

**LEARNING OUTCOME BASED CURRICULUM  
FRAMEWORK**

**(LOCF)**

**FOR**

**B.Sc. Organic Farming  
(A Four Year Degree Program)**

**(w.e.f. Academic session:2022-23)**



**“SCHOOL OF NATURAL RESOURCES”**

**DEPARTMENT OF FORESTRY, WILDLIFE & ENVIRONMENTAL SCIENCES**

**GURU GHASIDAS VISHWAVIDYALAYA**

**(A Central University established by the Central University Act.2009 No. 25 of 2009)**

**BILASPUR-495009, CHHATTISGARH**

## **Course Structure and Credit Distribution**

### **B.Sc. Organic Farming (4 -Year / 8- Semester) LOCF based Program**

#### **Programme Outcomes:**

##### **Graduates Attributes**

Graduates Attributes (GAs) are measurable outcomes that signify the capabilities and potentials of the graduate to attain accomplishment and perform in adequate manner at appropriate situations. Following are the Graduate Attributes of B. Sc. Organic Farming are given as below:

**PO1. Fundamentals and acquaintance with subject:** Gain in-depth knowledge and understandings of each discipline or professional area across boundaries of nations with an aptitude to identify, access, analyze and synthesize existing and new knowledge, and integrate them for enrichment of knowledge.

**PO2. Problem analysis:** Ability to analyze and address multifaceted scientific issues to organic farming; pertain and take independent decision for synchronizing information to formulate innovative and intellectual advances towards focused research over theoretical and different domains of organic farming and allied sciences.

**PO3. Application of modern tool and techniques:** Select, learn and apply appropriate techniques, resources, sophisticated instruments all knowledge for explaining different activities with investigate problems by analysis and finding out valid solution with a thorough understanding.

**PO4. Problem Solving:** Address and solve scientific vis-a-vis environmental problems via rational and original thinking; keep updates of different solution avenues and select appropriate options considering public health, cultural, and societal factors.

**PO5. Multidisciplinary competence:** Develop sound knowledge and perception initiatives and leadership in collaborative-multidisciplinary and trans-disciplinary scientific research, demonstrate a capacity for self-management and teamwork, achieving common goals and objectives; motivate group members to address different issues on agriculture, farming, organic practices with scientific temperament.

**PO6. Communication:** Ability to communicate scientific/technological knowledge and new learning to the scientific community and the society at large with strong conviction and confidence. This can be achieved through sound technical proficiency of computing skill, training of software's, writing skills, in-depth subject specifics knowledge.

**PO7.Ethical values and moral values:** Attain strong academic integrity, professional code of conduct, ethics of experimental research and scientific writings, contemplation of the impact of research findings on conventional issues and a sense of responsibility towards societal needs for attaining inclusive and sustainable development goals.

**PO8. Futuristic approach:** Ability to recognize and address current issues of land degradation and sustainable agriculture in changing world with a futuristic view and practicing intuitiveness and interest towards scientific prediction via application of basic knowledge of science especially with regard to India's SDGs and national action plan for sustainable development.

**Programme Specific Outcomes:**

**PSO1:** To develop undergraduate level student strong competencies in the field of organic farming and its application in an interactive environment for real-world applications.

**PSO2:** To develop strong student skills in the field of organic farming and sustainable agriculture by using new techniques and tools.

**PSO3:** Apply knowledge and skill in the development of organic farming practices and its application in allied disciplines to meet the fulfillment of local, governmental and industrial needs.

**PSO4:** Become trained in the areas of organic farming and ready for handling complex issues of organic farming management for sustainable development in the changing global world.

Semester	Course Opted	Course Code	Name of the course	Credit	Hour/week	Marks
I	Core-01	OFUATT1	Introductory Organic Farming Principles	3	3	100
	Core-01 Practical	OFUALT1	Introductory Organic Farming Principles	2	3	100
	Core-02	OFUATT2	Organic Agronomical Practices	3	3	100
	Core-02 Practical	OFUALT1	Organic Agronomical Practices	2	3	100
	Generic Elective (GE)-01	OFUATG1	Nursery Technology	3	3	100
	Practical/Seminar	OFUAIG1	Nursery Technology	2	3	100

	Ability Enhancement Course (AEC-01)	OFUATA1	Drawn from the University Pool	2	-	100
	Skill Enhancement Course(SEC-01)	OFUATL1	Drawn From the University pool	2	-	100
	Extra Curricular Activity-(ECA-01) *Additional Credit Course (Non-Mandatory)	OFUATS1	ECA-Extra-curricular activity (Field visit/ NSS/NCC/ <i>Swachhta</i> / Physical Education/ Plantation Activities)	2	-	
	<b>TOTAL</b>			<b>21</b>	<b>18</b>	<b>800</b>
<b>II</b>	Core -03	OFUBTT3	Soil and Water Management	3	3	100
	Core -03 Practical	OFUBLT3	Soil and Water Management	2	3	100
	Core -04	OFUBTT4	Plant Protection and Bio-pesticides	3	3	100
	Core -04 Practical	OFUBLT4	Plant Protection and Bio-pesticides	2	3	100
	Generic Elective (GE)-02	OFUBTG2	Farm Machinery	3	3	100
	Generic Elective (GE)- 02 Practical	OFUBLG2	Farm Machinery	2	3	100
	Ability Enhancement Compulsory (AEC-02)	OFUBTA2	Drawn from the university pool	2	2	100
	Skill Enhancement Course(SEC-02)	OFUBTL2	Drawn From the University pool	2	-	100
	Extracurricular Activity-(ECA-02) *Additional Credit Course (Non Mandatory)	OFUBTS2	ECA-Extracurricular activity(Field visit/ NSS/ <i>Swachhta</i> / vocational Training/ Sports/ Plantation activities)	2	-	100
		<b>TOTAL</b>			<b>21</b>	<b>20</b>
<b>Semester</b>	<b>Course Opted</b>	<b>Course Code</b>	<b>Name of the course</b>	<b>Credit</b>	<b>Hour/ week</b>	<b>Marks</b>
<b>III</b>	Core -05	OFUCTT5	Orchard Farming	3	3	100

	Core -05 Practical	OFUCLT5	Orchard Farming	2	3	100
	Core -06	OFUCTT6	Organic Farming & Biofertilizers	3	3	100
	Core -06 Practical	OFUCLT6	Organic Farming & Biofertilizers	2	3	100
	Core -07	OFUCTT7	Basics of Plant Genetics and Plant Breeding	3	3	100
	Core - 07Practical	OFUCLT7	Basics of Plant Genetics and Plant Breeding	2	3	100
	Generic Elective- (GE)-03	OFUCTG3	Organic farming startups and Entrepreneurship	3	3	100
	Generic Elective (GE- 3) Practical	OFUCLG3	Organic farming startups and Entrepreneurship	2	3	100
	Ability Enhancement Course(AEC- 03)	OFUCTA3	Drawn From the University Pool	2	-	100
	Extracurricular Activity- (ECA-03) *Additional Credit Course (Non Mandatory)	OFUCTS3	ECA-Extracurricular activity (Field visit/ NSS/NCC/ <i>Swachhta</i> / Physical Education/ Plantation Activities)	2	-	100
	<b>Total</b>			<b>24</b>	<b>24</b>	<b>1000</b>
<b>IV</b>	Core -08	OFUDTT8	Biodynamic Farming	3	3	100
	Core - 08Practical	OFUDLT8	Biodynamic Farming	2	3	100
	Core -09	OFUDTT9	Carbon Neutral Farming	3	3	100
	Core -09 Practical	OFUDLT9	Carbon Neutral Farming	2	3	100
	Core -10	OFUDTT10	Urban Farming and Terrace Gardening	3	3	100
	Core -10 Practical	OFUDLT10	Urban Farming and Terrace Gardening	2	3	100
	Generic Elective- (GE)-04	OFUDTG4	Methods of Soil, Plant, Water & Seed Testing	3	3	100
	Generic Elective Practical(GE)- 04	OFUDLG4	Methods of Soil, Plant, Water & Seed Testing	2	3	100
	Ability Enhancement Course(AEC-	OFUDTA4	Drawn From the University pool	2	-	100

	04)						
	<b>TOTAL</b>			<b>22</b>	<b>24</b>	<b>900</b>	
<b>V</b>	Core -11	OFUETT11	Fundamentals of Agroforestry	3	3	100	
	Core -11 Practical	OFUEL11	Fundamentals of Agroforestry	2	3	100	
	Core -12	OFUETT12	Floriculture	3	3	100	
	Core -12 Practical	OFUEL12	Floriculture	2	3	100	
	Core -13	OFUETT13	Residue Management Practices and Manure Production	3	3	100	
	Core -13 Practical	OFUEL13	Residue Management Practices and Manure Production	2	3	100	
	Discipline Specific Elective DSE-1	OFUETD1	Climatology and Meteorology	3	3	100	
	Practical	OFUEL13	Climatology and Meteorology	2	3	100	
	OR						
			OFUEL13	Sericulture Technology	3	3	100
	Practical		OFUEL13	Sericulture Technology	2	3	100
	<b>TOTAL</b>				<b>20</b>	<b>24</b>	<b>800</b>
<b>VI</b>	Core -14	OFUFTT14	Vegetable Farming	3	3	100	
	Core -14 Practical	OFUFLT14	Vegetable Farming	2	3	100	
	Core -15	OFUFTT15	Medicinal & Aromatic Plants Farming	3	3	100	
	Core -15 Practical	OFUFLT15	Medicinal & Aromatic Plants Farming	2	3	100	
	Discipline Specific Elective-(DSE-02)	OFUFTD2	Harvesting Organic Produce, Quality Analysis and Improvement	3	3	100	
	Practical	OFUFLD2	Harvesting Organic Produce, Quality Analysis and Improvement	2	3	100	
	OR						
	Discipline Specific		OFUFTD2	Post Harvest management and Value	3	3	100

	Elective-(DSE-02)		Addition			
	Practical	OFUFLD2	Post Harvest management and Value Addition	2	3	100
	Ability Enhancement Course (AEC-05)	OFUFTA5	Drawn from the University Pool	2	-	100
	MOOC Course (01)		Online MOOC Course	2-4	-	-
	<b>TOTAL</b>			<b>17+ 2-4</b>	<b>18</b>	<b>700</b>
<b>VII</b>	Core -16	OFUGTT16	Biostatistics	3	3	100
	Core -16 Practical	OFUGLT16	Biostatistics	2	3	100
	Core -17	OFUGTT17	Genetic Engineering and Transgenic Plants	3	3	100
	Core -17 Practical	OFUGLT17	Genetic Engineering and Transgenic Plants	2	3	100
	Core -18	OFUFTT18	Organic Certification	3	3	100
	Core -18 Practical	OFUFLT18	Organic Certification	2	3	100
	Discipline Specific Elective-(DSE-3)	OFUGTD3	Mushroom Technology	3	3	100
	Practical	OFUGLD3	Mushroom Technology	2	3	100
	OR					
	Discipline Specific Elective-(DSE-3)	OFUGTD3	Apiculture Technology	3	3	100
	Practical	OFUGLD3	Apiculture Technology	2	3	100
	Seminar (S1)	OFUGSS1	Seminar/Experimental learning: NTFP processing, Compost production, Vermi-composting and value addition, Nursery production	2	2	100
	<b>TOTAL</b>			<b>22</b>	<b>26</b>	<b>900</b>

<b>VIII</b>	INTR -1	OFUHEF1	Farming operation Work Experience (Report Writing, Presentation, Viva-Voce)	6		200
	INTR – 2	OFUHEF2	Institute and Industrial visit/training (Report Writing, Presentation, Viva-Voce)	6		200
	Dissertation	OFUHDF1	Dissertation writing, Presentation, Viva-Voce	6		200
			<b>TOTAL</b>	<b>18</b>		<b>600</b>
			The nature of the course in VIII Semester will be field based for learning exposure on agricultural operational/organic farming works through attachment with agriculture department/ Farmers group/ fertilizer industries/ Marketing agencies/NGOs. Institute/ industrial training will be accomplished by the students through visits of nearby farming based Industries / Institutions. Dissertation will be required to inculcate research experience in the students.			
<b>GRAND TOTAL</b>				<b>165 + 2-4 (MOOC)</b>		<b>6500</b>

**Table 2: Structure of Courses**

Semester	Core Courses (19)	GE (4)	DSE (3)	AEC (5)	SEC (2)	Seminar (1)	Dissertation (1)	Internship (3)	Additional Credit Courses (Optional)
I	C1 C2	GE1		AEC1	SEC1				ECA1
II	C3 C4	GE2		AEC2	SEC2				ECA2
III	C5 C6 C7	GE3		AEC3					ECA3
IV	C8 C9 C10	GE4		AEC4					
V	C11		DSE1						



	C12 C13								
VI	C14 C15		DSE2	AEC5					MOOC
VII	C16 C17 C18		DSE3			Seminar/Experimental learning			
VIII							Dissertation	Internship1 Internship2	

## Course structure

### B. Sc. Degree in Organic Farming

#### SEMESTER I

**PAPER 1: INTRODUCTORY ORGANIC FARMING PRINCIPLES (CORE-01) CR:  
3+2**

#### Course Objectives:

1. To provide knowledge about basic concepts and principles related to organic farming.
2. To study the scope, applications and needs of organic farming.
3. To develop concepts of conventional farming and organic farming.
4. To help students understand various organic farming practices in the national and international level.

