LOYOLA ACADEMY

DEGREE & PG COLLEGE

OLD ALWAL, SECUNDERABAD - 500 010, TELANGANA, INDIA

(An Autonomous Institution Affiliated to Osmania University)

Re-accredited with 'A' Grade (III Cycle) by NAAC

A Catholic Christian Minority Institution (Co-Education)

A "College with Potential for Excellence" by UGC

www.loyolaacademy.edu.in **email:** info@loyolaacademy.edu.in **Ph:** 040-27862363/27860077

SYLLABUS

of

B.Sc. (Hons.) Agriculture

For the Academic Year 2026-2027

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of

B.Sc. (Hons.) Agriculture

Principal **Dean** **Chairman, Board of Studies**

For the Academic Year 2026-2027 for the Batch 2025-29

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SCHOOL OF AGRICULTURE

PROGRAMME OUTCOMES

- **PO1.** Scientific Knowledge. Apply the knowledge of Science, Mathematics, Engineering& Technology fundamentals to solve the complex problems.
- **PO2.** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO3**.Problem analysis: Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO4.** Modern tool usage: Create, select and apply appropriate techniques, resources, modern technology and IT tools to complex science and technological activities.
- **PO5.** Environment and sustainability: Understand the impact of professional science and technological solutions in societal and environmental contexts and for sustainable development.
- **PO6**.Individual and team work: Function objectively as an individual and as a member in diverse teams.
- **PO7.** Communication: Communicate effectively on complex science & technology activities with society at large and able to write effective reports and documentation.
- **PO8.** Life-long learning: Recognize the need and ability to engage in independent and lifelong learning in the context of technological change.

DEPARTMENT OF B.Sc. (*Hons.*) AGRICULTURE

PROGRAMME SPECIFIC OUTCOMES

- Knowledge of crop production, crop protection and crop improvement techniques.
- Knowledge of farm management economics, various agricultural extension methods and communication techniques to serve farming community and industries.
- To develop scientific, technical and practical skills related to lab and field in various plant and animal related courses with critical thinking and strong ethical foundation.
- Develops entrepreneurship qualities at various levels by taking apt decisions to enhance the success of an agricultural enterprise or an organization.

LOYOLA ACADEMY DEGREE & PG COLLEGE (AUTONOMOUS), ALWAL, SECUNDERABAD- 500 010 TS
CONSOLIDATED SCHEME FOR THE ACADEMIC YEAR 2026-27 FOR BATCH 2026-30

	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	Course 9	Course 10	Hr	Cr	
1	General English-1 (3+0) (AECC-1)	VE & PD (2+0) (AECC-2)	Fund. of Soil Science (2+1) (Core-1)	Farming based Livelihood systems (2+1) (Core -2)	Livestock and poultry management (1+1) (Core-3)	Fund. of Horticulture (2+1) (Core-4)	Rural Sociology & Educational Psych. (2+0) (Core-5)	Mushroom production technology (0+2) (SEC-1)	Commercial Horticulture (0+2) (SEC-2)		30	22	**AECC=2 Core= 5 SEC= 2**
2	Communication skills (1+1) (AECC-3)	IHC (2+0) (AECC-4)	Fundamentals of Agronomy (2+1) (Core-6)	Personality Development (1+1) (Core-7)	Environmental studies and Disaster Management (2+1) (Core-8)	Soil Fertility Management (2+1) (Core-9)	Fundamentals of Entomology (2+1) (Core-10)	Fundamentals of Plant Pathology (2+1) (Core-11)	Post-harvest production Technology (0+2) (SEC-3)	Vermi-composting (0+2) (SEC-4)	36	25	**AECC=2 Core= 6 SEC= 2**
3	Generic Elective (2+1) (GE-1)	Crop Prod. Tech.- 1 (2+1) (Core -12)	Prod. Tech. of Fruits & Plan.Crops (1+1) (Core-13)	Principles of Genetics (2+1) (Core-14)	Fundamentals of Extn. Education (1+1) (Core-15)	Fundamentals of Nematology (1+1) (Core-16)	Farm Power & Machinery (1+1) (Core-17)	Agri-Informatics (2+1) (Core-18)	Organic production technology (0+2) (SEC-5)	-	32	22	**GE=1 Core=7 SEC=1**
4	Entre. Dev. and Busi. Comm. (2+1) (Core-19)	Crop Prod. Tech. -2 (2+1) (Core - 20)	Prodn. Tech. of vegetables and spices (2+1) (Core-21)	Principles of Agrl. Eco. & Farm management (2+0) (Core-22)	Princ. and practices of Natural Farming (1+1) (Core-23)	Water Management (1+1) (Core-24)	Problematic Soils & their Mngt (1+1) (Core25)	Basics of Plant breeding (2+1) (Core-26)	Protected cultivation (SEC- 6) (0+2)	-	31	22	**Core=8 SEC=1**
5	Intro. to Agro-Meteorology (1+1) (Core-27)	Fund. of Crop Physiology (2+1) (Core-28)	Introduction to Agro-Forestry (1+1) (Core-29)	Fundamentals of Agri-Bio-technology (2+1) (Core-30)	Crop Improvement-I (1+1) (Core-31)	Dryland Agriculture and Watershed management (1+1) (Core-32)	Diseases of field and Hort. Crops and their mngt. (2+1) (Core-33)	Pest management in crops and Stored grains (2+1) (Core-34)	Agricultural Marketing and Trade (2+1) (Core-35)	-	32	23	**Core=9**
6	Basic and Applied Agril. Statistics (2+1) (Core-36)	Weed Management (1+1) (Core-37)	Crop Improvement -II (1+1) (Core-38)	Ornamental crops, MAPs and Landscasping (1+1) (Core-39)	Agricultural Microbiology and Phyto-remediation (1+1) (Core-40)	Renewable energy in Agriculture and Allied sectors (1+1) (Core-41)	Essentials of Plant Bio-Chemistry (2+1) (Core-42)	Agricultural Finance and cooperation (1+1) (Core-43)	Fundamentals of Seed Science and Technology (1+1) (Core-44)		33	20	**Core=9**
7	**5 Elective courses 5 x (3+1)** Agri Business management/Post Harvest Technology/ Bio-pesticides and Bio-fertilizers/ Geo-Informatics and Remote sensing/ Micro-propagation/ Commercial plant breeding/ Beneficial insects/ Bio-formulation and Nano formulation										25	20	**DSE=5**
8	Rural Agricultural Work Experience Programme (SEC-7)					Industrial attachment (SEC-8)					36	20	**SEC=2**
Total **Legend: 1. Ability Enhancement Compulsory Course: 04** **2. Generic Elective:01** **3. Skill Enhancement Course:08** **4. Core:44** **5. Discipline Specific Elective:05**											**255**	**174**	

LOYOLA ACADEMY DEGREE & PG COLLEGE (AUTONOMOUS), ALWAL, SECUNDERABAD- 500 010 TS
CONSOLIDATED SCHEME FOR THE ACADEMIC YEAR 2026-27 FOR BATCH 2025-29

	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	Course 9	Course 10	Hr	Cr	
1	General English-1 (3+0) (AECC-1)	VE & PD (2+0) (AECC-2)	Fund. of Soil Science (2+1) (Core-1)	Farming based Livelihood systems (2+1) (Core -2)	Livestock and poultry management (1+1) (Core-3)	Fund. of Horticulture (2+1) (Core-4)	Rural sociology & Educational Psych.(2+0) (Core-5)	Mushroom production technology (0+2) (SEC-1)	Fundamentals of IOT (0+2) (SEC-2)		30	22	**AECC=2 Core= 5 SEC= 2**
2	Communication skills (1+1) (AECC-3)	IHC (2+0) (AECC-4)	Fundamentals of Agronomy (2+1) (Core-6)	Personality Development (1+1) (Core-7)	Environmental studies and Disaster Management (2+1) (Core-8)	Soil Fertility Management (2+1) (Core-9)	Fundamentals of Entomology (2+1) (Core-10)	Fundamentals of Plant Pathology (2+1) (Core-11)	Post-harvest production Technology (0+2) (SEC-3)	Vermi-composting (0+2) (SEC-4)	36	25	**AECC=2 Core= 6 SEC= 2**
3	Generic Elective (2+1) (GE-1)	Crop Prod. Tech.- 1 (2+1) (Core -12)	Prod. Tech. of Fruits & Plan.Crops (1+1) (Core-13)	Principles of Genetics (2+1) (Core-14)	Fundamentals of Extn. Education (1+1) (Core-15)	Fundamentals of Nematology (1+1) (Core-16)	Farm Power& Machinery (1+1) (Core-17)	Agri-Informatics (2+1) (Core-18)	Organic production technology (0+2) (SEC-5)	-	32	22	**GE=1 Core=7 SEC=1**
4	Entre. Dev. and Busi.Comm. (2+1) (Core-19)	Crop Prod. Tech. -2 (2+1) (Core-20)	Prodn. Tech. of vegetables and spices (2+1) (Core-21)	Principles of Agrl. Eco. & Farm management (2+0)(Core-22)	Princ. and practices of Natural Farming(1+1) (Core-23)	Water Management (1+1) (Core-24)	Problematic Soils & their Mngt(1+1) (Core25)	Basics of Plant breeding (2+1) (Core-26)	Protected cultivation (SEC- 6)(0+2)	-	31	22	**Core=8 SEC=1**
5	Intro. to Agro-Meteorology (1+1) (Core-27)	Fund. of Crop Physiology(2+1) (Core-28)	Introduction to Agro-Forestry(1+1) (Core-29)	Fundamentals of Agri-Bio-technology (2+1) (Core-30)	Crop Improvement-I (1+1) (Core-31)	Dryland Agriculture and Watershed management (1+1) (Core-32)	Diseases of field and Hort. Crops and their mngt. (2+1) (Core-33)	Pest management in crops and Stored grains (2+1) (Core-34)	Agricultural Marketing and Trade (2+1) (Core-35)	-	32	23	**Core=9**
6	Basic and Applied Agril. Statistics (2+1) (Core-36)	Weed Management (1+1) (Core-37)	Crop Improvement -II (1+1) (Core-38)	Ornamental crops, MAPs and Landscasping (1+1) (Core-39)	Agricultural Microbiology and Phyto-remediation (1+1)(Core-40)	Renewable energy in Agriculture and Allied sectors (1+1) (Core-41)	Essentials of Plant Bio-chemistry (2+1) (Core-42)	Agricultural Finance and cooperation (1+1) (Core-43)	Fundamentals of Seed Science and Technology(1+1) (Core-44)		33	20	**Core=9**
7	**5 Elective courses 5 x (3+1)** Agri Business management/Post Harvest Technology/ Bio-pesticides and Bio-fertilizers/ Geo-Informatics and Remote sensing/ Micro-propagation/ Commercial plant breeding/ Beneficial insects/ Bio-formulation and Nano formulation										25	20	**DSE=5**
8	Rural Agricultural Work Experience Programme (SEC-7)					Industrial attachment (SEC-8)					36	20	**SEC=2**
Total											**255**	**174**	

Legend: 1. **Ability Enhancement Compulsory Course: 04**
2. **Generic Elective:01**
3. **Skill Enhancement Course:08**
4. **Core:44**
5. **Discipline Specific Elective:05**

LOYOLA ACADEMY DEGREE AND PG COLLEGE, ALWAL, SECUNDERABAD-500010, TS

CONSOLIDATED SCHEME FOR THE ACADEMIC YEAR 2026-27 FOR BATCH 2024-28

Sem	Course 1	Course 2	Course 3	Course 4	Course 5	Course 6	Course 7	Course 8	Course 9	Course 10	Hr	Cr	
1	General English-1 (3+0) (AECC-1)	VE & PD (2+0) (AECC-2)	Ag. Her. & Fund. of Agronomy (2+1) (Core-1)	Fund. Of Gen.(2+1) (Core – 2)	Fund. Of CropPhysio (1+1) (Core-3)	Intro. to Pl.Pathogens (2+1) (Core-4)	Find. Of Agri.Economics(2+0) (Core-5)	Fund. Of Horticulture (1+1) (Core-6)	Rural socio. & Edu. Psych.(2+0) (Core-7)	Elementary Mathematics (2+0) (SEC-1)	29	24	**AECC=2 Core= 7 SEC= 1**
2	General English-2 (3+0) (AECC-3)	IC (2+0) (AECC-4)	Meteorology& Climate change (1+1) (Core-8)	Intro. to Forestry (1+1) (Core-9)	Ag.Microbiology (1+1) (GE-1)	Fund of Ent-I(2+1) (Core-10)	Fund. Of Soil Sc. (2+1) (Core-11)	Soil & Water Cons.Engg. (1+1) (Core-12)	Agri-Informatics (1+1) (SEC-2)	Fund. Of Pl. BioChem& Biotech(2+1) (Core-13)	32	24	**AECC=2 Core= 6 GE=1**
3	Generic Elective(2+1) (GE-2)	Crop Prod. Tech. 1 (2+1) (Core -14)	Water Mgmt. (1+1) (Core-15)	Fund. of Pl. Breeding (2+1) (Core-16)	Insect Ecology & IPM(1+1) (Core-17)	Farm Mgmt. &Prod.Economics(2+1) (Core-18)	Farm Power& Machinery (1+1) (SEC – 2)	Prin.of Food Sc.& Nutrition (2+0) (Core-19)	Prod. Tech. of Veg& Spices (1+1) (Core-20)	Problematic Soils & their Mngt(1+1) (SEC-3)	33	23	**GE=1 Core=7 SEC=2**
4	Env. Sci. (3+0) (AECC-5)	Crop Prod. Tech. -2 (2+1) (Core-21)	Prin. Of Seed Sc.& IPR(2+1) (Core-22)	Manures, Fert. & SFM (2+1) (Core-23)	Princ. of Pl. Path.(2+0) (Core-24)	Ag. Finance, Cooperation& Marketin(2+1) (Core-25)	Orn.Crops ,Med&Aro.. Pl.&Landsc(1+1)(Core26)	Statistical Methods (1+1) (SEC-4)	Fund. Of Ag. Extn. (2+1) (Core-27)	Micropopagation / ABM (2+1) (DSE-1)	35	27	**AECC=1 Core=7 SEC=1 DSE=1**
5	Rainfed Agri.& Watershed Mng(1+1) (Core-28)	Crop Improvement (2+1) (Core-29)	Ent.Devpt.& Busi. Comm. (1+1) (Core-30)	Diseases of Field crops &Mng.(2+1) (Core-31)	IPDM(1+1) (Core-32)	Prod. Tech. Of Fruits & Plan.Crops(1+1) (Core-33)	Pests of Crops &stored grains(2+1) (Core-34)	Renewable Energy & Green Tech. (1+1) (SEC-5)	Practical Crop Prod -I(0+1) (SEC-6)	Weed Sc./ Soil, Plant, Water & Seed Testing (2+1) (DSE-2)	33	23	**Core=7 SEC=2 DSE=1**
6	Farming Sys & Org. Far (2+1) (Core-35)	Geo Info, NanoTech. & Prec. Far(1+1) (Core-36)	Practical Crop Prod -II(0+1) (SEC-7)	Mngt. of Beneficial Insects (1+1) (Core-37)	Protected Cultivation & Sec. Agri (1+1) (SEC-8)	Livestock & Poultry Mgmt. (2+1) (SEC-9)	Diseases of Hort. Crops (2+1) (Core-38)	Value Add. Of Fruits & Veg. (1+1) (SEC-10)	Comm. Skills & PD (1+1) (SEC-11)	Agri Chem / Comm. Pl. Breeding (2+1) (DSE-3)	33	23	**Core=4 SEC=5 DSE=1**
7	Rural Awareness Works Experience (SEC-12)					Agro-Industrial Attachment (DSE-4)					36	20	**SEC=5 DSE=1**
8	Ag. Experiential Learning Programme (SEC-13)					Ag. Experiential Learning Programme (SEC-14)					36	20	**SEC=2**
Total	**Legend: 1. Ability Enhancement Compulsory Course: 05 2. Generic Elective:02 3. Skill Enhancement Course:18 4. Core:38 5. Discipline Specific Elective:04**										**267**	**184**	

