter number & page number, wherever needed): 1. Buol, S.W., Hole, F.D., McCracken, R.J., (1973). *Soil genesis and classification*. Oxford and IBH publishing Co., New Delhi 2. Sehgal, J.2005. *Pedology concepts and applications*, Kalyani Publishers, New Delhi 3. USDA, 1954. *Diagnosis and improvements of saline and alkali soils (Ed)* L.A. Richards, Handbook No.60. USDA Washington DC. 4. Somani, L.L. and K.L. Totawat, 1993. *Management of salt affected soils and water*.	
	Reference Books: 1. Poonkodi, P., Dhanasekaran, K. and Rasavel, M. 2004. *Soil Survey, Taxonomy, Remote Sensing and Problem soils.* Rasi offset Printers, Chidambaram. 2. Paul A. Longley, Mike Goodchild, David J.Maguire and David W. Rhind, 2010. *Geographic Information Systems and Science*, John Wiley and Sons Ltd., Chichester 3. David Dent, Anthony Young, 1981. *Soil Survey and Land Evaluation*. Harper Collins Publishers Ltd. US.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org/ soils- portal 3. http.// web soil survey. nrcs.usda.gov 4. www. isric.org 5. www.icar.org.in 6. www.agrimoon.com	

Course Outcomes	CO 1: Assess and evaluate the soil quality using quality indices. CO 2: Categorize wastelands and describe the land use pattern and classification. CO 3: Analyze and evaluate problem soils and recommend appropriate management measures. CO 4: Assess water quality and recommend appropriate management measures. CO 5: Discuss the role of remote sensing and GIS in problem soil management.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	2	3	2	2	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	2	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21PBGU0403**
Course Title	**PRINCIPLES OF SEED TECHNOLOGY**		
No. of Credits	**1+2**	No. of contact hours per Week	**6.0**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • teach the importance of seed varieties and maintenance of genetic purity of seeds • impart knowledge on the types of seeds and seed certification procedure • enable to understand about genetically modified crops and organic seed production • give knowledge about seed treatment and storage of seeds. • introduce the channels of seed marketing and marketing strategies.		

UNIT	Content	No. of Hours
I	**Seed** –Definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, Seed quality: Definition, Characters, different classes of seed.	**3**
II	**Foundation and certified seed** production of important cereals, pulses, oilseeds, fodder and vegetables. Seed Certification: phase, procedure, field inspection. Seed act and	**3**

	seed act enforcement, duty and powers of seed inspector, offences and penalties.	
III	**Seeds control order 1983**. Detection of genetically modified crops, GM crops and organic seed production. Seed drying, processing and their steps, Seed testing for quality assessment: Grow out test and Electrophoresis, molecular and biochemical test.	**3**
IV	**Seed treatment**, its importance, method of application and seed packing. Seed storage: principles, stages and factors affecting seed longevity during storage .Measure for pest and disease control during storage.	**3**
V	**Seed Marketing:** Structure and organization, promotional media, Factors affecting seed marketing, Role of WTO in seed marketing. Private and public sectors and their production and marketing strategies.	**2**
Practical	Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi. Seed production in major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea. Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production in important vegetable crops. Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Seed certification: Procedure, Field inspection, Preparation of field inspection report. Visit to seed production farms, seed testing laboratories and seed processing plant.	**75**
References	Text Books (with chapter number & page number, wherever needed): 1. Agarwal, R.L.1991. *Seed Technology*, Oxford & IBH Publishing Co. Delhi 2. Agarwal, P.K. 1999. *Seed Technology*, ICAR, New Delhi. 3. Subir Sen and Nabinanda Ghosh.1999. *Seed Science and Technology*, Kalyani Publishers. New Delhi.	
	Reference Books: 1. Dhirenra Khare and Mohan S. Bhale.2000. *Seed Technology.* Scientific Publishers (India), Jodhpur. 2. A.K. Joshi and B.D. Singh.2005. *Seed Technology*. Kalyani Publishers, New Delhi. 3. Bhaskaran .M *et al.,* 2004. *Principles of seed production*. Scientific Publishers, Ludhiana.	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.fao.org 2. www.seednet.gov.in 3. www.agricoop.nic.in 4. www.online library.willey.com 5. www.sciencedirect.com 6. www.jgateplus.com
Course Outcomes	On completion of the course, students should be able to CO1: Describe the importance of seed varieties and maintained of genetic purity of seeds CO2: Identify the types of seeds and to explain the Seed Legislation and seed certification procedure CO3: Develop skills to perform seed quality tests CO4: Describe about seed treatment and storage of seeds CO5: Identify the channels of seed marketing and marketing strategies.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	3	3
CO2	3	2	2	3	3
CO3	3	2	2	3	3
CO4	3	1	1	3	3
CO5	3	3	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21HORU0403**
Course Title	**PRODUCTION TECHNOLOGY FOR FRUIT AND PLANTATION CROPS**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • Impart knowledge about the Scope and importance of fruit crops and rootstocks and the production technology of major fruit crops. • Enable students understand about the production technology of Tropical and sub-tropical fruit crops. • Educate about the production technology of temperate fruit crops. • Give an understanding about the production technology of arid and semi-arid fruit crops • Impart knowledge about the production technology of Plantation crops		

UNIT	Content	No. of Hours
I	**Introduction - Major fruit crops**: Importance and scope of fruit and plantation crop industry in India. Importance of rootstocks. Production technologies for the cultivation of major fruits-Mango, Banana, Citrus.	5.0

II	**Tropical and subtropical fruits**: Grape, Guava, Litchi, Papaya and Sapota	3.0
III	**Temperate fruits**: Temperate fruits-Apple, Pear, Peach & Walnut and Almond	3.0
IV	**Minor fruits-Arid or semiarid zone fruit crops**: Minor fruits- Date palm, Ber, Pineapple, Pomegranate, Jackfruit and Strawberry	4.0
V	**Plantation crops**: Coconut, Arecanut, Cashew, Tea, Coffee and Rubber.	2.0
Practical	Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruit. Preparation of plant bio regulators and their uses, Important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.	37.5
References	Text Books (with chapter number & page number, wherever needed) : 1. Veeraraghavathatham, D., M. Jawaharlal, S. Jeeva and S. Rabindran 1996. *Scientific Fruit culture*, Suri Associates, Coimbatore. 2. Bose, T.K. 1988. *Fruits of India – Tropical and Sub-tropica*l, Naya Prakash Publications, Calcutta. 3. Gardner, V.R., F.F. Bradford and H.D. Hooker. 1952. *Fundamentals of fruit production.* Mc Graw Hill Book Co., Inc. London. 4. Kumar N, A. Khader P. Rangaswami and Irulappan I. 2000. *Introduction to Spices, Plantation Crops*, Medicinal and Aromatic Plants. Oxford and IBH. 5. Chadha, K.L. (ICAR) 2002, 2001. *Handbook of Horticulture*. ICAR, New Delhi.	
	Reference Books: 1. Shanmugavelu, K.G. 1990. *Production technology of fruit crops*. Oxford and IBH Publishing Co (P) Ltd., New Delhi. 2. Shanmugavelu, K.G. and V.N. Madhava Rao. 1980. *Spices and plantation crops.* India Book House, New Delhi. 3. Chadha, K.L. (ICAR) 2002, 2001. *Hand book of Horticulture*. ICAR, New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.fruits-mg.com 2. www.hort.purdue.edu/newcrop/morton 3. http://www.indianspices.com/ 4. http://indiacoffee.org./ 5. http://cpcri.nic.in/	

Course Outcomes	On completion of the course, students should be able to CO1: Discuss the importance and scope of fruit crops and production technology of mango, banana, citrus. CO2: Explain the production technology of tropical and subtropical fruit crops and papain extraction methods. CO3: Describe the production technology of temperate fruit crops. CO4: Elaborate the production technology of arid zone fruit crops and bahar treatment followed for pomegranate. CO5: Raise nursery for fruit crops and manage it, perform training, pruning, harvesting and processing in plantation crops.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	2	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21HORU0404**
Course Title	**PRODUCTION TECHNOLOGY FOR ORNAMENTAL CROPS, MAP AND LANDSCAPING**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • learn the basic aspects of successful Landscape Design • Impart knowledge about the production technology of loose flowers. • impart knowledge on the advances made in the production technology of Cut flowers in India. • impart comprehensive knowledge about the production technology of Medicinal crops. • learn about the production technology of Aromatic crops.		

UNIT	Content	No. of Hours
I	**Introduction:** Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping. Landscape uses of Trees, Shrubs and Climbers.	3
II	**Production technology of Loose flowers:** Production technology of Marigold, Jasmine, chrysanthemum under open conditions.	3
III	**Protected cultivation – Cut flowers:** Production technology of important cut flowers like Rose, Gerbera, Carnation,	5

	Lilium and Orchids under protected conditions. Production technology of Gladiolus and Tuberose under open condition.	
IV	**Production technology of Medicinal plants:** Production technology of important medicinal plants like Ashwagandha, Asparagus, Aloe, Costus, Cinnamomum, Periwinkle, Isabgol	3
V	**Production technology of Aromatic plants:** Mint, Lemongrass, Citronella, Palmarosa, Ocimum, Rose, geranium, Vetiver. Processing and value addition in ornamental crops and MAPs produce.	2
Practical	Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nursery bed preparation and seed sowing. Training and pruning of Ornamental plants. Planning and layout of garden. Bed preparation and planting of MAP. Protected structures – care and maintenance. Intercultural operations in flowers and MAP. Harvesting and postharvest handling of cut and loose flowers. Processing of MAP. Visit to commercial flower/MAP unit.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Bose, T.K. and P. Yadav. 1989. *Commercial flowers*. Naya Prakash Publications, Calcutta. 2. Kumar, N. 1997. *Introduction to Horticulture*. Rajalakshmi Publication, Nagercoil. 3. Kumar, N, Md. Abdul Khader, P. Rangasamy, and I. Irulappan, 1994. *Spices, Plantation Crops, Medicinal and Aromatic plants*, Rajalakshmi Publications, Nagercoil 4. Randhawa, G.S. and A. Mukhopadhyay. 1986. *Floriculture in India*. Allied Publishers (P) Ltd., New Delhi. 5. Robert Bentley and Henry Trimen. 2002. *Medicinal plants*, Omsons Publications, New Delhi.	
	Reference Books: 1. Prajapati, Purohit, Sharma and Kumar. 2006. *A Handbook of Medicinal plants*-A complete source book. Agrobios, India 2. Nursadh Ali. 2008. *Medicinal plants cultivation*, Mittal publications, New Delhi. 3. Kannan, K., P. Archana and S. Vinod. 2017. Ornamental gardening and Landscaping. New India Publishing Agency, New Delhi	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.herbs.org 2. http://www.intuxford.tripod.com 3. www.nmpb.nic.in 4. www.agrobiosindia.com 5. www.frlht.india.org 6. http://agritech.tnau.ac.in/	

Course Outcomes	On completion of the course, students should be able to CO1: Discuss the importance and scope of ornamental crops, medicinal and aromatic plants and principles of landscaping. CO2: Acquire skill in agro-techniques and management of different flower crops under protected environmental conditions and pruning techniques followed in Rose CO3: Describe the Production Technology of cut flowers and loose flowers, floral concrete extraction methods. CO4: Elaborate the Production Technology of medicinal plants and the uses of secondary metabolites. CO5: Explain the Production Technology of Lemon grass, Citronella, Palmarosa, Geranium and oil extraction methods.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	2	3	3	3	2
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21AGEU0403**
Course Title	**RENEWABLE ENERGY AND GREEN TECHNOLOGY**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	Core Course		
Scope of the Course (may be more than one)	Basic Skill / Advanced Skill Skill Development Field project		
Cognitive Levels addressed by the Course	K-1: (Remember) K-2: (Understand) K-3: (Apply) K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • impart knowledge on various energy sources • give an understanding on energy production from biomass • teach the students about biofuel production • introduce about solar energy and its applications • impart knowledge on wind energy and its applications		

UNIT	Content	No. of Hours
I	**Energy sources**: Classification of energy sources, contribution of these of sources in agricultural sector.	2.0
II	**Energy from Biomass**: Familiarization with biomass utilization for biofuel production and their application.	3.0
III	**Bio fuel production**: Familiarization with types of biogas plants and gasifiers, biogas, bio alcohol, biodiesel and bio oil production and their utilization as bioenergy resource.	4.0
IV	**Solar energy**: Introduction of solar energy, collection and their application, Familiarization with solar energy gadgets: solar cooker, solar water heater, application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application.	4.0
V	**Wind energy**: Introduction of wind energy and their application.	2.0

Practicals	Familiarization with renewable energy gadgets. To study biogas plants, To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio-fuels. Familiarization with different solar energy gadgets. To study solar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Koushika M.D., "Solar Energy Principles and Applications", IBT publications, 1988. 2. Anna Mani & Nooley "Wind Energy Data for India", 1983 3. Mital K.M, "Biogas systems: Principles and Applications", New Age International Publishers (P) Ltd., 1996.	
	Reference Books: 4. Venkata Ramana P and Srinivas S.N., "Biomass Energy Systems", TERI, 1996. 5. Rai, G.D., "Non-Conventional Sources of Energy", Khanna Publishers, Delhi 1995.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 6. www.agrimoon.com	
Course Outcomes	On completion of the course, the students should be able to CO 1: Classify energy sources CO 2: Discuss energy production from biomass and its application CO 3: Discuss biogas and biofuel production and its application CO 4: Elaborate about solar energy and its application CO 5: Elaborate about wind energy and its application.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	1	1	1	2
CO2	1	2	2	1	1
CO3	1	2	2	1	1
CO4	1	1	1	2	2
CO5	1	1	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV SEMESTER**	Course Code	**21AECU0403**
Course Title	**AGRICULTURAL MARKETING, TRADE AND PRICES**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate)		
Course Objectives (Maximum: 5)	**The course aims to** • impart the students on knowledge about the Marketing concepts and its role. • assess the importance of marketing functionaries and their role in agricultural marketing • impart the students on knowledge about the Marketing strategies and their nature. • analyze the role of government in marketing and to analyze the importance of cooperative marketing • impart the students on knowledge about the Marketing process their functions, Hurdles and the Trade concepts.		

UNIT	Content	No. of Hours
I	**Agricultural Marketing:** Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets**;** demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types, marketable and	6

	marketed surplus, factors affecting marketable surplus of agri-commodities	
II	**Product life cycle (PLC)** and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits &demerits;	5
III	**Marketing process and functions:** Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products;	6
IV	**Integration,** efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions;	7
V	**Cooperative marketing in India;** Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR	6
Practical	Plotting and study of demand and supply curves and calculation of elasticity**;** Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of	37.5

	data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.	
References	Text Books (with chapter number & page number, wherever needed): 1. Subba Reddy, S., P.Raghu Ram., P. Sastry, T.V.N and Bhavani Devi, I. 2010. Agricultural Economics. Oxford & IBH Publishing Company private Ltd., New Delhi, 2010. 2. Acharya, S.S and Agarwal, N.K.(1992) *Agricultural Marketing in India*, IBH, Publishing Ltd., New Delhi	
	Reference Books: 1. Jhingam, J.L. (1998). *International Economics*, Vrinda Publications, New Delhi. 2. Francis Cherunilam, (2000). *International Economics*, Oxford & IBH, New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.agrimoon.com	
Course Outcomes	On completion of the course, students should be able to • Interpret about various marketing concepts • Elaborate the importance of marketing functionaries and their role in agricultural marketing • Identify the marketing strategies and their nature. • Analyze the role of government in marketing and to appreciate the importance of cooperative marketing • Apply the knowledge of marketing process, their functions, hurdles and the trade concepts.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	3
CO2	2	2	2	3	3
CO3	3	2	2	2	3
CO4	2	2	2	3	3
CO5	3	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	V	Course Code	21SACU0504
Course Title	**GEOINFORMATICS, NANO-TECHNOLOGY AND PRECISION FARMING**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course		If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Field projects		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The course aims to • to impart knowledge on precision agriculture • to teach the applications of remote sensing in agriculture • to impart knowledge on the concepts and applications of GIS in precision agriculture • to develop skills to use geospatial technologies for precision agriculture • to teach the applications of nanotechnology in Agriculture		

UNIT	Content	No. of Hours
I	**Introduction to precision agriculture:** Precision agriculture- Historical Aspects, Definitions for Precision Farming, Major Components of Precision Farming or Site-specific Farming, Advantages and Constraints to Adoption of Precision Farming, issues and concerns for Indian agriculture	2.0