#### THEORY:

Introduction to organic farming, aim, objective, scope and concept, principles and need of organic farming, agencies and institutions related to organic farming, types of organic farming, benefits of organic farming, conventional farming v/s organic farming, scope,

potential and present status of organic farming; Chhattisgarh, national and international, essentials for organic farming, farm components for an organic farm.

**PRACTICAL:**

1. Visit of a farm around Bilaspur (CG) to identify their adopted techniques.
2. Field based experiment for organic farming.
3. Organic Farm Industry visit with the vision to know the comparative study of chemical based production and organic based production system.
4. Identification of types of organic farming.
5. Analysis of organic farming pattern at State, national and international levels.

**Suggested Readings:**

1. Veeresh G. K. (2011). Organic Farming. Publisher: Foundation Books. ISBN: 9788175968813 <https://doi.org/10.1017/UPO9788175968813>
2. Reddy S. R. (2017). Principles of Organic Farming. Publisher: Kalayani, ISBN :9327274474.
3. Rateaver B. (1993). Organic method primer update: A practical explanation: the how and why for the beginner and the experience (Conservation gardening and farming). Publisher: The Rateavers; Special edition, ISBN: 0915966018.
4. Gershuny G. and Martin D. L. (2018). The Rodale Book of Composting, Newly Revised and Updated: Simple Methods to Improve Your Soil, Recycle Waste, Grow Healthier Plants, and Create an Earth-Friendly Garden (Rodale Classics). Publisher: Rodale Books; Updated edition, ISBN: 1635651026.

**Course Outcome:**

**CO1:** The course will enrich the basic concept and principles related to organic farming.

**CO2:** The course makes the student to understand different concepts of conventional and organic farming.

**CO3:** Development of theoretical concept through field experiments and field visit.

**CO4:** The student will learn about real life issue related to farming through mini visit of organic farms and organic farm industry visit.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	2	3	2	2	-	-	3	3	3	3	2
<b>CO2</b>	3	2	3	2	3	-	-	3	3	3	3	2

<b>CO3</b>	3	2	3	2	2	2	-	3	3	3	3	2
<b>CO4</b>	3	2	3	2	3	2	-	3	3	3	3	2

Weightage:**1-Sightly;2-Moderately;3-Strongly**

## **PAPER-02: ORGANIC AGRONOMICAL PRACTICES (CORE-02)**

**CR:3+2**

### **Course Objectives:**

1. To provide knowledge about basic concepts and principles related to agriculture and crop production.
2. To develop concepts of agronomic classification and classification of crop plants.
3. To provide the knowledge of crop and crop production method.
4. To help students to understand various crop production practices in the national and international level.

### **THEORY:**

Introduction of agriculture, crops, meaning of crop production, classification of crop plants, agronomic classification: cereal, legume, fibre, forage, sugar, oil crops, growing seasons, Crop production methods for rice, wheat, maize, cowpea, Dolichos bean (*Dolichos lablab*), green gram, black gram, pigeon pea, pea.

### **PRACTICAL**

1. Paddy field visit and survey of organic cultivation.
2. Practical approaches of agricultural practices preparation of soil, sowing, adding manure and fertilisers, irrigation, protecting from weeds, harvesting, storage of paddy, wheat and maize
3. Analysis of organic cultivation techniques of leguminous vegetables
4. Cost benefit analysis of organic farming.

### **Suggested Readings:**

1. Reddy S.R. (2014). Principles of Crop Production. Kalyani Publishers, ISBN-10: 9327218582.
2. An Introduction to Agriculture and Agronomy. 2015.  
<http://www.newagepublishers.com/samplechapter/001757>
3. Onwueme I. C. and Sinha, T. D. (1999). Field Crop Production in Tropical Africa. Netherlands: CTA, Wageningen, Pp. 1-14.

4. Bassey E. (2019). Fundamental Principles of Crop Production. ISBN; 9781706242604, 1706242603. Publisher: Independently Published
5. Jena, J. and Jena, T. (2020). Glimpses of Crop Production. Publisher: Jain Brothers ISBN: 9788194484646

**Course Outcome:**

**CO1:** The course will enrich knowledge about basic concepts and principles related to agriculture and crop production.

**CO2:** The course makes the student to understand different concepts of agronomic classification and classification of crop plants.

**CO3:** Development of practical experience through field experiments and field visit.

**CO4:** The student will learn about Practical approaches of agricultural practices.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	-	-	2	3	3	3	2
CO2	3	2	3	2	2	-	-	2	3	3	3	2
CO3	3	3	3	2	3	-	-	2	3	3	3	2
CO4	3	3	3	2	3	-	-	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER-03: NURSERY TECHNOLOGY GE-01 CR: 3+2**

**Course Objectives:**

1. To provide knowledge about basic concepts and principles about Nursery technology.
2. To study the preparation and management of a Nursery.
3. To study the disease and pest controlling nursery with practical experience.
4. To help students to study marketing and management relating to nursery.

**THEORY:**

Nursery, introduction, objectives and scope, types of nursery, choosing nursery site, design and layout of the nursery, preparation of nursery beds, producing plant from seed, seed handling, dormancy and treatments, methods of sowing, time and season, potting mixtures, transplanting of young seedlings, plant containers, compost and mulches, nutrient and soil management, disease and pest control, sale and marketing.

**PRACTICAL**

1. Site selection and its assessment.
2. Preparation of different types of nursery bed
3. Application of seed treatment, seed sowing,
4. Preparation of potting mixtures, application of mulches,
5. Tools and instruments, nursery record
6. Assessment of plantation site, visit of nursery and plantations
7. Marketing management of nursery grown seedlings.

**Suggested Readings:**

1. Hall K. C. (2003). Manual on nursery practice. Forest Department, Jamaica. E book
2. Pawar P. (2007). Practical Manual of plantation forestry. Scientific publisher, Jodhpur
3. Sharma A. and Singh N. P. (2011). Soil and orchard management. Daya Publishing House, Delhi.
4. Luna R. K. (2006). Plantation forestry in India. International book distributor, Dehradun, India.

**Course Outcome:**

**CO1:** The course will provide knowledge about basic concepts and principles about Nursery technology.

**CO2:** The course makes the student to understand the method of preparation and management of a Nursery.

**CO3:** Development of practical experience of disease and pest control through field experiments and nursery visit.

**CO4:** The student will learn about real life issue related to nursery management and marketing.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	2	2	2	2	-	-	2	3	3	3	2
<b>CO2</b>	3	2	3	2	2	-	-	2	3	3	3	2
<b>CO3</b>	3	2	3	2	2	1	-	2	3	3	3	2
<b>CO4</b>	3	2	2	2	2	2	1	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER 4. ABILITY ENHANCEMENT COURSE (AEC-01)****CR: 2****Course Objectives:**

1. The course will be selected from the University pool by students.
2. Such course will enable student and enhance their ability and contribute in understanding on the subject.

**Course Outcomes:**

**CO1:** The student will be able to gain the knowledge, value addition and its application in their area of interest.

**CO2:** The necessary skill will be enhanced related to selected subjects.

**CO3:** Future career development prospects among students will increase.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER 5. SKILL ENHANCEMENT COURSE (SEC-01)****CR: 2****Course Objectives:**

1. The course will be selected from the University pool by students as per their interest.
2. This type of course will augment the student's skill on the subject.

**Course Outcomes:**

**CO1:** The students will develop skill related to selected subjects.

**CO2:** The student will be able to gain the theoretical, practical knowledge and its application in their area of interest.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:1-Slightly;2-Moderately;3-Strongly

**PAPER 6. EXTRA CURRICULAR ACTIVITY (ECA-01)****CR: 2****Course Objectives:**

1. It will be a nature of additional credit course with non-mandatory nature.
2. Students of NSS/NCC/Swachhata/Physical Education/Plantation Activities, etc. may opt such courses for acquiring addition knowledge and practical experience.

**Course Outcomes:****CO1:** The students will develop practical experience related to different fields.**CO2:** The student will be able to gain the theoretical, practical knowledge and its application in their area of interest.**CO3:** Future career development prospects among students will increase.**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO3</b>	3	1	2	3	3	2	3	2	3	2	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**SEMESTER II****PAPER- 01. SOIL AND WATER MANAGEMENT (CORE-03) CR: 3+2****Course Objectives:**

1. To provide practical knowledge about soil, components and their properties with relation to plant growth and environment.
2. To study the traditional and modern method of irrigation and water management.
3. It will provide knowledge about soil, fertilizers, biofertilizers and develop an understanding the soil and its management for organic farming.
4. Course will develop the ability of student in soil testing and site evaluation for farming practices.

**THEORY:**

Introduction of soil, its formation and properties, plant nutrients, essential nutrients and their role, nutrient uptake phenomenon in plant nutrient cycle, soil tillage, choice of varieties, crop

rotation multiple and cropping systems, intercropping in relation to maintenance of soil productivity, sources of nutrients, manures and fertilizers, benefits and drawback of chemical and organic fertilizer, concentrated organic manures, organic preparations, organic amendments and sludges, bio-fertilizers-methods of application, advantages and disadvantages, Standards for organic inputs- fertilizers.

Introduction to traditional and modern methods of water management, water management techniques in agriculture, horticulture and forestry, effects of soil type, soil texture, and inherent limitations, irrigation management, water management benefits of cover crops, irrigation management, watershed management, smart farming.

### **PRACTICAL:**

1. Analysis of adopted farming system adopted for water conservation in Chhattisgarh.
2. Determination of water holding capacity of soil, soil moisture and field capacity.
3. Demonstration of Soil tillage operations.
4. Analysis of cropping systems and intercropping pattern of organic farming
5. Soil analysis to understand the correlation with water management practices
6. Identification of fertilizer.
7. Application methods of biofertilizers

### **Suggested Readings:**

1. Singh S. Y. (2021). Soil Fertility and Plant Nutrient Management. Publisher: New India Publishing Agency- Nipa, ISBN: 9789390512270.
2. NPCS Board of Consultants & Engineers (2021). The Complete Book on Organic Farming and Production of Organic Compost. Publisher :Asia Pacific Business Press, ISBN-10 : 8194099528
3. Mishra S. R. (2014). Soil and Nutrient Management. Publisher: Discovery Publishing House Pvt Ltd. ISBN: 9789350564578, 9350564572
4. Fawzy Z. F. (2020). Organic Crop Cultivation. Publisher: Excelic Press, ISBN: 9781642243383.
5. Lalitha B.S., Sannagoudar M.S. & Reddy G. (2011). Enhancing Nutrient Use Efficiency: Concepts, Methods and Management Interventions. New India Publishing Agency (NIPA).
6. Cole G. (2017). Water Conservation and Management. Publisher: Larsen and Keller Education, ISBN-10 : 1635492882.