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE
B.Sc. (Hons.) AGRICULTURE
FIRST SEMESTER
ACADEMIC YEAR-2026-27 OF 2026-30 BATCH (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours / week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
THEORY									
1	I	EN 23101	General English-I (AECC-1)	3	3	40	60	100	3
2	I	VE 26101	VE & PD (AECC-2)	2	2	40	60	100	2
3	II	AG 25101	Fundamentals of Soil Science (Core-1)	2	3	40	60	100	2
4	II	AG 25102	Farming-based Livelihood Systems (Core-2)	2	3	40	60	100	2
5	II	AG 25103	Livestock and poultry management (Core-3)	1	3	40	60	100	1
6	II	AG 25104	Fund. of Horticulture (Core-4)	2	3	40	60	100	2
7	II	AG 25105	Rural sociology & Educational Psychology (Core-5)	2	3	40	60	100	2
PRACTICALS									
8	II	AG 25106	Fundamentals of Soil Science (Core-1)	2	3	40	60	100	1
9	II	AG 25107	Farming-based Livelihood systems (Core-2)	2	3	40	60	100	1
10	II	AG 25108	Livestock and poultry management (Core-3)	2	3	40	60	100	1
11	II	AG 25109	Fund. of Horticulture (Core-4)	2	3	40	60	100	1
12	II	AG 25110	Mushroom production technology **(SEC-1)**	4	3	40	60	100	2
13	II	AG 26111	Commercial Horticulture (SEC-2)	4	3	40	60	100	2
Total				**30**		520	780	1300	**22**

* Ability Enhancement Compulsory Course(AECC)

* Skill Enhancement Course (SEC)

GENERAL ENGLISH-I

Credits: 3 **Semester: I**
Course Code: EN23101 **No of Lecture Hours: 45**

Course Objective:

- To enhance the learners' communication skills by giving adequate exposure in reading, writing, listening, and speaking skills and the related sub-skills.
- To develop oral and written communicative skills among the students so that their employability enhances and English becomes the medium of their livelihood and personality.

Course Outcome:

CO1: Students will be able to improve on the usage and application of new words & phrases, especially new terminology.

CO2: Identify and implement new linguistic skills and communication skills through role play and group discussion, and improve language in a holistic way through application, differentiation, organization, and creation of their own composition in writing skills.

Course Content	Hours Allotted	Pedagogy
Module I: Title: Wit and Humor • Explanation of the text • Grammar----Nouns, Articles • Vocabulary -- Homonyms, homophones, homographs • Writing Skill----Note- Making • Speaking Skill – Note-Making	**(9)** **2** 2 2 2 1	Power point presentations / Lectures
Module II: Title: Risk Management • Explanation of the text • Grammar---Tenses – The Present Tense • Vocabulary ---Synonyms • Writing Skill--- Information Transfer • Speaking Skill	**(9)** 2 2 2 2 1	Power point presentations / Lectures
Module III: Title: Human Values • Grammar--- Tenses- The Past Tense • Vocabulary -----Adjective and Adverb Suffixes • Writing Skill----Formal Letters. Curriculum Vitae • Speaking Skill---- JAM	**(9)** 2 2 3 2	Power point presentations / Lectures

Module IV: Title: The Cyber Age • Explanation of the text • Grammar----Concord or Subject Verb Agreement • Vocabulary ----- Word Formation. Collocations • Writing Skill-----References and Bibliographies • Speaking Skill----Presentations	**(9)** 2 2 2 2 1	Power point presentations / Lectures
Module V: Title: Sports • Explanation of the text • Grammar ----- Adjectives, Comparison of Adjectives • Vocabulary—Common Errors, Commonly Mispelt Words, • Commonly Confused Words • Writing Skill- Technical Reports, Project Reports • Speaking Skill---- Group Discussions	**(9)** 2 2 2 2 1	Power point presentations / Lectures

Learning Resources	
1.	Balasubramaniam, M. 1985. *Business Communication*. Vani Educational Books, New Delhi.
2.	Krishna Mohan and Meera Banerjee, 1990. *Developing Communication Skills*. Macmillan India Ltd. New Delhi.
3.	Krishnaswamy. N. and Sriraman, T. 1995. *Current English for Colleges*. Macmillan India Ltd. Madras
4.	Narayanaswamy, V.R. 1979. *Strengthen Your Writing*. Orient Longman, New Delhi
5.	Sharma, R.C. and Krishna Mohan. 1978. *Business Correspondence*. Tata McGraw-Hill Publishing Co., New Delhi.

VALUE EDUCATION & PERSONALITY DEVELOPMENT

Credits: 2 **Semester: I**
Course Code: VE26101 **No of Lecture Hours: 30**

Objective: To form intellectually competent, morally upright, socially committed, spiritually inspired citizens in the service of the nation and the world.

Outcome:

CO1: Students will be able to **differentiate** between Accepted norms and Counter values and be able to understand the various Dimensions of Human Development.

CO2: Students will be able to **demonstrate** Love and Experience of God and identify the Basic Issues of Life and Happiness as a life goal.

CO3: The students will be able to **recognize** the traits of a good personality and practice Self-exploration.

CO4: Students will be able to **interpret** the Purpose of Life and Goal Setting and **inculcate** the skills required for Self-management.

CO5: Students will **understand** constitutional values, rights, and civic duties. They will develop a sense of global citizenship, environmental responsibility, and respect for diversity.

Course Content	Hours Allotted	Pedagogy
MODULE-I **INTRODUCTION TO VALUES AND ETHICS** • Importance of Value Education • Reasons to have Ethics • Accepted Norms and Counter Values • Dimensions of Human Development: Physical, Intellectual, Emotional, Moral, Spiritual and Social	**(6)** 1 1 2 2	Power point presentations / Lectures
MODULE-II **APPROACH TO LIFE** • Conscience and Pseudo-Conscience • Happiness as Life-goal • Self and another • Values revealed and lived in Religions • Experience of God • Moral problems of society / True Society: Social Desire, Social Fear, Social Science, Social Indifference.	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures

MODULE-III **TRANSFORMATION OF SELF** • Definitions of personality • Characteristics of good personality • Self-Identity, Self-Concept • Self-Discovery, Self-Acceptance • Self-Esteem WORK SHEET (1): Self Evaluation	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
MODULE-IV **LIFE ENRICHMENT SKILLS** • Characteristics of Goals-Purpose of life-Goal setting • Building Relationships • Time Management • Stress Management • Emotional Management • Conflict Management • Team Management (Group Dynamics) WORK SHEETS (1) & (2): 1. Anger Management 2. Team Management	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
MODULE-V **CONSTITUTIONAL VALUES AND GLOBAL CITIZENSHIP** • Values embedded in the Preamble of the Indian-Constitution • Individual Human Rights and duties • Directive Principles and Responsibilities as citizens of India • Sensibility and responsibilities towards global environment, Loksangraha and Vasudhaiva Kutumbakam. • Practical: Debates and Theatre on diversity and plurality, research on similarities and differences in the ethos of different countries	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	In Harmony by G.M James, B.J. Jayaraj, K. Candassamy, Bernard D'Sami, S.J.A Packiaraj 2011, Prakash Printers, Chennai.
2.	Human Values - Development Programme – 2015, An AIACHE Publication, New Delhi
3	Blanchard, Kenneth and Peale, Norman Vincent. 1988. The Power of Ethical Management. New York: William Morrow and Company, Inc
4	Gandhi, Mohandas Karamchand. 197l. Pathway to God compiled by MS Deshpande. Ahmedabad: Navajivan Mudranalaya, Navjivan Trust
5	Goleman, D. 2008. What Makes a Leader. Boston: Harvard Business School Press
6	Kashyap, Subhash C. 2019. Constitution of India. A handbook for students. New Delhi: National Book Trust
7	Lama, D. 2012. Beyond Religion: Ethics for a Whole World. India: Harper Collins
8	Sharma, M. 2017. Radical Transformational Leadership: Strategic Action for Change Agents. Berkely, US: North Atlantic Books

FUNDAMENTALS OF SOIL SCIENCE

Credits: 2 **Semester: I**
Course Code: AG25101 **No of Lecture Hours: 30**

Course Objective:

- To impart knowledge on the principles of soil science and to explain how different soils are formed and how does soil acts as a medium for plant growth.

Course Outcome:

CO1: Define soil and describes different soil forming processes, explains soil profile and differentiates surface soil and subsurface soil.
CO2: Explain different Physical properties of soil and their influence on crop growth.
CO3: Explain different chemical and biological properties of soil and its importance in agriculture.
CO4: Differentiate and explain role of organic matter and humus. Describes carbon cycle and C:N ratio.
CO5: Classify different soil groups of India, Telangana and A.P.

Course Content	Hours Allotted	Pedagogy
Module I:	(6)	Power point presentations / Lectures
• Introduction- Earth crust and composition - Soil- definition and concepts of soil- scope and branches of soil science.	1	
• Soil components – mineral matter, organic matter, air, water, and organisms.	1	
• Rocks and minerals- definitions- classification based on origin, silica content.	1	
• Weathering- definition- types- factors and processes (physical, chemical, biological)	1	
• Soil formation- definition- factors- Pedogenic processes- humification-eluviation & illuviation, podzolisation, calcification, laterization and gleization.	1	
• Soil profile- definition – description of theoritical soil profile- differences between soil and sub-soil.	1	
Module II:	**(6)**	Power point presentations / Lectures
• Soil physical properties – texture- definition- physical nature of soil separates- various textural classes- determination of texture- importance of texture.	1	
• Soil structure- definition- types, classes and grades of structure- importance of soil structure and its management.	1	
• Soil porosity- importance-bulk density and particle		

density-factors affecting- importance. Soil colour- components- importance- soil crusting and its importance- soil consistence- consistence of wet and dry soils - importance. • Soil temperature - sources of heat - losses of soil heat-factors affecting-control of soil temperature - importance of soil temperature on crop growth. • Soil aeration- importance- soil drainage- effects of ill drainage- significance. • Soil water- forces of retention- classification of soil moisture. Movement of water in soil- Infiltration, percolation- permeability.	1 1 1 1	
Module III: • Soil colloids-definition– nature- types- significance- properties of soil colloids. • Adsorption of ions – ion exchange – types – cation and anion exchange – CEC and AEC of soil - factors affecting ion exchange capacity of soils – importance of CEC. • Soil reaction – definition- pH scale – factors affecting- importance of soil pH- buffering capacity of soils. • Soil acidity and alkalinity- acid, saline and alkali soils – characteristics- formation- reclamation methods. • Soil biology – macro and microorganisms- classification- beneficial role of soil organisms in organic matter decomposition, mineralization-immobilization. • Nitrogen fixation- denitrification- solubilization of phosphorous-mobilization of nutrients by soil microorganisms- harmful activities of soil organisms.	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module IV: • Soil organic matter – various sources- composition of organic material. • Decomposition of different constituents of organic material. • Humus- definition- nature- composition- humification- properties and its influence on properties of soil, water and nutrient availability and plant growth. • Role of organic matter and humus- differences between organic matter and humus • Carbon cycle- Carbon: Nitrogen (C/N) ratio- definition- significance in soil fertility.	**(6)** 1 1 2 1 1	Power point presentations / Lectures

Module V: • Soil taxonomy – definition- objectives- systems of soil classification- current trends in soil classification. • Soil taxonomy- order, sub- order- great group, family, series- nomenclature. • Soil survey –definition- objectives and uses - types and methods- soil survey report. • Soil groups of India,Telangana and A.P.	**(6)** 2 2 1 1	Power point presentations / Lectures

Learning Resources	
1.	Biswas, T.D. and Mukherjee, S.K. 1987. **Textbook of Soil Science**. New Delhi: Tata McGraw Hill Pub.Co. Ltd
2.	Sahai, V.N. 1990. **Fundamentals of Soils**. Ludhiana-New Delhi: Kalyani Publications.
3.	Brady, N. C. and Ray, R.Weil. 2002. **The Nature and Properties of soil**. New Delhi: Pearson Education Inc.
4.	Kolay, A.K. 2000. **Basic Concepts of Soil Science**. New Delhi. New Age InternationalPub.
5.	Raymond W. Miller and Roy L. Donahue. 1992. **Soils-An Introduction to Soils and Plant Growth**. New Delhi: Prentice Hall of India Pvt Ltd.
6.	Ghildyal, B.P. and Tripathi, R.P. 1987. **Soil Physics**. New Delhi: Wiley Estern Ltd.
7.	Baver, L.D., Gardner, W.H. and Gardner, W.R. 1972. **Soil Physics**. New Delhi: Wiley Eastern Ltd.