II	**Remote sensing in agriculture:** Remote sensing concepts and application in agriculture; Image processing and interpretation	3.0
III	**Geo-informatics:** Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. Spatial data and their management in GIS; Global positioning system (GPS), components and its functions.	4.0
IV	**Geospatial technologies in agriculture:** Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Variable Rate Technology (VRT), STCR approach for precision agriculture; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs.	4.0
V	**Nanotechnology and its applications in agriculture:** Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, application in agriculture- nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.	2.0
Practicals	Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/ abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Eden, M.J and Pary, J.T., 1986. *Remote Sensing and Tropical Land Management*. Wiley and Sons, London. 2. Paul A. Longley, Mike Goodchild, David J.Maguire and David W. Rhind, 2010. *Geographic Information Systems and Science*, John Wiley and Sons Ltd., Chichester	
	Reference Books: 1. Poonkodi, P., Dhanasekaran, K. and Rasavel, M. 2004. *Soil Survey, Taxonomy, Remote Sensing and Problem soils*. Rasi offset Printers, Chidambaram. 2. Pradeep. T. 2012. *Nano – The essentials – Understanding Nanoscience and Nanotechnology*, Tata Mc Grew-Hill, New Delhi.	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http.// crisp.nus.edu.sg 2. www.esri.com
Course Outcomes	On completion of the course, the students should be able to CO1: Explain the concepts of precision farming CO2: Analyse and interpret image processing data CO3: Use GIS tools for precision agriculture CO4: Familiarise with the use of geospatial technologies for application of agriculture inputs CO5: Discuss the role of nanotechnology in precision agriculture

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	3	3	2
CO2	3	2	3	3	2
CO3	3	3	2	3	3
CO4	3	1	3	2	3
CO5	3	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**V**	Course Code	**21AGRU0508**
Course Title	**PRACTICAL CROP PRODUCTION-I (*Kharif Crops*)**		
No. of Credits	**0+2**	No. of contact hours per Week	**5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • Students can learn about cultivation of crops in the field with practical exposure • Students can gain knowledge on working out cost of cultivation and CBR		

UNIT	Content	
	Crop planning, raising field crops in multiple cropping systems: Field preparation, seed treatment, Nursery raising, sowing, nutrient, water and weed management and management of insect-pest diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, weed, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students • Each student will be allotted a minimum of 100/200 m2 and he/she will do all field operations in the allotted land area for field preparation to harvest and processing • Any irrigated Puddled low land rice/ any irrigated dry crops (maize /Sorghum/Pearl millet/ finger millet/cotton/groundnut/ *kharif* pulses like Black gram/	75

	green gram/Red gram based on the availability of water in the farm	
References	Text Books 1. Ahlawat, I.P.S., Om Prakash and G.S. Saini, 1998. *Scientific Crop production in India*. Rama publishing House, Meerut 2. Chidda Singh, 1997. *Modern Techniques of raising Field crops.* Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.	
	Reference Books: 1. ICAR 2006. *Hand Book of Agriculture*. Indian Council of Agricultural Research, New Delhi 2. *Crop production Guide*, 2005. Directorate of Agriculture, Chennai and TNAU 3. Rajendra Prasad, 2004. *Text book on Field Crop production*. Indian Council of Agricultural Research, New Delhi	
	E-Resources 1. www.irri.org 2. www.crri.nic.in 3. www.drrindia.org	
Course Outcomes	On completion of the course, the students should be able to CO 1: Undertake crop planning and, raise field crops in multiple cropping systems CO 2: Acquaint with field preparation, seed treatment, nursery raising, sowing, harvesting, threshing, drying, winnowing, storage and marketing of produce CO 3: Practice integrated nutrient, weed, insect-pest and disease management technologies CO 4: Record and assess growth and yield attributes and predict crop yield CO 5: Prepare balance sheet including cost of cultivation and cost benefit ratio.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**V**	Course Code	**21SACU0505**
Course Title	**MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship • Field Placement / Field Project • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	**The course aims** • to impart knowledge on importance and types of organic manures • to teach about composition and types of chemical fertilizers and amendments • to impart knowledge on plant nutrition • to teach about chemistry and transformation of plant nutrients • to impart knowledge on soil fertility evaluation		

UNIT	Content	No. of Hours
I	**Organic manures:** Introduction and importance of organic manures, properties, classification and methods of preparation of bulky and concentrated manures. Compost – Enriched FYM, Composting of organic wastes *viz*, coir pith, sugarcane trash, leaf litters and farm wastes; Green/leaf manures	5.0
II	**Chemical fertilizers:** Chemical fertilizers: sources, classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers, Fertilizer Storage, Fertilizer Control Order, Soil amendments.	5.5
III	**Soil fertility and plant nutrition:** History of soil fertility and plant nutrition. criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of	6.5

	nutrient transport to plants, factors affecting nutrient availability to plants.	
IV	**Transformation of essential nutrients:** Chemistry of essential nutrients namely sources – forms – transformation – mobility - uptake – fixation – losses of soil Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur and Micronutrients.	6.5
V	**Soil fertility evaluation:** Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Fertilizer recommendation approaches; Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), Methods of application under rainfed and irrigated conditions. Nutrient management strategies – INM, RTNM, SSNM.	6.5
Practicals	Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeable K; Ca and Mg in soils. Estimation of soil extractable S in soils. Estimation of DTPA extractable Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Das, P.C. 1993. *Manures and Fertilizers*. Kalyani Publishers, Ludhiana 2. *Hand Book of Fertilizer Technology*. 2001. FAI, New Delhi 3. *Hand Book of Fertilizer Usage*. FAI, New Delhi 4. Kanwar, J.S. 1976. *Soil Fertility – Theory and Practice*. ICAR, New Delhi 5. Krishna, K.R.(Ed.). 2002. *Soil Fertility and Crop Production*. Oxford and IBH Publishing Co., New Delhi 6. Kolay, A.K. 2010. Soil fertility. Atlantic Publishers & Distributors Pvt Ltd. India.	
	Reference Books: 1. Sehgal, J. 1996. *Pedology concepts and applications*. Kalyani Publishers, New Delhi 2. Singh, S.S.1995. *Soil Fertility and Nutrient Management*. Kalyani Publishers, Ludhiana. 3. Soil Survey Staff. 1996. *Soil Survey Manual*. Oxford and IBH Publishing Co., New Delhi 4. Tisdale, S.L., Nelson, W.L. and Beaton, J.D. 1990. *Soil Fertility and Fertilizers*. MacMillan Publishing Company, New York.	

	5. Brady, N.C.,2002 The Nature and Properties of Soils (13th Edition) McMillan Co., New York. Indian Publisher – Eurasia Publishing House (P) Ltd., Ramnagar, New Delhi – 55 6. Dilip Kumar Das. 2004. Introductory Soil Science, Kalyani Publishers, New Delhi 7. Fundamentals of Soil Science.2009 .ISSS Publication, New Delhi. 8. Tandon, H.L.S. 1994. Fertilizer, Organic Manures, Recyclable Wastes
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org/ soils- portal 3. www.agrimoon.com
Course Outcomes	On completion of the course, the students should be able to CO1: Identify organic manures and demonstrate its importance in soil fertility. CO2: Classify and describe chemical fertilizers. CO3: Identify deficiency and toxicity symptoms of essential elements and recommend remedial measures CO4: Describe the chemistry and transformation of plant nutrients. CO5: Apply the concepts of soil fertility evaluation for recommendation of agricultural inputs.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**V**	Course Code	**21PBGU0504**
Course Title	**CROP IMPROVEMENT –I (*KHARIF CROPS*)**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims** • To explain about distribution of species and to familiarize the wild relatives. • To describe about **Plant genetic resources**, its utilization and conservation, study of genetics of qualitative and quantitative character. Important concept of plant breeding • To facilitate **Breeding objective and methods**, procedure for developing hybrids / varieties of Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeon pea, Urdbean, Mungbean, Soybean, Groundnut, Seasame, Castor, Cotton, Cowpea. • To facilitate **Breeding objective and methods**, procedure for developing hybrids / varieties of Tobacco, Brinjal, Okra and Cucurbitaceous. • To describe about Hybrid seed production technology – Rice, Maize, Sorghum, Pearl millet and Pigeaon pea, Cotton.		

UNIT	Content	No. of Hours
I	**Centers of origin**, distribution of species, wild relatives – Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeon pea, Urdbean, Mungbean, Soybean, Groundnut, Sesame, Castor, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous	2.0
II	**Plant genetic resources**, its utilization and conservation, study of genetics of qualitative and quantitative character. Important concept of plant breeding - self pollinated, Cross	3.0

	pollinated, Vegetatively propagated crops	
III	**Breeding objective and methods**, procedure for developing hybrids / varieties - Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeon pea, Urdbean, Mungbean, Soybean, Groundnut, Sesame, Castor, Cotton, Cowpea.	4.0
IV	**Breeding objective and methods**, procedure for developing hybrids / varieties - Tobacco, Brinjal, Okra and Cucurbitaceous. Breeding for abiotic stress and biotic stress. Genotype – Environment interaction and adaptation.	4.0
V	**Hybrid seed production technology** – Rice, Maize, Sorghum, Pearl millet and Pigeonpea, Cotton. Ideotype concept and climate resilient crop varieties for future.	2.0
Practicals	Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean, Groundnut, Sesame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different *kharif* crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Kharif* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Singh, B.D. 2007. *Plant breeding - Principles and methods*. Kalyani Publishers, New Delhi 2. Chopra, V.L. 2000. *Breeding of Field Crops (Edt.)*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi 3. Manjit S. Kang 2004. *Crop Improvement: Challenges in the Twenty-First Century (Edt)*. International Book Distributing Co. Lucknow. 4. Ram, H.H. and H.G. Singh. 1994. *Crop Breeding and Genetics*. Kalyani Publishers, New Delhi.	
	Reference Books: 1. Sharma, A.K. 2005. *Breeding Technology of Crop Plants (Edt.)*. Yash Publishing House, Bikaner. 2. Phoelman, J.N. and Borthakur, 1969. *Breeding Asian field crops* .Oxford & IBH Publishing Co., New Delhi 3. Briggs, F.N. and P.F. Knowels, 1970. *Introduction to plant breeding*. Reinhold, New York. 4. Harihar Ram and Hari Govind Singh, 1994. *Crop breeding and Genetics*. Kalyani Publishers, New Delhi.	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.nmsu.edu 2. www.biology200.gsu.edu 3. www.agrimoon.com
Course Outcomes	On completion of the course, the students should be able to CO1: Identify putative parents and wild relatives CO2: Differentiate the crops based on floral biology CO3: Identify and understand the methodologies employed for self, cross and vegetatively propagated crops CO4: Discuss about the current trends of plant breeding. CO5: Describe hybrid seed production procedures in plant breeding

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	2	2
CO2	2	3	1	3	2
CO3	3	3	1	2	3
CO4	3	3	2	3	2
CO5	3	3	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**V**	Course Code	**21AENU0502**
Course Title	**PESTS OF CROPS AND STORED GRAINS AND THEIR MANAGEMENT**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims to** • Impart knowledge on the Pests of Cereals, Millets and Pulses • Impart knowledge on the Pests of Oilseeds, Fibres, Sugars and Forage Crops • Impart knowledge on the Pests of Vegetables, Spices and Plantation • Impart knowledge on the Pests of Fruits, Ornamentals and Medicinal crops • Impart knowledge on the Pests of stored products and its management		

UNIT		No. of Hours
I	**Pests of Cereals, Millets and Pulses:** Rice, Wheat, Maize, Sorghum, Cumbu, Ragi, Red gram, Green gram, Black gram, Bengal gram and Cowpea	3
II	**Pests of Oilseeds, Fibres, Sugars and Forage Crops:** Coconut, Groundnut, Castor, Gingelly, Sunflower, Cotton, Sugarcane, Subabul, Agathi and Sunhemp	5
III	**Pests of Vegetables, Spices and Plantation:** Brinjal, Tomato, Bhendi, Curcurbits, Crucifers (cole crops), Moringa, Peas, Beans, Amaranthus, Pepper, Cardamom, Turmeric, Ginger,	7

	Chillies, Garlic, Curryleaf, Coriander, Oilpalm, Arecanut, Rubber, Coffee, Tea and Betelvine	
IV	**Pests of Fruits, Ornamentals and Medicinal crops:** Mango, Citrus, Cashew, Sapota, Guava, Banana, Pomegranate, Grapevine, Ber, Jack, Custard apple, Pineapple, Papaya, Apple, Rose, Jasmine, Crossandra, Chrysanthemum, Tuberose, Gloriosa, Aswagantha, Belladonna, and Senna,	6
V	**Pests of stored products and its management:** Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain. Insect pests, Mites, Rodents, Birds and Microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management. Locusts – outbreaks – swarm – forewarning – methods of management.	4
Practicals	Identification of different types of damage. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce: (a) Field Crops; Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, Spices & Condiments. Identification of insect pests and Mites associated with stored grain. Determination of insect infestation by different methods. Assessment of losses due to insects. Calculations on the doses of insecticides application technique. Fumigation of grain store / godown. Identification of rodents and rodent control operations in godowns. Identification of birds and bird control operations in godowns. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCI godowns.	14
References	Text Books (with chapter number & page number, wherever needed): 1. Ayyar, T.V.R. 1963. *Hand Book of Economic Entomology for South India* – Govt. Press, Madras, 516p. 2. David, B.V. and V.V. Ramamurthy. 2010. *Elements of Economic Entomology (Revised Edition)*. Namrutha Publications, Chennai.	
	Reference Books: 1. Regupathy, A., Palanisamy, S., Chandramohan, N. and Gunathilagaraj, K. 1987. *A Guide on Crop Pests*. Sooriya desktop publishers, Coimbatore, 290 p. 2. Atwal, A.S. 1991. *Agricultural Pests of India and South – East Asia*. Kalyani Publishers, New Delhi, 529 p.	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.agrimoon.com
Course Outcomes	On completion of the course, the students should be able to CO1: Identify the major pests and their symptoms, biology and host range of Cereals, Millets, Pulses and its management CO2: Identify the major pests and their symptoms, biology and host range of Oilseeds, Fibres, Sugars, Forage crops and its management CO3: Identify the major pests and their symptoms, biology and host range of Vegetables, Spices CO4: Identify the major pests and their symptoms, biology and host range of Fruits, Ornamentals and Medicinal crops and its management CO5: Identify the major pests and their symptoms, biology and host range stored products and its management

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	2	3	4	5
CO2	2	1	3	2	1
CO3	2	1	3	2	1
CO4	1	1	2	3	1
CO5	1	2	2	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	V	Course Code	21APPU0502
Course Title	**DISEASES OF FIELD & HORTICULTURAL CROPS & THEIR MANAGEMENT- I**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Field projects		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims to** • To learn and understanding, Identifying and managing important crop diseases of Rice, Maize, Sorghum • To learn and understanding, Identifying and managing important crop diseases of Bajra, Finger Millet, Castor and Soybean • To learn and understanding, Identifying and managing important crop diseases of Pigeon pea, Black gram & Green gram and Tobacco • To learn and understanding, Identifying and managing important crop diseases of Guava, Banana, Papaya, Pomegranate, Crucifers and Brinjal. • To learn and understanding, Identifying and managing important crop diseases of Tomato, Okra, Beans, Ginger, Coconut, Coffee and Tea.		

UNIT	Content	No. of Hours
I	**Field crops I:** Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and	5.0

	anthracnose.	
II	**Field crops II:** Bajra: Downy mildew and ergot; Finger millet: Blast and leaf spot; Groundnut: early and late leaf spots, wilt, Castor: Phytophthora blight, Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic.	5.5
III	**Field crops III:** Pigeon pea: Phytophthora blight, wilt and sterility mosaic; Black & Green gram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Tobacco: black shank, black root rot and mosaic.	6.5
IV	**Horticultural crops I:** Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot; Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight.	6.5
V	**Horticultural crops II:** Tomato: Damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust.	6.5
Practical	Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well mounted specimens.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Agarwal, R.K. and C.L. Jandaik. 1986. *Mushroom cultivation in India*. Indian Mushroom Growers Association, Solan, HP p-83. 2. Agarwal, S.C. 1993. *Diseases of greengram and blackgram*, International Book Distributors, UP. 3. Agrios. G.N. 1997. *Plant Pathology, 4th Edn*, Academic Press, New York. 4. Dasgupta, M.K. 1988. *Principles of Plant Pathology*. Allied Publishers Pvt. Ltd., Bangalore. 5. Dube, H.C. 1978. *A Text Book of Fungi, Bacteria and Viruses*. Vikas Publishing House Pvt. Ltd., New Delhi.	
	Reference Books: 1. Agrios. G.N. 1997. *Plant Pathology, 4th Edn,* Academic Press, New York. 2. Arjunan, G. Karthikeyan, G. Dinakaran, D. and Raguchander, T. 1999. *Diseases of Horticultural Crops,* AE Publications, Coimbatore. 3. Dickson, J.G. 1997. *Diseases of Field Crops*. Daya Publishing House,	

	New Delhi. 4. Pathak, P.N. 2001. *Diseases of Fruit Crops*. Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi. 5. Singh, R.S. 1993. *Plant Diseases*. Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi 6. Singh, R.S. 1999. *Diseases of Fruit crops*. Oxford & IBH Publications. New Delhi. 350.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 7. agritech.tnau.ac.in 8. www.fao.org/ soils- portal 9. agrimoon.com
Course Outcomes	On completion of the course, the students should be able to CO1: Identify, collect and preserve diseased plant specimens following standard procedures. CO2: Identify and manage important diseases of field crops such as Rice, Maize, Sorghum, Bajra and Finger millets. CO3: Identify and manage important diseases of oil seed crops (Groundnut, Castor and Soybean) and pulses (Pigeon pea, Green gram and Black gram). CO4: Identify and manage important diseases of Banana, Guava, Coffee and Tea. CO5: Identify and manage important diseases of vegetables such as Tomato, Okra, Beans, Brinjal and Ginger.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	2	3
CO2	3	3	2	2	3
CO3	3	2	2	3	3
CO4	3	2	2	2	3
CO5	3	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**V**	Course Code	**21AENU0503**
Course Title	**PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.50**
New Course / Revised Course		If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • Teach all about the Integrated Pest Management • Imparts knowledge of Economic importance of insect pest, diseases and pest risk analysis • Introduce about the various pest control methods and classification of pesticides • Introduce about conventional pesticides • Impart knowledge on Implementation and impact of IPM and case histories of important IPM programme.		