7. Magdoff F. and Van E. H. (2009). Building Soils for Better Crops, 3rd ed. Sustainable Agriculture research and Education (SARE).

**Course Outcome:**

**CO1:** Student's will able to differentiate between different soil types, its components and properties with relation to vegetation growth.

**CO2:**The course will makes the student to understand traditional and modern method of irrigation and water management systems.

**CO3:** The students will be enhance the knowledge about soil characteristics, soil –water relationships, soil fertility of different forest and its interaction with each other.

**CO4:**The student will learn about measure physio-chemical property of soil and its impact on the crop.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	2	2	2	2	-	-	2	3	3	3	2
<b>CO2</b>	3	3	3	3	2	-	-	2	3	3	3	2
<b>CO3</b>	3	2	3	3	2	-	-	2	3	3	3	2
<b>CO4</b>	3	3	3	3	2	-	-	2	3	3	3	2

Weightage:**1-Sightly;2-Moderately;3-Strongly**

**PAPER-02. PLANT PROTECTION AND BIOPESTICIDES(CORE-04) CR: 3+2**

**Course Objectives:**

1. To provide knowledge about plant protection, disease and pest control in organic farming.
2. To study the scope and applications of bio-control agents in organic farming.
3. To study the chemical and biological pesticide and its effective use.
4. To study various pest and disease management practices in the national and international level.

**THEORY:**

Plant protection- cultural, mechanical methods, botanical pesticides. Plant protection- botanical pesticides, bio-control agents, weed management weedicide, national and international standards for organic inputs- plant protection, disease and pest control by biopesticide of paddy,

wheat, maize, pea, market available chemicals, application methods, principles of efficacy, pest and diseases of rice, vegetables and its control methods.

**PRACTICAL:**

1. Comparative analysis of impact of cultural and mechanical plant protection practices.
2. Preparation of various types of botanical pesticide.
3. Application of pheromone traps and light traps.
4. Weed management practices by bio pesticide and chemical control analysis.
5. Application of herbicides in field and monitoring.

**Suggested Readings:**

1. Vincenzo V. ( 2017). Handbook of Pest Management in Organic Farming. Mediterranean University, Italy, Serge Kreiter, Montpellier SupAgro, France. Publisher: CABI, ISBN: 9781780644998.
2. Zadoks J. C.(2013). Crop Protection in Medieval Agriculture: Studies in pre-modern organic agriculture. ISBN: 9088901872, Publisher : Sidestone Press.
3. Teulon D.A. Plant Protection in Organic Arable and Vegetable Crops – a grower’s resource. Publisher: New Zealand Institute for Crop & Food Research. ISBN 0 478 10843 5.
4. Roger B. Y.Organic plant protection: a comprehensive reference on controlling insects and diseases in the garden, orchard and yard without using chemicals / edited by and the editors of Organic gardening and farming magazine. Publisher: Emmaus, Pa.: Rodale Press. ISBN: 0878571108.

**Course Outcome:**

- CO1:**The course will enrich the knowledge about plant protection, disease and pest control in organic farming.
- CO2:** The course makes the student to understand different scope and applications of bio-control agents in organic farming.
- CO3:** The student will learn about chemical and biological pesticide and its effective use.
- CO4:** The student will learn about various pest and disease management practices in the national and international levels.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO	PSO
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	2	-	-	2	3	3	3	2
CO2	3	2	3	2	2	-	-	2	3	3	3	2
CO3	3	2	3	3	2	-	-	2	3	3	3	2
CO4	3	2	3	3	2	-	-	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

### **PAPER-03. ORGANIC FARMING STARTUPS AND ENTREPRENEURSHIP (GE-02)CR: 3+2**

#### **Course Objectives:**

1. To provide knowledge about scope and start-up potential in the organic farming.
2. To empower student for entrepreneurship and star-up management.
3. To develop concepts about social and financial aspect of organic farming.
4. To help students to practically understand the function of various organic product stat-ups by industrial visit and interview.

#### **THEORY:**

Organic products start-ups, scope and potential areas for start-ups, funding agencies, food processing and handling, entrepreneurship concept, characteristics, approaches, need for entrepreneurship, traits of an entrepreneur –risk taking, leadership, decision making, planning, organizing, coordinating and marketing, agri-enterprises- stages of establishing enterprise, project identification, step to be considered in setting up an enterprise, feasibility report, product selection, project management and appraisal: market, technical, social, financial analysis, market management concept planning for marketing target, marketing and competitive strategy, types of entrepreneurs, challenges in organic farming.

#### **PRACTICAL**

1. Industrial visits to learn food processing and handling methods
2. Interview of organic farming entrepreneurs to analyse the risk bearing capacity
3. Analysis of problems related to organic farming marketing with its solution
4. Conceptual project development on organic farming by the students
5. Project planning, appraisal and management analysis

**Suggested Readings:**

1. Kumar S. A., Poornima S. C., Abraham M. K. and Jayshree K. (2021). Entrepreneurship Development .Publisher: New Age Publishers, ISBN-10 : 8122414346
2. Wiswall R. (2009).The Organic Farmer's Business Handbook: A Complete Guide to Managing Finances, Crops, and Staff - and Making a Profit. Publishers: Chelsea Green Publishing; Pap/Cdr edition ASIN : B007EDZ2X6
3. Salatin J. (2013). You Can Farm: The Entrepreneur's Guide to Start & Succeed in a Farming Enterprise. Publishers: Polyface, Incorporated; ISBN-10 : 0963810928
4. Uwajeh A. N. Investments: The Easy Guide to Building Wealth with Agricultural Business for Beginners.Publishers: Kindle Edition. ASIN : B01LG5B0NS
5. Nuthall P. L. Farm Business Management: The Human Factor. Publishers: Lincoln University, New Zealand 9781789240733.

(<https://www.cabi.org/bookshop/book/9781789240757/>)

**Course Outcome:**

**CO1:** The course will provide knowledge about scope and start-up potential in the organic farming.

**CO2:** The course will make empower student for entrepreneurship and start-up management..

**CO3:** The course will develop concepts about social and financial aspect of organic farming.

**CO4:** The student will learn about the function of various organic product start-ups by industrial visit and interview.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	2	2	2	3	2	2	2	3	3	3	3	3
<b>CO2</b>	2	2	3	2	3	2	2	3	3	3	3	3
<b>CO3</b>	3	2	3	2	3	2	2	3	3	3	3	3
<b>CO4</b>	3	2	3	2	3	2	2	3	3	3	3	3

Weightage:1-Slightly;2-Moderately;3-Strongly

**PAPER 4. ABILITY ENHANCEMENT COURSE (AEC-02)****CR: 2****Course Objective:**

1. The course will be selected from the University pool by students.

**Course Outcome:**

**CO1:** The student will be able to gain the theoretical and practical knowledge and develop future career prospects related to the selected subjects.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	2	2	3	2	2	2	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER 5. SKILL ENHANCEMENT COURSE (SEC-02)****CR: 2****Objective:**

1. The course will be selected from the University pool by students.

**Course Outcomes:**

**CO1:** The student will learn necessary skill related to their subject of interest.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	2	3	3	3	2	2	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER 6. EXTRA CURRICULAR ACTIVITY (ECA-02)****CR: 2****Course Objectives:**

1. It will be a nature of additional credit course with non-mandatory nature.
2. Students of NSS/NCC/Swachhata/Physical Education/Plantation Activities, etc. may opt such courses for acquiring addition knowledge and practical experience.

**Course Outcomes:**

**CO1:** The student will be able to gain the theoretical, practical knowledge and apply it in their social and practical approaches.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:1-Slightly;2-Moderately;3-Strongly

## SEMESTER-III

### PAPER-01. ORCHARD FARMING(CORE-05) CR: 3+2

#### Course Objectives:

1. To acquaint the students about horticultural systems in various climatic condition and their management.
2. To develop skill related to practical aspects of the orchard management and cropping system in the horticultural system.
3. To aware the students about the importance of the organic farming in the field of horticultural system.

#### THEORY:

Orchard management, importance, objectives, merits and demerits, clean cultivation, sod culture, Sod mulch, herbicides and inorganic and organic mulches, tropical, sub-tropical and temperate horticultural systems, competitive and complimentary effect of root and shoot systems, biological efficiency of cropping systems in horticulture, systems of irrigation, soil management, integrated nutrient and pest management, utilization of resources constraints in existing systems, crop model and crop regulation in relation to cropping systems, status of organic horticulture national and international scenario, principles, practices, prospects of organic farming, technological advancements made in organic farming of fruits, Site selection, crop selection, soil preparation, soil solarisation, orchard management and mulching, establishment of orchard, high density and meadow orchad, planting and layout, organic crop production methods of plantation crops, mango, guava, coconut, arecanut, cashew, organic crop production methods- pineapple (*Ananas comosus*), banana, papaya.

#### PRACTICAL:

1. Site selection criteria with reference to types of crops
2. Land preparation and plantation techniques of plantation crops
3. Cultivation practices of mango and guava
4. Cultivation and management methods of papaya and banana
5. Marketing demand and supply analysis of the horticultural crops.

#### Suggested Readings:

1. Burrill, T. J. Orchard Cultivation. Publisher: Nabu Press, ISBN: 9781289619411

2. Singh H.P., George V. (2010). Thomas Organic Horticulture: Principles, Practices and Technologies Hardcover. Publisher: Westvill Publishing House, ISBN-10 : 8185873615.
2. Rateaver B. (1993). Organic method primer update: A practical explanation : the how and why for the beginner and the experience (Conservation gardening and farming) . Publishers: The Rateavers; ISBN-10 : 0915966018
3. Denckla T. C. (2003). The Gardener's A-Z Guide to Growing Organic Food. Publishers: Storey Publishing, LLC; Revised edition (January 1, 2003). ISBN-10 : 1580173705
4. Pathak R.K. & Ram, R. (2013). Manual on organic farming in Horticultural crops. 10.13140/2.1.1166.9761.  
[https://www.researchgate.net/publication/265846481\\_Manual\\_on\\_organic\\_farming\\_in\\_Horticultural\\_crops](https://www.researchgate.net/publication/265846481_Manual_on_organic_farming_in_Horticultural_crops)
5. Chand G, Akhtar N., Kumar S.(2020). Diseases of Fruits and Vegetable Crops: Recent Management Approaches (Innovations in Horticultural Science). Publishers: Apple Academic Press; 1st edition (1 September 2020) ISBN-10 : 1771888369
6. Reddy P. P. (2012).Organic Farming for Sustainable Horticulture. Scientific Publishers, ASIN : B0783H6YRD

**Course Outcome:**

- CO1:** The course will enrich the basic concept and principles related to horticultural system.
- CO2:** The course makes the student to understand different practical aspects of the orchard management practices and cropping system in the horticultural system.
- CO3:** Development of theoretical concept through field experiments and field visit.
- CO4:** The student will learn about role of organic methods for sustainable horticultural management.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	3	-	-	2	3	3	3	2
CO2	3	2	3	2	3	-	-	2	3	3	3	2
CO3	3	2	3	2	3	2	-	2	3	3	3	2
CO4	3	2	3	2	3	-	2	2	3	3	3	2

Weightage:**1-Sightly;2-Moderately;3-Strongly**

## **PAPER-02. ORGANIC FARMING AND BIOFERTILIZERS (CORE-06)**

### **Course Objectives:**

1. To understand the concept of biofertilizers and its potential in farming.
2. To encourage students for production of biofertilizers and establish mass production unit as a eco-friendly start-up.
3. To understand the use of biofertilizer and its commercial production by providing skill on it.
4. To help students to demonstrate biofertilizer production and its processing.