FARMING BASED LIVELIHOOD SYSTEMS

Credits: 2 **Semester: I**
Course Code: AG25102 **No of Lecture Hours: 30**

Course Objective:

- To impart knowledge on farming-based livelihood systems

Course Outcome:

CO1: Describe agricultural livelihood in India and Telangana, explain about the agricultural livelihood systems.
CO2: Classify different types of farming systems based on livelihood, describe components of farming system and the cropping systems.
CO3: Classify the different enterprises including value chains as livelihood components for farmers and farming systems for different agro-climatic zones.
CO4: Describe organizations and schemes, programme and case study of different enterprises associated with farming
CO5: Analyse role of farming-based livelihood enterprises in 21st century in view of circular economy and risk and success factors in farming-based livelihood systems

Course Content	Hours Allotted	Pedagogy
Module I: • Status of agriculture in India and different states • Income of farmers and rural people in India • Livelihood - Definition, concept • Livelihood pattern in urban and rural areas • Different indicators to study livelihood systems • Agricultural livelihood systems (ALS): Meaning, approach, approaches and framework	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module II: • Definition of farming systems and farming-based livelihood systems • Prevalent Farming systems in India contributing to livelihood • Types of traditional and modern farming systems • Components of farming system/ farming-based livelihood systems - Crops and cropping systems, Livestock (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agroforestry system, Aqua culture - Duck/Poultry cum Fish, Dairy cum Fish, Piggery cum Fish etc.,	**(6)** 1 2 1 2	Power point presentations / Lectures
Module III: • Small, medium, and large enterprises, including value	**(6)**	Power point presentations /

chains secondary enterprises as livelihood components for farmers • Factors affecting the integration of various enterprises of farming for livelihood • Feasibility of different farming systems for different agro-climatic zones	2 2 2	Lectures
Module IV: • Commercial farming-based livelihood models by NABARD, ICAR, and other organizations across the country • Schemes and programs by the Central and State Governments • Public and Private organizations involved in the promotion of farming-based livelihood opportunities	**(6)** 2 2 2	Lectures Power point presentations / Lectures
Module V: • Case studies on different livelihood enterprises associated with the farming • Role of farming-based livelihood enterprises in 21st Century in view of circular economy, green economy, climate change, digitalization and changing lifestyle • Risk and success factors in farming-based livelihood systems	**(6)** 2 2 2	Power point presentations / Lectures

Learning Resources	
1.	Dixon, J. and A. Gulliver with D. Gibbon. (2001). Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO and World Bank, Rome, Italy and Washington, DC, USA
2.	Ashley, C.; Carney, D. (1999). Sustainable Livelihoods: Lessons from Early Experience; Department for International Development: London, UK, Volume 7. [Google Scholar].
3.	Reddy, S.R. 2016. Farming System and Sustainable Agriculture, Kalyani Publishers, New Delhi.
4.	Panwar et al. 2020. Integrated Farming System models for Agricultural Diversification, Enhanced Income and employment, Indian Council of Agricultural Research, New Delhi.
5.	Singh, J.P., et al. 2015. Region Specific Integrated Farming System Models, ICAR-Indian Institute of Farming Systems Research, Modipuram.
6.	Walia, S. S. and U. S. Walia, 2020. Farming System and Sustainable Agriculture, Scientific Publishers, Jodhpur, Rajasthan.

LIVESTOCK AND POULTRY MANAGEMENT

Credits: 1 **Semester: I**
Course Code: AG25103 **No of Lecture Hours: 15**

Course Objective:

- Students will be able to gain knowledge on dairy farming, sheep and goat faming, swine and poultry production.
- Knowledge on different types of breeds that are suitable to our local climatic conditions. How to run a profitable dairy, poultry, sheep, and goat farming.
- Clear idea about economics of livestock production and management.

Course Outcome:

CO1: To impart knowledge to the students on dairy farming, sheep and goat farming, swine and poultry production.
CO2: To provide basic knowledge to the students about scientific livestock and poultry rearing practices.
CO3: To understand the managemental practices of livestock and poultry to gain good profits.
CO4: To develop entrepreneurship through Livestock/Poultry and Agriculture Integrated farming system
CO5: To get knowledge of feeding of least cost ration formulation with available local ingredients.
CO6: To acquire awareness regarding different livestock diseases and their control measures, sanitation, care, feed and good management practices.

Course Content	Hours Allotted	Pedagogy
Module I: • Role of livestock in the national economy – Statistics, Improvement of farm animals and poultry. • Important Indian and exotic breeds of cattle, buffalo, sheep, swine, and poultry	(3) 2 1	Power point presentations / Lectures
Module II: • Digestion system in livestock and poultry. • Reproduction system in farm animals and poultry.	**(3)** 2 1	Power point presentations / Lectures
Module III: • Classification of feedstuffs – feed ingredients for ration for livestock and poultry • Proximate principles of feed – nutrients and their functions • Feeding of livestock and poultry – feed supplements and feed additives	**(3)** 1 1 1	Power point presentations / Lectures

Module IV: • Housing principles, space requirements for different species of livestock and poultry • Management of calves, growing heifers, and milch animals • Management of sheep, goat and swine	**(3)** 1 1 1	Power point presentations / Lectures
Module V: • Incubation, hatching and brooding – management of growers and layers • Introduction of livestock and poultry diseases • Prevention and control of important diseases of livestock and poultry – vaccination schedule	**(3)** 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	A Textbook of Animal Husbandry by G.C Banerjee
2.	A Textbook of Livestock Production management in Tropic by D.N. Verma

FUNDAMENTALS OF HORTICULTURE

Credits: 2 **Semester: I**
Course Code: AG25104 **No of Lecture Hours: 30**

Course Objective:

- To impart knowledge on Fundamentals of Horticulture.

Course Outcome:

CO1: Describe the importance of horticulture, climate, soil, branches, and layout of the orchard
CO2: Distinguish methods of Propagation, explain cutting and layering
CO3: Identify and explain various vegetative propagation methods by grafting, budding and training methods.
CO4: Distinguish and differentiate pruning methods, and unfruitfulness
CO5: Classify and compare irrigation and fertilizer application methods, plant propagation structure, and role of PGR in horticulture.

Course Content	Hours Allotted	Pedagogy
Module I: • Horticulture – Definition - Divisions of Horticulture with suitable examples • Importance & Scope of Horticulture - Importance of Horticulture in terms of income, employment generation, industry, religious, aesthetic, food & nutritive value, and export. • Horticultural botanical classification. • Climate for Horticultural crops - Influence of environmental factors on Horticultural crop production – Temperature, humidity, wind, rainfall, and solar radiation. • Soil for horticultural crops- Influence of soil factors, Soil types • Principles of orchard establishment, Systems of planting - Square, rectangle, quincunx, hexagonal, and contour, and their merits and demerits	**(6)** 1 1 1 1 2	Power point presentations / Lectures
Module II: • Plant propagation- Definition - Methods - Sexual and asexual - advantages and disadvantages, • Plant propagation structures - Greenhouse, lath house, hot bed, cold frame, and other propagating frames. • Seed germination – Dormancy – Reasons for seed dormancy, methods to overcome seed dormancy, and germination • Asexual Propagation by cuttings – Definition of cutting – Stem cuttings (Hard wood, semi-hard wood, soft wood, and herbaceous -example for each type, Leaf cuttings	**(6)** 1 1 1 1	Power point presentations / Lectures

• Propagation by Layering - Definition -Types of layering (simple, compound, mound, trench, air layering, tip) with examples.	2	
Module III: • Grafting – definition - Grafting methods – Veneer grafting, epicotyl grafting, soft wood grafting, Wedge grafting, Bridge grafting, Innarch grafting) • Budding – Definition - Methods of budding – T-budding, patch budding, chip budding, ring budding and forket budding • Training – Definition- objectives - methods of Training of fruit crops - Open Centre, closed Centre, and modified leader systems, their merits and demerits	**(6)** 2 2 2	Power point presentations / Lectures
Module IV: • Definition of pruning- objectives and methods of pruning of fruit crops (Thinning out, trimming, heading back, pollarding, pinching, disbudding, deblossoming) • Juvenile and flower bud differentiation – Methods for shortening juvenility • Unfruitfulness – causes (environmental, Nutritional, biological, Cultural) and remedies.	**(6)** 2 2 2	Power point presentations / Lectures
Module V: • Pollination, Pollinizers and pollinators, Fertilization and Parthenocarpy. • Irrigation methods in horticulture crops - Different methods followed in horticultural crops (check basin, furrow, ring basin, basin, flood, pitcher, drip, and sprinkler). • Application of growth regulators (Gibberellins, Auxins, Cytokinins, Abscisic acid, Ethylene. • Fertilizer application- Different methods of application to horticultural crops: Broadcasting, top dressing, localized placement, contact placement, Band placement, row placement, pellet, foliar application, starter solution, fertigation.	**(6)** 1 2 1 2	Power point presentations / Lectures

Learning Resources	
1.	Kumar, N. 1997. Introduction to Horticulture. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
2.	Chadha, K.L. 2001. Handbook of Horticulture. ICAR, New Delhi.
3.	Jitendra Singh, 2012. Basic Horticulture. Kalyani Publishers. Ludhiana.
4.	George Acquaash. Horticulture- Principles and practices. PHI Learning Pvt. Ltd. New Delhi.
5.	Edmond, J. B., Senn, T.L, and Andrews, F.S. Fundamentals of Horticulture. McGraw -Hill Book Co. New York.
6.	Sharma, R.R. Propagation of Horticultural crops – Principles and practices Kalyani Publishers. Ludhiana

RURAL SOCIOLOGY & EDUCATIONAL PSYCHOLOGY

Credits: 2 **Semester: I**
Course Code: AG25105 **No of Lecture Hours: 30**

Course Objective: To provide knowledge on the concept and importance of sociology and rural sociology as well as the relationship with Extension Education

Course Outcome:

CO1: Describe the importance of rural sociology in agriculture extension.

CO2: Explain different concepts in rural sociology like social stratification, culture, social institutions, social change and social ecology.

CO3: Explain the concept of rural development in India.

CO4: Explain the importance of educational psychology in agricultural extension with special emphasis on leadership and intelligence.

CO5: Apply various personality types, process of teaching and learning with special reference to extension teaching.

Course Content	Hours Allotted	Pedagogy
Module I:	**(6)**	Power point presentations / Lectures
• Extension Education: Meaning, definition, scope, and importance	1	
• Agricultural Extension: Meaning, definition, scope, importance	1	
• Sociology: Meaning, definition, scope	1	
• Rural sociology: Meaning, definition, scope	1	
• Importance of rural sociology in Agricultural Extension and the interrelationship between rural sociology and Agricultural Extension	1	
• Indian Rural Society: Important characteristics, differences, and relationship between rural and urban societies	1	
Module II:	**(6)**	Power point presentations / Lectures
• Social Groups: Meaning, definition, classification, factors considered information and organization of groups, motivation in group formation and role of social groups in Agricultural Extension.	1	
• Social Stratification: Meaning, definition, functions, basis for stratification, forms of social stratification, characteristics and differences between class and caste system.	1	
• Social Institutions: Meaning, definition, major institutions in rural society, functions, and their role in agricultural Extension.	1	
• Social Organizations: Meaning, definition, types, and role of social organizations in agricultural Extension.	1	
• Social Control: Meaning, definition, need, and means of social control	1	
• Social change: Meaning, definition, nature, dimensions, and factors of social change	1	

Module III: • Cultural concepts: culture, customs, folkways, mores, taboos, rituals • Traditions: Meaning, definition and their role in Agricultural Extension • Social Values and Attitudes: Meaning, definition, types and role of social values and attitudes in agricultural Extension • Leadership: Meaning, definition, classification, roles of leader • Different methods of selection of professional and lay leaders • Training of Leaders: Meaning, definition, methods of training, Advantages and limitations in use of local leaders in Agricultural Extension	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module IV: • Psychology and educational psychology: Meaning, definition, scope of psychology • Educational psychology: Meaning, definition and scope • Importance of educational psychology in Agricultural Extension • Intelligence: Meaning, definition, types of intelligence • Factors affecting intelligence • Importance of intelligence in Agricultural Extension	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module V: • Personality: Meaning, definition, types of personality • Factors influencing the personality, role of personality in agricultural Extension. • Teaching - Learning process: Meaning and definition of teaching, learning • Elements of learning situation and its characteristics • Learning experience and learning situation • Principles of learning and their implication of teaching.	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	A. R. Desai -Rural Sociology in India
2.	Dahama O. P. and Bhatnagar, O. P. - Education and Communication for Development
3.	J.B. Chitambar -Introductory Rural Sociology
4.	M.B. Ghorpade- Essential of psychology
5.	Prepared You Tube videos
6.	R Velusamy Textbook on Rural Sociology and Educational Psychology
7.	Ray, G. L. -Extension Communication and Management
8.	Sandhu A. S. -Textbook on Agricultural Communication
9.	Web Material

FUNDAMENTALS OF SOIL SCIENCE
PRACTICALS

Credits : 1 **Semester: I**
Subject code : AG25106 **No. of lecture hours: 30**

1. Methods of chemical analysis, principles, techniques and calculations.
2. Study of soil sampling tools, collection of representative soil sample, its Processing and storage.
3. Description of soil profile in the field.
4. Study of soil forming rocks and minerals
5. Determination of texture by feel and bouyoucos methods.
6. Determination of bulk density and particle density of soil and porosity.
7. Determination of soil moisture content by gravimetric method.
8. Determination of infiltration rate.
9. Determination of soil pH
10. Determination of EC of soil.
11. Determination of soil colour & study of soil map.
12. Determination of cation exchange capacity of soil.
13. Preparation of soil water extract and determination of chlorides in soil water extract
14. Determination of carbonates and bicarbonates and soil water extract
15. Estimation of organic carbon content in soil.

FARMING-BASED LIVELIHOOD SYSTEMS
PRACTICALS

Credits :1 **Semester: I**
Subject code : AG25107 **No. of lecture hours: 30**

1. Survey of farming systems
2. Survey of agricultural-based livelihood enterprises
3. Study of components of important farming- based livelihood models/ systems in different agro-climatic zones.
4. Study of production and profitability of crop Based livelihood models
5. Study of production and profitability of livestock Based livelihood models
6. Study of production and profitability of processing Based livelihood models
7. Study of production and profitability of integrated farming Based livelihood models
8. Field visit of innovative farming system models.
9. Visit of Agri-based enterprises and their functional aspects for integration of production sectors
10. Visit of Agri-based enterprises and their functional aspects for integration of processing sectors
11. Visit of Agri-based enterprises and their functional aspects for integration of distribution sectors
12. Study of Agri-enterprises involved in industry
13. Study of Agri-enterprises involved service sectors (Value Chain Models).
14. Learning about concept of project formulation on farming-based livelihood systems along with cost and profit analysis
15. Case study of Start-Ups in Agri-sectors.