UNIT		No. of Hours
I	**Categories of insect pests and diseases**, IPM: Introduction, history, importance, concepts, principles and tools of IPM	3
II	**Economic importance of insect pests,** diseases and pest risk analysis. Methods of detection and diagnosis of insect pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level	3
III	**Methods of control:** Host plant resistance – Types and mechanisms of resistance, cultural, mechanical, physical, legislative, Biological control–parasitoids, predators, viruses, bacteria, fungi and nematodes and their role in insect management and chemical control. Classification of pesticides, role of insecticides in pest management. Ecological management of crop environment	10

IV	**Introduction to conventional pesticides** for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module	3
V	**Implementation and impact of IPM** (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programmes. Case histories of important IPM programmes.	5
Practical	Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of *Trichoderma, Pseudomonas*, *Trichogramma,* NPV etc. Identification and nature of damage of important insect pests and diseases and their management. Crop (agro ecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision making. crop monitoring attacked by insect, pest and diseases . Awareness campaign at farmers fields	14
References	Text Books (with chapter number & page number, wherever needed): 1. Dhaliwal, G.S. and R. Arora. 2014. *Integrated Pest Managem*ent. Kalyani publishers. 2. Kogan, M. 1998. *Integrated Pest Management. Historical Perspectives and contemporary developments. Ann. Rev. Entomol*. 43: 243 – 270	
	Reference Books: 1.Koul, O. and G.W. Cuperus. 2007 *Ecologically Based Integrated Pest Managem*ent, CABI Publishing, London. 462p. 2.Koul, O., G.S. Dhaliwal and G.W. Cuperus. 2004 *Integrated Pest Management: Potential, Constraints and Challenge*s. CABI Publishing, Oxon, UK and Cambridge, USA 329p. 3.Metcalf, R.L. and W.H. Luckman. 1982. *Introduction to Insect Pest Managemen*t. John Wiley and Sons, New York, 577 p	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.agrimoon.com	
Course Outcomes	On completion of the course, the students should be able to CO1: Apply various Integrated Pest Management techniques in the farm CO2: Document and assess the incidence of pest and disease and risk involved CO3: Practice various pest control methods and classify the pesticides based on their mode of action CO4: Develop and validate IPM module and Crop monitoring techniques CO5: Discuss the political, social and legal implications of IPM techniques	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**1**	**2**	**3**	**4**	**5**
CO2	**1**	**3**	**3**	**2**	**1**
CO3	**3**	**2**	**2**	**2**	**1**
CO4	**2**	**2**	**1**	**3**	**2**
CO5	**2**	**2**	**1**	**2**	**1**

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**V**	Course Code	**21ARCU0503**
Course Title	**INTELLECTUAL PROPERTY RIGHTS**		
No. of Credits	**1+0**	No. of contact hours per Week	**1**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)		
Course Objectives (Maximum: 5)	**The course aims** • To learn about the meaning of property rights and important organizations. • To acquire information about the types of property rights and analyze the importance of Geographical indications, integrated circuits, Trade secrets. • To impart knowledge on Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, compulsory licensing • To describe about Traditional knowledge-meaning and rights of TK holders • To understand about Convention on Biological Diversity systems**.**		

UNIT	Content	No. of Hours
I	**Introduction and meaning of intellectual property**, brief introduction to GATT, WTO, TRIP and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty.	3
II	**Types of Intellectual Property and legislations** covering IPR in India:-Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets.	3

III	**Patents Act 1970** and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.	3
IV	**Origin and history including a brief introduction** to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researchers and farmers rights. Traditional knowledge-meaning and rights of TK holders.	3
V	**Convention on Biological Diversity**, International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.	2
References	Text Books (with chapter number & page number, wherever needed): 1. Cullet, Pillippe. 2005. Intellectual *Property Protection and Sustainable Development*. London: Butterworth, 2. Erbisch, F.H. and K. Maredia. 1998. *Intellectual Property Rights in Agricultural Biotechnology*. Wallingford : CABI,	
	Reference Books: 1. Santaniello, V., R.E. Evension, D. Zeberman, and G.A. Carlson.2003 *Agriculture and Intellectual Property Rights: Economic, institutional and implementation issues in bio technology*, Hyderabad, University Press.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.wipo.com 2. www.indiastatics.com 3. www.taminadustatics.com	
Course Outcomes	On completion of the course, students should be able to CO1: interpret about the meaning of property rights and important organizations. CO2: understand about the types of property rights and analyze the importance of Geographical indications, integrated circuits, Trade secrets. CO3: Elaborate on Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, compulsory licensing CO4: analyze about meaning of Traditional knowledge and rights of TK holders CO5: identify about Convention on Biological Diversity systems.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	1	2	1
CO2	1	2	1	2	1
CO3	1	1	1	2	2
CO4	2	1	1	2	2
CO5	2	1	1	1	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**V**	Course Code	**21AEXU0503**
Course Title	**ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • Introduce the concepts of entrepreneurship, policies and programs of the Government. • Introduce SWOT analysis for successful enterprise development. • Describe the Exhibit leadership skills being aware of economic reforms related to Agri enterprises and agribusiness. • Describe managerial and problem-solving skills in entrepreneurship. • Identify and select business idea, prepare business plan and propose projects for funding.		

UNIT	Content	No. of Hours
I	**Entrepreneur:** Concepts and Functions of Entrepreneur, Characteristics of entrepreneurs, Entrepreneurship Development; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development.	3
II	**Agribusiness/ Agri enterprises:** Impact of economic reforms on Agribusiness/ Agri enterprises, Entrepreneurial Development Process; Business Leadership Skills.	3
III	**Leadership and Managerial Skill:** Developing	3

	organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills) Problem solving skill.	
IV	**Finance and Agri-entrepreneurship**: Financing of enterprise, Opportunities for agri entrepreneurship and rural enterprise, Venture Capital – Concept, Aims, Features, Financing steps sources, Criteria to provide Venture Capital Finance, Export and Import Relevant to Agriculture Sector.	3
V	**Supply chain management and Project Planning Formulation:** Supply chain management – meaning, advantages, stages, process, drivers and scope of agri-supply chain management, Total quality management, Women Entrepreneurship – concept problems and development of women entrepreneurs, Project Planning Formulation and report preparation.	2
Practical	Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.	14
References	Text Books (with chapter number & page number, wherever needed): 1. Gupta, C.B. 2001. *Management: Theory and Practice.* Sultan Chand and Sons, New Delhi. 2. Khanka, S.S.1999. *Entrepreneurial Development*. S. Chand and Co., New Delhi. 3. Mary Coulter. 2008. *Entrepreneurship in Action*. Prentice Hall of India Pvt. Ltd., New Delhi.	
	Reference Books: 1. Mohanty, S.K.2009. *Fundamentals of Entrepreneurship*. Prentice Hall of India Pvt. Ltd., New Delhi. 2. Sagar Mondal and G.L. Ray. 2009. *Text Book of Entrepreneurship and Rural Development,* Kalyani Publishers, Ludhiana. 3. Vasant Desai. 1997. *Small Scale Industries and Entrepreneurship*. Himalaya Publishing House, New Delhi. 4. Vasant Desai. 2000. *Dynamics of Entrepreneurial Development and Management,* Himalaya Publishing House, New Delhi.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. **www.dcmsme.gov.in**	

Course Outcomes	On completion of the course, students should be able to CO1: Discuss the concepts of entrepreneurship, policies and programs of the Government. CO2: Perform SWOT analysis for successful enterprise development CO3: Exhibit leadership skills being aware of economic reforms related to Agri enterprises and agribusiness CO4: Show managerial and problem-solving skills in entrepreneurship. CO5: Identify and select business idea, prepare business plan and propose projects for funding)

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	2
CO2	2	3	3	2	2
CO3	2	3	2	2	3
CO4	2	2	2	2	3
CO5	2	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI SEMESTER**	Course Code	**21AGRU0609**
Course Title	**PRINCIPLES OF ORGANIC FARMING**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3 (Apply)		
Course Objectives (Maximum: 5)	The Course aims to • impart basic knowledge on the components and principles of organic farming • provide an understanding of organic sources of nutrients and its utilities • gain knowledge on non-chemical weed and pest disease management practices • inculcate knowledge on ITK and its significance in Agriculture • obtain information and knowledge on Organic certification and its procedures		

UNIT	Content	No. of Hours
I	**Components and principles of Organic farming:** Organic farming : Definition, Scope, Principles and Concepts- Relevance, Ethics and Objectives and Characteristics -History of organic farming- Global scenario- biodiversity: Importance and measure to preserve biodiversity- Pre requisites for Organic farming: Soil organic carbon: status and improvement strategies	5
II	**Organic Sources of nutrients**- Manures and other inputs- on farm and off farm sources- organic waste recycling- methods- soil and crop management – intercropping, crop rotation- green manures, cover crops, mulching – Bio fertilizers.	4

III	**Non- chemical weed and pest disease management methods:** Preventive, physical, cultural, mechanical and biological measures- Bio-intensive pest and disease management.	3
IV	**Indigenous Technical Knowledge (ITK):** ITK in organic agriculture – scientific rationale- soil, nutrient, weed, water management- Prospects and problems in organic farming	2
V	**Organic Certification :** Organic certification – NPOP guidelines- Certification Types and Agencies in India- Crop production standards- Quality considerations- labeling and accreditation process- Marketing and export potential of organic products	3
Practical	Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; cost of organic production system; Post harvest management; Quality aspect, grading, packaging and handling.	35
References	Text Books 1. IIRR (1996), *Recording and Using Indigenous Knowledge - A Manual*, International Institute of Rural Reconstruction, Silang, Cavite, Philippines. 2. Sundaramari M (2003) *Indigenous Agricultural Practices for Sustainable Farming*, Agrobios (India), Jodhpur. 3. Sharma K. Arun, 2002, *A Hand Book of Organic Farming*, Agrobios (India) Jodhpur. 4. Palaniappan.S.P and K. Annadurai (1999), Organic *Farming*.	
	Reference Books: 1. Dahama, A.K. 2002. *Organic Farming for Sustainable Agriculture*, Agrobios (India), Jodhpur pp 301. 2. Lampkin, N. 1990. *Organic farming*, Ipswich, U.K. Farming Press Books pp. 710. *3.* Palaniappan, SP. and K. Annadurai. 1999. *Organic farming: Theory and Practice* Scientific Publishers, Jodhpur	
	E-Resources • www.ifoam.org • www.apeda.org • www.cowindia.org • www.ncof.org	

Course Outcomes	On completion of the course, students should be able to CO1: Discuss the problems and prospects of organic farming CO2: Prepare organic sources of nutrients and practice non chemical weed and pest disease management methods CO3: Discuss about ITK and its adoption CO4: Elaborate the guidelines for organic certification, certification types and agencies involved CO5: Demonstrate expertise in quality control, grading, packaging and handling of Organic produces

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	1
CO2	3	2	3	3	1
CO3	3	3	3	3	3
CO4	3	2	3	3	3
CO5	3	1	3	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI SEMESTER**	Course Code	**21AGRU0610**
Course Title	**RAINFED AGRICULTURE AND WATERSHED MANAGEMENT**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.50**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand)		
Course Objectives (Maximum: 5)	The Course aims to • teach the students about the basic aspects and concept of • Rain fed agriculture • learn about soil and water conservation techniques and drought management in different crops • enrich knowledge on Watershed management		

UNIT	Content	No. of Hours
I	**Rainfed agriculture**: Introduction, Types- History of rainfed agriculture in India; Problems and prospects of Rainfed Agriculture in India- characteristics features- Importance and need for development	5
II	**Soil moisture conservation**: Soil and climatic conditions prevalent in rainfed areas- Climatic constraints, Soil moisture constraints, Cultivation practices and Socio-economic constraints. Soil and water conservation techniques- In-situ soil moisture conservation.	4
III	**Drought:** Definition- Classification of drought –Types-, effect of moisture stress on physio-morphological characteristics of the plants and plant growth- Crop adaptation and mitigation to drought	3

IV	**Water harvesting and contingent crop planning**: Importance, its techniques- Efficient utilization of water through soil and crop management practices-Management of crops in rainfed areas. Contingent crop planning for aberrant weather conditions;	3
V	**Watershed management**: Definition, Concept, objective- Need and advantages- Principles and components of watershed management – Action plan and organizational requirement of watershed.	2
Practical	Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed**.**	35
References	Text Books 1. Anonymous, 2002. '*NATP Project on Watershed Management Technology for Hot and Arid Regions', Annual Report*, Fatehpur-Shekawati, Rajasthan,. 2. Brooks, K.N., Folliott, P.F., Gregersen, H.M. and DeBango, L., 1997. *Hydrology and the Management of Watersheds*, 2nd edn, Ames, lowa University Press.	
	Reference Books: 1. Sheng, T.C., 1990. *Watershed Management Field Manual- Watershed Survey and Planning* United Nations Food and Agriculture Organisation, FAO Conservation Guide, 13/6. 2. Singh, P.K., 2000. *Watershed Management- Design and Practices*, Udaipur, India, Agrawal Printers Pvt. Ltd.	
	E-Resources . 1.www.agrimoon.com . 2.www.tnauagri.portal.com	

Course Outcomes	**CO1:** Discuss the problems and prospects and characteristics of Rain fed |Agriculture **CO2:** Apply suitable methods for the conservation of soil and water **CO3:** Critically analyze rainfall and possible drought period and adopt mitigation methods **CO4:** Demonstrate effective utilization of water and prepare contingent crop plans for aberrant weather conditions **CO5:** Discuss watershed management concept, objective and its organizational structures

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	2
CO2	3	2	2	2	3
CO3	3	2	2	3	3
CO4	2	3	2	3	2
CO5	2	2	3	3	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21AGRU0611**
Course Title	**PRACTICAL CROP PRODUCTION-II (*Rabi Crops*)**		
No. of Credits	**0+2**	No. of contact hours per Week	5
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To expose the students on hands on training in cultivation of crops from land preparation up to harvest including economics of cultivation		

UNIT	Content	No. of Hours
Practical	Crop planning, raising field crops in multiple cropping systems: Field preparation, seed treatment, Nursery raising, sowing, nutrient, water and weed management and management of insect-pest diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, weed, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.	75

	• Each student will be allotted a minimum of 100/200 m^2 and he/she will do all field operations in the allotted land area for field preparation to harvest and processing • Any irrigated dry *rabi* crop (maize /Sesame/sunflower/ *rabi* pulses like Bengalgram/Coriander based on the availability of water in the farm Practical Schedule • Sesame/Sunflower • Oil seeds crop ecosystems- Climate and weather – seasons and varieties of Tamil Nadu • Preparation of main field- Application of organic manures- • Seed and sowing -Application of herbicides- Water management- Nutrient management- Plant protection measures- Mechanization in Oil seeds crop cultivation- Recording growth, yield attributes and yield. • Harvesting , threshing, drying and cleaning the produce- Working out cost of cultivation and Economics	
References	Text Books 1. Ahlawat, I.P.S., Om Prakash and G.S.Saini, 1998. *Scientific Crop production in India*. Rama publishing House, Meerut 2. Chiddasingh, 1997. *Modern Techniques of raising Field crops*. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi. 3. ICAR 2006. *Hand book of Agriculture*. Indian council of Agricultural Research, New Delhi	
	Reference Books: 1. *Crop production Guide*, 2005. Directorate of Agriculture, Chennai and TNAU. 2. Rajendra Prasad, 2004. *Text book on Field Crop production*. Indian Council of Agricultural Research, New Delhi.	
	E-Resources 1. .www.irri.org 2. .www.crri.nic.in 3. .www.drrindia.org	

Course Outcomes	**CO1:** Undertake crop planning and, raise field crops in multiple cropping systems **CO2:** Acquaint with field preparation, seed treatment, nursery raising, sowing, harvesting, threshing, drying, winnowing, storage and marketing of produce **CO3:** Practice integrated nutrient, weed, insect-pest and disease management technologies **CO4:** Record and assess growth and yield attributes and predict crop yield **CO5:** Prepare balance sheet including cost of cultivation and cost benefit ratio

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	3	3	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21AGRU0612**
Course Title	**STUDY TOUR -1**		
No. of Credits	**(0+1)**	No. of contact hours per Week	2.5
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Skill Development • Entrepreneurship • Field Placement / Field Project • Internship		

Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)
Course Objectives (Maximum: 5)	The Course aims to • Enrich the knowledge of students with different types of soils, crops, cultivation practices and latest techniques adopted in various Agro-climatic zones research station/institutes in South India.