### **THEORY:**

Concept of organic farming with the production of biofertilizer, biofertilizer's definition, scope, and potential microbes in organic farming, application of biofertilizer's, phosphorus solubilizing bio fertilizers, and microbial activities, biofertilizer formulations, scoping the use of transgenic microorganisms, quality control of biofertilizer, mycorrhizal fungi mass production guidelines to establish production unit, biofertilizer's industry and demand, case study on biofertilizer, prospects and challenges for future food utilization in sustainable agricultural, blue green algae, tools and instrument required for microbial production.

### **PRACTICAL**

1. Visit to a biofertilizer production centre.
2. Staining- Simple and differential staining of bacteria. Simple staining – *Bacillus subtilis*, differential staining – *Bacillus* and *E-coli*.
3. Culture media preparation- Nutrient broth, nutrient agar slant, potato dextrose agar.
4. Preparation of various biofertilizer.
5. Marketing and survey for biofertilizer availability.

### **Suggested Readings:**

1. Inamuddin, M., Imran A., Boddula R. And Rezakazemi M. (2021). Biofertilizers: Study and Impact Front Cover. Publisher: John Wiley & Sons. ISBN: 1119724678, 9781119724674.
2. Rakshit, A. Singh V. M., Parihar M., Singh, H. B., Singh A. K. (2021). Biofertilizers: Volume 1: Advances in Bio-inoculants. Publisher Elsevier Science, ISBN: 0128216670, 9780128216675



- Purohit S. S. (2006). Microbiology Fundamentals and applications. Agrobios publication. ISBN- 9788177542592
- Dubey R. C. and Maheshwari D. K. (2010). A text book of microbiology. S. Chand & Company Ltd. ISBN- 978-8121925594

**Course Outcome:**

**CO1:** The course will enrich the basic concept of biofertilizers and its potential in farming.

**CO2:** The course makes the student to understand different practical aspects of the biofertilizer and its use in organic farming.

**CO3:** Development of understanding of biofertilizer and its use in organic farming through field experiments and field visit.

**CO4:** The student will learn about role of biofertilizer in sustainable agricultural management.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	-	-	2	3	3	3	3
CO2	3	2	3	2	1	-	1	2	3	3	3	3
CO3	3	2	2	2	1	2	1	2	3	3	3	3
CO4	3	2	3	2	2	2	1	2	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER-03. BASICS OF PLANT GENETICS AND PLANT BREEDING (CORE-07)**

**CR: 3+2**

**Course Objectives:**

- To provide basic knowledge on plant cell, genetics and their importance in plant breeding.
- To understand the plant cell structure and functions.
- To understand the laws of inheritance, chromosome and basic genetics for their exploitation in plant breeding.
- To provide information about fertilization pattern of various tree species for tissue culture and genetic breeding programmes.

**THEORY:**

Plant cell: its structure and function. Cell reproduction, mitosis, meiosis and its significance. Nucleus chloroplast and mitochondria. Chromosome its structure and function. Chromosomal

aberration. Polyploidy. Linkage and crossing over. Mendel's principles of heredity. Deviation from mendalian inheritance, pleiotropy, threshold characters, co-dominance, chromosome theory of inheritance, gene interaction, multiple alleles. Sex determination-theories, sex linked inheritance and characters. Cytoplasmic inheritance and maternal effects. Chemical basis of heredity. Structure of DNA and its replication, RNA: its structure and function. Mutation and its classification. Plant breeding its aim and objectives, modes of reproduction, methods of breeding, selection types and importance.

### **PRACTICAL**

1. Preparation of slide showing various stages of mitosis.
2. Preparation of slides showing various stage of meiosis.
3. Testing the viability and germination of pollen grains.
4. Solving the problems based on Mendalian laws, floral morphology.

### **Suggested Readings:**

1. Prasad G. (1998). Introduction to Cytogenetics. Kalyani publishers New Delhi, India
2. Singh P. (2005). Elementary of Genetics. Kalyani publishers Ludhiana, India
3. Acquaah G. (2012). Principles of Plant Genetics and Breeding, 2nd Edition. Wiley-Blackwell
4. Singh B. D. (2014). Fundamentals of Genetics. Kalyani Publishers
5. Gupta P. K. (2015). Cytology, Genetics and Evolution. Rastogi publications, Meerut, India.

### **Course Outcomes:**

- CO1:** Students will be enriched with theoretical and practical knowledge about plant cell, genetics and plant breeding programme.
- CO2:** Students will learn the structure and functions of plant cell.
- CO3:** Students will able to understand the plant breeding programmes which will enhance their skill about future employment related to organic farming.
- CO4:** Student will understand fertilization pattern of various plant species.

### **Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	3	3	2	1	-	-	2	3	3	3	2
<b>CO2</b>	3	1	3	3	1	-	-	2	3	3	3	2
<b>CO3</b>	3	1	3	2	1	-	-	2	3	3	3	2
<b>CO4</b>	3	3	3	3	1	-	-	2	3	3	3	2

Weightage:**1-Sightly;2-Moderately;3-Strongly**

### **PAPER-04. FARM MACHINERY (GE-03) CR: 3+2**

#### **Course Objectives:**

1. To develop an understanding of farming equipment and machinery.
2. To understand different modern machinery for harvesting and post processing.
3. To develop the concept and working principle of different machinery.

#### **THEORY:**

Introduction, aim and objectives, tillage; primary tillage equipment's, seedbed refining and leveling equipment, sowing and planting equipment, weeding and intercultural equipment, plant protection equipment, harvesting equipment's for cereals, threshing equipment, forage harvesting and residue handling, rice cultivation machinery, potato planter and harvester, equipments for sugarcane cultivation, estimation of operational cost.

#### **PRACTICAL**

1. Introduction to various farm machines and equipment used on the farm.
2. To Measure field efficiency of Farm implements.
3. Study of construction details, adjustments and working of plough.
4. Study of construction details, adjustments and working of disc plough.
5. Study of construction details, adjustments and working of cultivator.
6. Study of different type of mechanical paddy transplants.
7. Study of different weeding equipment and their uses.
8. Study of sprayers and measurement of nozzle discharge

#### **Suggested readings:**

1. Singh T. P. (2017). Farm Machinery. Publisher: PHI learning private limited.
2. Bell B. M. and Rickatson. (2015). Farm Machinery, 6th Edition. ISBN: 9781910456064, 1910456063
3. Kutz M. Handbook of Farm, Dairy and Food Machinery Engineering. ISBN: 9780128148037, Publisher: Elsevier Academic press.

4. Chen G. (2018). Advances in Agricultural Machinery and Technologies. Publisher: CRC Press, ISBN:9781351132381, 1351132385.

**Course Outcomes:**

- CO1:** Students will develop knowledge about farming equipment and machinery.  
**CO2:** Students will be able to observe different modern machinery for harvesting and post processing activity of crop.  
**CO3:** Student will develop the concept and working principle of different machinery.  
**CO4:** Student will get practical experience of different agricultural operation and the use of equipment and machinery in it.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	1	-	-	1	3	3	3	2
CO2	2	2	3	2	1	-	-	1	3	3	3	2
CO3	3	2	3	-	-	-	-	1	3	3	3	2
CO4	3	2	3	-	-	1	1	1	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER -05. ABILITY ENHANCEMENT COURSE (AEC-03)**

**CR: 2**

**Course Objectives:**

1. The course will be selected from the University pool by students.

**Course Outcomes:**

- CO1:** The student will learn about the theoretical and practical knowledge and its application in social life.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3	2	2	2	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER -6. EXTRA CURRICULAR ACTIVITY (ECA-03)**

**CR: 2**

**Course Objectives:**

1. It will be a nature of additional credit course with non-mandatory nature.
2. Students of NSS/NCC/Swachhata/Physical Education/Plantation Activities, etc. may opt such courses for acquiring addition knowledge and practical experience.

**Course Outcomes:**

**CO1:** The student will learn about the extra-curricular activities in different aspects.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
<b>CO1</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:**1-Sightly;2-Moderately;3-Strongly**

**SEMESTER IV****PAPER-01. BIODYNAMIC FARMING (CORE-08)****CR: 3+2****Course Objectives:**

1. To develop basic concept and principle of biodynamic preparation.
2. To perform different preparation, storage and applications methods of biodynamics.
3. To develop knowledge about ecological aspects of biodynamic farming practices.

**THEORY:**

Introduction, History, Principle and advantages, biodynamic preparation: crop rotation, Peppering, farm organism, weeds, pests and diseases, Converting a farm to biodynamic, cow horn manure and cow horn silica: preparation, storage and application, preparation, storage and application of jivaamrit, bijaamrit, plant based preparations, panchgaya preparation and application, dasakavya: preparation, storage and application.

**PRACTICAL**

1. Preparation of cow horn manure and cow horn silica.

2. Compost preparations through plant materials poison preparation, storage and application.
3. Dasagavya: preparation, storage and application.
4. Bijaamrit and jivaamrit preparation, storage and application methods

**Suggested Reading:**

1. Selvaraj, N., AnitaB., Anusha B. and Saraswathi G. M. (2006). Organic Horticulture creating a more sustainable farming. Horticultural Research Station, Udthagamandalam.
2. Rudolf S. (2004). What is Biodynamics?Publisher SteinerBooks, 2004 ISBN: 0880109890
3. Waldin M. (2015).Biodynamic Gardening. Publisher: Dorling Kindersley Ltd, ISBN: 0241209331, 9780241209332
4. Masson V., Masson P. andBlais M. (2014). A Biodynamic Manual: Practical Instructions for Farmers and Gardeners.Publisher: Floris Books.ISBN-10: 1782500804

**Course Outcomes:**

**CO1:** Students will develop concept and principle of biodynamic preparation.

**CO2:** Students will be able to observe different preparation, storage and application method of biodynamics.

**CO3:** Student will develop the working principle of different plant and animal based esticide and manure.

**CO4:** Student will get practical experience of different compost preparation, plant based poison preparation and its application.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	1	-	-	2	3	3	3	3
CO2	3	2	3	3	2	-	-	2	3	3	3	3
CO3	3	2	3	2	1	-	-	2	3	3	3	3
CO4	3	2	3	3	1	-	-	2	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

**Objectives:**

1. To understand the scope and importance in carbon pool and carbon neutral farming.
2. The subject will enhance the skill of students in agricultural farming.
3. To aware students to protect environment from the synthetic fertilizer application.
4. To enrich students with the traditional farming pattern of India.

Basic concept; meaning, objectives, scope- carbon neutral tools, carbon neutral initiatives, policy frame work related to carbon neutral farming, initiatives for carbon neutral farming climate neutral agricultural systems practice for increasing carbon in soils, efficient use of farm inputs assessment are identification low carbon emitting farming system, permanent crop farming, mixed farming, agroforestry and organic farming, case studies of carbon stable farming system in India and world, carbon farming business and enterprise.

**PRACTICAL**

1. Measurement of soil organic matter and soil organic carbon.
2. Measurement of GHG from different farming systems.
3. Measurement of carbon and nitrogen in farm inputs.
4. Determination of carbon stocks in soils of agricultural farms.

**Suggested Readings:**

1. Bansal M. Basics of organic farming.
2. EIP-AGRI workshop processing towards carbon neutral agriculture.
3. USDA report of carbon farming
4. Global carbon report on carbon reduction and offsets mulching activities effectively carbon neutral.
5. Reddy S. R. Farming system and sustainable agriculture.
6. Piccolo A. Carbon sequestration in agricultural soils.
7. Fraser R. C. A farmers guide to climate disruption.