LIVESTOCK AND POULTRY MANAGEMENT
PRACTICALS

Credits : 1 **Semester: I**

Subject Code: AG25108 **No. of practical hours: 30**

1. External body parts of cattle, buffalo, sheep, goat, swine, poultry
2. Visit to IDF and IPF to study of livestock and poultry breeds and daily farm operations and farm records
3. Handling and restraining methods of livestock
4. Identification methods of farm animals & poultry
5. Judging & Grading-Elimination and culling of livestock, poultry
6. Familiarization with routine farm operations and farm records
7. Feed analysis & ration formulation
8. Planning, layout and construction of livestock & poultry farm houses
9. Clean milk production and different milking methods
10. Hatchery operations, incubation and hatching equipment.
11. Management of chicks, growers and layers. Debeaking, dusting and Vaccination.
12. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

FUNDAMENTALS OF HORTICULTURE PRACTICALS

Credits : 1 **Semester: I**
Subject Code : AG25109 **No. of practical hours: 30**

1. Identification and nomenclature of fruits.
2. Layout of an orchard, pit making and systems of planting different planting systems.
3. Preparation of nursery bed (raised and flat beds) and sowing of seeds.
4. Plant propagation structures
5. Propagation through seeds and plant parts.
6. Preparation of potting mixture, potting.
7. Vegetative propagation by cuttings.
8. Vegetative propagation by layering.
9. Vegetative propagation by Grafting.
10. Vegetative propagation by Budding
11. Training and pruning of fruit trees.
12. Preparation of Growth regulators – powder, solution, and lanolin paste.
13. Methods of irrigation
14. Maturity indices, harvesting, grading, packing, and storage
15. Visit to a commercial Nursery

MUSHROOM PRODUCTION TECHNOLOGY
PRACTICALS

Credits: 2 **Semester: I**
Subject Code: AG25110 **No. of Practical Hours: 60**

1. Introduction to Mushrooms
2. Collection, identification and morphology mushrooms
3. Acquaintance with infrastructure, equipment's and machineries required in the mushroom cultivation process
4. Preparation of media for raising of pure culture and isolation techniques
5. Mushroom Spawn Production
6. Genetic Improvement of Mushrooms
7. Cultivation technique of button Mushrooms
8. Cultivation Technology Oyster Mushrooms
9. Cultivation Technology of Paddy Straw Mushroom
10. Cultivation Technology of Milky Mushroom
11. Post Harvest Technology- Preservation of Mushrooms
12. Problems in Mushroom cultivation
13. Nutritional value of mushrooms and the mushroom recipe
14. Medicinal mushrooms and their use in industries
15. Project cost - analysis for mushroom cultivation and Field/ Industrial visit

COMMERCIAL HORTICULTURE
PRACTICALS

Credits: 2 **Semester: I**
Subject Code: AG26111 **No. of practical hours: 60**

1. Nursery and Types of nurseries
2. Layout of a Nursery, different components of nursery and their usage in maintenance of nursery stock
3. Nursery bed preparation and Types of nursery beds
4. Identification of Nursery Tools and Implements
5. Types of media for propagation of plants in nursery beds, pots and mist chamber
6. Sterilization of nursery media - Methods of sterilization of growing medium
7. Types of Containers used in Nursery
8. Plug tray Nursery raising technique, maintenance and transplant of seedlings
9. Preparation of potting mixture, potting and repotting
10. Establishment of Propagation structure
11. Seed treatment -Importance and methods of seed treatment
12. Types of Plant propagation
13. Selection of mother plants and maintenance /Establishment of mother block
14. Propagation through Cuttings
15. Propagation through Layering
16. Propagation through Grafting
17. Propagation through Budding
18. Specialized plant parts used in Propagation
19. Micro grafting and Vegetable grafting techniques
20. Micropropagation

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE
B.Sc. (Hons.) AGRICULTURE
SECOND SEMESTER
ACADEMIC YEAR-2026-27 OF 2026-30 BATCH (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours/ week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
THEORY									
1	I	AG 25201	Communication skills **(AECC-3)**	1	3	40	60	100	3
2	I	IC 26201	IHC **(AECC-4)**	2	2	40	60	100	2
3	II	AG 25202	Fundamentals of Agronomy **(Core-6)**	2	3	40	60	100	2
4	II	AG 25203	Personality Development **(Core-7)**	1	3	40	60	100	1
5	II	AG 25204	Environmental studies and Disaster Management **(Core-8)**	2	3	40	60	100	2
6	II	AG 25205	Soil Fertility Management **(Core-9)**	2	3	40	60	100	2
7	II	AG 25206	Fundamentals of Entomology **(Core-10)**	2	3	40	60	100	2
8	II	AG 25207	Fundamentals of Plant Pathology **(Core-11)**	2	3	40	60	100	2
PRACTICALS									
9	I	AG 25208	Communication skills **(AECC-3)**	2	3	40	60	100	1
10	II	AG 25209	Fundamentals of Agronomy (Core-6)	2	3	40	60	100	1
11	II	AG 25210	Personality Development (Core-7)	2	3	40	60	100	1
12	II	AG 25211	Environmental studies and Disaster Management (Core-8)	2	3	40	60	100	1
13	II	AG 25212	Soil Fertility Management (Core-9)	2	3	40	60	100	1
14	II	AG 25213	Fundamentals of Entomology (Core-10)	2	3	40	60	100	1
15	II	AG 25214	Fundamentals of Plant Pathology (Core-11)	2	3	40	60	100	1
16	II	AG 25215	Post harvest production technology **(SEC-3)**	4	3	40	60	100	2
17	II	AG 25216	Vermicomposting **(SEC-4)**	4	3	40	60	100	2
18	III	PL18001	PLANET						1
Total						680	1020	1700	**25**

* Ability Enhancement Compulsory Course (AECC) * Generic Elective (GE)
* Skill Enhancement Course (SEC)
* Programme of Loyola Academy for Neighborhood Empowerment & Transformation (PLANET)

COMMUNICATION SKILLS

Credits: 1 **Semester: II**
Course Code: AG25201 **No of Lecture Hours: 15**

Course Objective: To acquire competence in oral, written, and non-verbal communication, develop strong personal and professional communication, and demonstrate positive group communication.

Course Outcome:

CO1: Understand the meaning & concept of communication and identify the barriers to communication

CO2: Gain knowledge on the communication process – Verbal and Non-verbal

CO3: Understand the basic communication skills and explore various styles of technical communication and innovative methods to enhance vocabulary

CO4: Develop better knowledge of Structural grammar

CO5: Gain better knowledge of Functional Grammar

Course Content	Hours Allotted	Pedagogy
Module I: • Communication: Meaning, types, and Models of Communication • Verbal and non-verbal communication • Linguistic and non-linguistic barriers to communication, and reasons behind the communication gap/ miscommunication	**(3)** 1 1 1	Power point presentations / Lectures
Module II: • Communication Process: Concept, nature, and significance • Effective communication • Building self-esteem, and overcoming fears	**(3)** 1 1 1	Power point presentations / Lectures
Module III: • Basic Communication Skills: Listening, Speaking, Reading, and Writing Skills, Precis writing/Abstracting/Summarizing • Style of technical communication Curriculum vitae/ resume writing • Innovative methods to enhance vocabulary and analogy questions	**(3)** 1 1 1	Power point presentations / Lectures
Module IV: • Structural and Functional Grammar Sentence structure, modifiers • Connecting words, verbals, phrases, and clauses • Case: Subjective case, possessive case; objective case	**(3)** 1 1 1	Power point presentations / Lectures
Module V: • Correct usage of nouns, pronouns and antecedents, adjectives, adverbs, and articles • Agreement of verb with the subject: tense, mood, voice • Writing effective sentences and Basic sentence fault	**(3)** 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	Allport, G. W. 1937. Personality: A Psychological Interpretation. Holt, New York
2.	Brown Michele and Gyles Brandreth. 1994. How to Interview and be Interviewed. Sheldon Press, London.
3.	Carnegie Dale. 1997. The Quick and Easy Way to Effective Speaking. Pocket Books, New York
4.	Francis Peter, S. J. 2012. Soft Skills and Professional Communication. Tata McGraw Hill, New Delhi
5.	Kumar, S. and Pushpa Lata. 2011. Communication Skills. Oxford University Press
6.	Neuliep James, W. 2003. Intercultural Communication A Contextual Approach. Houghton Mifflin Co Boston
7.	Pease, Allan. 1998. Body Language. Sudha Publications, Delhi
8.	Raman, M. and Singh, P. 2000. Business Communication. Oxford University Press
9.	Seely, J. 2013. Oxford Guide to Effective Writing and Speaking. Oxford University Press
10.	Thomson, A. J. and Martinet, A. V. 1977. A Practical English Grammar. Oxford University

INDIAN HERITAGE & CULTURE

Credits: 2 **Semester: II**
Course Code: IC26201 **No of Lecture Hours: 30**

Overall Course Objective:

- Understand the evolution of Indian culture from ancient to modern times
- Appreciate India's cultural diversity and unity
- Analyze the contributions of different civilizations, rulers, movements, and communities
- Develop critical awareness of social reform, subaltern struggles, and democratic values
- Recognize the importance of preserving cultural heritage and constitutional ideals

Course Outcome:

CO1: Students will understand the foundations and characteristics of Indian culture, learn the contributions of ancient civilizations, rulers, and South Indian kingdoms, and recognize the impact of Buddhism and Jainism on Indian art and heritage.

CO2: Students will understand how Islamic culture influenced Indian society and shaped its social and cultural life. They will study cultural developments under the Delhi Sultanate, the Mughals, and regional kingdoms like the Kakatiyas and Qutubshahis. They will also appreciate the contributions of Sufi and Bhakti movements and the evolution of medieval art and architecture.

CO3: Students will understand the influence of Western culture on Indian society and the impact of 19th-century socio-religious reform movements. They will learn about the contributions of reformers and the struggles of marginalized communities through subaltern movements. They will also analyze the Moderate, Extremist, and Gandhian phases of the Indian National Movement to understand social change and nationalism.

CO4: Students will learn about Indian dance forms and their cultural and historical significance, explore important Indian monuments to understand their artistic and cultural value, and study key archaeological sites to learn how they reveal India's past.

CO5: Students will understand the beliefs and impact of India's major religions, learn about tribal cultures and the challenges they face, and explore the Indian Constitution to see how it ensures democracy and citizens' rights.

Course Content	Hours Allotted	Pedagogy
Module-I: Indian Culture, Civilization and Early kingdoms. 1. **Culture:** -Meaning and definition of culture-characteristics of Indian Culture. 2. **Indus Valley Civilization & Aryan Culture:** Salient Features of the Indus Valley Civilization-Meaning and origin of Aryan Culture-Vedic Culture-Ashram Dharmas-Social life and Varna system. 3. **Mauryas and Guptas:** Sources of Mauryan History-Important kings-Mauryan Administration-Sources of Gupta's History-Important Rulers-Golden Age of the Guptas. 4. **Ashoka the great and Harshavardhana: -** Sources of Ashoka's history-Kalinga war-Ashoka's Administration-Sources of Harshavardhana's history-Harsha's Administration. 5. **Development of Art and Architecture-Contributions of Buddhism and Jainism-** Art and Architecture-Buddhist art and Architecture (Stupes, Viharas and Chaityas)-Jainism Art and Architecture (Cave Temples). 6. **South Indian Kingdoms-**Sathavahanas, Pallavas, Cholas	**(6)**	Power point presentations / Lectures
Module-II: Islamic Influence and Cultural Development in Medieval India 1. **Influence of Islamic Culture on Indian Society: -**Introduction to Islamic Culture in India-arrival and spread of Islam in India. 2. **Cultural Development under the Delhi Sultanate and the Mughal Empire: -** Brief Account of the Five Dynasties of the Delhi Sultanate-Cultural Development of the Delhi Sultanate Period-The Great Mughals-Cultural Development under the Mughal Empire. 3. **The Sufi and Bhakti Movements during the Medieval Period: -** Origin and Meaning of Sufism-Main Principles of Sufism-Important Sufi Saints-Role of Sufis in Indian Society-Bhakti Movement-Origin and Meaning of the Bhakti Movement-Main Teachings of the Bhakti Movement-Important Bhakti Saints-Role of Bhakti Saints in Social Reform. 4. **Cultural Achievements of the Kakatiyas and the Qutb Shahis: -** Historical Background of the Kakatiyas-Important Kings-Literature-Language-Art & Architecture. Historical Background of the Qutb Shahis-Important Kings-Literature & Language-Art & Architecture.	**(6)**	Power point presentations / Lectures

5. Development of Art and Architecture during Medieval India: -Delhi Sultanate Art and Architecture-Mughals Art & Architecture-Kakatiya's Art & Architecture-Qutb Shahis art and architecture.		
Module-III: Social and Political Movements in Modern India **1.Influence of Western culture on Indian Society: -** Entry of western culture into India-reasons for the influence of the western culture on Indian Society. **2.19th century Socio Religious Reform Movements: -**Raja Ram Mohan Roy, Ishwara Chandra Vidyasagar and Veerasalingam Panthulu. **3.Subaltern Movements in India-** Jyothirao Phule, Savitribai Phule, E. V Ramaswamy (Periyar) Naikar, Narayana Guru and Dr.B.R. Ambedkar. **4. Indian National Movement:** Moderate, Extremist and Gandhian phases.	**(6)**	Power point presentations / Lectures
Module-IV: Indian Cultural Heritage: Dance, Art and Architecture. **1.Indian dance: -** Classification of Indian dance- Classical dance forms (Bharatanatyam, Kathak, Kathakali, Kuchipudi, Odissi, Manipuri, Mohiniyattam, Sattriya-folk-dance forms (Bhangra, Garba, Yakshagana, Kolattam, Bihu, Perini Shivatandavam, Bonalu folk dance. **2. Indian Art and Architecture: -** Temple Architecture in India (Nagara Style, Dravida Style, Vesara Style), Indian Sculpture (Ashokan Pillars, Nataraja Sculpture), Indian Paintings (Cave paintings, Mughal paintings, Rajput paintings) **3. Archaeological Sites of India:** Importance of archaeological sites-Indus valley civilization Sites-Buddhist and Jain sites-Mauryan and Gupta period sites.	**(6)**	Power point presentations / Lectures
Module-V: Religion, Tribal Life, and Governance in India 1. **Major Religions of India-An Overview: -** Hinduism, Buddhism, Jainism, Sikhism, Islam, Christianity. 2. **Tribal Culture and the Challenges faced by indigenous communities:** Salient Features of Tribal Culture, Major Challenges Faced by Tribal Communities. **3. Indian Constitution: -** Importance of the Indian Constitution-Fundamental Rights.	**(6)**	Power point presentations / Lectures