UNIT	Content	No. of Hours
Practical	Students will be taken to tour with in South India to study soils, crops, cropping pattern and cultivation practices for major crops in the various agro-climatic zones of the area. The duration of the tour will be 7-10 days. During the tour the students will visit important Research stations/Institutes .Students will maintain a Tour Dairy to record observations at the places of visit. A tour record has to be submitted after the tour.	

Course Outcomes	On completion of the course, students should be able to do CO1: Familiarize with the functioning of important national institutes related to agriculture CO2: Familiarize with the functioning of important agricultural research stations CO3: Get exposed to various agro-climatic zones in the country CO4: Get exposed to the different types of crops grown and cultivation practices followed in different parts of the country. CO5 Familiarize with the socio economic and cultural conditions of the farming community

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	1	1	1	1
CO2	2	1	1	1	1
CO3	2	1	1	3	2
CO4	1	1	1	2	2
CO5	2	1	1	2	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Evaluation procedure

1. Written test : 50 marks
2. Attendance and behavior : 20 marks
3. Record and pocket note book : 20 marks
4. *Viva- voce* : 10 marks

Total : 100 marks

Semester	**VI SEMESTER**	Course Code	**21PBGU0605**
Course Title	**CROP IMPROVEMENT-II *(RABI CROPS)***		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5 (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • educate students on Basic origin and Distribution of various important crops • educate students on Plant Genetic Resources in Crop improvement. • Educate students on Breeding Objectives and Methods for crop improvement • teach students on crop improvement in various Biotic and Abiotic stresses • teach the students on techniques in hybrid seed production.		

UNIT	Content	No. of Hours
I	**Centers of origin**, distribution of species, wild relatives – Wheat, Oat, Barley, Chickpea, Lentil, Field pea, French bean, Horse gram, Rapeseed, Mustard, Sunflower, Safflower , Sugarcane, Linseed, Potato , Tomato , Chilli and Onion.	2
II	**Plant genetic resources** - definition, importance, utilization and conservation, centre of diversity, study of genetics of qualitative and quantitative character.	3

III	**Breeding objective and methods**, procedure for developing hybrids / varieties Wheat, Oat, Barley, Chickpea, Lentil, Field pea, French bean, Horse gram, Rapeseed mustard, Sunflower, Safflower , Sugarcane ,Line seed.	4
IV	**Breeding objective and methods**, procedure for developing hybrids / varieties - Potato, Tomato, Chilli, and Onion. Breeding for abiotic stress and biotic stress .Genotype – Environment interaction and adaptation.	3
V	**Hybrid seed production technology** – Wheat, Barley, Rapeseed mustard, Sunflower, Safflower, Sugarcane. Ideotype concept and climate resilient crop varieties for future	3
Practical	Floral biology, emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem. Sugarcane, Tomato, Chilli, Onion; Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of field techniques for seed production and hybrid seeds production in *Rabi* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops	37.5
References	Text Books 1. Singh, B.D. 2007. *Plant breeding - Principles and methods*. Kalyani Publishers, New Delhi 2. Chopra, V.L. 2000. *Breeding of Field Crops (Edt.)*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi 3. Manjit S. Kang 2004. *Crop Improvement: Challenges in the Twenty-First Century (Edt)*. International Book Distributing Co. Lucknow.	
	Reference Books: 1. Ram, H.H. and H.G. Singh. 1994. *Crop Breeding and Genetics*. Kalyani Publishers, New Delhi. 2. Sharma, A.K. 2005. *Breeding Technology of Crop Plants (Edt.)*. Yash Publishing House, Bikaner. 3. Phoelman, J.N. and Borthakur, 1969. *Breeding Asian field crops* Oxford & IBH Publishing Co., New Delhi	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.agrimoon www.webcast.gov.in	

Course Outcomes	On completion of the course, the students should be able to CO1: Identify putative parents and wild relatives CO2 Differentiate the crops based on its floral biology CO3: Identify and apply breeding methodologies employed for self, cross and vegetatively propagated crops CO4: Discuss about the current trends in plant breeding CO5: Explain about the hybrid seed production procedures in plant breeding.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	2	2
CO2	2	3	1	3	2
CO3	3	3	1	2	3
CO4	3	3	2	3	2
CO5	3	3	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21AENU0604**
Course Title	**MANAGEMENT OF BENEFICIAL INSECTS**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	-Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply)		
Course Objectives (Maximum: 5)	**The course aims** • Introduce about beneficial insects • Impart knowledge on silkworms and mulberry cultivation • Impart knowledge on Pest and diseases of silkworm, rearing appliances and byproducts of sericulture • Impart knowledge on lac insect, uses and minor productive insects • Impart knowledge on predators and parasitoids used in biological control and to study the pollinator, weed killer and scavengers		

UNIT	Content	No. of Hours
I	**Importance of beneficial Insects**, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in	4

	cross pollinated plants.	
II	**Types of silkworm**, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons.	3
III	**Pest and diseases of silkworm**, management, rearing appliances of mulberry silkworm and methods of disinfection, types of disinfectants, byproducts of sericulture	2
IV	**Species of 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.	3
V	**Identification of major parasitoids** and predators commonly being used in biological control. Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.	3
Practicals	Honey bee species, castes of bees. Beekeeping appliances and seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniques for mass multiplication of natural enemies.	14
References	Text Books (with chapter number & page number, wherever needed): 1. David, B.V. and V.V. Ramamurthy. 2010. *Elements of Economic Entomology (Revised Edition)*. Namrutha Publications, Chennai. 2. Ayyar, T.V.R. 1963, *Hand Book of Economics Entomology for South India*. Govt. Press Madras.	
	Reference Books: 1. David, B.V. 2006. *Elements of Economic Entomology*. Popular Book Depot, Chennai. 2. De Bach P. 1964. *Biological Control of Insect Pests and Weeds*. Chapman and Hall, New York.	

Course Outcomes	On completion of the course, students should be able to do **CO1 :** Manage a bee keeping unit **CO2:** Manage a sericulture unit **CO3:** Identify pest and diseases and its management practices **CO4:** describe about Lac production, uses and minor productive insects **CO5:** Identifying the Parasitoids and Predators used in Pest control and their mass multiplication techniques.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**1**	**1**	**2**	**2**	**3**
CO2	**1**	**1**	**2**	**2**	**3**
CO3	**2**	**1**	**2**	**2**	**2**
CO4	**2**	**3**	**1**	**2**	**2**
CO5	**1**	**2**	**2**	**1**	**2**

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21APPU0603**
Course Title	**DISEASES OF FIELD & HORTICULTURAL CROPS & THEIR MANAGEMENT- II**		
No. of Credits	**2+1**	No. of contact hours per Week	4.5
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• **Core Course**		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • learn and understanding, Identifying and managing important crop diseases of Wheat, Sugarcane and Sunflower • learn and understanding, Identifying and managing important crop diseases of Mustard, Gram, Lentil, Cotton and Pea • learn and understanding, Identifying and managing important crop diseases of Mango, Citrus and Grape Vine • learn and understanding, Identifying and managing important crop diseases of Apple, Strawberry, Potato and Cucurbits. • learn and understanding, Identifying and managing important crop diseases of Onion & Garlic Chillies, Turmeric, Coriander, Marigold and Rose.		

UNIT	Content	No. of Hours
I	**Wheat:** rusts, loose smut, karnal bunt, powdery mildew, Alternaria blight, and ear cockle; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng; Sunflower: Sclerotinia stem rot	

	and Alternaria blight.	
II	**Mustard**: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; Gram: wilt, grey mould and Ascochyta blight; Lentil: rust and wilt; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.	
III	**Mango:** Anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose;	
IV	**Apple**: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl. Strawberry: leaf spot. Potato: early and late blight, black scurf, leaf roll, and mosaic; Cucurbits: downy mildew, powdery mildew, wilt	
V	**Onion and garlic**: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leaf spot.	
Practical	Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium. ***Note:*** Students should submit 50 pressed and well-mounted specimens.	
References	Text Books (with chapter number & page number, wherever needed): 1. Agarwal, R.K. and C.L. Jandaik. 1986. *Mushroom cultivation in India*. Indian Mushroom Growers Association, Solan, HPp-83. 2. Agarwal, S.C. 1993. *Diseases of greengram and blackgram*, International Book Distributors, UP. 3. Agrios. G.N. 1997. *Plant Pathology, 4thEdn*, Academic Press, New York.	
	Reference Books: 1. Dube, H.C. 1978. *A Text Book of Fungi, Bacteria and Viruses*. Vikas Publishing House Pvt. Ltd., New Delhi. 2. Agrios. G.N. 1997. *Plant Pathology, 4thEdn*, Academic Press, New York. 3. Arjunan, G. Karthikeyan, G. Dinakaran, D. and Raguchander, T. 1999. Diseases of Horticultural Crops, AE Publications, Coimbatore.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www. agrimoon 2. http:/icar.res.in 3. www.icar.org.in/nasm.html	

Course Outcomes	On completion of the course, students should be able to do CO1: Identify, collect and preserve diseased plant specimens by following proper procedures. CO2: Identify and manage important diseases of Wheat, Sugarcane and Sunflower CO3: Identify and manage important diseases of Mustard, Gram, Lentil, Cotton and Pea CO4: Identify and manage important diseases of Mango, Citrus and Grape Vine, Apple, Strawberry, Potato and Cucurbits. CO5: Identify and manage important diseases of Marigold, Rose and other flower crops

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	2	3
CO2	3	3	2	2	3
CO3	3	2	2	3	3
CO4	3	2	2	2	3
CO5	3	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21HORU0605**
Course Title	**POST-HARVEST MANAGEMENT AND VALUE ADDITION OF FRUITS AND VEGETABLES**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised Course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To understand the importance of post - harvest processing in fruits and vegetables. • To learn about the factors that affects the post - harvest process. • To learn about the respiration and different types of storage house. • To learn about the methods of preservation, Intermediate Moisture Food preparation. • To learn about the different types of drying and packing.		

UNIT	Content	No. of Hours
I	Importance of post-harvest processing of fruits and vegetables, extent and possible causes of postharvest losses.	4
II	Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening.	3
III	Respiration and factors affecting respiration rate. Harvesting and field handling. Storage (ZECC, cold storage, CA, MA,	3

	and hypobaric).	
IV	Value addition concept, Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards, Fermented and non-fermented beverages.	4
V	Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning – Concepts and Standards, packaging of products.	2
Practical	Applications of different types of packaging, containers for shelf life extension. Effect of temperature on shelf life and quality of produce. Demonstration of chilling and freezing injury in vegetables and fruits. Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomato products, canned products. Quality evaluation of products -- physico-chemical and sensory. Visit to processing unit/ industry.	35
References	Text Books (with chapter number & page number, wherever needed): 1. Vennila, P. and S. Kanchana. 2003. *Principles and preservation of fruits and vegetables.* Ratna Publications, Madurai. 2. Cruesss, W.V. 2000. *Commercial fruit and vegetable products*. Agrobios **(**India) 3. Jodhpur Pandey, P.H.2002. *Post Harvest Technologies of fruits and vegetables. Principles and practices*. Saroj Publishers and Distributors, Allahabad. 4. Saraswathy S., T.L. Preethi, S. Balasubramanyan, J. Suresh, N. Revathy and S. Natarajan. 2008. *Post Harvest Management of Horticultural Crops*. 5. Srivastava, R.P and Sanjeev Kumar. 1994. *Fruit and vegetable preservation. Principles and practices*. International book Distributing Co., Lucknow. Sudheer.	
	Reference Books: 1. K.P. and V. Indira. 2007. *Post Harvest Technology of Horticultural Crops*. New Delhi Publishing Agency, India. 2. Sumanbhatti and Uma Varma. 1995. *Fruit and vegetable processing*. CBS publishers and distributors, New Delhi 3. Thompson, A. K. 1996. *Post harvest Technology of fruits and vegetables*. Blackwell science, Inc. Cambridge. 4. Verma, L.R and V.K. Joshi 2000. *Post harvest technology of fruits and vegetables* **(**Vol I and II). Indus publishing company, New Delhi.	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http://www.fao.org/DOCKEP/005Y4358E/Y4358e04.htm 2. http://home.att.net/~africantech/GhIE/QPLFood.htm
Course Outcomes	On completion of the course, students should be able to do CO1: The students will acquire knowledge on various post-harvest management technologies on fruits and vegetables. CO2: The students will understand the different maturity indices of fruits and vegetables. CO3: The students will be having a thorough knowledge on harvesting, field handling and storage. CO4: The students will acquire knowledge on various management technologies on fruits and vegetables such as Jam, Jelly Candy and Squash. CO5: The Students will gain knowledge on concepts and methods of drying and canning, conventional and modern packaging methods.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	3	3	3
CO2	3	3	3	2	3
CO3	3	3	3	3	3
CO4	2	3	2	3	3
CO5	3	3	3	3	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21AECU0605**
Course Title	**FARM MANAGEMENT, PRODUCTION AND RESOURCE ECONOMICS**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum-
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Value-Added Courses imparting transferable and life skills		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze)		
Course Objectives (Maximum: 5)	**The course aims** • To impart knowledge on students about the basic aspects of Farm management and farm business analysis. • To describe the principle involved in cost of cultivation and its calculations • To impart knowledge on farm business analysis. • To impart knowledge on students about the concept of risk and uncertainty and the management of common property resources. • To describe the management of various farm resources.		

UNIT	Content	No. of Hours
I	**Meaning and concept of farm management,** objectives and relationship with other sciences. Meaning and definition of	3

	farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product -product relationship,	
II	**Law of equi-marginal/ or principles** of opportunity cost and law of comparative advantage. Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labour income and farm business income.	3
III	**Farm business analysis:** meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises.	3
IV	**Concept of risk and uncertainty** occurs in agriculture production, nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation. Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources.	3
V	**Positive and negative externalities in agriculture**, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.	2
Practical	Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resources in India.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1) Johl S.S. and Kapur T.R. 2001. Fundamentals of Farm Business Management, Kalyani publishers, Ludhiana.	

	2) Muniraj, R. 2000. Farm Finance for Development, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi. 3) Subbareddy, S and P. Raghu Ram, 1996. Agricultural Finance and Management, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
	Reference Books: 1. Raju V.T., 2002. Essentials of farm management, oxford and IBH publishing Co. Pvt. Ltd., New Delhi. 2. Sankhayan P.L., 2001. Introduction to Farm Management, Tata Mcgraw hill publishing Co. Ltd., New Delhi.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1.www.agrimoon.com
Course Outcomes	On completion of the course, students should be able to CO1: Prepare farm layout and calculate the depreciation cost of farm assets CO2: Determine most profitable level of inputs use in a farm production process CO3: Select the most profitable enterprise combination and apply the cost principles in the estimation of cost of crop and livestock enterprise CO4: Describe about the concept of risk and uncertainty and the management of common property resources CO5: Preparation of farm plan and budget, maintain farm records and profit and loss accounts

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	3	2	3	2
CO2	3	2	2	3	2
CO3	2	3	2	2	3
CO4	3	2	2	3	2
CO5	2	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21AGEU0604**
Course Title	**PROTECTED CULTIVATION AND SECONDARY AGRICULTURE**		
No. of Credits	**1+1**	No. of contact hours per Week	**3.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • learn the importance of green house and the factors influencing the effective functioning of green house. • identify different types of green houses based on constraints, covering materials, suitability and cost. • learn the design principles and estimate the construction cost of green house • learn the accessories needed & its types for effective functioning of green house. • estimate selected engineering properties of agricultural materials and learn the different types of & material handling equipments.		