**Course Outcomes:**

**CO1:** Subject will develop skills in students to optimal use of resources without harming environment.

**CO2:** Student will able to generate new ideas related to carbon neutral farming as income generating source.

**CO3:** Graduates may be able to make some new compositions of organic fertilizer for agricultural crops.

### **Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	1	1	-	2	3	3	3	3
CO2	3	1	3	3	2	-	-	2	3	3	3	3
CO3	3	2	3	2	1	-	-	2	3	3	3	3
CO4	3	1	3	3	1	-	-	2	3	3	3	3

Weightage:**1-Sightly;2-Moderately;3-Strongly**

### **PAPER-03. URBAN FARMING AND TERRACE GARDENING (CORE-10)**

**CR: 3+2**

#### **Course Objectives:**

1. To provide knowledge about basic concepts and principles related to urban farming and terrace gardening.
2. To acquire knowledge about organic fertilizers and house composting.
3. To provide the knowledge of terrace gardening and working of a sustainable organic gardening.
4. To help students to understand various crop production in urban area: crop management and gardening.

#### **THEORY:**

Introduction: concept, aim and significance, benefits; economic, environmental, organic container gardening, garden design, soil composition and soil texture, seed sowing and transplanting, features of organic fertilizers, principles of making liquid organic fertilizers, in house composting: organic matter, kitchen waste composting guidelines, soil management; general soil care, simple crop rotation plan, water and light management, pest management: organic foliar spray, roof and terrace gardening, ecosystem and working of a sustainable organic garden, soil, garden management and maintain, organic farming: a tool of good food good life, suitable crops for urban farming and terrace gardening yields and crop management practices.



## PRACTICAL

1. Garden designing with available space.
2. Demonstration to container selection as per the different types of plants.
3. Soil preparation and preparation of potting mix.
4. Seed sowing methods.
5. Preparation of organic fertilizers with the help of kitchen waste.
6. Application of organic fertilizers as per plant requirement.
7. Management practices; pest, plant, soil and water.
8. Survey of urban kitchen gardening.

### Suggested Readings:

1. Free e-book 'Organic Urban Farming The Indian Way'  
<https://www.udemy.com/course/organic-container-gardening-the-indian-way/>
2. George R.(2015). Container Gardening for Absolute Beginners.  
<https://www.amazon.in/Organic-Container-Gardening-Absolute-Beginners-ebook/dp/B010XWRT1M>

### Course Outcomes:

**CO1:** Students will learn about concepts and principles related to urban farming and terrace gardening.

**CO2:** Students will be able to learn about organic fertilizers and house composting.

**CO3:** Student will develop terrace gardening and working of a sustainable organic garden.

**CO4:** Student will get practical experience of urban farming and terrace gardening by field visit and practical exercise.

### Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	1	-	1	2	3	3	3	2
CO2	3	2	2	2	1	-	2	2	3	3	3	2
CO3	3	2	2	2	1	-	2	1	3	3	3	2
CO4	3	2	2	2	1	-	2	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER-04. SOIL, WATER AND SEED TESTING (GE-04) CR: 3+2**

**Course Objectives:**

1. To provide knowledge about soil formation, components and their properties by soil testing.
2. To develop concepts of qualitative and quantitative analysis of water properties and its impact on crop.
3. To provide knowledge of seed formation and seed testing.
4. To help students to understand plant nutrient and their impact of plant.

**THEORY:**

Soil formation, physio-chemical properties of the soil and its significance, physical chemical properties of the water, water quality test, importance of water testing in agricultural practices, Seed formation, structure, types of seed, seed viability, dormancy, seedling growth parameters, Economically importance of seed testing, instruments for soil, water and plant testing analysis, nitrogen, phosphorus, potash, organic carbon in soil, hardness, nitrate, pH in water, tetrazolium seed viability test.

**PRACTICAL**

1. Estimation of available soil Potassium by flame photometer method.
2. Estimation of microbial biomass carbon.
3. Estimation of Nitrogen in plant sample.
4. Estimation of pH of Irrigation water.
5. Computation of quality parameters in Irrigation water.
6. Description of seed structures composition and economic importance.
7. Seed and soil health test.
8. Normal seedlings and abnormal seedlings.
9. Washing and cleaning of laboratory glass ware.
10. Equivalent weights and Molecular weights of some important chemical.
11. Unit of measurements and conversions.
12. Physical purity test, Determination of Seed Moisture.
13. Colour changes due to pH change in the presence of pH indicators

**Suggested readings:**

1. Gurumurthy P. Practical Manual for Soil, Plant, Water and Seed Testing. Publisher Educreation Publishing.

2. Adepetu J. H. and Nabhan H. and Osinubi A.(1996).Simple soil, water and plant testing techniques for soil resource management. FAO.
3. Singh D. (2015). Manual on Soil Plant and Water Analysis. Publisher: Westville Publishing House, ISBN-10: 8185873267.
4. Patiram B. (2020). Soil Testing and Analysis: Plant, Water And Pesticide Residues. Publisher : New India Publishing Agency- Nipa.ISBN-10 : 939017547X

**Course Outcomes:**

- CO1:** Students will develop knowledge about soil formation, components and their properties by soil testing.
- CO2:** Students will be able to observe different analysis method of water properties and its impact on crop.
- CO3:** Student will develop the concept related to seed properties and seed testing.
- CO4:** Student will get practical experience of different physio-chemical parameters and its impact on the plant growth and crop yield

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	2	1	-	-	2	3	3	3	2
CO2	3	1	2	2	1	-	-	2	3	3	3	2
CO3	3	2	2	2	2	-	-	2	3	3	3	2
CO4	3	2	2	2	2	2	2	2	3	3	3	2

Weightage:**1-Sightly;2-Moderately;3-Strongly**

**PAPER -05. ABILITY ENHANCEMENT COURSE (AEC-04)**

**CR: 2**

**Course Objectives:**

1. It will be a nature of additional credit course with non-mandatory nature.
2. Students of NSS/NCC/Swachhata/Physical Education/Plantation Activities, etc. may opt such courses for acquiring addition knowledge and practical experience.

**Course Outcomes:**

- CO1:** The student will be able to gain the theoretical, practical knowledge and apply it in their social and practical approaches

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:1-Slightly;2-Moderately;3-Strongly

**SEMESTER V****PAPER-01. AGROFORESTRY(CORE-11) CR: 3+2****Course Objectives:**

1. To provide knowledge about basic concepts and principles related to agroforestry practices in India.
2. To develop concepts of traditional agroforestry system.
3. To understand economics of agroforestry system in different agroclimatic zone.
4. To help students to understand characteristics of trees/shrubs/grasses for agroforestry.

**THEORY:**

Indian agriculture- structure and constraints. Land use definition, classification and planning. Agroforestry- definition, aims objectives and need. Traditional Agroforestry systems: Taungya system, Shifting cultivation, Wind break, Shelterbelts, Homestead gardens. Alley cropping, high density short rotation plantation systems, silvicultural woodlots/energy plantations. Classification of agroforestry system-structural, Tree architecture, canopy management, Agroforestry systems in different agroclimatic zones, Tree-crop interface. Economics of agroforestry systems. People participation, rural entrepreneurship through agroforestry and industrial linkages.

**PRACTICAL**

1. Study characteristics of trees/shrubs/grasses for agroforestry.
2. Volume and biomass estimation.
3. Crown measurement, light interception and moisture measurement in agroforestry systems.
4. Litter estimation and nutrient analysis
5. Soil analysis, quantification of fertilizer doses,
6. Annual crops/grass growth measurements and yield

**Suggested Readings:**

1. Dwivedi A. P. (1992). Agroforestry principles and practices. Oxford and IBH Publication Co., New Delhi.
2. Chundawat D.S. and Gautam S. K. (2010). Textbook of agroforestry. Oxford and IBH publishing co pvt. Ltd.
3. Nair P. K. R.(1993). An introduction to agroforestry. Kluwer Academic Publishers. 499 p.
4. Huxley P. (1999). Tropical agroforestry. Blackwell Science, Oxford. 371 p.
5. Ramakrishnan P. S. (1992). Shifting agriculture and sustainable development. Man and biosphere series. The Parthenon Publishing Group.

**Course Outcomes:**

- CO1:** Students will develop knowledge about basic concepts and principles related to agroforestry practices in India.
- CO2:** Students will be able to observe different modern agroforestry system and traditional agroforestry system.
- CO3:** Student will understand the agroforestry system in different agroclimatic zone.
- CO4:** Student will get practical experience of different agroforestry system and their characteristics.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	2	1	-	1	1	3	3	3	2
CO2	3	1	2	2	1	-	1	2	3	3	3	2
CO3	3	2	2	2	2	-	1	2	3	3	3	2
CO4	3	2	2	2	2	-	2	1	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER-02. FLORICULTURE (CORE-12) CR: 3+2**

**Course Objectives:**

1. To provide knowledge about basic concepts and processes related to floriculture.
2. To develop concepts of poly house, net house and propagation technique of flower and landscape garden.
3. To provide knowledge of all management practices related to floriculture.
4. To help students to understand various commercial flowering plant and their marketing.

## **THEORY:**

Floriculture: definition, component and importance, Nursery management practices, Identify Plant morphology, different plant varieties and plant families, poly house, net house, propagation techniques of flower, landscape garden, establishment of farm planning and layout different types of landscapes, mulching, planting system and planting densities. Integrated Organic Pest control management of floriculture. Use of growth regulators in horticulture, weed management, types of indoor gardening, Tree based cropping system, identify commercial flowers rose, gerbera, marigold and marketing, project preparation for commercial flowering plant.

## **PRACTICAL**

1. Planning and layout of orchard, tools and implements,
2. Visit of commercial flower production unit.
3. Preparation of nursery beds for sowing of seeds.
4. Land preparation for flowering plants, planting system.
5. Preparation of organic fertilizer mixtures and field application.
6. Preparation and application of growth regulators, maturity standards, harvesting, grading, packaging and storage.

## **Suggested Readings:**

1. Merlo G. (2018). Floriculture and Landscaping. Publisher: Scitus Academics LLC, ISBN 9781681179360
2. Kulkarni B. S. (2016). Floriculture and Landscaping. Agro India Publications
3. Singh J. (2007). Basic Horticulture. Kalyani publishers.
4. Singh A. K. (2020). Textbook of Floriculture And Landscaping. Publisher New India Publishing Agency- Nipa, ISBN; 9386546000.
5. Bal J. S. (2002). Fruit Growing in India. Kalyani publishers
6. Chadha K. L. (2015). Handbook of Horticulture. Jain book Agency.
7. Acquah G. (2002). Horticulture - Principles and Practices.

## **Course Outcomes:**

**CO1:** Students will develop knowledge about floriculture.

**CO2:** Students will be able to observe poly house, net house and different propagation technique of floriculture.

**CO3:** Student will learn about various commercial flowering plant and their marketing.

**CO4:** Student will get practical experience of management practices in floriculture.

## Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2	1	2	-	-	2	3	3	3	2
CO2	3	2	3	2	2	-	-	2	3	3	3	2
CO3	3	2	3	2	2	3	3	3	3	3	3	2
CO4	3	2	3	2	1	2	3	3	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

### PAPER-03. RESIDUE MANAGEMENT PRACTICES AND MANURE PRODUCTION (CORE-13) CR: 3+2

#### Course Objectives:

1. To provide holistic knowledge of solid waste and its management.
2. To understand the concepts of reuse and recycle of organic waste.
3. To provide the knowledge of manure production and its marketing.
4. To help students to understand wealth generation form waste.

#### THEORY:

Introduction Sources, composition and characterization of the solid waste, Economic consideration; Wastes as a wealth and source of income, Planning system, Valorization of organic solid waste, Recycling of organic wastes; Animal feed, composting, anaerobic digestion, rendering, rapid thermophilic digestion, Immobilized enzyme reaction, process, sanitary land filling, Energy recovery, manure production methods, Nadep compost, vermin-compost, Azola production.