Learning Resources	
1.	Jha, Dr K.N. 2006. Studies in ancient & Medieval India. COSMOS Book hives Ltd: Gurgaon.
2.	Mahajan, V.D. 2008. Ancient India. S.Chand, New Delhi.
3.	Manasseh, Dr P. 2010. An Overview of Indian Culture. Gamaleil Publishers, Hyderabad.
4	Malpani, Madanlal & Malpani, Shamsunder. 2014. Indian Heritage and Culture. Kalyani Publishers, Ludhiana.
5.	A.L. Basham, The Wonder That Was India, Rupa Publications, 2013 (Reprint)
6	Kapila Vatsyayan, Indian Classical Dance, Publications Divisions, Govt of India, 2001.
7	R.S. Sharma, India's Ancient Past, Oxford University Press, 2017.
8	Romila Thapar, Ashoka and the Decline of the Mauryas, Oxford University Press, 2012.
9	Satish Chandra, History of Medieval India, Orient Black swan, 2018.
10	Irfan Habib, the Mughal Empire, Cambridge University press, 1997.
11	K.A. Nilakanta Sastri, A History of South India, Oxford University press, 2011.
12	Bipan Chandra, India's Struggle for Independence, Penguin India, 2016.
13	Sumit Sarkar, Modern India, Macmillan, 2014.
14	R.C. Majumdar, History of the Freedom Movement in India, Firma KLM, 2001.
15	Gail Omvedt, Sage Publications, 2011.
16	Dhananjay Keer, Dr. Ambedkar: Life and Mission, popular Prakashan, 2016.
17	Verrier Elwin, the Tribal World of India, Oxford University press, 2014.

FUNDAMENTALS OF AGRONOMY

Credits:2 **Semester: II**
Course Code:AG25202 **No of Lecture Hours: 30**

Course Objective: To impart the basic and fundamental knowledge of Agronomy

Course Outcome:
CO1: Classify agro-climatic zones of India and Telangana, explain various methods of sowing and tillage.
CO2: List of various methods of sowing and nutrients classification
CO3: Classify manures and fertilizers
CO4: Explain Integrated nutrient management and green manuring
CO5: Describe various methods of Irrigation and weed classification

Course Content	Hours Allotted	Pedagogy
Module I:	**(6)**	
• Agronomy and its scope: Definition, meaning and scope of Agronomy; art, science and business of crop production, relation of Agronomy with other disciplines of Agricultural Science, fields crops and classification, importance, ecology and ecosystem	1	
• Agroclimatic zones of India	2	Power point presentations / Lectures
• Agroclimatic zones of Telangana	1	
• Tillage and tilth: Definition, objectives, types, advantages and disadvantages of tillage including conservation tillage	1	
• Seeds and sowing: Definitions of crops, variety and seed, good quality seed, proper tillage, time of sowing, seed rate, depth and method of sowing: broadcasting, drilling, dibbling, transplanting etc.	1	
Module II:	**(6)**	
• Factors affecting crop stand establishment	1	
• Crop density and geometry: plant geometry and planting geometry, its effect on growth and yield	1	Power point presentations / Lectures
• Crop nutrition: Definition of essential nutrients, criteria of essentiality, functional elements	2	
• Classification of essential nutrients, role of macro and micronutrients	2	
Module III:	**(6)**	
• Nutrient absorption, active and passive absorption of nutrients, forms of plant nutrients absorbed by plants, Combined /uncombined forms	1	Power point presentations / Lectures
• Manures and fertilizers, nutrient use efficiency	1	

• Sources of nutrients: Inorganic (fertilizers), organic (manures) and bio-fertilizers; their classification and characteristics • Method of preparation and role of organic manures in crop production	2 2	
Module IV: • Integrated Nutrient Management (INM): Meaning, different approaches and advantages of INM • Green manure- role in crop production: Definition, objectives types of green manuring, desirable characteristics, advantages and limitations of green manuring • Growth and development of crops: Definition, Meaning and factors affecting growth and development • Water management: Water resources of the world, India and Telangana • Soil Moisture constants: gravitational water, capillary water, hygroscopic water, Soil moisture constants • Concept of water availability to plants, soil-plant-water relationship, crop water requirement, water use efficiency	**(6)** 1 1 1 1 1 1 1	Power point presentations / Lectures
Module V: • Methods of irrigation • Scheduling of irrigation, different approaches to scheduling irrigation • Weeds: Definition, Importance, and basics of classification of weeds and their control • Cropping systems: Factors affecting cropping systems, major cropping patterns and systems in the country • Sustainable crop production: Definition, importance and practices, natural resources and conservation, pollution and pollutants • Allelopathy: Meaning and importance in crop production	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	Rao V S. 1992. Principles of Weed Science. Oxford and IBH Publishing Co. Ltd. New Delhi
2.	Reddy Yellamanda T and Shankar Reddy G H. 1995. Principles of Agronomy. Kalyani Publishers, Ludhiana
3.	Reddy, S. R. 2008. Principle of Crop Production, Kalyani Publisher, Ludhiana
4.	William L Donn. 1965. Meteorology. McGraw-Hill Book Co. New York
5.	Yawalkar K S and Agarwal J P. 1977. Manures and Fertilizers. Agricultural Horticultural Publishing House, Nagpur

PERSONALITY DEVELOPMENT

Credits:1 **Semester: II**
Course Code: AG25203 **No of Lecture Hours: 15**

Course Objective: To make students realize their potential strengths, cultivate their inter-personal skills and improve employability.

Course Outcome:

- **CO1:** Learn and understand about personality development and various approaches
- **CO2:** Gain clear knowledge of behavior - Individual and Organizational Behaviour
- **CO3:** Understand the importance of perception and attributes
- **CO4:** Content knowledge on learning, attitudes, and values in personality development
- **CO5:** Improve comprehension of Intelligence and Motivation

Course Content	Hours Allotted	Pedagogy
Module I: • Personality: Definition, Nature, types and theories of personality • Shaping of personality, determinants of personality • The humanistic approach - Maslow's self-actualization theory, Myers-Briggs Typology • Indicator, Locus of control and performance, Type A and Type B Personality	**(3)** 1 1 1	Power point presentations / Lectures
Module II: • Behavior: Meaning, definitions, Importance and types of behavior • Organizational behavior: Overview • Individual behavior: Foundation, factors influencing and Models of individual behavior	**(3)** 1 1 1	Power point presentations / Lectures
Module III: • Perception: Meaning & definitions, factors affecting perception • Attributes: Meaning and Attribution theory • Case Studies on Perception and Attribution	**(3)** 1 1 1	Power point presentations / Lectures

Module IV: • Learning: Meaning and definition, theories and principles of learning • Learning and organizational behavior, Learning and training, learning feedback • Attitude and values: Meaning, definitions and types	**(3)** 1 1 1	Power point presentations / Lectures
Module V: • Intelligence – Types, theories, measurements, and factors influencing intelligence • Intelligence and Organizational behavior, emotional intelligence • Motivation- theories and principles, Teamwork and group dynamics.	**(3)** 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	Andrews, Sudhir. 1988. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw Hill.
2.	Heller, Robert. 2002. Effective Leadership. Essential Manager series. Dk Publishing.
3.	Hindle, Tim. 2003. Reducing Stress. Essential Manager series. Dk Publishing
4.	Kumar, Pravesh. 2005. All about Self- Motivation. New Delhi. Goodwill Publishing House
5.	Lucas, Stephen. 2001. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill.
6.	Mile, D.J. 2004. Power of Positive Thinking. Delhi. Rohan Book Company
7.	Smith, B. 2004. Body Language. Delhi: Rohan Book Company
8.	Shaffer, D. R. 2009. Social and Personality Development (6th Edition). Belmont, CA: Wadswor

ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

Credits:2 **Semester: II**
Course Code:AG25204 **No of Lecture Hours: 30**

Course Objective: To expose and acquire knowledge on the environment and to gain state-of-the-art - skill and expertise on management of disasters

Course Outcome:

CO1: Understand the segments of environment
CO2: Analyse the causes of pollution
CO3: Identify the problems related to environmental pollution
CO4: Find ways for environmental protection
CO5: Plan strategies for disaster reduction

Course Content	Hours Allotted	Pedagogy
Module I: • Environmental studies: Definition, scope and importance - Multidisciplinary nature of environmental studies • Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere - Atmosphere - Different layers of atmosphere • Natural Resources: Classification - Forest resources. Water resources. Mineral resources Food resources. Energy resources. Land resources. Soil resources. • Ecosystems: Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem. Types of ecosystems • Biodiversity and its conservation: Introduction, definition, types. Biogeographical classification of India. Importance and Value of biodiversity. • Biodiversity hot spots. Threats and Conservation of biodiversity	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module II: • Environmental Pollution: Definition, cause, effects and control measures of: a) Air pollution. b) Water pollution. c) Soil pollution. d) Marine pollution. e) Noise pollution. f) Thermal pollution g) Light pollution	**(6)** 3	Power point presentations / Lectures

• Solid Waste Management: Classification of solid wastes and management methods, Composting, Incineration, Pyrolysis, Biogas production • Causes, effects and control measures of urban and industrial wastes	2 1	
Module III: • Social Issues and the Environment: Urban problems related to energy • Water conservation, rain water harvesting, watershed management • Environmental ethics: Issues and possible solutions • Climate change, global warming, acid rain, ozone layer depletion • Nuclear accidents and holocaust	**(6)** 1 2 1 1 1	Power point presentations / Lectures
Module IV: • Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act • Wildlife Protection Act. Forest Conservation Act • Human Population and the Environment: Environment and human health: Human Rights, Value Education • Women and Child Welfare • Role of Information Technology in Environment and human health	**(6)** 1 1 2 1 1	Power point presentations / Lectures
Module V: • Disaster management: Disaster definition - Types - Natural Disasters - Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves • Man Made Disasters: Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents • International and National strategy for disaster reduction • Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media in disaster management • Central, state, district and local administration in disaster control; Armed forces in disaster response; Police and other organizations in disaster management	**(6)** 1 1 1 1 2	Power point presentations / Lectures

Learning Resources	
1.	De, A.K. 2010. Environmental chemistry. Published by New Age International Publishers, New Delhi. ISBN:13–978 81 224 2617 5. 384 pp
2.	Dhar Chakrabarti, P.G. 2011. Disaster management - India's risk management policy frameworks and key challenges. Published by Centre for Social Markets (India), Bangalore. 36 pp.
3.	Erach Bharucha, Text book for Environmental studies. University Grants Commission, New Delhi
4.	Parthiban, K.T. Vennila, Prasanthrajan, S., Umesh, M. and Kanna, S. 2023. Forest, Environment, Biodiversity and Sustainable development. Narendra Publishing House, New Delhi, India. (In Press).
5.	Prasanthrajan M. and Mahendran, P.P. 2008. A text book on Ecology and Environmental Science. ISBN 81-8321-104-6. Agrotech Publishing Academy, Udaipur - 313 002. First Edition: 2008
6.	Prasanthrajan M. 2018. Objective environmental studies and disaster management. ISBN 9789387893825. Scientific publishers, Jodhpur, India. Pp. 146
7.	Sharma, P.D. 2009. Ecology and Environment, Rastogi Publications, Meerut, India
8.	Tyler Miller and Scot Spoolman. 2009. Living in the Environment (Concepts, Connections, and Solutions). Brooks/cole, Cengage learning publication, Belmont, USA

SOIL FERTILITY MANAGEMENT

Credits:2 **Semester: II**
Course Code: AG25205 **No of Lecture Hours: 30**

Course Objective: To impart to the student thorough understanding of plant nutrients, soil fertility, nutrient management, manures and fertilizers so that he/she can describe influence of soil biological, physical and chemical properties and their interactions on nutrient availability to plants

Course Outcome:

CO1: Define and list out macro and micro nutrients

CO2: Differentiate and classify Manures and Fertilizers and different composting method

CO3: Explain characteristics and manufacturing process of nitrogenous, phosphatic and potassic fertilizers

CO4: Differentiate and classify complex, mixed and bio-fertilizers

CO5: Compare and judge various methods of soil fertility evaluation

Course Content	Hours Allotted	Pedagogy
Module I:	**(6)**	Power point presentations / Lectures
• Introduction – Definition and importance of organic manures in improving soil properties – Differences between organic manures and fertilizers - Classification of organic manures.	1	
• Preparation of FYM (collection and storage) – Properties (nutrient contents) of FYM and factors affecting quality of FYM	1	
• Compost – preparation of compost from agricultural wastes – urban compost preparation -Vermicompost – preparation and properties	1	
• Green manuring – Green manuring *in situ* and Green leaf manuring – criteria for selectionof crops – crops suitable – advantages – disadvantages	1	
• Concentrated organic manures – preparation and nutrient contents of animal and plant origin manures.	1	
• Classification of fertilizers with examples - Nutrient content and properties of nitrogenousfertilizers - ammonia, ammonium hydroxide, ammonium sulphate	1	