UNIT	Content	No. of Hours
I	**Green House Technology** – introduction, advantages of Green houses, plant response to Green house environment parameter for plant growth in a Green house – light, temperature, soil temperature, air movement and humidity.	2.0
II	**Types of Green houses** – Based on shape, utility, construction, covering materials, suitability and cost.	2.0

III	**Design principles** – site selection, orientation, size, spacing and height of green house; components of Green house; Desirable environmental conditions for growth of a plant, cost estimation and economic analysis.	4.0
IV	**Design criteria** for cooling arrangements in a Green house – Ventilation, Evaporative cooling and movable insulation ; Design criteria for heating arrangement in a Green house – Direct solar gain, indirect solar gain, external sources of heating; Equipments for Green house – Temperature, radiation, photosynthesis and Leaf area Index measurement.	4.0
V	**Engineering properties of agricultural materials** – hydroscopic, physical, thermal, chemical and aerodynamic; basic drying theory – Equilibrium moisture content; Mechanical during types – thin bed and deep bed drying; Commercial grain dryer – solar cabinet drier, portable batch dryer, Recirculating batch dryer and tray dryer; Material handling equipment – bucket elevator and screw conveyor – components, function and suitability.	3.0
Practicals	Study of different type of green houses based on shape. Determine the rate of air exchange in an active summer winter cooling system. Determination of drying rate of agricultural products inside green house. Study of green house equipments. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials).Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Er. Sanjay Kumar, Er. Vishal Kumar and Ram Kumar Sahu, 2012. *Fundamentals of Agricultural Engineering*, Kalyani Publishers New Delhi. 2. P.H. Pandey, 1994. *Principles of Agricultural Processing – A Text Book*. Kalyani Publishers New Delhi.	
	Reference Books: 1. P.H. Pandey, 1998. *Principles of Practices of Post Harvest Technology– A Text Book*. Kalyani Publishers New Delhi. 2. R.P. Kachru, P.K. Srivastava, B.S. Bisht and T.P. Ojha, 1986 *Bankable Post Harvest Equipment Developed in India.* Central Institute of Agricultural Engineering, Bhopal, India.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) www.agrimoon.com	

Course Outcomes	On completion of the course, the students should be able to CO1: Appreciate the advantages of green house and favorable environment parameters for promoting plant growth. CO2: Classify the green house based on shape, utility, and construction, covering materials, suitability and cost. CO3: Design suitable green house based on crop and environmental conditions. CO4: Evaluate the parameters that affect the functioning of green house and standardize the physical requirements. CO5: Identify different mechanical driers and material handling equipments.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	3
CO2	2	3	3	2	2
CO3	2	3	3	2	2
CO4	3	2	2	2	3
CO5	2	3	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VI**	Course Code	**21AFSU0604**
Course Title	**PRINCIPLES OF FOOD SCIENCE AND NUTRITION**		
No. of Credits	**2+0**	No. of contact hours per Week	**2.0**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • Impart knowledge regarding the physical and chemical properties of the food constituents • Understand the role of microbes in food processing and spoilage • Familiarize the principles of food preservation and the methods of preservation. • Know the fundamentals of human nutrition and its relationship to health/wellness		

UNIT	Content	No. of Hours
I	**Food Composition and Chemistry:** Water- structure and properties, types of water; Carbohydrates – classification, structure and properties; Proteins- classification, structure and properties; Fats- classification, structure and properties; Vitamins & Minerals; flavours, colours, Miscellaneous bioactive substances in food and their properties; colloidal systems: sol, gel, emulsion and foam.	5.0
II	**Concept of Food Science:** Food groups, basic operations in	6.5

	food preparation. Cooking methods- moist, dry and combination. Composition and nutritive value of plant and animal foods; Processing of plant foods- cereals, pulses, nuts/oilseeds, fruits, vegetables; Processing of animal foods – milk, meat, poultry, egg, fish; storage of plant and animal foods.	
III	**Food spoilage:** Food deterioration meaning, causes of spoilage–microorganisms, enzymes/chemical reactions, insects, rodents, birds; microbial spoilage of fresh foods- cereals, pulses, nuts/oilseeds, fruits and vegetables, milk, meat, poultry, egg and fish and the processed products of these. Production of fermented foods - wine, beer, vinegar, soy based products and cereal/pulse based fermented products.	6.5
IV	**Food Preservation:** Principles and methods of food preservation**:** use of heat, low temperature, chemicals, fermentation, radiation, drying, evaporation, hurdle technology; novel methods – high pressure processing, ohmic heating, ozone processing, membrane processing, pulsed electric field, ultrasonication.	6.5
V	**Food and Nutrition:** Functions of food, nutrients– carbohydrate, protein, lipid, vitamins and minerals classification, functions, RDA, food sources, deficiency and toxicity; energy metabolism – energy balance, energy sources, energy expenditure, factors influencing energy intake and expenditure, Malnutrition- over and under nutrition, nutritional problems in India; concept of balanced modified diet, menu planning, health and wellness; dietary guidelines for healthy living, dietary modification for various diseases/disorders.	5.5
References	Text Books (with chapter number & page number, wherever needed): **Text books** 1. Swaminathan, M. (1999). *Food Science*, Chemistry and Experimental Foods. 2nd ed. The Banglore Printing and Publishing Co., Bangalore. 2. Many, N.S. and M. Shadaksharswamy (1996). *Food Facts and Principles*. 2nd ed. New Age International Pvt. Limited, New Delhi. 3. Kalia, M. and S. Sood (2010). *Food Preservation and Processing*. Revised edn. Kalyani Publishers, New Delhi. 4. Srilakshmi, B. (2018). *Food Science***.** 5th edn. New Age International. Pvt. Limited. 5. Jood, S. and N. Khetarpaul. (2002). *Food Preservation*. Geeta Somani Agrotech Publishing Academy, Udaipur. 6. Sivasankar, B. (2002). *Food Processing and Preservation*, PHI Learning Pvt. Ltd. Delhi. 7. Frazier W.C and D.C. Westhoff (1992), *Food Microbiology*, Tata McGraw Hill Publishing Co., Ltd. New Delhi.	

	Reference Books: 1. Ray, B (2001). *Fundamentals of Food Microbiology*, 2nd Ed, CRC press, Boca Raton F. 2. Srilakshmi, B. (2018). *Nutrition Science*. 5th edn. New Age International. Pvt. Limited. 3. SeemaYadav, (1997). *Food Chemistry*, Anomol Publications Pvt. Ltd., New Delhi. 4. Meyer, (1991). *Food Chemistry*, AVI Publictions, New York. 5. Norman N. Potter and Joseph H. Hotchkiss. (2006). *Food Science*, 5th Ed. Chapman & Hall, New York, USA. 6. Srilakshmi, B. (2018). *Dietetics***.** 5th edn. New Age International. Pvt. Limited.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org 3. www.icar.org.in 4. www.agrimoon.com
Course Outcomes	CO1: Describes the composition of different plant and animal foods and their properties. CO2: Explains the processing technologies of both plant and animal based food products CO3: Describes different factors of food spoilage CO4: Discusses about the principles of food preservation and its novel technologies. CO5: Explains the role of metabolites in human nutrition and energy metabolism.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	3
CO2	2	3	2	3	2
CO3	2	2	3	2	2
CO4	2	2	2	2	3
CO5	2	3	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VII**	Course Code	**21AEXU0704**
Course Title	**RURAL AGRICULTURAL WORK EXPERIENCE**		
No. of Credits	**0+20**	No. of contact hours per Week	
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Field Placement		
Scope of the Course (may be more than one)	• **Skill Development** • **Entrepreneurship** • **Field Placement / Field Project** • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • Train students in extension education by attaching to villages • Give exposure on development departments • Enable to understand the role of NGOs in Agriculture • Offer hands on training in Agro based industries		

UNIT	Content	No. of Hours
I	**I. Village Attachment Training Programme Studying Village Scenario** ➢ Orientation & On campus training by different faculties and Survey of Village Understanding, social participation, leadership pattern, scientific orientation and role of women and youth in agricultural development ➢ Conducting PRA to assess the resources.	(6Weeks)

	• Study of rural situation – village settlement pattern, demography, climate, land utilization pattern, resources inventory, infrastructural facilities, rural institutions, organizations, groups, customs, beliefs and value systems • Contacting individual farmers to assess the differential farming system practiced by marginal, small, medium, big farmers and Farm Women • **Agronomical Interventions** - Study of cropping pattern, cropping systems, extent of adoption of latest technologies and constraints – cereals, pulses, oilseeds – productivity – Decline in productivity – Yield gap – constraints in production ➢ Plant Protection Interventions ➢ Soil Improvement Interventions (Soil sampling and testing) ➢ Fruit and Vegetable production interventions ➢ Food Processing and Storage interventions ➢ Animal Production Interventions ➢ Extension and Transfer of Technology activities • Studying the existing indigenous technical knowledge and its importance for technology generation. • Gathering the farm women's association / farmers association / commodity groups and knowing their functioning and use their services for dissemination • Conducting need based skill demonstrations in the village.	
II	**II. Studying Development Departments** • Study the organizational structures and schemes implemented by the various Development Departments. • Study of Agricultural Department – Organization pattern, role and functions of Department of Agriculture and other allied departments • Study of KVK – Organization pattern, role and functions of Department of Agriculture and other allied departments	(2Weeks)
III	**III. Studying NGO** • Study of NGO – Roles and objectives – organizational pattern – sources of funding – extension activities of NGO	(2Weeks)

	– Contacting target groups • Study of SHG, Agri business, Agri clinic and documentation of success stories of the farmers	
IV	**IV. Agro Industrial Attachment** • Students shall be placed in Agro-and Cottage industries and Commodities Boards • Industries include Seed/ Sapling production, Pesticides-insecticides, Pesticides-insecticides, Post harvest processing, value addition, Agri-finance institutions, etc. **Activities and Tasks during Agro-Industrial Attachment Programme** • Acquaintance with industry and staff • Study of structure, functioning, objective and mandates of the industry • Study of various processing units and hands-on trainings under supervision of industry staff • Ethics of industry • Employment generated by the industry • Contribution of the industry promoting environment • Learning business network including outlets of the industry • Skill development in all crucial tasks of the industry • Documentation of the activities and task performed by the students • Performance evaluation, appraisal and ranking of students	(2Weeks)
Course Outcomes	On completion of the course, the students should be able to CO1: Conduct PRA to assess the resources and evaluate farming system practiced by marginal, small, medium, big farmers and farmwomen. CO2: Gather various farm associations and groups to know their functions, describe ITK and demonstrate various technologies to farmers. CO3: Describe the organizational structures and schemes implemented by the various Development departments, Agriculture and allied departments CO4: Discuss the roles and objectives, organizational pattern, funding, extension activities of NGOs and SHGs CO5: Acquaint with agro industry and staff to study structure, functioning, objective and mandates and develop skills to perform crucial tasks of the industry.	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	3
CO2	2	2	2	2	3
CO3	2	2	2	3	2
CO4	2	2	2	3	2
CO5	2	3	2	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Evaluation Pattern

Components	**VATP (6 Weeks)**	**ADA /KVK (2 Weeks)**	**NGO (2 Weeks)**	**Agro Industry (2 Weeks)**	**Total (12 Weeks)**
Participation and oral presentation	30 marks	10 marks	10 marks	10 marks	60 marks
Record	10 marks	5 marks	5 marks	5 marks	25 marks
Total	40 marks	15 marks	15 marks	15 marks	85 marks
				Overall Exhibition	15 marks
				Grand Total	***100 marks***

Semester	**VII**	Course Code	**21AGRU0713**
Course Title	**STUDY TOUR -1I**		
No. of Credits	**(0+1)**	No. of contact hours per Week	2.5
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Core Course		
Scope of the Course (may be more than one)	• Skill Development • Entrepreneurship • Field Placement / Field Project • Internship		

Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply)
ourse Objectives (Maximum: 5)	The Course aims to • Enrich the knowledge of students with different types of soils, crops, cultivation practices and latest techniques adopted in various Agro-climatic zones research station/institutes in South India.

UNIT	Content	No. of Hours
Practical	1. The students will visit various National and International Institutions related to Agriculture, Horticulture, Forestry and other allied fields in various regions of the country. The students will gain firsthand knowledge about different agro-climatic zones, crops grown, cultivation practices, socio-cultural and economic status of the farming communities in different parts of the country. The duration of the tour will be 12-15 days (institutional visits and intermediate journey) exclusive of onward and return journey. 2. Students will maintain a tour diary to record their observations at the places of visit. A Tour Record has to be submitted after the tour.	

Course Outcomes	On completion of the course, students should be able to do CO1: Familiarize with the functioning of important national institutes related to agriculture CO2: Familiarize with the functioning of important agricultural research stations CO3: Get exposed to various agro-climatic zones in the country CO4: Get exposed to the different types of crops grown and cultivation practices followed in different parts of the country. CO5 Familiarize with the socio economic and cultural conditions of the farming community

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	1	1	1	1
CO2	2	1	1	1	1
CO3	2	1	1	3	2
CO4	1	1	1	2	2
CO5	2	1	1	2	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Evaluation Procedure

1. Attendance : 10
2. Behaviour : 15
3. Tour diary : 10
4. Tour record : 20
5. Written test : 15
6. Viva-Voce : 10
7. Presentation : 10

TOTAL : 100

Semester	**VIII SEMESTER**	Course Code	**21AEXU0805**
Course Title	**PROJECT WORK**		
No. of Credits	0+4	No. of contact hours per Week	10.0
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Project		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • introduce thrust areas of research to students • teach research methodology • enable students to prepare research report		
UNIT	Content		No. of Hours
	Introduction to thrust areas of research – Identification of research problem – Review of literature – Research methodology – Conduct of study – Data collection – Analysis and interpretation of data – Preparation of research report and submission.		
References	Text Books (with chapter number & page number, wherever needed): 1. (Kothari, C.R. 1997. *Research Methodology*, Wishawa Prakasam, New Delhi. 2. Rangaswamy, R. 1995. *A Hand Book of Agriculture Statistics*, Wiley Eastern Ltd., New Delhi. 3. Robert A.D.2001. *How to Write and Publish Scientific Paper*, Cambridge University Press, and Cambridge.		

Course Outcomes	On completion of the course, students should be able to do CO1: Identify a research problem CO2: Conduct scientific literature survey and propose a project to find solution to the research problem CO3: Conduct the project study using scientific principles both in the lab and land CO4: Collect, analyze and interpret data to offer solution to the research problem CO5: Prepare and document the results and conclusions of the study project

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	1	1	2	2
CO2	1	2	2	1	1
CO3	2	3	3	2	2
CO4	2	2	3	3	2
CO5	3	2	2	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Evaluation procedure

1. Project plan : 10marks
2. Literature collection : 10 marks
3. Conducting the study : 25 marks
4. Project Report : 30 marks
5. Presentation : 15 marks
6. *Viva Voce* : 10 marks

Total : 100 marks

SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II
MODULES

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II PRODUCTION TECHNOLOGY FOR BIOAGENTS AND BIOFERTILIZER**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • Have hands on Experience in production of botanical insecticides, microbial insecticides, biological fungicides and biofertilizers. • understand the economics of bio control and biofertilizers production unit.		
	Work plan		
Preparation of neem oil, pungam oil and other plant based formulations. Packing and marketing - equipments & facilities needed. Economics of botanical insecticides and biofertilizers production. Mass production of *Rhizobium, Azotobacter, Phosphobacteria,* Mycorrhiza, *Bacillus thuringiensis, Pseudomonas, Trichoderma, Beauvaria, Verticillium and Metarrhizium*. Fermentors in large scale production. Operating procedures and standardization of parameters. Development of liquids and talc based formulations - Quality parameters - Marketing strategies - Economics of Bioagents and Biofertilizer - Visit to commercial biocontrol laboratories.			

Course Outcomes	On completion of the course, the students should be able to CO1: Demonstrate skills in the techniques for the production of biocontrol agents CO2: Demonstrate skills in the techniques for the production of biofertilizers. CO3: Elaborate on mass production on bioagents and biofertilizers. CO4: Manage bioagents and biofertilizers production unit CO5: Work out the economics and market the produced bioagents and biofertilizers.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	2	3
CO2	3	2	2	3	3
CO3	3	3	1	2	3
CO4	2	3	1	2	3
CO5	3	3	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **SEED PRODUCTION AND TECHNOLOGY**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To motivate the students in seed production activities as a business enterprise and to gain confidence as a leader in seed production technology.		
	Work plan		
Students will procure quality seeds from certified agencies/ Agricultural Universities/ Government seed farms. Depending upon the availability of seed, it will be taken for production. Students will themselves raise the crop till harvest following all scientific principles and approved methods. The seeds harvested will be marketed after following seed legislation. A balance sheet will be prepared for making out profit and loss account.			

Course Outcomes	On completion of the course, students should be able to do CO1: Raise the crop following approved methods for seed production. CO2: Develop skills in the techniques for scientific seed production CO3: Elaborate on seed certification procedures CO4: Develop skills on management of seed production unit CO5: Calculate the economics and market produced seeds.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	3
CO2	3	2	2	2	3
CO3	3	2	2	3	3
CO4	2	3	1	2	2
CO5	3	2	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **MUSHROOM CULTIVATION TECHNOLOGY**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • motivate the students in Mushroom production techniques. • understand the economics of Mushroom production enterprise.		
	Work plan		
Students will learn about Mushroom culture techniques, Mushroom spawn, types–techniques in commercial spawn production, bed spawn preparation techniques, Spawn lab layout designing – exposure on the creation of infrastructure and machinery. Cultivation techniques of mushrooms *Agaricus* spp, *Pleurotus* spp, and *Volvariella* spp – Button mushroom, Oyster mushroom, Milky mushroom and Paddy straw mushroom farm layout design – assignment – Guidelines on harvesting, grading, packaging and post-harvest storage of mushrooms – Preparation of value added mushroom products, Mushroom business planning and project preparation and cost analysis.			