#### PRACTICAL

1. Evaluation of the source of waste.
2. Categorization of wastes in different categories
3. Recycling of wastes in organic manure or any other useful materials
4. Case studies, Field visits, Economic valuation of waste management practices.
5. Vermi compost production.
6. Litter decomposition of different plant species.

### Suggested readings:

1. Pichtel J. (2014). Waste Management Practices. Publisher; CRC press, ISBN; 9781000762648.
2. Sharma C.K.(2022). Solid, Liquid and Hazardous Waste Management. Publisher: Foundation Publishing House, ISBN-1:8195475590.
3. Tabassum B. (2016). Waste Management and Environmental Health. Publisher : Discovery Publishing House Pvt Ltd. ISBN-10 : 9350567776
4. Ramanathan A. L. and Jagbir Singh J. (2019). Solid Waste Management: Present and Future. Publisher: Dreamtech Press, ISBN-10: 9389447925
5. Waldrip, H. M. Pagliari, P. H. and He Z. (2020). Animal Manure: Production, Characteristics, Environmental Concerns, and Management, Volume 67 Print ISBN:9780891183709.

### Course Outcomes:

**CO1:** Students will develop knowledge of solid waste and its management.

**CO2:** Students will be able to understand the concept of reuse and recycle of organic waste.

**CO3:** Students will develop the concept of manure production and its marketing.

**CO4:** Students will get practical experience of wealth generation from waste.

### Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1	1	-	1	2	3	3	3	2
CO2	3	2	2	2	1	-	2	2	3	3	3	2
CO3	3	2	2	2	1	-	2	2	3	3	3	2
CO4	3	2	2	2	1	-	1	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

### PAPER-04. CLIMATOLOGY AND METEOROLOGY (DSE-1)

CR: 3 + 2

#### Course Objectives:

1. To provide knowledge about basic concepts and principles related to climate and its relation with crop production.



2. To develop concepts of meteorological phenomenon and its impact on farming.
3. To provide the knowledge of environmental variables and its management.
4. To help students to understand various crop production practices in the changing climatic condition.

### **THEORY:**

Introduction the atmosphere: origin, composition and structure, isolation and heat budget temperature of the atmosphere, distribution of temperature, air pressure and winds, general circulation of the atmosphere, monsoon, winds, humidity, fog and clouds, precipitation, atmosphere equilibrium: stability and instability, air masses, classification of climate, distribution, climate Change, weather forecasting and analysis, applied climatology, global warming, meteorology: weather and climate, micro-climate, weather elements, solar radiation, nature, properties, solar constant and energy balance, introduction to monsoon, basics of weather forecasting.

### **PRACTICAL**

1. Site selection for agromet observatory, measurement of temperature, measurement of rainfall, measurement of evaporation, measurement of atmospheric pressure, measurement of sunshine duration and solar radiation.
2. Measurement of wind direction and speed and relative humidity.
3. Study of weather forecasting and synoptic chart.
4. Field visits to observe changing pattern adopted by farmer for agriculture due to climate change.

### **Suggested Readings:**

1. Lal D.S. (2011). Climatology. Publisher: Sharda Pustak Bhawan, ISBN-10 : 8186204121
2. Ghadekar S.R. (2008). Textbook of Agro-meteorology. Agromet publishers.
3. Norman D. D. and Malcolm (2007). Farming Systems Development and Soil Conservation FAO. Jain Book Agency.
4. Khan M. K. and Ajmal A. (2008). Crop and forage production using saline waters nam S&T Centre. Jain Book Agency.
5. Singh C. (2012). Modern techniques of raising field crops. Oxford and IBH publishing company, New Delhi.

6. Varshnaya M. C. and Pillai B. (2012). A textbook of agriculture metrology. ICAR, New Delhi Publications.

**Course Outcomes:**

**CO1:** Students will develop knowledge about related to climate and its relation with crop production.

**CO2:** Students will be able to observe different environmental variables and its management.

**CO3:** Student will develop the concept of meteorological phenomenon and its impact on farming practices.

**CO4:** Student will get practical experience of different agricultural operation and the management of environmental variable.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	-	-	1	3	3	3	3
CO2	3	2	3	2	1	-	-	1	3	3	3	3
CO3	3	2	3	2	1	-	-	2	3	3	3	3
CO4	3	2	3	2	2	-	-	1	3	3	3	3

Weightage:1-Slightly;2-Moderately;3-Strongly

**OR**

**SERICULTURE TECHNOLOGY (DSE-01)**

**CR: 3+2**

**Course Objectives:**

1. To provide knowledge about host plant for silk production, rearing and reeling technology.
2. To development of students for entrepreneurship and skill on sericulture to cater the need of field personnel's to sericulture industries.
3. To provide the knowledge about silk marketing and trading of silk.

**THEORY:**

Introduction, scope and principle of Sericulture, Silk production in India and other countries and their export and import, types of silk produced in India; host plants of mulberry and non-mulberry silkworms, classification of sericigenous insects. Classification of silkworms based

on moulting, voltinism and geographical distribution; popular silkworm breeds and hybrids of Chhattisgarh, silkworm morphology, silkworm rearing methods, silkworm pest and diseases. Preparation of nursery beds, Selection of materials for cuttings, selection of cutting planting. Selection and grading of sampling, planting System and intercultural operations: - characteristics of sericulture industry, silk reeling, handloom and power loom activities, role of state sericulture department, Central Silk Board, prospects and problems of Sericulture industry for livelihood.

### **PRACTICAL**

1. Sericulture World maps and map of India and Chhattisgarh,
2. Study of life cycle of silkworm: Morphology of egg, larva, pupa and adult. Cocoon characters of popular uni-, bi- and multivoltine races,
3. Identification of different diseased silkworms based on external symptoms.
4. Morphological study of few important cultivars in Chhattisgarh.
5. Preparation of grafting (bud or shoot grafting) or layering (simple layering) drawing and labelling.
6. Identification of different types of weeds, fertilizers, calculation of dosages. Preparation Compost.

### **Suggested Readings:**

1. Kim H. B. (1989). Filature water engineering, Seoul national university press, Republic of Korea.
2. Huang G. R. (1988). Silk reeling, Oxford and IBH publishing co. Pvt. New Delhi.
3. Mahadeveppa D. Halliyal, V.G., Shankar, A.G. And Bhandiwad, R. (2000). Mulberry Silk Reeling Technology, Oxford And IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Sonwalker T. N. (2010). Handbook of Silk Technology, New Age International Pvt., Ltd.
5. Lee Y. W. (1999). Silk Reeling And Testing Manual, FAO Agricultural Services Bulletin No. 136, Rome, Italy.
6. Akira Nakamura (2000). Fiber Science and Technology. Oxford & IBH Publications, New Delhi.

### **Course Outcomes:**

- CO1:** Students will learn and get practical knowledge about silk, host plants and silk production, rearing and reeling technology.
- CO2:** The entrepreneurial skill related to sericulture will be developed among students.

**CO3:** Employment opportunity for students in sericulture department due field based exposure on silk production.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1	1	-	-	2	3	3	3	2
CO2	3	2	2	2	1	-	-	2	3	3	3	2
CO3	3	2	2	2	1	-	-	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**SEMESTER-VI**

**PAPER-01. VEGETABLE FARMING (CORE-14) CR 3+2**

**Course Objectives:**

1. To provide knowledge about basic concepts and principles related to vegetable production.
2. To develop concepts of cultivation technique and management practices.
3. To provide the knowledge of post harvesting management and marketing of vegetables.
4. To help students to understand vegetable specific production practices and start-up creation by giving practical knowledge.

**THEORY:**

Introduction to vegetable growing, cultural practices for vegetables, export and import of vegetables, explain general cultural practices used for vegetable production, crop rotation, soils, plant foods, cover crops, cultivation techniques, seed, hybrid seed, storing seed, sowing seed, understanding soils, dealing with soil problems, plant nutrition and feeding, pest, disease & weed control, hydroponic, aeroponic and greenhouse growing, growing selected vegetable varieties, irrigation, harvest & post-harvest, marketing of vegetables, vegetable production methods- okra, amaranthus, cauliflower, cabbage, tomato, solanaceous, cucurbits, spices-pepper, ginger, turmeric, *Amorphophallus paeoniifolius*, drumstick (*Moringa oleifera L.*).

**PRACTICAL**

1. Site selection and preparation.
2. Cultural practices of cover crops.
3. Planting Vegetables -seed, hybrid seed, storing seed, sowing seed.

4. Cultivation practices of vegetables as per their requirements and plant nutrition management.
6. Pest and weed management practices.
7. Storage and marketing process of vegetables.

**Suggested readings:**

1. Jeavons J. and LelerR.(1979). How to Grow More Vegetables. Publisher: Ten Speed Press, ISBN-10 : 0913668990.
2. Coleman E. (2018). The New Organic Grower. Publisher: Chelsea Green Publishing, ISBN-10 : 1603588175.
3. Sowards J. (2021). The First-Time Gardener: Growing Vegetables. Publisher : Cool Springs Press, ISBN-10 : 0760368724.
4. Matt Rees-Warren M. (2022). Book Review: The Ecological Gardener. <https://www.sustainablemarketfarming.com/>

**Course Outcomes:**

- CO1:** Students will develop knowledge of concepts and principles related to vegetable production.
- CO2:** Students will be able to practically understand concepts of cultivation technique and management practices.
- CO3:** Student will develop understanding of post harvesting management and marketing of vegetables.
- CO4:** Student will understand vegetable specific production practices and start-up creation by giving practical knowledge.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1	1	-	-	2	3	3	3	2
CO2	3	2	2	2	1	-	-	3	3	3	3	2
CO3	3	2	2	1	2	-	-	3	3	3	3	2
CO4	3	2	2	2	2	-	-	3	3	3	3	2

Weightage:1-Slightly;2-Moderately;3-Strongly

## **PAPER-02. MEDICINAL PLANT & AROMATIC PLANT FARMING (CORE-15) CR:**

**3+2**

### **Course Objectives:**

1. Students understand and knowledge about medicinal plant diversity in India.
2. To develop knowledge of aromatic plant and its farming practices.
3. To provide the knowledge of medicinal plant usages and its cultivation.
4. To help students to understand economic aspect of medicinal plants and aromatic plant in the national and international market.

### **THEORY:**

Medicinal diversity in India, Indian Traditional knowledge on medicinal plants: history, scopes, opportunities, Merits and demerits of using herbal products, important medicinal plants viz. *Pepper*, *Cardamom*, *Rauwolfia serpentina*, *Withania somnifera*, *Dioscorea*, *Baladona*, *Cinchona*, *Citronellagrass*, khus grass (Vetiver), *Mentha*, Sweet flag (butch), *Ocimum*, Safedmusli, Giloy, soil and climate requirements, export and import potential of medicinal plants, cultivation techniques, value addition and processing techniques, medicinal/herbal garden, National Medicinal Plant Development Board, Medicinal plant conservation area (MPCA).

### **PRACTICAL**

1. Identification of different medicinal and aromatic plants.
2. Collection and processing of medicinal and aromatic plants, processing techniques, storage, packaging.
3. Visit of MPCA, forest area.
4. Application of locally available medicinal plants, interaction with Vaidya and local healers.

### **Suggested readings:**

1. Amritpal Singh Saroya (2018). Textbook of Medicinal and Aromatic Plants. Indian Council of Agriculture Research, New Delhi.
2. Anand Singh Bisht (2019). Hand Book of Medicinal and Aromatic Crops, Brillion Publishing House, New Delhi.