Module II: • Nutrient content and properties of nitrogenous fertilizers - ammonium nitrate, calcium ammonium nitrate, urea. Urea super granules – slow-release N fertilizers - coated urea – nitrification inhibitors • Nutrient content and properties of phosphatic fertilizers – Rock phosphate, SSP, TSP, Basic slag –Nutrient content and properties of potassic fertilizers – MOP, potassium sulphate • Secondary and micronutrient fertilizers – nutrient contents – Complex fertilizers – incomplete and complete complex fertilizers - properties and nutrient contents of MAP, DAP, UAP, nitro phosphates, and complete complex fertilizers • Nano fertilizers – definition - fertilizers available – nutrient contents and properties. Amendments – amendments for acid soils and alkali soils – examples and mode of action. • Fate and effect of application of N, P, K fertilizers to soil with chemical reactions – Calculations for application of fertilizers and manures to soil for crops • Bio-fertilizers – classification with examples – constraints for use in agriculture – bio-fertilizers used for different crops/situations	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module III: • Introduction to soil chemistry & fertility–their importance in crop production–concept of soil fertility & soil productivity-Arnon's criteria of essentiality of nutrients. Essential, functional and beneficial elements – classification of essential nutrients- forms of nutrients in soils and ionic forms of nutrient uptake by plants. • Mechanisms of nutrient transport to plants – mass flow, diffusion, root interception, cation Exchange Nitrogen chemistry– functions, deficiency and toxicity symptoms of nitrogen in plants –corrective measures - nitrogen cycle • Nitrogen transformations in soil – mineralisation – immobilization - ammonium fixation – nitrification – denitrification - nitrogen fixation • Phosphorous chemistry - functions, deficiency and toxicity symptoms of phosphorous in plants – phosphorous cycle – phosphorous fixation in soils – forms and factors affecting phosphorous fixation in soils • Potassium chemistry – functions and deficiency symptoms of potassium in plants -potassium fixation in soils – factors affecting potassium fixation in soils – luxury consumption of Potassium	**(6)** 2 1 1 1 1	Power point presentations / Lectures

Module IV: • Calcium and magnesium chemistry – functions and deficiency symptoms in plants corrective measures – factors affecting their availability to plants. • Sulphur chemistry – functions and deficiency symptoms in plants – corrective measures –sulphur transformation in soils – mineralisation, immobilization – factors affecting sulphuravailability in soils • Micronutrients – sources, forms and content in soils – critical limits in soils and plants -functions, deficiency and toxicity symptoms in plants for zinc, iron, manganese and copper– corrective measures • Cationic micronutrient –chemistry- pools in soils- factors affecting their availability predisposing. factors for occurrence of micronutrient deficiencies in soils and plants • Boron and Molybdenum -chemistry – content and forms in soils – critical limits in soils andplants – factors affecting availability - functions – deficiency and toxicity symptoms – corrective measures. Chlorine & beneficial nutrients–role in plant nutrition – sources of supply to plants	**(6)** 1 1 1 1 2	Power point presentations / Lectures
Module V: • Soil fertility evaluation – approaches – using nutrient deficiency symptoms for evaluation –soil testing objectives – chemical methods of estimating available nutrients. • Plant analysis – rapid tissue tests – diagnosis and recommendation integrated system (DRIS) – indicator plants. • Biological methods of soil fertility evaluation – microbiological methods – Sacket and Stewart technique, Mehlich technique, *Cunninghamella*plaque method and Mulder'*Aspergillusniger*test, Pot culture test – Neubauer's seedling method – A value. • Fertilizer recommendation approaches–soil test-based fertilizer recommendation - Integratednutrient management-Definition & components–critical nutrient concept • Nutrient use efficiency – soil, plant and management factors influencing use efficiency – improving nutrient use efficiency for NPKS and Zn fertilizers • Source, method and time of nutrient application under irrigated and rainfed conditions.	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources:	
1.	Manures and Fertilizers Yawalkar, K. S. Agarwal, J.P. and Bokde, S. 1992 Agri. Horticultural Publishing House, Nagpur.
2.	Fertilizer Guide Tandon HLS 1994 Fertilizers Development Consultation Organization, New Delhi
3.	Handbook on fertilizer usage Seetharaman, S., Biswas, B.C., Yadav, D.S. and Matheswaran, S. 1996 Oxford and IBH Publishing Company, New Delhi
4.	Fertilizer control order1985 The Fertiliser Association of India The fertilizer Association of India, 10, Shaheed Jit Singh Marg, New Delhi
5.	Fertilizers - A Text Book Ranjan Kumar Basak 2000 Kalyani publishers, New Delhi
6.	Soil fertility and Fertilizers Tisdale, S.L., Nelson, W.L. and Beaton, J.D. 1993 Macmillan Publishing Company, New York

FUNDAMENTALS OF ENTOMOLOGY

Credits: 2 **Semester: II**
Course Code: AG25206 **No of Lecture Hours: 30**

Course Objective:

1. To know the history of entomology, classification of insects and their relationship with other arthropods
2. To study the various morphological characters of class insect and their importance for classification of insects
3. To get an idea about the different physiological systems of insects and their roles in growth and development and communications of insects
4. To study the characteristics of commonly observed insect orders and their economically important families

Course Outcome:

CO1: Explains the history, Scope and importance of entomology and insect body wall and body segmentation
CO2: Identify and recognize various structures and functions of insect antenna, legs, wings and different types of larval and pupal forms of insect
CO3: Illustrates various physiological systems of insect body
CO4: Describes the characters of insects belongs to the orders Orthoptera, Isoptera. Thysanoptera, Lepidoptera and develops ability to identify various insects
CO5: Identify the characters of insects belongs to the orders Coleoptera, Hymenoptera, Diptera, Hemiptera and develops ability to identify various insects.

Course Content	Hours Allotted	Pedagogy
Module I:	**(6)**	Power point presentations / Lectures
• History of Entomology in India - Contributions of eminent entomologists,	1	
Classification of Phylum Arthropoda up to Classes	1	
Contributory factors for abundance of insects – Major structural characters, developmental characters and protective characters (Morphological, physiological, behavioural and construction of protected niches) of Insecta in Animal Kingdom.	1	
Morphology: Structure and functions of body wall and moulting, Moulting – Apolysis, ecdysis and sclerotization.	1	
• Body segmentation, structure of head, types of head, sclerites and sutures of insect head - Thorax – Segments and	1	

appendages (wings and legs). • Abdomen – Segments, pre and post genital appendages (Furcula, cornicles, tracheal gills and pseudo-ovipositor	1	
Module II: • Antenna – Structure of typical antenna and its modifications in different insects with Examples • Mouthparts – Biting and chewing, sucking (Piercing and sucking, Rasping and sucking, Chewing and lapping, Sponging and Siphoning/ Simple sucking), mask and degenerate types with examples. • Legs – Structure and modifications, Wings – Venation, margins and angles – Types of wings and wing apparatus with examples • Metamorphosis-Types and diapause • Types of larva and pupa • Structure and functions of the Digestive system, Circulatory system	**(6)** 1 1 1 1 1	Power point presentations / Lectures
Module III: • Excretory system, Respiratory system • Nervous system, Reproductive system • Reproductive system – Structure of male and female reproductive systems – Types of reproduction in insects • Secretary (Endocrine) system – Structure and functions of neurosecretory organs, Major sensory organs • Insect ecology- intro. & it's components. Effect of biotic and abiotic factors, Categories of pests	**(6)** 1 1 1 1 2	Power point presentations / Lectures
Module IV: • Concepts of IPM, practices, scope and limitation of IPM. Classification of insecticides, toxicity and formulations of insecticides • Taxonomy – Importance - History – Binomial nomenclature - Def. of Biotype, family, Species, Sub-species, Genus, and Order • Orthoptera – General characters - Gryllidae, Acrididae, Tettigonidae and Gryllotalpidae – Characters with examples • Isoptera – General characters –Termitidae –Characters with examples, Neuroptera- General character-Chrysopidae, Thysanoptera –Thripidae –Characters with examples Lepidoptera- General characters - Pyralidae, Crambidae, Gelechiidae, Lycaenidae • Arctiidae, Papilionidae, Saturniidae and Bombycidae - Characters with examples	**(6)** 1 1 1 2 1	Power point presentations / Lectures

Module V: • Coleoptera - General characters – Scarabaeidae, Coccinellidae, Chrysomelidae, Bruchidae, Curclionidae, Cerambycidae • Hymenoptera - General characters – Tenthredinidae, Ichneumonidae, Braconidae • Chalcididae, Trichogrammatidae, and Apidae - Characters with examples • Diptera - General characters - Culicidae, Cecidomyiidae, Muscidae, Tachinidae, • Agromyzidae and Tephritidae - Characters with examples • Hemiptera – General characters - Cimicidae - Miridae, Pentatomidae, Lygaeidae, Coreidae, Pyrrhocoridae, Cicadellidae, Aleurodidae, Coccidae, Pseudococcidae, Delphacidae- Characters with examples	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	Fundamentals of Ecology - Eugene. P. Odum and Gray W. Barrett
2.	Imm's General Text book of Entomology— O.W. Rechards and R.G. Davies
3.	Introduction to the study of Insects –D. J. Borror and DeLong's

FUNDAMENTALS OF PLANT PATHOLOGY

Credits: 2 **Semester: II**
Course Code: AG25207 **No of Lecture Hours: 30**

Course Objective: To impart knowledge to the students on pathogens that causes diseases in plants. To impart knowledge on the principles of plant disease Management

Course Outcome:

CO1: To get acquainted with the role of different microorganisms and general characteristics of fungi

CO2: To acquaint the students with the reproduction of fungi and classify the Kingdom Fungi into phylum, subphylum and orders

CO3: To impart knowledge on different phylum Ascomycota and Basidiomycota with examples

CO4: To study the various plant parasitic viruses and viroids and classification of plant diseases

CO5: To get acquainted with development of plant diseases and general concepts, and various plant disease management principles and practices

Course Content	Hours Allotted	Pedagogy
Module I: • Introduction to Plant Pathology: Definition of Plant Pathology • Concept of disease in plants; Different terms used in Plant Pathology • History of Plant Pathology with special references to India • Causes of plant disease: Inanimate and animate causes • Fungi and their morphology, General characteristics of fungi, fungus definition • Somatic structures - types of fungal thalli. Ultra structure of fungal cell	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module II: • Types of fungi based on reproductive structures- eucarpic, holocarpic. Modifications of mycelium (rhizomorphs, sclerotium, stroma, haustorium, rhizoids and appressorium). • Reproduction: Methods of Asexual and sexual reproduction. Fruiting bodies and sterile structures • classification of fungi: Taxonomy - Nomenclature, Binomial system of nomenclature, rules of nomenclature • Classification of fungi as per Kirk *et al* (2008)-Key to phylum,	**(6)** 1 1 1	Power point presentations / Lectures

subphyla, classes, orders and families • Major characteristic features of Kingdom Fungi: Chromista and Protozoa • Characteristics of Phyla Chytridiomycota	1 1 1	
Module III: • Characteristics of Phyla Zygomycota • Characteristics of Phyla Ascomycota • Characteristics of Phyla Basidiomycota • Characteristics of Phyla Mitosporic fungi (Anamorphic fungi) • Bacteria: Characteristics of phyto pathogenic bacteria, Morphology, reproduction • Classification (2nd Edition of Bergey's Manual of Systematic Bacteriology,2004)	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures
Module IV: • Other plant pathogens: Mollicutes; Flagellant protozoa; FVB; Green algae and parasitic higher plants • Viruses and viroids: -important characteristics of plant viruses and viroids -multiplication • Classification of viruses based on nucleic acid (single stranded (ss) RNA, double stranded (ds)RNA, ssDNA and dsDNA). • Methods of transmission of plant viruses with examples of vector transmitted virus diseases • important characteristics of viroids Examples of important viroid diseases potato spindle tuber viroid and coconut cadang-cadang • Classification of plant disease; Parasitism and pathogenesis	**(6)** 1 1 1 1 1 1	Power point presentations / Power point presentations / Lectures
Module V: • Development of disease in plants: Disease Triangle, Disease cycle. • Principles of Plant disease management: Avoidance, Exclusion – Plant quarantine– Domestic, International and Embargo – Phytosanitary Certificate (PSC) – Quarantine in India • Eradication: cultural methods: role of different cultural methods in plant disease management • Physical methods-soil solarization, hot water treatment, soil sterilization and Biological methods: concept, examples of biocontrol agents • Protection and therapy- definition of terms - nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics • Immunization – cross protection and host plant resistance – Types of resistance – vertical and horizontal resistance – Resistant varieties. Integrated Disease Management (IDM)	**(6)** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	Agrios, G.N. 2010. Plant Pathology. Acad. Press
2.	Alexopoulos, Mims and Blackwel. Introductory Mycology.
3.	Dhingra, O.D. and Sinclair, J.B. 1986. Basic Plant Pathology Methods. CRC Press, London, Tokyo
4.	Gibbs, A. and Harrison, B. 1976. Plant Virology - The Principles. Edward Arnold, London
5.	Goto, M. 1990. Fundamentals of Plant Bacteriology. Academic Press, New York
6.	Hull R. 2002. Mathew's Plant Virology. 4th edn. Academic Press, New York.
7.	Kamat, M. N. Introductory Plant Pathology. Prakash Pub, Jaipur
8.	Mehrotra, R.S. and Aggarwal, A. 2007. Plant Pathology. 7th edn. Tata Mc Graw Hill Publ. Co. Ltd
9.	Nene, Y.L. and Thapliyal, P.N. 1993. Fungicides in Plant Disease Control. 3rd Ed. Oxford & IBH, New Delhi
10.	Pathak, V. N. Essentials of Plant Pathology. Prakash Pub., Jaipur
11.	Rajeev, K. and Mukherjee, R.C. 1996. Role of Plant Quarantine in IPM. Aditya Books
12.	Rhower, G.G. 1991. Regulatory Plant Pest Management. In: Handbook of Pest Management in Agriculture. 2nd edn. Vol. II. (Ed. David Pimental). CRC Press.
13.	Singh R.S. 2008. Plant Diseases. 8 th Ed. Oxford & IBH. Pub. Co
14.	Singh R.S. 2013. Introduction to Principles of Plant Pathology. Oxford and IBH Pub. Co
15.	Verma, J.P. 1998. The Bacteria. Malhotra Publ. House, New Delhi
16.	Vyas SC. 1993. Handbook of Systemic Fungicides. Vols. I-III. Tata McGraw Hill, New Delhi

COMMUNICATION SKILLS
PRACTICALS

Credits: 1 **Semester: II**
Subject Code: AG25208 **No. of Practical Hours: 30**

Objective: To inculcate effective communication skills, reading skills, comprehension skills, and creative skills among students

Outcome: Students will acquire and apply knowledge of effective communication skills.

1. Listening and note-taking
2. Writing skills: precis writing
3. Writing skills: summarizing and abstracting
4. Reading and comprehension (written and oral) of general articles
5. Reading and comprehension (written and oral) of technical articles
6. Stage manners on grooming and body language
7. Stage manners on voice modulation and speed
8. Micro-presentations
9. Impromptu presentations
10. Feedback on presentations
11. Group discussions
12. Public speaking
13. Vocabulary building
14. Interview Techniques
15. organization of events

FUNDAMENTALS OF AGRONOMY
PRACTICALS

Credits: 1 **Semester: II**
Subject code: AG25209 **No. of Practical hours: 30**

Objective: To Identify different seeds, manures, fertilizers, herbicides and to participate in all agricultural operations from sowing to harvesting.