Course Outcomes	On completion of the course, students should be able to do CO1: Identify different types of mushroom used for commercial production CO2: Develop skills in mushroom culture techniques CO3: Practice the production of mushrooms. CO4: Develop skills on handling and creation of infrastructure for mushroom production CO5: Plan mushroom business and marketing

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	3	3
CO2	3	2	1	3	3
CO3	3	3	1	3	3
CO4	2	3	1	2	3
CO5	3	3	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **SOIL, PLANT, WATER AND SEED TESTING**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • train the students to get familiarized with the recent methods adopted in the analysis of soil, water and plants • set up soil, water and plant clinic, • interpret the soil and plant analysis data • give suitable fertilizer recommendation to the farmers.		
	Work plan		

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Collection and Preparation of Soil sample, Analysis of soil sample for pH, EC and available N, P, K, S exchangeable Ca and Mg, DTPA extractable Zn, Mn, Fe and Cu and hot water-soluble B. Collection of Irrigation water sample in bore well and open well, Analysis of water sample for pH, EC, cations and anions, Calculation of irrigation suitability indices. Analysis of plant samples: Tissue test, plant analysis – visual nutrient deficiency symptoms – collection and preparation of plant sample, preparation of Di/Tri acid extract, Analysis of plant sample for total N, P, K, Ca, Mg, S, Zn, Fe, Mn ,Cu, B and Cl. Interpretation of plant analysis data.

Course Outcomes	On completion of the course, students should be able to do CO1: Collect and prepare soil, water and plant samples for analysis CO2: Develop skills in the recent methods adopted in the analysis of agricultural samples CO3: Identify nutrient deficiency symptoms and recommend suitable corrective measures CO4: Develop skills for the management of soil, water and plant clinics. CO5: Interpret the soil and plant analysis data and give suitable recommendation to farmers

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	2	2
CO2	3	2	3	3	2
CO3	3	2	1	2	3
CO4	3	3	2	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **COMMERCIAL BEE KEEPING**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • have hands on training in beekeeping • understand the economics of bee keeping and • marketing of honey and other by-products		
	Work plan		

Hands on experience in establishment of Apiary-Transport of hives, installing hives in Apiary. Maintenance of bee floral garden – identification of nectar and pollen yielding plants – preparation of month wise bee floral calendar-Management of bees during dearth and honey flow period. Swarming and absconding – Detection and management. Pest and disease management in bees- Harvesting of honey – Packing and marketing - Processing bee wax and marketing – Cost benefit ratio of rearing Indian bees

Course Outcomes	On completion of the course, the students should be able to CO1: Identify different types of bees and establish an apiary. CO2: Transport and install hives and maintain a bee floral garden CO3: Practice the production of honey and other by-products. CO4: Develop skills on Pest and disease management in bees CO5: Pack and market honey and other by-products

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	2	3
CO2	3	2	1	3	2
CO3	2	3	1	3	3
CO4	3	2	1	2	3
CO5	3	3	1	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **POULTRY PRODUCTION TECHNOLOGY**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To give practical exposure to the students in poultry production methods (broiler and desi types), concepts of poultry houses and other advanced techniques used in the industry.		
	Work plan		
Systems of rearing – backyard system, semi-intensive system, intensive system; Selection of site and location of farm – poultry housing, principles of housing, principles of construction; Types of houses – open sided, deep litter, slat system, wire floor, cage houses and raised cage houses; Cages – types of cages; Environmentally controlled houses; Fundamentals of ventilation system – tunnel, duct, windowless; Insulating materials for poultry houses; Farm equipment; Automation in industry – automatic climate control – feeders and drinkers, egg and mature collection system – automation in feed mill units, hatchery and egg processing unit- working out the profit and loss – marketing.			

Course Outcomes	On completion of the course, the students should be able to CO1: Identify suitable site and location for poultry production unit. CO2: Construct poultry house based on the principles of poultry housing and construction CO3: Maintain a poultry production unit CO4: Develop skills to handle automated systems in the poultry unit CO5: Calculate the economics and marks the eggs

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	3	3
CO2	3	3	2	3	3
CO3	3	3	2	3	2
CO4	2	3	1	3	3
CO5	2	3	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **COMMERCIAL HORTICULTURE**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • give practical exposure to the students in propagation practices of commercially important horticultural crops and their production techniques.		
	Work plan		

Identification of commercially important horticultural crops; Propagation practices in mango, guava, sapota, flower crops, commercially important vegetables; Orchard management; Crop specific practices like pinching, disbudding, training and pruning; Storage and preservation of the economically important crops; Scope of export and its regulations.

Course Outcomes	On completion of the course, the students should be able to CO1: Identify and propagate various commercially important horticultural crops CO2: Develop skills in crop specific practices like pinching, disbudding, training and pruning CO3: Develop skill in management of an orchard CO4: Store and preserve economically important crops for marketability CO5: Assess the export potential of horticultural crops and follow the regulations for export

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	3	3
CO2	3	2	1	3	3
CO3	3	2	2	3	2
CO4	3	3	2	2	3
CO5	3	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **FLORICULTURE AND LANDSCAPING**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To give practical exposure to the students in production techniques of flower crops and landscaping		
	Work plan		

Identification of species and varieties in loose flowers –propagation and planting – seed treatment and sowing – planting of tubers and suckers – layout and planting of rose and jasmine –special practices in rose, jasmine, chrysanthemum and marigold – harvesting, post harvest handling and storage identification of ornamental plants and garden components – study of form, size, shape, texture, flowering season and flower colour of different living components – Identification and description of trees, shrubs, flower beds, foliage beds, climbers and creepers, hedges, edges. evaluation of different garden sites in the campus based on the basic principles – lawn – study of types of grasses – establishment, care and maintenance of lawn – art of topiary – identification, planning and designing of non – living

components –preparation of landscape design plan for various sectors.	
Course Outcomes	On completion of the course, the students should be able to CO1: Identify various species and varieties in loose flowers CO2: Demonstrate skill in propagation, cultivation, post harvest handling and storage of flower crops CO3: Identify and describe various components of a garden. CO4: Identify different types of grasses, establish and maintain a lawn CO5: Prepare landscape design plan for various sectors.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	3	2
CO2	3	2	1	3	3
CO3	3	3	2	3	2
CO4	3	3	1	2	3
CO5	2	3	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **FOOD PROCESSING**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To give practical exposure to the students in food processing techniques which are relevant to the current trend.		

Work plan
Post harvest processing of fruits and vegetables- Peeling, sizing, blanching, canning of fruits and vegetables, Drying and freezing of fruits and vegetables. Juice processing- Juice extraction, equipment's and methods of fruit juice extraction, preservation of fruit juices, fruit juice clarification, concentration of fruit juices, fruit juice powders. Fruit juice processing- Orange and tangerine, Lemon and lime juice, Apple juice, Grape juice, Nectars, pulpy juices, tropical blends, Vegetable juices. Manufacture of Jam, Jelly and Marmalade. Tomato based products- Juice, puree, paste, sauce, ketchup. Making pickles- Principle of pickling, technology of pickles. Drying and dehydration technology of fruits and vegetables: preparation of raisins, anardana, dried fig, dried leafy vegetables, juice powders, flakes, wafers, chips etc.

Course Outcomes	On completion of the course, the students should be able to CO1:Demonstrate skill in post harvest processing of fruits and vegetables CO2:Practice different methods of fruit juice extraction, preserve, clarify, concentrate fruit juices CO3:Prepare jam, jelly, marmalade and pickles CO4:Demonstrate skill in preparing Tomato based products CO5:Develop skill in drying and dehydration technology of food products

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	3	3
CO2	3	2	2	3	3
CO3	3	3	2	3	2
CO4	3	2	2	3	2
CO5	2	3	3	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **AGRICULTURE WASTE MANAGEMENT**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To study the nature of different types of wastes and different techniques of preparing enriched composts • To know the role of microorganism in composting techniques • To study the quality standards of compost and its role in sustainable agriculture		
	Work plan		
Characterization of waste material – Physical characterization of waste materials- Chemical characterization of waste materials - method of composting – Aerobic method of composting - Anaerobic method of composting-enriched compost-Vermicomposting– qualitative analysis- estimation of microbial load- assessment of maturity of compost by physical and chemical tests – Maturity index -quantitative assay – Estimation of N, P, K and micronutrient - Dehydrogenase activity of mature compost – value addition of compost - visit to compost yard.			

Course Outcomes	On completion of the course, the students should be able to CO1:Demonstrate knowledge in the aerobic and anaerobic method of composting CO2:Assess the physical and chemical characteristics of compost CO3:Practice different methods of composting CO4:Test the maturity of the compost using maturity indices CO5:Estimate the quantity of nutrients present in the compost

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	3
CO2	3	2	1	3	3
CO3	3	2	3	3	2
CO4	3	3	1	3	2
CO5	3	2	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **ORGANIC PRODUCTION TECHNOLOGY**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To impart knowledge on various aspects of organic farming and • its importance in present world scenario and its impact on environment and soil health.		
	Work plan		
Organic Crop Production and Protection methods. Organic certification – NPOP guidelines – Certification agencies in India – crop production standards – Quality considerations – labeling and accreditation process – marketing and export opportunities; Indigenous practices in seed treatment and raising of field crop (Rice/ Maize/ Cowpea/ Cotton/ Sugarcane); Hands-on-experience in recycling techniques–composting and vermicomposting, Production techniques – grading, packaging; ITK based preparations (Panchakavya, Dasakavya, Amirthakaraisal, fish amino acids); Manures and bio-fertilizers application methods practical experience; Exposure visit to bio–control agent units and bio-fertilizer production units; Working out cost of production for organic cultivation of important field crops.			

Course Outcomes	On completion of the course, the students should be able to CO1:Demonstrate knowledge on organic certification procedures CO2:Create composting facility based on need and availability of resources CO3:Prepare organic nutrient solutions and insect repellants based on ITK CO4:Demonstrate application of organic nutrient solutions and insect repellants CO5: Work out the cost of cultivation for organic cultivation of important field crops.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	3
CO2	3	3	1	3	2
CO3	3	3	1	3	3
CO4	3	3	1	2	3
CO5	2	2	1	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**VIII**	Course Code	**21SDEU0801/ 21SDEU0802**
Course Title	**SKILL DEVELOPMENT AND ENTREPRENEURSHIP I & II** **COMMERCIAL SERICULTURE**		
No. of Credits	**0+ 10**	No. of contact hours per Week	25
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Modular Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To have hands on training in sericulture • To understand the economics and marketing of cocoons		

Work plan
Description of mulberry plant and propagation techniques- Nursery bed preparation - care in selection of planting materials - biofertilizer treatment in nursery main field preparation - methods of planting-Identification of nutrient deficiency symptoms and identification of weeds – Pruning and training methods -selection of leaf for harvesting based on the larval instar - preservation of leaves. Identification of damaged symptoms of pests, diseases and nematodes of mulberry- Study the morphology of mulberry silkworm - different stages - sexual dimorphism- identification of races by cocoon shape and colour- dissection of mouth parts and silk glands. Study of ideal rearing house and rearing appliances - preparation and methods of disinfection- Incubation of eggs - methods - chawki rearing - brushing – feeding- cleaning and other practices in silkworm unit- Identification of pests and diseases of silkworm- Harvesting and deflossing - Visit to Grainage and cocoon market - Eri and Tasar silkworms - morphology - food plants- rearing methods- Economics of mulberry silkworm rearing and visit to sericulture farms - interaction with sericulturists.

Course Outcomes	On completion of the course, the students should be able to CO1: Demonstrate skill in propagation and cultivation of mulberry plant CO2: Select, harvest and preserve leaves of mulberry plant according to larval instar CO3: Identify races by cocoon shape and colour CO4: Practice rearing of silkworms including eri and tasar silkworms CO5: Calculate the economics of silkworm rearing

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	1	3	3
CO2	3	2	1	3	3
CO3	3	2	2	3	2
CO4	3	3	2	2	3
CO5	3	2	2	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Evaluation pattern for Skill Development And Entrepreneurship I & II

S.No.	Parameters	Max. Marks
1.	Project Planning and Writing	10
2.	Presentation	10
3.	Regularity	10
4.	Monthly Assessment	10
5.	Feasibility Study and Output delivery	10
6.	Technical Skill Development	10
7.	Entrepreneurship Skills	10
8.	Business Plan and Networking skills	10
9.	Report Writing Skills	10
10.	Final Presentation	10
	Total	**100**

ELECTIVE COURSES

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**WEED MANAGEMENT**		
No. of Credits	**2+1**	No. of contact hours per Week	4.5
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • To learn about Importance of Weed management and Herbicides • To learn about types, methods & techniques of Weed management.		

UNIT	Content	No. of Hours
I	Weeds- Definition- Introduction, Importance and Characteristics of weeds- harmful and beneficial effects of weeds- classification of weeds- propagation and dissemination- weed biology and ecology- crop weed association and crop weed competition and allelopathy	5
II	Concept of Weed management- weed prevention, eradication and control- Methods of weed control; Physical, Cultural,	5.5

	Chemical, Biological and bio-technological methods- Integrated Weed Management (IWM).	
III	Herbicides- Definition, Classification and characteristics of herbicides- herbicide formulations- Methods of application of herbicides- Advantages and limitations of herbicide usage in India- Concept of adjuvants and surfactants	6.5
IV	Herbicide selectivity- Selective and non selective herbicides- herbicide absorption and translocation- Compatibility of herbicides with other agro inputs- Herbicide residue management-	6.5
V	Herbicide Mixture: Concept of herbicide mixture and utility in agriculture- Herbicide resistant weeds and their management- Herbicide resistant crops- Weed management in major field and horticultural crops- weed shift- weed control in non-cropped areas- aquatic and problematic weed and their control.	6.5
Practical	Techniques of weed preservation- weed identification and their losses study- Biology of important weeds- study of herbicide formulations and mixture of herbicide- Herbicide and agro-chemicals study- shift of weed flora study in long term experiments- Study of methods of herbicide application, spraying equipments- Calculations of herbicide doses and weed control efficiency and weed index.	37.5
References	Text Books 1. Gupta, O.P.1998. *Modern Weed Management*. Agro Botanica, Bikaner, India 2. Subramanian,S., A. Mohammed Ali and R.Jayakumar, 1991.*All about Weed Control*. Kalyani publishers, New Delhi.	
	Reference Books: 1. Jaganathan, R. and R.Jayakumar, 2003. *Weed Science Principles*. Kalyani Publishers, New Delhi	
	E-Resources 1. www.tnau.ac.in 2. www.fao.org 3. www.tnau.ac.in/agriportal	

Course Outcomes	On completion of the course, students should be able to do CO1:Identify and classify different types of weeds CO2:Communicate different methods of weed control including integrated weed management CO3:Classify herbicides and calculate herbicide doses and demonstrate various application methods of herbicides CO4:Select herbicides based on compatibility with other inputs and discuss herbicide residue management CO5:Discuss weed management in field and horticultural crops and in non cropped areas.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	2	3	2	3	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**SYSTEM SIMULATION AND AGRO ADVISORY**		
No. of Credits	2+1	No. of contact hours per Week	4.5
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims** • To impart knowledge on System approach for representing Soil-Plant-Atmospheric Continuum (SPAC) i.e., Crop models concepts and techniques and data needs. • To evaluate the crop responses to weather elements, study of elementary crop growth models- calibration, validation and verification and sensitivity analysis. • To provide knowledge on crop production in moisture and nutrients limited conditions • To facilitates the knowledge about Weather forecasting- types, methods, verification of forecast, value added weather forecast • To train the students on preparation of Agro-advisory bulletin based on weather forecast and use of simulation models for Agro-advisory purpose.		