3. N Deepa Devi (2017). A Text Book of Medicinal and Aromatic Crops. Aavishkar Publishers, Distributors, Jaipur

**Course Outcomes:**

- CO1:** Students will develop understand and knowledge about medicinal plant diversity in India.
- CO2:** Students will be able to observe knowledge of aromatic plant and its farming practices.
- CO3:** Student will develop the knowledge of medicinal plant usages and its cultivation.
- CO4:** Student will get practical experience of different economic aspect of medicinal plants and aromatic plant in the national and international market.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	1	-	-	2	3	3	3	2
CO2	3	2	2	2	1	-	-	2	3	3	3	2
CO3	3	3	2	2	1	-	-	2	3	3	3	2
CO4	3	2	2	2	1	1	1	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**PAPER-03. HARVESTING ORGANIC PRODUCE, QUALITY ANALYSIS AND IMPROVEMENT (DSE-02) CR: 3+2**

**Course Objectives:**

1. To provide knowledge about basic concepts and principles related to harvesting of crop in organic farms.
2. To develop concepts of different harvesting technology.
3. To provide knowledge of crop production methods and post processing of yield.
4. To help students to understand various aspect of quality analysis and value addition of organic products.

**THEORY:**

Harvesting technology; operations – digging, lifting, winnowing, stocking and threshing, timing of harvest, methods of harvest, special techniques, yield collection and management, planning for postharvest quality, crop quality indicators, crop rotation, intercropping, designing

cropping system, criteria for seed evaluation, characterization and multiplication, importance of traditional varieties, management of crop purity.

## PRACTICAL

1. Harvesting operations digging, lifting, winnowing, stocking and threshing
2. Analysis of crop yield and management.
3. Post harvest techniques of quality.
4. Crop quality indicators to predict the productivity.

## Suggested Reading:

1. Thompson and A. K . (2014) Fruit And Vegetables: Harvesting, Handling And Storage, 2 Volume, Publisher: John Wiley, ISBN: 9781118654040
2. Organic Materials Review Institute, <http://www.omri.org/>
3. Charles D.J.(2004). Handbook of Herbs and Spices, Volume 2
4. Munnaf M.A. and Mouazen A.M.(2020). Advances in Agronomy.
5. [https://www.fao.org/fileadmin/templates/nr/sustainability\\_pathways/docs/Compilation\\_techniques\\_organic\\_agriculture\\_rev.pdf](https://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Compilation_techniques_organic_agriculture_rev.pdf)

## Course Outcomes:

**CO1:** Students will develop knowledge about farming equipment and machinery of crop in organic farms.

**CO2:** Students will be able to observe different modern machinery for harvesting and post processing activity of crop.

**CO3:** Student will develop practical knowledge of crop production methods and post processing of yield .

**CO4:** Student will get practical experience of quality analysis and value addition of organic products.

## Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	1	-	-	2	3	3	3	2
CO2	3	2	3	1	1	-	-	2	3	3	3	2
CO3	3	2	3	2	1	2	2	2	3	3	3	2
CO4	3	2	3	2	1	2	2	2	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly



**OR**

**POST-HARVEST MANAGEMENT AND VALUE ADDITION (DSE-02) CR:3+2**

**Course Objectives:**

1. To provide knowledge of crop production methods and post-processing of yield.
2. To develop concepts of different harvesting management process and technology.
3. To provide the knowledge of crop harvest management in organic farming.
4. To help students to understand various aspect of quality analysis and value addition of organic products.

**THEORY:**

Post-harvesting management and its Importance, status of food processing in India, concept of safe food and important food regulations in India, harvesting and post-harvest handling of organic crops, fruits and vegetables ripening process, fruits and vegetables, factors affecting the quality of the post-harvest life and deterioration of harvested crops. Principles and methods of food processing and preservation and its benefits. Methods of storage-precooling, pre-storage treatments, low-temperature storage, controlled atmosphere storage, hypobaric storage, irradiation, and low-cost storage structures, packaging technology.

**PRACTICAL**

1. Visit of Mart for identification of different value-added products.
2. Preparation of Pickles, Jam, Jelly, ketchup and Morabba.
3. Drying of fruits, vegetables and flowers.
4. Identification of fresh and aged vegetables and fruits.
5. Visit to cold storage for recording the protocols storage of various fruits and vegetables.
6. Visit to a flower Mandi and record the activities in the Mandi.
7. Visit to a local fruit market and record the activities in the market.

**Suggested books**

1. Goel K. A., Kumar R. and Mann S. S. (2007). Postharvest Management and Value Addition. *Daya Publishing House*. ISBN- 978-8170354543
2. Rathore N. S., Mathur G. K. and Chasta S.S. (2012). Post-Harvest Management and Processing of Fruits and Vegetables. *The Energy and Resources Institute*. ISBN- 978-8171641154

3. Simson S. P. & Straus M.C. (2010). Post-Harvest Technology of Horticultural Crops. *Oxford*. ISBN- 978-9380179254
4. Kumar P. V. S. & Sudha Vani V. (2020). Post-Harvest Handling and Processing of Plantation Crops. *Notion Press*. ISBN- 9781648501289
5. Arya M. A., Kumar T. and Chandra S. (2020). Practical Manual on Post Harvest Management and Value Addition of Fruits and Vegetables. *Jain Brothers*. ISBN- 978-8194413745

**Course Outcomes:**

**CO1:** Student will get practical experience of quality analysis and value addition of organic products.

**CO2:** Student will develop practical knowledge of crop production methods and post processing of yield.

**CO3:** Student will develop the concept and working principle of different management practices in organic farming.

**CO4:** Student will get practical experience of different agricultural operation and the management practices use in it.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	1	-	-	2	3	3	3	2
CO2	3	2	1	2	1	-	-	2	3	3	3	2
CO3	3	2	1	2	2	1	1	2	3	3	3	2
CO4	3	2	1	2	2	1	1	2	3	3	3	2

Weightage: **1-Sightly; 2-Moderately; 3-Strongly**

**PAPER -04. ABILITY ENHANCEMENT COURSE (AEC-05)**

**CR: 2**

1. The course will be selected from the University pool by students.

**Course Outcomes:**

**CO1:** The student will be able to gain the theoretical, practical knowledge and apply it in their social and practical approaches

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

## PAPER-05. MOOC COURSE

CR:2-4

### Objectives:

1. To utilize and explore online platform courses related to forestry and resource management for updating knowledge on the subject.
2. To promote comprehensive knowledge offered by other institutions for wide adoptability and developing competence.

### Course Outcomes:

CO1: The students will be able to explore online learning system for extra skill and knowledge.

CO2: The students will develop competency for national level institutions.

### Course Outcomes and their mapping with Program Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:1-Slightly;2-Moderately;3-Strongly

## SEMESTER VII

### PAPER: 1. BIOSTATISTICS (CORE-16)

CR: 3 + 2

#### Course Objectives:

1. To provide knowledge about fundamentals of biostatistics and its use in farming research and management.
2. To develop concepts for testing hypothesis signification for research and analysis.
3. To provide knowledge of the data analysis, data representation and tabulation.
4. To understand relationship between two or more quantitative variables related to the agriculture.

#### THEORY:

Definition and application of statistics, types and source of data, classification and tabulation of data, frequency, distribution, graphical representation of data, (Bar diagram, pie chart,

histogram, frequency polygon) measures of central tendency ( mean, median, mode) measures of Dispersion (range, standard deviation, Mean deviation, Quartile deviation, variance, coefficient of variation), Probability, Test of signification: basic concepts,( Z- Test, X<sup>2</sup>-Test, t-Test, F-test,), regression, correlation : (scatter diagram, correlation co-efficient, its properties).

## PRACTICAL

1. Histogram, frequency polygon, Bar chart, pie chart.
2. Measures of central tendency: Mean median and mode for raw and grouped data.
3. Construction of frequency distribution table and its graphical representation.
4. Measures of dispersion: Range, mean deviation, quartile deviation and standard deviation for raw and grouped data.
5. Paired‘t’ test, Chi-square test for contingency tables and theoretical ratios
6. Correlation and linear regression.

## Suggested Readings:

1. Kenneth N. B. (1998). Introductory Statistics. [www.amazon.com](http://www.amazon.com)
2. Arora P. N. (2003). Biostatistics. Himalayan publishers.
3. Pagano M. and Gauvreau K. (2008). Principles of Biostatistics. Jhon and Wiley Sons Ltd.
4. Chandel S. R. S. (2009). A Hand Book of Agricultural Statistics. Publisher: Anchal Prakhn Mandir.

## Course Outcomes:

- CO1:** Students enable to exploit biostatistics in agriculture and allied subjects.
- CO2:** Students friendly worksheet using excel sheet for analysis and data interpretation using computer based software.
- CO3:** Student will be efficient in data handing and graphic, and representation.
- CO4:** Subject will help in their professional development and career building.

## Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	3	-	-	2	3	3	3	3
CO2	3	3	2	2	3	-	-	2	3	3	3	3
CO3	3	3	2	3	3	-	-	2	3	3	3	3
CO4	3	3	2	3	3	-	-	2	3	3	3	3

Weightage:**1-Sightly;2-Moderately;3-Strongly**

## **PAPER-02. FARMING SYSTEMS AND SUSTAINABLE AGRICULTURE (CORE-17)**

**CR: 3+2**

### **Course Objectives:**

1. To provide knowledge about basic concepts and principles related to sustainable agriculture and crop production.
2. To develop concepts biodiversity conservation and natural resource management through organic farming practices.
3. To provide the knowledge of sustainable crop and crop production method.
4. To help students to understand various sustainable agricultural practices in the national and international level.

### **THEORY:**

Sustainable agriculture concept, Factors affecting ecological balance and sustainability of agricultural resources, soil erosion, siltation of reservoirs, rise in water table, water logging, salinization and alkalization in command areas prevention, control and reclamation measures, Ground water development, over exploitation problems and safe yield concept – artificial recharge methods, environmental pollution, fertilizers as a source of pollution management factors to reduce fertilizer pollution, pesticides pollution and control measures, management of natural resource, Impact on Low External Input Agriculture (ILEIA) and Low External Inputs for Sustainable Agriculture (LEISA), Conjunctive use of water advantages and limitations, Organic farming, farming systems; system and systems approach, significance of integrating crop and livestock dairy, sheep and goat, biogas plant, biodiversity, adverse impacts of genetic erosion, conservation of natural resources.

### **PRACTICAL**

1. Preparation of cropping scheme to suite different irrigated and garden land situations
2. Preparation of farming systems to suite to dryland situation
3. Compost making, vermi-compost, Preparation of enriched farmyard manure
6. Recycling of urban waste.
7. Use of bio-pesticides
8. Preparation of project proposals for land development
9. Management of problematic soils

10. Management practices to prevent environmental deterioration for sustainable agriculture
11. Visit to wetland farm – observation on resource allocation, recycling of inputs and economics
12. Visit to garden land farm – observation on resource allocation, recycling of inputs and economics
13. Visit to dry land farm – observation on resource allocation, recycling of inputs and economics

### **Suggested readings**

1. Arun, K. Sharma A. K. (2006). A Hand Book of Organic Farming. Agrobios (India), Jodhpur.
2. Dahama, A.K. (2007). Organic Farming for Sustainable Agriculture. Agrobios (India), Jodhpur.
3. Dalela, R.C. and Mani, U.H. (1985). Assessment of Environmental Pollution. Academy of Environmental Biology, Muzaffarnagar.
4. Deb, D.L. (1994). Natural Resources Management for Sustainable Agriculture and Environment. Angkor publishers Ltd., New Delhi.
5. Purohit, S.S. (2006). Trends in Organic Farming in India. Agrobios (India), Jodhpur.
6. Ruthenburg, H. (1971). Farming Systems in Tropics. Clarendon Press, London.
7. Saroja R. (2006). Agricultural Sustainability – Principles, Processes and Prospects. Food Products Press, New York.
8. Subramanian, S. (2004). Globalization of Sustainable Agriculture. Kalyani Publishers, Ludhiana.
9. Thampan, P.K. (1993). Organics in Soil Health and Crop Production. Peekay Tree Crops Development Foundation, Cochin.