Outcome: Students will be able to identify different seeds, manures, fertilizers, herbicides and participate in all agricultural operations like ploughing, sowing, application of fertilizers, and measurement of soil moisture etc.

1. A visit to Instructional Crop farm and study on field crops
2. Identification of crops, seeds, fertilizers, pesticides, Crops and cropping systems in different Agro-climatic zones of the state
3. Study of some preparatory tillage implements
4. Study of inter tillage implements
5. Practice of ploughing / puddling
6. Study and practice of inter cultivation in field crops
7. Numerical exercises on calculation of seed, plant population and fertilizer requirement
8. Study of yield contributing characters and yield estimation of crops
9. Identification of weeds in different crops
10. Seed germination test
11. Seed viability test
12. Practice on time and method of application of manures and fertilizers.
13. Measurement of soil moisture by gravimetric and volumetric method and bulk density
14. Determination of field capacity, determination of gross and net irrigation requirement
15. Determination of infiltration rate

PERSONALITY DEVELOPMENT
PRACTICALS

Credits: 1 | **Semester: II**
Subject Code: AG25210 | **No. of Practical Hours: 30**

Objective: To make students realize their potential strengths and develop their interpersonal skills to improve employability.

Outcome: Students will acquire better understanding of personality development by practical application.

1. Myers–Briggs Type Indicator (MBTI) personality analysis
2. Learning styles
3. Learning Strategies
4. Motivational needs
5. Fundamental Interpersonal Relations Orientation-Behavior (FIRO-B)
6. Interpersonal Communication
7. Teamwork
8. team building
9. Group Dynamics
10. Win-win game
11. Conflict Management
12. Leadership styles
13. Case Studies on Personality
14. Case Studies on Organizational Behavior
15. Visit to Personality Development center

ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT PRACTICALS

Credits: 1 **Semester: II**
Course code: AG25211 **Number of hours: 30**

1. Visit to a local area to document environmental assets river/forest/grassland/hill/ mountain.
2. Energy: Biogas production from organic wastes. Visit to windmill / hydro power / solar power generation units.
3. Biodiversity assessment in farming system. Floral and faunal diversity assessment in polluted and un polluted system.
4. Visit to local polluted site - Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds.
5. Environmental sampling and preservation. Water quality analysis: pH, EC and TDS. Estimation of Acidity, Alkalinity. Estimation of water hardness. Estimation of DO and BOD in water samples. Estimation of COD in water samples. Enumeration of E. coli in water sample.
6. Assessment of Suspended Particulate Matter (SPM).
7. Study of simple ecosystem – Visit to pond/river/hills. Visit to areas affected by natural disaster.

SOIL FERTILITY MANAGEMENT
PRACTICALS

Credits: 1 **Semester: II**
Subject Code: AG25212 **No. of practical hours: 30**

Objective: To collect representative samples of Soils, plants, organic manures and analyze their nutrient content.

Outcome:

At the end of the course, the student will be able to

1. Estimate the fertility status of soils,
2. Estimate the nutrient contents of plants
3. Estimate the nutrient contents in manures.

PRACTICALS

1. Introduction of analytical instruments and their principles – pH meter and Electrical Conductivity meter
2. Introduction of analytical instruments and their principles –flame photometer, colorimeter/spectrophotometer and atomic absorption spectrophotometer
3. Estimation of available nitrogen content of soils
4. Estimation of nitrogen content in organic manures
5. Estimation of available phosphorous content of soils
6. Estimation of available potassium content of soils
7. Estimation of available sulphur content of soils
8. Estimation of exchangeable calcium and magnesium in soils
9. Estimation of available micronutrients in soils
10. Collection of plant samples and digestion of plant samples
11. Estimation of nitrogen content of plants
12. Estimation of phosphorous content of plants
13. Estimation of potassium content of plants
14. Estimation of sulphur content of plants
15. Quick tests for soil and plant analysis and interpretation of analysis

FUNDAMENTALS OF ENTOMOLOGY
PRACTICALS

Credits: 1 **Semester: II**
Subject Code: AG25213 **No. of lecture hours: 30**

Practicals

1. Methods of collection and preservation of insects including immature stages.
2. External features of Grasshopper / Blister beetle.
3. Study of types of mouthparts – Biting and chewing, piercing and sucking, rasping and sucking, chewing and lapping, sponging and siphoning.
4. Study of different types of insect antennae and legs.
5. Study of wing venation, types of wings and wing coupling mechanisms.
6. Study of different types of insect larva and pupa.
7. Dissection of digestive system in insects (Grasshopper).
8. Study of characters of Orders - Orthoptera, Dictyoptera, Odonata and their families
9. Study of characters of Orders - Isoptera and Thysanoptera and their families.
10. Study of characters of Orders and Sub orders -Hemiptera and their families.
11. Study of characters of Order- Neuroptera and Lepidoptera and their families.
12. Study of characters of Order- Coleoptera and its families.
13. Study of characters of Order- Hymenoptera and its families.
14. Study of characters of Order - Diptera and its families.
15. Study of Insecticides and their formulations
16. Pesticide appliances and their maintenance
17. Sampling techniques for estimation of insect population and damage

FUNDAMENTALS OF PLANT PATHOLOGY
PRACTICALS

Credits: 1 **Semester: II**
Subject Code: AG25214 **No. of practical hours: 30**

Objective: To identify the plant pathogens and to know the modes of transmission of viruses and different methods of application of fungicides.

Outcome: Students will be able to identify different pathogens causing diseases and gain knowledge on fungicide applications.

1. Study of the microscope
2. Acquaintance with laboratory material and equipment
3. Study of different plant disease symptoms
4. Microscopic examination of general structure of fungi
5. Simple staining of bacteria: Direct and indirect staining
6. Gram staining of bacteria
7. Microscopic examination of fungal diseased specimen
8. Microscopic examination of bacterial diseased specimen
9. Preparation of culture media: PDA and NA
10. Preparation of culture media: PDA and NA
11. Isolation and purification of plant pathogens: Fungi and bacteria
12. Study on plant disease diagnosis: Koch's Postulates
13. Characteristics, formulation of fungicides. Preparation of Bordeaux mixture, Bordeaux paste.
14. Methods of application of fungicides: seed, soil and foliar.
15. Calculation of fungicides.

POST-HARVEST PRODUCTION TECHNOLOGY
PRACTICALS

Credits: 2 **Semester: II**

Subject Code: AG25215 **No. of practical hours: 60**

Objective: To provide students with an in-depth understanding of post-harvest technology applied to fruits, vegetable and other plant-based products.

Outcome: Students will be able to gain knowledge on food processing and prepare different value-added products.

1, 2. Applications of different types of packing, containers for shelf-life extension.

3, 4. Effect of temperature on shelf life and quality of produce.

5, 6. Demonstration of chilling and freezing injury in vegetables and fruits.

7, 8. Extraction and preservation of pulps and juices.

9, 10. Preparation of jam and jelly.

11,12. Preparation of Ready-to-serve drink nectar.

13,14. Preparation of nectar and squash

15, 16. Processing of osmotically dried fruits and vegetable products,

17, 18. Preparation of fruit bar and candy.

19, 20. Processing of tomato products and canned products.

21, 22. Quality evaluation of products- Physio-chemical and sensory.

23, 24. Manufacture of tomato ketchup / tomato sauce and soup.

25, 26,27. Manufacture of fruit preserve, candied fruits and fruit bar

28, 29. Preparation of pickles and powders.

30. Visit to processing unit/industry

VERMICOMPOSTING
PRACTICALS

Credits: 2 **Semester: II**
Subject Code: AG25216 **No. of practical hours: 60**

Objective

To expose and acquire knowledge on the vermi-compost and to gain the state-of-the-art - skill and expertise on Vermi-composting.

Practical

1. Studying types of Earthworms and Understanding morphology, behavioural pattern and feeding habit of Earthworm.
2. Studying the types of Vermi-composting.
3. Procuring materials for Vermi-composting.
4. Vermi bed preparations and filling of pits.
5. Measuring decomposition rates.
6. Moisture addition to pits.
7. Collection of compost.
8. Analysis of nutrient content in vermi compost
9. Sieving, packing.
10. Marketing of Vermi compost.
11. SWOT Analysis
12. Visit to a large scale vermicompost unit

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE
B.Sc. (*Hons.*) AGRICULTURE
THIRD SEMESTER
ACADEMIC YEAR-2026-27 OF 2025-29 BATCH (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours/ week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
THEORY									
1	II	G19AG1T	Principles of Organic Farming (GE-1) (ID)	2	3	40	60	100	2
2	II	AG26301	Crop Production Technology -1 (Kharif crops) (Core-12)	2	3	40	60	100	2
3	II	AG26302	Production Technology of Fruits and Plantation crops (Core-13)	1	3	40	60	100	1
4	II	AG26303	Principles of Genetics (core-14)	2	3	40	60	100	2
5	II	AG26304	Fundamentals of Extension Education (core-15)	1	3	40	60	100	1
6	II	AG26305	Fundamentals of Nematology (core-16)	1	3	40	60	100	1
7	II	AG26306	Farm power and machinery (core-17)	1	3	40	60	100	1
8	II	AG26307	Agricultural informatics and Artificial intelligence (core-18)	2	3	40	60	100	2
PRACTICALS									
9	II	G19AG1P	Principles of Organic Farming (GE-1) (ID)	2	3	40	60	100	1
10	II	AG26308	Crop Production Technology-1 (Kharif crops) (Core-12)	2	3	40	60	100	1
11	II	AG26309	Production Technology of Fruits and Plantation crops (Core-13)	2	3	40	60	100	1
12	II	AG26310	Principles of Genetics (core-14)	2	3	40	60	100	1
13	II	AG26311	Fundamentals of Extension Education (core-15)	2	3	40	60	100	1
14	II	AG26312	Fundamentals of Nematology (core-16)	2	3	40	60	100	1
15	II	AG26313	Farm power and machinery (core-17)	2	3	40	60	100	1
16	II	AG26314	Agricultural informatics and Artificial intelligence (core-18)	2	3	40	60	100	1
17	II	AG26315	Organic Production Technology (SEC-5)	4	3	40	60	100	2
Total				**32**		680	1020	1700	**22**

PRINCIPLES OF ORGANIC FARMING (GE)

Credits : 2 **Semester: III**
Subject Code: G19AG1T **No. of lecture hours: 30**

Objective:

- To impart knowledge on principles and practices of organic farming.
- To impart knowledge on the preparation of bio fertilizers and botanical pesticides.

Course outcomes:

CO1: Analyse the need of Organic farming
CO2: Understand the steps in Organic farming
CO3: Understand the differences between various cultivation methods
CO4: Classify the types of manures and fertilizers
CO5: Understand the importance of bio-fertilizers

Course Content	Hours Allotted	Pedagogy
Module I: • Introduction to Organic Farming- definition, principles, need of organic farming • Difference between organic farming and modern chemical farming • Detrimental effects of currently chemical dependent farming • Demand for organic farming and health benefits of organic foods. • Characteristics of modern and organic farming	**(6)** 2 1 1 1 1	Power point presentations / Lectures
Module II: • Types of organic farming • Advantages and limitations of organic farming • Basic steps in organic farming • Components of organic farming	**(6)** 2 2 1 1	Power point presentations/ Lectures
Module III: • Diverse crop rotation • Soil fertility management • Irrigation water management and Weed control • Natural pests and disease control	**(6)** 1 1 2 2	Power point presentations/ Lectures
Module IV: • Plant nutrients, classification and their importance in crop production • Sources of nutrients for organic agriculture – organic manures • Differences between manures and fertilizers • Preparation and application of FYM, Compost and Concentrated Manures.	**(6)** 2 1 1 2	PowerPoint presentations/ Lectures

Module V: • Animal waste and Vermicompost • Green manures- definition, types and benefits and method of application • Biofertilizers-definition, types, examples and benefits • Application methods of Biofertilizer	**(6)** 1 2 2 1	PowerPoint presentations/ Lectures

Learning Resources	
1.	Basics of organic farming. MamtaBansal, 2017, CBS Publishers & Distributors pvt Ltd.
2.	Fundamental approaches in sustainable Agriculture. Jag Paul Sharma, 2006, Kalyani Publishers.
3.	This is organic agriculture, Rajanya Jaisingh, 2005, Jain brothers.
4.	Sustainable through organic farming. Mukund Joshi, T.K. Prabhakarasetty, 2006, Kalyani Publishers.
5.	Farming systems and sustainable agriculture, S.R. Reddy, Kalyani publishers.
6.	Organic farming-principles, prospects and problems, Suresh N. Deshmukh, 2012, Agrobios Publishers.

CROP PRODUCTION TECHNOLOGY -1 (Kharif crops)

Credits : 2 **Semester: III**
Subject Code: AG26301 **No. of lecture hours: 30**

Objective: To impart knowledge on production of cereals, millets, pulses and fodder crops, Origin, Geographic distribution, Adaptation, Area, Production, and Productivity in India and Andhra Pradesh, Economic importance, Soil and Climatic requirements, Cultural practices, Cropping systems, Yield attributes, and Yield of following Cereals, Millets, Pulse and Fodder crops.