UNIT	Content	No. of Hours
I	**System Approach for representing soil-plant-atmospheric continuum**: system boundaries, Crop models, concepts &	5.0

	techniques, types of crop models, data requirements, relational diagrams.	
II	**Evaluation of crop responses:** to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling techniques for their estimation.	5.5
III	**Crop production:** in moisture and nutrients limited conditions; components of soil water and nutrients balance.	6.5
IV	**Weather forecasting**: types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity;	6.5
V	**Crop-Weather Calendars**: Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.	6.5
Practicals	Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production; yield forecasting, insect & disease forecasting models. Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast. Feedback from farmers about the agro advisory.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Ghadekar S. R. 2001. *Meteorology*. Agromet Publishers, Nagpur, Maharastra, India, 251 pp. 2. Griffiths, J. F. (ed). 1994. *Handbook of Agricultural Meteorology*. Oxford University Press, United Kingdom, 320 pp. 3. Jackson, I. J. 1989. *Climate, Water and Agricultural in the Tropics* (2nd edition). Longman, United Kingdom, 377 pp.	
	Reference Books: 1. Jones, H. G. 1992. *Plants and Microclimate*. Cambridge University Press, U. K., 428 pp. 2. Mavi, H,S. 1986. *Introduction to Agrometeorology*. Oxford and IBH publishing company, New Delhi, India, 237 pp. 3. Murthy, V.R.K. 1995. *Practical Manual on Agricultural Meteorology*. Kalyani Publishers, Ludhiana, India, 86 pp	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org	

Course Outcomes	**On the completion of the course , students should be able to** CO1: Discuss about the concepts and techniques of crop models, its types and data needs. CO2: Demonstrate knowledge in calibration, validation, verification and sensitivity analysis of elementary crop growth models. CO3: Explain about the management of crops under limited moisture and nutrients situations. CO4: Elaborate on the types, methods, tools & techniques, and verification of weather forecasting including validity of ITK based forecasting CO5: Prepare of Agro-advisory bulletin based on weather forecasting.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	3	3	2
CO2	2	3	3	2	2
CO3	2	2	2	3	2
CO4	3	2	2	2	3
CO5	3	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**COMMERCIAL PLANT BREEDING**		
No. of Credits	**1+2**	No. of contact hours per Week	**6.0**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • Educate the students on aspects of hybridization techniques • Teach the students on quality seed production • Teach the students on advanced crop improvement • Teach the students on new variety release proposals • Teach the students on principles and techniques of commercial seed production techniques		

UNIT	Content	No. of Hours
I	**Mode of reproduction**: Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production.	2.0
II	**Genetic Purity test:** of commercial hybrids. Advances in hybrid seed production of rice, maize, sorghum, pearl millet, castor, sunflower, cotton pigeon pea, Brassica. Quality seed production of vegetable crops.	3.0

III	**Alternative strategies:** For the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools.	4.0
IV	**IPR issues in commercial plant breeding**: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India.	4.0
V	**Principles and techniques of seed production:** types of seeds, quality testing in self and cross pollinated crops.	2.0
Practicals	Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system. Learning techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing hybrid seed production. Concept of rouging in seed production plot. Concept of line its multiplication and purification in hybrid seed production. Role of pollinators in hybrid seed production. Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops. Sampling and analytical procedures for purity testing and detection of spurious seed. Seed drying and storage structure in quality seed management. Screening techniques during seed processing viz., grading and packaging. Visit to public private seed production and processing plants.	75.0
References	Text Books (with chapter number & page number, wherever needed): 1. Daniel Sundararaj, D. and G Thulasidas, 1993. *Botany of Field Crops*. MacMillan India Ltd., New Delhi. 2. Chakravarty, A. 1999. *Post Harvest Technology of Cereals*, Pulses and Oil Seeds. Oxford and IBH Pub. New Delhi.	
	Reference Books: 1. Arya, P.S. 2001. *Breeding and Seed Production*. Kalyani Pub., Ludhiana 2. R.L. Agarwal, 1995. *Seed Technology*, Oxford & IBH Publication, New Delhi	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org	

Course Outcomes	**On the completion of the course , students should be able to** CO1: Demonstrate knowledge in the methodologies involved in hybrid seed production. CO2: Identify and explain the methodologies employed for self, cross and vegetatively propagated crops CO3: Show enhanced knowledge in the field of commercial plant breeding. CO4: Discuss about the intellectual property rights and variety release process CO5: Carry out seed quality testing for self and cross pollinated crops

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	3
CO2	3	3	1	3	2
CO3	3	2	2	3	2
CO4	3	3	2	2	3
CO5	2	1	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**MICRO PROPAGATION TECHNOLOGIES**		
No. of Credits	**1+2**	No. of contact hours per Week	**6.0**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Field Placement / Field Project • Entrepreneurship		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	The course aims to • Teach the students about the concept, advantages and limitations of plant tissue culture • Make the students understand organogenesis and embryogenesis • Teach the students various techniques in callus culture • Educate the students on protoplast culture and its applications • Educate the students on production aspects of secondary metabolites		

UNIT	Content	No. of Hours
I	**Introduction**, History of plant tissue culture-Concepts– Advantages and limitations, Factors affecting plant tissue culture.	2.0
II	**Organogenesis and embryogenesis**, Micro propagation – stages of micro propagation, Ovule, ovary endosperm culture, synthetic seeds.	3.0
III	**Callus culture**- cell culture, shoot tip culture – meristem/ meristem tip culture for virus elimination-virus indexing-anther and microspore culture.	4.0

IV	**Protoplast culture** and fusion techniques Applications, Somatic embryogenesis **(**direct and indirect), cell suspension culture.	4.0
V	**Production of secondary metabolites**, somaclonal variation - *In vitro* mutagenesis- *In vitro* germplasm conservation.	2.0
Practicals	Identification and use of equipments in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers and small instruments, sterilization techniques for explants, Preparation of stocks and working solution, Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.	75.0
References	Text Books (with chapter number & page number, wherever needed): 1. Bhojwani and Dantu, 2013. *Plant Tissue culture: An introductory Text*, Springer, New Delhi. 2. Bhojwani, S.S and Razdan. M.K. 2009. *Plant Tissue culture-Theory and Practice*. Elsevier India Pvt. Ltd.	
	Reference Books: 1. Cassells, A. C and Peter B. Gahan. 2006. *Dictionary of Plant Tissue culture*. Food Products Press, an Imprint of the Haworth Press, Inc., New York-London-Oxford.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org	
Course Outcomes	**On the completion of the course , students should be able to** CO 1: Demonstrate knowledge in the basic tissue culture techniques CO 2: Practice various sterilization methods CO 3: Demonstrate skill in various techniques in callus culture. CO 4: Describe on protoplast culture and its applications CO 5: Explain about the production aspects of secondary metabolites	

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	3
CO2	3	3	1	3	2
CO3	3	2	2	3	2
CO4	3	3	2	2	3
CO5	2	1	1	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**BIOPESTICIDES AND BIOFERTILIZERS**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship • Employability • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims to** • Impart knowledge on history, concepts and mass production technology of biopesticide • Impart knowledge on Biopesticide Application methods and quality control • Introduce the concepts of biofertilizers • Discuss the concepts in biofertilizer and mass production • Imparts knowledge on Application technology, quality control and marketing of biofertilizer		

UNIT	Content	No. of Hours
I	**History and concept of biopesticides**. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationals. Botanicals and their uses. Mass production technology of bio-pesticides.	5.0

II	**Virulence, Pathogenicity** and symptoms of entomopathogenic pathogens and nematodes. Methods of application of biopesticides. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticide.	5.5
III	**Biofertilizers -** Introduction, status and scope**.** Structure and characteristic features of bacterial biofertilizers- *Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium* and *Frankia*; Cynobacterial biofertilizers- *Anabaena*, *Nostoc*, Hapalosiphon and fungal biofertilizers- AM *mycorrhiz*a and *ectomycorhiza.*	6.5
IV	**Nitrogen fixation -Free living and symbiotic nitrogen fixation**. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization. Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers.	6.5
V	**FCO specifications and Quality control of Biofertilizers**. Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.	6.5
Practical	Isolation and purification of important biopesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium* etc. and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides. Isolation and purification of *Azospirillum* , *Azotobacter*, *Rhizobium*, P- solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Subba Rao, N.S. 1999. *Biofertilizers in Agriculture and Agroforestry*. Oxford and IBH, New Delhi. 2. Subba Rao, N. S. 2000. *Soil Microbiology*. Oxford and IBH, New Delhi. 3. Alexander, M. 1985. *Introduction to Soil Microbiology*, John Willey and Sons Inc. N. Y. and London 4. Rangaswami, G. and D. J. Bagyaraj, 1999. *Agricultural Microbiology***,**	

	Asia Publishing House, New Delhi.
	Reference Books: 1. Wicklow, D.T. and B.E. Soderstrom. 1997, *Environmental and Microbial Relationships*. Springer ISBN. 2. Kannaiyan, S. (2003). *Biotechnology of Biofertilizers*, CHIPS, Texas. 3. Mahendra K. Rai (2005). *Hand book of Microbial Biofertilizers*, The Haworth Press, Inc. New York
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org 3. www.agrimoon.com
Course Outcomes	**On the completion of the course , students should be able to** CO1: Isolate biocontrol microbes for mass production of biopesticides. CO2: Perform and Practice on biopesticide application methods. CO3: Isolate, discuss and analyze the uses of biofertilizer. CO4: Apply the concepts in biofertilizer mass production CO5: Apply the technology of application, marketing and quality control in biofertilizer production.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	3	2	3	3
CO4	2	3	2	3	3
CO5	3	2	3	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark

Note: No course can have "0" (Zero) score

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**AGROCHEMICALS**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Entrepreneurship • Field Placement / Field Project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	**The course aims to** • Introduce the uses of agrochemicals and management for sustainable agriculture • Impart knowledge of Herbicides and fungicides • Introduce the insecticides and their Classification • Introduce the Fertilizers and their importance and impart knowledge on manufacturing • Impart knowledge on mixed and complex fertilizer		

UNIT	Content	No. of Hours
I	**An introduction to Agrochemicals:** Their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture.	5.0
II	**Herbicides:** Major classes, properties and important herbicides. Fate of herbicides. Fungicides - Classification –	5.5

	Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride. Organic fungicides- Mode of action-Dithiocarbamates- characteristics, preparation and use of Zineb and maneb. Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use.	
III	**Introduction and classification of Insecticides:** Inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses. Plant bio-pesticides for ecological agriculture, Bio-insect repellent	6.5
IV	**Fertilizers and their importance:** Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate.	6.5
V	**Mixed and Complex fertilizers:** Sources and compatibility– preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitro phosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing.	6.5
Practicals	Sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticides appliances. Quick tests for identification of common fertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used. To study and identify various formulations of insecticide available kin market. Estimation of nitrogen in Urea. Estimation of water soluble P2O5 and citrate soluble P2O5 in single super phosphate. Estimation of potassium in Muriate of Potash/ Sulphate of Potash by flame photometer. Determination of copper content in copper oxychloride. Determination of sulphur content in sulphur fungicide. Determination of thiram. Determination of ziram content.	37.5

References	Text Books (with chapter number & page number, wherever needed): 1. Buchel, K. H. 1983 *Chemistry of Pesticides*. John Wiley and Sons New York. 2. Collings G. H. 1955 *Commercial Fertilizers*. Mc. Grew Hill Publishing Co. New York. 3. Geroge W. W 1986. *Fundamentals of Pesticides- A self instruction Guide*. Thomas publication P.O. Box 9335. Freno, California. 4. Sree Ramulu, U. S. 1979. *Chemistry of Insecticides and Fungicides*. Oxford and IBH Publishing House Co. New Delhi.
	Reference Books: 1. Sree Ramulu, U.S. 1990. *Methods of Pesticides Analysis*, Oxford-IBH 2. Gunter Zweig Academic *Pesticides, Plant Growth Regulators and Food Additives*, Vol I to XI , Gunter Zweig Academic . 3. Vogel.A.I. – 1989. *A Textbook of Practical Organic Chemistry*. ELBS with Longman, 5th Ed.,
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in 2. www.fao.org/ soils- portal 3. www.fertcorpindia.nic.in 4. www.agrimoon.com 5. www.icar.org.in
Course Outcomes	CO 1: Discuss the uses of agrochemicals and their management for sustainable agriculture. CO 2: Classify and discuss the mode of action and fate of different types of fungicides. CO 3: Classify and Identify various formulations and calculate the doses of insecticides for application. CO 4: Discuss the importance of fertilizers and manufacturing procedures. CO 5: Sample and analyze fertilizers and pesticides.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	2	3	3
CO3	3	1	2	3	2
CO4	2	3	2	3	3
CO5	3	3	3	2	2

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**HI-TECH HORTICULTURE**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised course	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate) • K-6: (Create)		
Course Objectives (Maximum: 5)	The Course aims to • To learn about the nursery management and micro propagation of horticultural crops. • To impart knowledge on the protected cultivation of vegetables, fruits and Flower crops. • To learn about the High Density Planting. • To sensitize the students on hi-tech production technology of fruits, vegetables and flower crops. • To learn about the application of precision farming.		
UNIT	Content		No. of Hours
I	**Introduction**: Introduction & importance; Nursery management and mechanization; micro propagation of horticultural crops; Modern field preparation and planting methods.		8

II	**Importance and methods of Protected cultivation**: Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH based fertilizer scheduling.	6
III	**High density planting**: Canopy management, high density orcharding	5
IV	**Concept and introduction of Precision Horticulture**: Components of precision farming: Remote sensing, Geographical Information System (GIS), Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA).	6
V	**Precision farming techniques for Horticultural crops:** Application of precision farming in horticultural crops (fruits, vegetables and ornamental crops); mechanized harvesting of produce.	7
Practical	Types of Polyhouses and shade net houses, Intercultural operations, tools and equipments identification and application, Micro propagation, Nursery- protrays, micro-irrigation, EC, PH based fertilizer scheduling, canopy management, visit to hi-tech orchard/nursery.	35
References	Text Books (with chapter number & page number, wherever needed): 1. Anonymous 2003. Proc. *All India Seminar on Potential and Prospects for Protective Cultivation.* Organized by Institute of Engineers, Ahmednagar. Dec.12- 13, 2003. 2. Chandra, S. and V. Som. 2000. *Cultivating Vegetables in Green House*. Indian Horticulture 45:17-18. 3. Prasad, S and U. Kumar. 2005. *Greenhouse Management for Horticultural Crops*. 2nd Ed. Agrobios.	
	Reference Books: 1. Tiwari, G.N. 2003. Green House Technology for Controlled Environment. Narosa Publ. House.	
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http://www.informaworld.com/smpp/title~db=all~content=g904622674 2. http://www.ces.ncsu.edu/depts/hort/hil/hil-32-a.html 3. http://attra.ncat.org/attra-pub/manures.html 4. http://ucanr.org/freepubs/docs/8129.pdf	

Course Outcomes	On completion of the course, students should be able to do CO1: Explain the aspects of nursery production and micro propagation techniques of horticultural crops CO2: Demonstrate knowledge on principles and practical aspects of protected cultivation techniques. CO3: Discuss about the consequences of high density orchard planting and their canopy management CO4: Elaborate on basic remote sensing concepts and applications and Geographic Information Systems (GIS) mapping technologies. CO5: Demonstrate knowledge on precision farming techniques in various fruits, vegetables and ornamental crops.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	2	3	3	3	3
CO4	3	3	3	2	3
CO5	3	3	3	3	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**LANDSCAPING**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Field Placement / Field Project • Internship		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze) • K-5:(Evaluate) • K-6: (Create)		
Course Objectives (Maximum: 5)	The Course aims to • To learn about Importance, Principles of Landscape Horticulture and Garden components • To learn about the Lawn making and Landscape Design. • TO learn about the selection of ornamental plants • To learn about the Bio-aesthetic planning. • To learn about the bonsai growing and management, lawn establishment and CAD application		

UNIT	Content	No. of Hours
I	**Importance and scope of landscaping**. Principles of landscaping, garden styles and types, terrace gardening,	8

	vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes.	
II	**Trees**: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture. Climber and creepers:	6
III	**Importance, Selection, Propagation, Planting**, Annuals, selection, propagation, planting scheme, other garden plants: palms, ferns, grasses and cacti, succulents. Pot plants: selection, arrangement, management.	6
IV	**Bio-aesthetic planning**: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions.	7
V	**Bonsai**: principles and management, lawn: establishment and maintenance CAD application.	5
Practical	Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals care and maintenance of plants, potting and repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Use of computer software, visit to important gardens/ parks/institutes.	35
References	Text Books (with chapter number & page number, wherever needed): 1. Bose, T.K. and D. Mukherjee. 1977. *Gardening in India*. Oxford and IBH Publishers and Co., Calcutta. 2. Gopalsamy Iyengar, 1990. *Complete Gardening in India*. IBH, Bangalore. 3. John Ainsworth. 1988. *The Act of Indoor Bonsai*. Wardlock Publishing ltd., London. 4. John Ravenscroft. 1996. *Gardeners Diary*. Marshall Cavendish Publishers Italy. 5. Lancaster, P. 1991. *Gardening in India.* Oxford and IBH publishers Pvt. Ltd., Calcutta. 6. Kannan, M, P. Archana and S. Vinod. 2017 *Ornamental Gardening and Landscaping.* New India Publishing Agency, New Delhi.	