### **Course Outcomes:**

**CO1:** Students will develop knowledge about concepts and principles related to sustainable agriculture and crop production.

**CO2:** Students will be able to observe biodiversity conservation and natural resource management through organic farming practices.

**CO3:** Student will develop the concept of sustainable crop and crop production method.

**CO4:** Student will get practical experience understand various sustainable agricultural practices in the national and international level.

## Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	3	-	-	3	3	3	3	3
CO2	3	3	3	2	3	-	-	3	3	3	3	3
CO3	3	3	3	2	3	-	-	3	3	3	3	3
CO4	3	3	3	3	3	-	-	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

### PAPER-03. ORGANIC CERTIFICATION (CORE-18) CR: 3+2

#### Course Objectives:

1. To provide knowledge about basic concepts and principles related to farm economy.
2. To develop concepts of certification of organic products and geo-tagging.
3. To provide knowledge of different policies related to marketing , import and export activity.
4. To help students to value addition and ways to increase return from organic farming.

#### THEORY:

Farm economy: basic concept of economics- demand, supply, economic, viability of a farm. Basic production principles, reducing expenses, ways to increase returns, cost of production system, benefit/ cost ratio, marketing, imports and exports, policies and incentives of organic production, farm inspection and certification: conversion to organic farming, organic earning and national economy, socio economic impacts, procedure of certification of organic products, geo-tagging.

#### PRACTICAL

1. Estimation of the relationship between demand of supply of organic farm produces
2. Estimation of revenue of farm produces
3. Calculate the cost benefit ratio of organic farming
4. Marketing channels of import and export of organic produces
5. Organic certification process with implementation of policies
6. Socio economic impact assessment with adaptation of organic farming
7. Field visit for Apiculture, Mushroom production, Terrace farming

**Suggested Reading:**

1. Gehlot D. (2005). Organic Farming: Standard Accreditation Certification and Inspection. Publishers: Agrobios, ISBN-10: 9788177542370.
2. Ogunbanwo S A. (2012). Organic Certification for Livelihoods Improvement Paperback – Import. Publishers: LAP Lambert Academic Publishing, ISBN-10 : 9783848416332.
3. Vijayan G. (2014). Organic Food Certification and Marketing Strategies. Publishers: AGRIHORTICO ASIN : B00HZI59ZG
4. Yadav A K. Training Manual Certification and Inspection Systems in Organic Farming in India. Government of India Ministry of Agriculture Department of Agriculture and Cooperation. Publishers: National Centre of Organic Farming CGO-II, Kamla Nehru Nagar, Ghaziabad, UP – 201 002.

**Course Outcomes:**

- CO1:** Students will develop basic concepts and principles related to farm economy.
- CO2:** Students will be able to understand concepts of certification of organic products and geo-tagging.
- CO3:** Student will develop understanding of different policies related to marketing , import and export activity.
- CO4:** Student will get practical experience of different marketing activities which will help them to start their own organic product.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	1	2	-	-	3	3	3	3	2
CO2	3	3	1	1	2	-	-	3	3	3	3	2
CO3	3	3	1	2	2	-	-	3	3	3	3	2
CO4	3	3	1	2	2	-	-	3	3	3	3	2

Weightage:**1-Sightly;2-Moderately;3-Strongly**

**PAPER-04.MUSHROOM TECHNOLOGY (DSE-03) CR: 3+2****Course Objectives:**

1. To provide knowledge about basic concepts of mushrooms cultivation.
2. To understand different process related to mushroom farming and its management.



3. To provide the knowledge edible mushroom flora in India.
4. To help students to understand various edible mushrooms and their cultivation status in India and world.

### **THEORY:**

Introduction to mushroom technology; biology of mushrooms; nutritional value, medicinal value of mushrooms, edible mushrooms and cultivation status in India and world, cultivation technology: infrastructure, equipment and substrates in mushroom cultivation, spawn: types, preparation, mushroom bed preparation and factors affecting, compost technology in mushroom production, casing; raw material used for casing, preparation of casing material; important sanitation cultivation, insect - pests management in cultivated mushroom, disease management in cultivated mushroom, value addition of mushroom.

### **PRACTICAL:**

1. Identification of local mushroom Flora and preserved specimens of mushroom.
2. Sterilization of glasswares, equipment, and culture media used in mushroom cultivation.
3. Preparation of culture media: Potato Dextrose medium, Richards medium.
4. Preparation of spawn: Grain spawn, Straw spawn, Sawdust spawn.
5. Preparation of compost and known compost formulations.
6. Identification and management of pests, diseases in Mushroom cultivation.

### **Suggested Readings:**

1. Bahl N. (2008). Handbook on Mushrooms. Publisher: Oxford & IBH publishing Company. ISBN: 9788120413993.
2. Revathy N.(2020). Mushroom Cultivation. Publisher: Shanlax Publications. ISBN: 978939082735
3. Rana R. S.(2020). Mushroom Cultivation and its Diseases. Publisher: Sankalp Publication. ISBN: 9788194717607

### **Course Outcomes:**

**CO1:** Students will develop knowledge about process of mushroom farming.

**CO2:** Students will be able to observe different modern method for harvesting and post processing activity of mushroom.

**CO3:** Student will develop the knowledge edible mushroom flora in India.

**CO4:** Student will get practical experience of various edible mushrooms and their cultivation status in India and world.

## Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	2	-	-	3	3	3	3	2
CO2	3	2	2	2	2	-	-	3	3	3	3	2
CO3	3	2	2	2	2	-	-	3	3	3	3	2
CO4	3	2	2	2	2	-	-	3	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

OR

### APICULTURE TECHNOLOGY (DSE-03) CR: 3+2

#### Course Objectives:

1. To provide knowledge about basic concepts and process related to bee keeping.
2. To develop practical knowledge of honey extraction and processing.
3. To provide the knowledge of quality control standard and marketing.

#### THEORY:

Introduction to Apiculture - scope, importance; Apiculture development in India - institutions involved; Species of Honey bees - indigenous, exotic - morphology; Honey - its medicinal properties - application in various fields - other valuable products of honey bees, Bee keeping equipment - introduction to types of bee boxes - BIS standard Tools used in apiculture; Bee flora - importance and rearing - congenial conditions for starting up of apiculture; Honey extraction & handling - Quality control standards - Honey testing kit - Processing of honey; Diseases of Honey Bees - Preventive & Control measures.

#### PRACTICAL:

1. To study the morphology of local Honey Bee species and their life cycle.
2. To study the detail of honey extraction procedures and quality assessment of Honey samples obtained from local marketing areas.
3. Identification of Bee Flora, their rearing and other importance.
4. To study various Bee keeping equipment's with well labelled diagrams.

#### Suggested Readings:

1. Mishra R. C. (2013). Prospective in Indian Apiculture. Publisher: Agrobios Publication. ISBN: 9788177541311
2. Nagaraja N. (2014). Honeybees. Publisher: MJP Publishers. ISBN: 9788180940590
3. Mishra R. C. (2013). Honeybees and Their Management in India. Publisher: ICAR, New Delhi. ISBN: 9788171641475

**Course Outcomes:**

**CO1:** Students will develop concepts and process related to bee keeping.

**CO2:** Students will be able to learn about honey extraction and their processing.

**CO3:** Student will develop the knowledge of quality control of honey and its marketing.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	2	-	-	3	3	3	3	2
CO2	3	2	2	2	2	-	-	3	3	3	3	2
CO3	3	2	2	2	2	-	-	3	3	3	3	2
CO4	3	2	2	2	2	-	-	3	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

**1. SEMINAR (S1)/ EXPERIMENTAL LEARNING CR: 2**

**Objective**

1. Seminar will develop confidence and communication skills in to the students

Student has to present and participate in class seminar which will be conducted in the department every week. Based on the student performance in the seminar, the score/credit will be evaluated.

**Course outcomes**

**CO1:** Student will develop their personality and skills in various aspects.

**Course Outcomes and their mapping with Program Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	3	2	3	3	3	3	2	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

## SEMESTER - VIII

### PAPER 1. FARMING OPERATIONS WORK EXPERIENCE (INTR -1)

**CR: 06**

#### Course Objectives:

1. To provide knowledge about practical concepts related to marketing and management of important crop
2. To develop concepts of Hi-tech nursery, green house and herbal garden.
3. To provide the knowledge of crop and crop production method.
4. To help students to understand tree of agricultural farming equipment and instrument.

#### THEORY:

Visit to Hi-Tech Nursery, green house, Herbal garden and watersheds. Adopted traditional and modern farming pattern by the villages and crop production. Soil type and adopted cropping pattern and yield calculation. Study the CAT (Catchment area treatment) plan. Use of agricultural farming equipment's instruments. Study the marketing and management of important crops. Methods adopted for the organic manure production.

#### Course Outcomes:

**CO1:** Students will develop knowledge about Hi-tech nursery, green house and herbal garden.

**CO2:** Students will be able to observe different modern machinery for harvesting and post processing activity of crop.

**CO3:** Student will develop the concept and working principle of different machinery.

**CO4:** Student will get practical experience of different agricultural operation and the use of equipment and machinery in it.

#### Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	2		3	2	3	3	3	3	2	3	3
CO2	3	1		3	3	3	3	3	3	3	3	2
CO3	3	2	3	3	2	3	3	3	3	3	3	2
CO4	3	3	3	3	3	3	3	3	3	3	3	3

Weightage:1-Sightly;2-Moderately;3-Strongly

## PAPER 2. INSTITUTES AND INDUSTRIAL VISIT/ TRAINING (INTR-2)

**CR: 06**

### Course Objectives:

1. To make the students acquaint with the raw materials, processing techniques, industrial utilization, financial implications and marketing of finished organic farming based industries.
2. To provide exposure of working of others institution to students.
3. To develop man power equipped with latest techniques and knowledge for the sustainable utilization and management of fore based industries.

Study the nature of farming based industries. Organic yield- production of raw material. Production and management process. Marketing and financial management. Visits of nearby agroforestry field or organic farming institutions/ organizations

### Course Outcomes

**CO1:** Students will be able to efficient in organic product production and processing of products with its marketing trading methods.

**CO2:** Graduate be able to implement of industrial utilization related to organic farming products and financial implications and marketing of finished product based industries.

**CO3:** To provide exposure of working of others institution to students.

**CO4:** To develop man power equipped with latest techniques and knowledge for the sustainable utilization and management of forest based industries.

### Course Outcomes and their mapping with Programme Outcomes:

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	2		3	2	3	3	3	3	2	3	3
CO2	3	1		3	3	3	3	3	3	3	3	2
CO3	3	2	3	3	2	3	3	3	3	3	3	2

Weightage:1-Sightly;2-Moderately;3-Strongly

## PAPER 3. DISSERTION

**CR: 06**

### Course Objectives:

1. To provide the students research based skills on organic farming subjects for analysis of the

problem, identification of topic and writing skill.

2. This will enable the students for field/laboratory based research work on different aspects of organic farming and to improve their scientific writing skill.

Students select any topic of research, case study, review of literatures, field study, and experiment on organic farming and sustainable agriculture. Supervisor/ Mentors will be allotted to supervise and guide the students for writing and drafting work plan, etc.

**Course Outcomes**

**CO1:** Student will learn how to perform research work in organic farming with proper solving approaches.

**CO2:** Graduates will be able analyze problems and its solution with writing skill.

**CO3:** Skilled students will be performed field/laboratory based research work on different aspects of organic farming, agricultural process and to improve their scientific writing skill.

**Course Outcomes and their mapping with Programme Outcomes:**

CO	PO								PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO1	2	2		3	2	3	3	3	3	2	3	3
CO2	3	1		3	3	3	3	3	3	3	3	2
CO3	3	2	3	3	2	3	3	3	3	3	2	2

Weightage:**1-Sightly;2-Moderately;3-Strongly**