	Reference Books: 1. Nambisan, K. M. P. 1992. *Design Elements of Landscape Gardening*. Oxford and IBH Publications Co., (P) Ltd, New Delhi. 2. Peter Mc Hoy. 1997. *The A-Z Guide to House Plants*. Marshall Cavendish publishers, Italy.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.bestgarden.net 2. www.centralfloridagarden.blogspot.com 3. www.intuxford.tripod.com 4. www.lawngrasses.com 5. www.personal.psu.edu 6. www.sunny.crk.umn.edu/courses 7. www.webct.uark.edu
Course Outcomes	On completion of the course, students should be able to do CO1: Identify and classify different garden styles and types CO2: Apply the knowledge of selection, propagation and planting schemes of trees CO3: Apply the knowledge of selection, propagation and planting schemes of garden plants CO4: Plan and design gardens for different regions. CO5: Demonstrate skill in management of bonsai plants, lawn making methods and its management.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	2
CO2	2	3	3	2	2
CO3	2	3	3	2	2
CO4	2	2	2	3	3
CO5	3	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**PROTECTED CULTIVATION**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course		If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Core Course		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Field project		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims to** • Understand the Importance, methods and theoretical aspects of protected cultivation in horticultural crops. • To learn about the Greenhouse cultivation, principles and their types, developing skills in erection of protected structures and cultivation of horticultural crops. • To educate about the Protected cultivation technology for flower crops • To acquire knowledge the Protected cultivation technology for Vegetable crops • To impart comprehensive knowledge about the Protected cultivation technology for Medicinal and Aromatic crops		

UNIT	Content	No. of Hours
I	**Importance and methods of Protected cultivation in horticultural crops:** Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate.	5.0

	Cladding material involved in greenhouse/ poly house.	
II	**Greenhouse cultivation:** Greenhouse design, environment control, artificial lights, Automation. Soil preparation and management, Substrate management. Types of benches and containers. Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops.	5.5
III	**Protected cultivation technology for Flower crops:** Greenhouse cultivation of important horticultural crops – Rose, Carnation, Chrysanthemum, Gerbera, Orchid, Anthurium.	6.5
IV	**Protected cultivation technology for Vegetable crops:** Greenhouse cultivation of important horticultural crops- Lilium, Tulip, Tomato, Bell pepper, Cucumber, Strawberry, Pot plants, etc.	6.5
V	**Protected cultivation technology for Medicinal and Aromatic crops:** Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management .	6.5
Practicals	Raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production, Inter cultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging and misting.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Aldrich, R.A. and J.W. Bartok. 1994. *Green House Engineering*. NRAES, Riley, Robb Hall, Cornell University, Ithaca, New York. 2. Chandra, S. and V. Som. 2000. *Cultivating Vegetables in Green House*. Indian Horticulture, 45: 17-18. *3.* Lauria, A. and H.R. Victor. 2001. *Floriculture - Fundamentals and Practices,* Agrobios. 4. Laurie, A., D.D. Kiplingr and K.S. Nelson. 1968. *Commercial Flower Forcing*. McGraw-Hill. 5. Pant V. N. 1991. *Green House Operation and Management*. Bali Publ.	
	Reference Books: 1. Prasad, S. and U. Kumar. 2005. *Greenhouse Management for Horticultural Crops.* 2nd Ed. Agrobios.	

	2. Reddy, S., B. Janakiram, T. Balaji, S. Kulkarni and R.L. Misra. 2007. *Hightech Floriculture*. Indian Society of Ornamental Horticulture, New Delhi. 3. Tiwari, G.N. 2003. *Green House Technology for Controlled Environment*. Narosa Publ. House. **Journals:** 1. Vegetable sciences 2. Acta Horticulture 3. Indian Journal of Horticulture 4. Asian Journal of Horticulture 5. Indian Horticulture
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. http://www.informaworld.com/smpp/title~db=all~content=g904622674 2. http://www.ces.ncsu.edu/depts/hort/hil/hil-32-a.html 3. http://attra.ncat.org/attra-pub/manures.html 4. http://ucanr.org/freepubs/docs/8129.pdf
Course Outcomes	On completion of the course, the students should be able to CO 1: Discuss the status of protected cultivation in India and types of protected structures based on site and climate CO 2: Design and draw layout of green house with environment control, irrigation and fertigation facilities. CO 3: Demonstrate cultivation of important flower crops under protected cultivation. CO 4: Demonstrate cultivation of important vegetable crops under protected cultivation. CO 5: Demonstrate cultivation of medicinal and aromatic plants under protected cultivation.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	3	2
CO2	2	3	3	2	2
CO3	1	3	3	2	1
CO4	1	3	3	2	1
CO5	1	3	3	2	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**AGRI-BUSINESS MANAGEMENT**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum-
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability • Entrepreneurship • Value-Added Courses imparting transferable and lifeskills		
Cognitive Levels addressed by the Course	• K-1:(Remember) • K-2:(Understand) • K-3:(Apply) • K-4:(Analyze)		
Course Objectives (Maximum: 5)	The Course aims to 1. Introduce business opportunities and prepare business plan 2. describe the principles of management and its function in agri business 3. identify about various financial institutions and prepare projects and feasibility reports for agribusiness entrepreneur. 4. Discuss about appraisal/evaluation techniques of identifying viable project 5. describe the market potential for agro-inputs and agro products		
UNIT			No. of Hours
I	**Introduction to Agri Business Management: Agri business** – Meaning, Definition, Scope, Structure, Characteristics.-Transformation of agriculture into		5

	agribusiness. Various stakeholders and components of agribusiness systems- Importance of agribusiness in the Indian economy and New Agricultural Policy- Distinctive features of Agribusiness.	
II	**Introduction to Principles of Management: Management** – Definition, Elements, Concepts and Functions- Entrepreneur–Small business – characteristics and stages of growth. **Management functions** –Roles and Activities. Planning – Types of Plan. Organizing –Forms of agri business organization – Staffing, Directing, Supervision, Motivation and Controlling – Types, performance, evaluation and control techniques. Components of a business plan, Management approaches – Profit centre approach, Management By Objectives (MBO) and Quality Circles (QC). Strength Weakness Opportunities and Threats (SWOT) analysis.	5
III	**Production and Personal Management:** Functional areas of agri business – production and operations management – functions, planning, physical facilities and managing quality. Inventory management– raw material procurement, inventory types, costs. Personnel management – recruitment, selection and training. **Agro-based industries** - Importance and Need, Classification and Types. Institutional arrangement and procedures to set up agro based industries. Constraints in establishing agro-based industries. Agri-value chain: Understanding primary and support activities and their linkages.	4
IV	**Financial and Marketing Management:** Financial management – Importance, Characteristic of Capital, Working Capital, Types, -Balance sheet and Profit Loss statement– Financial ratio analysis (Liquidity, Coverage and Profitability)-Marketing management- Marketing environment, marketing mix.	4
V	**Input Marketing: Input marketing** firms-types and distribution channels. Processing firms-Types, size and managerial problems. Management Information System (MIS) – concept and applications. Business standards – ISO – Government policies for agri business. WTO and its impact on agri business - Intellectual Property Rights and patenting. **Projec**t- Meaning and Definition, Characteristics and Types-	4

	Project Cycle -identification, formulation, appraisal, implementation, monitoring and evaluation. Undiscounted and Discounted Techniques (NPW,BCR,IRR,NBIR and Sensitivity Analysis) **Business environment**: Consumer behaviour analysis, Product Life Cycle (PLC). Sales and Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle.	
Practical	Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products. Study of financing institutions-Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD. Preparations of projects and Feasibility reports for agribusiness entrepreneur. Appraisal/evaluation techniques of identifying viable project-Non-discounting techniques. Case study of agro- based industries. Trend and growth rate of prices of agricultural commodities. Net present worth technique for selection of viable project. Internal rate of return..	14
References	Text Books (with chapter number & page number, wherever needed): *1.* Harsh, S.B, U.J. Conner and G.D. Schwab. 1981. *Management of the Farm Business.* Prentice Hall Inc., New Jersey *2.* Broadway, A.C. (2003). *Text Book of Agri Business Management*, Atlas Books and Periodicals, New Delhi. *3.* Joseph, L. Massie. 1995. *Essentials of Management. Prentice* Hall India Pvt. Ltd., New Delhi *4.* Kapur, S.K. (1994). *Principles and Practice of Management*, S.K. Publishers, New Delhi.	
	Reference Books: 1. Omri Rawlins, N. 1980. *Introduction to Agri Business.* Prentice Hall India Pvt. Ltd., New Delhi 2. Prasad, L.M. (1993). *Principles and Practice of Management*, Sultan Chand & Sons, New Delhi. 3. Amarnath, J.S. and Samvel, A.P.V., 2008. *Agri-Business Management*, Satish Serial Publishing House, New Delhi. 4. Aswathappa, K. 2008. *Human Resource Management: Text and Cases*, Tata McGraw Hill Pub. Co. Ltd., New Delhi.. 5. Prasad, L.M., 2005. *Principles and Practices of Management*, Sultan Chand and Sons Educational Publishers, New Delhi	

	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. www.i4d.com 2. www.panasia.org
Course Outcomes	On completion of the course, students should be able to do **CO1:**Identify business opportunities and prepare business plan **CO2:**Apply the principles of management and its function in agri business **CO3:**Describe about various financial institutions and prepare projects and feasibility reports for agribusiness entrepreneur. **CO4:**Discuss about appraisal/evaluation techniques of identifying viable project **CO5:**Assess the market potential for agro-inputs and agro products

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	2	2	2	2	3
CO2	3	2	2	2	2
CO3	2	2	2	3	3
CO4	2	3	2	2	2
CO5	2	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**FOOD SAFETY AND STANDARDS**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course	Revised	If revised, Percentage of Revision effected **(Minimum 20%)**	Minimum
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze) • K-5: (Evaluate)		
Course Objectives (Maximum: 5)	The Course aims to • Impart knowledge on the importance of food safety in food service institutions. • Teach the tools used for assessment of food safety and quality. • Give an understanding of the food laws and standards for ensuring food quality.		

UNIT	Content	No. of Hours
I	**Food safety concepts:** Food safety- definition, importance and scope; Factors affecting food safety; Food hazards-meaning, biological, chemical, physical hazards; control and preventive measures; Hazard management during storage, processing, handling and distribution ; Sources of contamination; Waste disposal, pest and rodent; Water analysis: testing water quality-physic-chemical and microbiological, Surface sanitation -personnel and plant	**6**

	hygiene.	
II	**Food safety measures:** Food safety management- basic concepts; HACCP- principles, importance accreditation and auditing; Food safety practices- PRPs, GHPs, GMPs, SSOPs; TQM - Concept and need for quality, Components of TQM, Accreditation and Auditing; ISO series, Risk analysis; kaizen (or) continuous improvement.	**5**
III	**Food quality criterion:** Food quality- meaning; sensory attributes, subjective and objective evaluation of foods, Food analysis- nutrient, microbial, pesticide, toxicant, heavy metals; Food additives- definition, common food additives and its functions, Food adulterants-meaning and types; Food packaging- functions, requirements**,** materials, package testing; Food labeling-definition, principles, requirements and nutritional labeling, nutrition claims.	**8**
IV	**Food laws and standards**- need and importance; Indian food regulatory regime; global scenario- Codex Alimentarius Commission (CAC); other laws and standards related to food-National food legislation- AGMARK, BIS, FPO, PFA, FSSA and Essential commodities act; International organization- FAO, WTO, WHO and APEDA.	**5**
V	**Novel approaches for food safety:** Genetically modified foods- meaning, role, merits and demerits.GM foods- golden rice, brinjal, tomato, potato and kiwi; biofortification; Organic foods - meaning, advantages and limitations of organic farming; nutraceuticals/functional foods meaning, advantages and limitations.	**4**
References	Text Books (with chapter number & page number, wherever needed): 1. Many, N.S. and Shadaksharswamy, M. (1996). *Food Facts and Principles*. 2nd ed. New Age International Pvt. Limited, New Delhi. 2. Srilakshmi, B. (2018). *Food Science***.** 5th edn. New Age International. Pvt. Limited. 3. Norman N. Potter and Joseph H. Hotchkiss. (2006). *Food Science,* 5th Ed. Chapman & Hall, New York, USA	

	Reference Books: 1. Ronald H. Schmidt and Gary E. Rodrick. (2003). *Food Safety Hand Book.* Wiley Interscience, A John Wiley and Sons Publication Inc., Hoboken. New Jersey. 2. Frazier W.C and Westhoff D.C (1992), *Food Microbiology,* Tata McGraw Hill Publishing Co., Ltd. New Delhi. 3. Ray, B (2001). *Fundamentals of Food Microbiology*, 2nd Ed, CRC press, New York.
Course Outcomes	On completion of the course, students should be able to do CO1: outline the sources of contamination in food and factors influencing food safety CO2: explain the necessity of safety measures in quality maintenance and assurance. CO3: evaluate the quality of food and identify any contaminants and adulterants in food CO4: describe the role/ functions of National and International agencies regulating food safety and quality CO5: discuss about the novel approaches to enhance nutritional and functional quality of food.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	2
CO2	2	2	2	2	3
CO3	2	2	2	3	2
CO4	2	3	2	2	2
CO5	2	2	2	2	3

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	

Semester	**IV, V, VI**	Course Code	**21ELEU0401** **21ELEU0502** **21ELEU0603**
Course Title	**AGRICULTURAL JOURNALISM**		
No. of Credits	**2+1**	No. of contact hours per Week	**4.5**
New Course / Revised Course		If revised, Percentage of Revision effected **(Minimum 20%)**	
Category	• Major Elective		
Scope of the Course (may be more than one)	• Basic Skill / Advanced Skill • Skill Development • Employability		
Cognitive Levels addressed by the Course	• K-1: (Remember) • K-2: (Understand) • K-3: (Apply) • K-4: (Analyze)		
Course Objectives (Maximum: 5)	**The course aims** • To educate knowledge on basic aspects of Agricultural Journalism and their characteristics. • To impart knowledge on form and content of the newspapers. • To educate knowledge on gathering of agricultural related information. • To impart knowledge on write up stories and how it should be presented in a neat manner • To educate on editorial mechanics		

UNIT	Content	No. of Hours
I	**Agricultural Journalism:** The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism. Newspapers	5.0

	and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers.	
II	**Form and content of newspapers and magazines:** Style and language of newspapers and magazines, parts of newspapers and magazines. The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story.	5.5
III	**Gathering agricultural information:** Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news sources.	6.5
IV	**Writing the story:** Organizing the material, treatment of the story, writing the news lead and the body, readability measures. Illustrating agricultural stories: Use of photographs, use of artwork (graphs, charts, maps, etc.), writing the captions.	6.5
V	**Editorial mechanics:** Copy reading, headline and title writing, proofreading, lay outing.	6.5
Practicals	Practice in interviewing. Covering agricultural events. Abstracting stories from research and scientific materials and from wire services. Writing different types of agricultural stories. Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading, headline and title writing, proofreading, lay outing. Testing copy with a readability formula. Visit to a publishing office.	37.5
References	Text Books (with chapter number & page number, wherever needed): 1. Jana BL and K.P. Mitra. 2005. *Farm Journalism*. Agrotech Publ. Academy. Ray GL. 2. Bhaskaran C, R. Prakash and N. Kishore Kumar 2008. *Farm Journalism in Media Management*. Agro-Tech Publ. Academy. 3. Chattergee . P.C. 1991. *Broadcasting in India*. Sage Publishers 4. Chiranjeev A. 1999. *Electronic Media Management*. Authors Press. 5. D'Souza Y.K.1998. *Principles and Ethics of Journalism and Mass Communication.* Common wealth Publications 6. Defleur ML and E.E. Dennis. 2001. *Understanding Mass Communications*. Goyalsaab Publications.	

	Reference Books: 1. Keval J Kumar. 2004. *Mass Communication in India*. Jaico Publications 2. Malhan PN. 2004. *Communication Media: Yesterday, Today and Tomorrow*. Directorate of Publication Division, New Delhi. 3. Mehta DS. 1992. *Mass Communication and Journalism in India*. Allied Publ. 4. Panigrahy D. 1993. *Media Management in India*. 5. P. K. Biswasroy (Ed.). Kanishka Publ. Shrivastava KM. 1995. *News Writing for Radio and TV*. Sterling Publ. Sinha KK. 2001. *Business Communications*. Galgotia Publications.
	E-Resources (URLs of e-books / YouTube videos / online learning resources, etc.) 1. agritech.tnau.ac.in
Course Outcomes	**On the completion of the course , students should be able to** CO1: Describe the basic aspects of Agricultural Journalism and its characteristics. CO2: Describe the form and content of the newspapers and magazines. CO3: Gather agricultural related information from various sources using different methods. CO4: Demonstrate skill in writing and presenting agricultural stories and abstracting from scientific writings. CO5: Demonstrate knowledge in editorial mechanics.

Mapping of COs with PSOs:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	2	2	2	3
CO2	1	3	2	2	2
CO3	3	2	2	3	2
CO4	1	3	2	1	1
CO5	1	3	2	1	1

Strongly Correlated (S)	3 marks
Moderately Correlated (M)	2 marks
Weakly Correlated (W)	1 mark
No Correlation (N)	0 mark
Note: No course can have "0" (Zero) score	