Course Outcomes:

CO1: Explains various crop production techniques from sowing to harvest for Rice and wheat

CO2: Explains various crop production techniques from sowing to harvest for maize and sorghum

CO3: Explains various crop production techniques from sowing to harvest for pearl millet, Finger millet, foxtail millet, Kodo millet, proso millet, little millet

CO4: Explains various crop production techniques from sowing to harvest for Red gram, Bengal gram, green gram, black gram, cowpea, horse gram

CO5: Explains various crop production techniques from sowing to harvest for different forage crops

Course Content	Hours Allotted	Pedagogy
Module I: Origin, Geographic distribution, Adaptation, Area, Production, and Productivity, Economic importance, Soil and Climatic requirements, Cultural practices, Cropping systems and Yield attributes, and yield of Rice Maize	**6 Hrs** 4 2	Power point presentations / Lectures
Module II: Origin, Geographic distribution, Adaptation, Area, Production, and Productivity, Economic importance, Soil and Climatic requirements, Cultural practices, Cropping systems and Yield attributes, and yield of Sorghum Pearl millet Finger millet Minor millets- Foxtail, Kodo millet, common millet and little millet	**6 Hrs** 2 1 1 2	Power point presentations / Lectures
Module III Origin, Geographic distribution, Adaptation, Area, Production, and Productivity, Economic importance, Soil and Climatic requirements, Cultural practices, Cropping systems and Yield attributes, and yield of Red gram soyabean Green gram & black gram	**6** 1 1 2 2	Power point presentations / Lectures

Cowpea, Horse gram		
Module IV Origin, Geographic distribution, Adaptation, Area, Production, and Productivity, Economic importance, Soil and Climatic requirements, Cultural practices, Cropping systems and Yield attributes, and yield of Sesamum, Castor Cotton Jute	**6** 1 1 2 2	Power point presentations / Lectures
Module V Origin, Geographic distribution, Adaptation, Area, Production, and Productivity, Economic importance, Soil and Climatic requirements, Cultural practices, Cropping systems and Yield attributes, and yield of Maize, Jowar, Bajra, Cowpea, Napier hybrid, Para grass, Guinea grass, Sunhemp, Pillipesara	**6** 1 1 1 2 1	Power point presentations / Lectures

Learning Resources:	
1.	Singh Chidda. 1983. **Modern Techniques of Raising Field Crops**. New Delhi: Oxford & IBH Publishing Co
2.	Chatterjee, BN. and Maiti, S. 1985. **Cropping Systems Theory & Practice**. New Delhi: IBH 3
3.	Reddy, SR. 2004. **Agronomy of Field Crops**. Ludhiana: Kalyani Publishers
4.	Bose Subhash Chandra, M.andBalakrishnan, V. 2001. **Forage Production**. New Delhi: Asian Publishers
5.	Prasad Rajendra. 2002. **Text Book of Field Crop Production**. New Delhi: Technical Editor, ICAR
6.	Singh, SS. 1988. **Crop Production Management**. Ludhiana: Kalyani Publishers
7.	Pal Mahendra, DekaJayanta and Raj, RK. 1996. **Fundamentals of Cereal Crop Production**. New Delhi: Tata McGraw Hill Publishing Co

PRODUCTION TECHNOLOGY OF FRUITS AND PLANTATION CROPS

Credits: 1 **Semester: III**
Subject Code: AG26302 **No. of lecture hours: 15**

Course Objective: To impart knowledge on production technology of fruit and plantation crops.

Course Outcomes:

CO1: Identify problems in raising of Mango, Banana and Citrus crops.

CO2: Demonstrate the Raising of Grape, Guava, Papaya & Pomegranate and select suitable training and pruning methods for Grape, Pomegranate.

CO3: Explain Production technology in Apple, Pear, Peach, Ber, Phalsa and Custard apple

CO4: Elaborate Production of Pineapple, Litchi, Sapota, and Jack fruit

CO5: Relate the production and processing of plantation crops

Course Content	Hours Allotted	Pedagogy
Module I: Importance and scope of fruit and plantation crop industry in India. Importance of rootstocks. **Production technology of Mango** – origin – importance – climate – soils – varieties – propagation – land preparation –planting –HDP - spacing – irrigation – manuring – inter cultivation and intercropping – training and pruning – flowering – pollination – fruit set – cropping – harvesting – maturity indices – yield – physiological disorders black tip or mango necrosis, mango malformation, spongy tissue and fruit drop – causes and remedies – alternate or biennial bearing and irregular bearing. **Production technology of Banana** – origin – importance – climate – soils – varieties – propagation – propagating material – suckers (water and sword suckers) and rhizomes– planting -land preparation – system of planting – spacing – application of manures – season of planting– inter cultivation – desuckering – trashing – mattocking – wrapping of bunches – removal of male bud – removal of floral remnants – propping – earthing-up – weeding – harvesting – maturity indices – yield**.** **Production technology of Citrus** – origin – importance – different citrus species – climate – soils – varieties – propagation–land preparation – method of planting – spacing - irrigation – manuring – pruning and training – intercultivation – intercropping – flowering – bahar treatment– cropping – fruit drop – causes and control – harvesting – maturity indices – yield. **Production technology of Guava** – origin – importance – climate – soils – varieties – Propagation – different methods of propagation – commercial method of propagation – planting-land preparation – system of planting –	**3** **1** **1**	Power point presentations / Lectures

spacing – application of manures – season of planting– flowering – seasons of flowering – crop regulation – irrigation – manuring – training – pruning for encouraging new shoots and for sanitation – pollarding, bending inter-cultivation and intercropping – harvesting – maturity indices– yield	**1**	
Module II: **Production technology of Grape** – origin – importance – climate – soils – varieties – propagation – different methods of propagation – different rootstocks used – planting – land preparation – system of planting – spacing – application of manures – season of planting – training – different methods of training – head, arbour, kniffin, and telephone trellis system – advantages and disadvantages of each system. Pruning – irrigation – manuring – intercultivation– Fruit thinning – use of growth regulators in increasing fruit set, berry size, cluster size and maturity harvesting – maturity indices – yield. **Production technology of Litchi** – Origin -importance – climate – soils – varieties – propagation – methods of propagation – commercial method of propagation – planting – land preparation – system of planting –spacing – digging of pits – filling of pits – application of manures – season of planting – training and pruning – system of training pruning for sanitation and heavy pruning of old trees – irrigation – manuring – intercultivation and intercropping – harvesting – maturity indices – yield. **Production technology of Papaya** – origin – importance – climate – soils – varieties –sex expression – climate – soils – propagation – raising of seedlings – planting – land preparation – system of planting – spacing – digging of pits – filling of pits – season of planting – irrigation – manuring – intercultivation and intercropping – flowering and fruiting – harvesting – maturity indices – yield – papain – uses and its extraction. **Production technology of Sapota** – origin – importance – climate – soils – varieties – propagation – land preparation – planting – spacing – season of planting – irrigation – manuring– Intercultivation and intercropping – flowering and cropping – harvesting – maturity indices – yield	**3** **1** **1** **1**	Power point presentations / Lectures
Module III **Production technology of Apple, Pear, Peach, Strawberry and Nut crops (Walnut ,Almond)** – origin – importance – climate- soils – varieties propagation – methods of propagation –rootstocks – planting – land preparation – system of planting – spacing – digging of pits – filling of pits –application of manures – season of planting – spacing – digging of pits – filling of pits – application of manures - season of	**3**	Power point presentations / Lectures

planting – planting of pollenizers – training – system of training adopted – pruning – pruning for sanitation and production of new spurs – irrigation – manuring – inter cultivation and inter cropping – harvesting – maturity indices – yield.		
Module IV **Production technology of Ber, Date palm and Jackfruit**– origin – importance – climate – soils – varieties– propagation – method of propagation – raising of seedlings and rootstocks used – planting – land preparation – system of planting – spacing — application of manures – training – method of training – pruning for sanitation and bearing – time of pruning – irrigation – intercultivation and intercropping – flowering and fruiting – harvesting – maturity indices – yield. **Production technology of Pineapple** – origin – importance – climate – soils – varieties – propagation – propagation material – commercial method of propagation – planting – land preparation – systems of planting – spacing – application of manures – season of planting – irrigation – intercultivation – induction of flowering – harvesting – maturity indices – yield. **Production technology of Pomegranate** – origin – importance – climate – soils – varieties– propagation – methods of propagation – commercial method of propagation – planting – land preparation – system of planting – spacing– application of manures – season of planting – irrigation – manuring – cropping – harvesting – maturity indices – yield –physiological disorder – fruit cracking and its control	**3** **1** **1** **1**	Power point presentations / Lectures
Module V **Production technology of Coconut and Arecanut** – botanical name – family – origin – economic part – importance – botany – varieties – tall, dwarf and hybrids – climate – soil – planting – manuring – irrigation – intercultivation – harvesting and yield and nd value addition **Production technology of Cashew nut** – preparation of land – planting – irrigation – manuring – intercultivation – intercropping – training and pruning – cropping – harvesting – yield – processing. **Production technology of Oil palm** – botanical name – family – origin – economic part – importance – botany – varieties – climate – soil – propagation and planting – irrigation – intercultivation – harvesting – yield – processing. **Production technology of Cocoa**– botanical name – family – origin – importance – botany – varieties – forestero, criollo and other types – climate – soil – propagation – preparation of land – planting – irrigation – weeding – mulching – pruning – intercropping – cover cropping – manuring – harvesting – yield – processing – uses	**3** **1** **1**	Power point presentations / Lectures

Production technology of Tea and Coffee – botanical name – family – origin – introduction – importance – botany – arabica and robusta coffee – varieties – climate and soil– propagation – preparation of land – planting – provision of shade – training and pruning – manuring – irrigation – inter cropping – soil management – mulching – weed control – cropping – harvesting – yield – processing. **Production technology of Palmyrah and Rubber**– botanical name – family – origin – importance – botany – varieties – climate – soil – propagation – preparation of land – planting – irrigation – weeding – mulching – pruning – intercropping – cover cropping – manuring – harvesting – yield – processing – uses	**1**	

Learning Resources:	
1.	Shanmugavelu, K.G. Production Technology of fruits. New Delhi: Oxford and IBH
2.	Bose, T.K.N. and Mitra, S.K. 1990. Fruits- Tropical and Sub Tropical
3.	Shanmugavelu, K. and Madhava Rao, V.N. 1977. Spices and Plantation Crops. Madras: Popular Book depot
4.	Kumar, N., Abdul Khader, J.B.M, Ranga Swami, P. and Irulappan, I. 1991. Spices, Plantation Crops. Medicinal and Aromatic plants. New Delhi and Kolkata: Oxford and IBH Co
5.	Bose. T.K Fruits: Tropical and Subtropical (Vol.-I, II&III), Calcutta
6.	N. Kumar., Introduction to spices, plantation crops, medicinal and aromatic plantsby Oxford and IBM Publishing Co.Pvt. Ltd., New Delhi
7.	Chattopadhyay, N.1997 Pomology-Vol. I to IV-, Kalyani Publishers, Ludhiana

PRINCIPLES OF GENETICS

Credits: 2 **Semester: III**

Subject Code: AG26303 **No. of lecture hours: 30**

Objective: To impart knowledge on the fundamentals of genetics and their applications in plant breeding to improve agricultural productivity

COURSE OUTCOMES: Students will be able to

CO1: Express knowledge of Mendel's Laws

CO2: Classify types of alleles

CO3: Explain chromosomal aberrations and solve problems on chi square

CO4: Classify mutations and extra chromosomal inheritance

CO5: Analyzes the structure and expression of genes

Course Content	Hours Allotted	Pedagogy
Module-I • Pre-Mendelian and Post-Mendelian Concepts of heredity • Mendelian Principles of heredity- Law of Segregation • Law of Independent assortment • Exceptions to Mendels 1 st law- Dominance relationships • Exceptions to Mendels 2 nd law-Law of Incomplete Dominance and Interaction of factors -Epistatic Gene Interactions with examples	**6** 1 1 1 1 2	Power point presentations / Lectures
Module-II Architecture of chromosomes • Cell division-cell cycle- Mitosis • Meiosis • Probability and Chi-square • Multiple alleles- examples • Blood group genetics, pleiotropism and pseudo alleles • Sex determination mechanisms	6 1 1 1 1 1 1	Power point presentations / Lectures

Module-III • Sex linkage, sex limited and sex influenced traits Linkage-its estimation, 2-point test cross • Crossing –over mechanisms • 3-point test-cross, chromosome mapping • Structural changes in chromosomes- Deletions, Duplications and Inversions • Translocations, examples of all structural alternations	**6** 2 1 1 1 1	Power point presentations / Lectures
Module-IV • Mutations and classifications • Mutagenic agents and induction of mutations • CIB technique and induction of Mutations • Qualitative and Quantitative traits • Polygenes, continuous variations, Multiple factor hypothesis • Cytoplasmic inheritance	6 1 1 1 1 1 1	Power point presentations / Lectures
Module-V • Genetic disorders • Nature and structure of DNA and RNA • Replication of Genetic material (DNA) • Transcription • Translation • Gene concept, gene structure, Gene function and regulation, lac operon.	6 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1	Gupta, PK. 1985. **Cytology, Genetics and Cytogenetics**. Meerut: RastogiPublications
2	Gupta, PK. 2007. **Genetics**. Meerut: Rastogi Publications
3	Singh Pundhan. 2000. **Elements of Genetics**. Ludhiana: Kalyani Publishers
4	Singh, BD. 2007. **Fundamentals of Genetics**. Ludhiana: Kalyani Publishers
5	Strickberger, MW. 2004. **Genetics**. New Delhi: PHI Learning Pvt. Ltd.
6	Verma, PS. and Agarwal, VK. 2005. **Cell Biology, Genetics, Molecular Biology, Evolution and Ecology**. New Delhi: S. Chand and Co

FUNDAMENTALS OF EXTENSION EDUCATION

Credits: 1 **Semester: III**
Subject Code: AG26304 **No. of Lecture Hours: 15**

Course Objective:

To provide an understanding of the concepts, evolution, and systems of agricultural extension in India, along with development programmes, technology transfer, and communication processes, including the adoption and diffusion of innovations in agriculture.

Course Outcomes:

CO1: Understand the concept of agriculture extension, principles, and philosophy of Extension.
CO2: Learn about extension systems in India, and extension efforts in pre- and post-independence eras.
CO3: Analyze new trends in agricultural extension and development concepts.
CO4: Gain knowledge on monitoring, evaluation, and Transfer of Technology in agriculture.
CO5: Describe the communication, adoption, and diffusion of innovation concepts in agricultural extension.

Course Content	Hours Allotted	Pedagogy
Module I: • Education: Meaning, definition, and types. • Extension Education: meaning, definition, scope, and process; objectives and principles of Extension Education. • Extension Programme planning: Meaning, Process, Principles and Steps in Programme Development. Extension administration: meaning and concept, principles and functions.	**3** 1 1 1	Power point presentations / Lectures
Module II: • Extension systems in India: extension efforts in the pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and the post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.) • Reorganized Extension System (T&V system) various extension/ agriculture development programs launched by ICAR/Govt. of India (IADP, LAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). • Social Justice and Poverty Alleviation Programme: ITDA, IRDP/SGSY/NRLM. Women Development Programme: RMK, MSY etc.	**3** 1 1 1	Power point presentations / Lectures

Module III: • New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc., DWCRA, Commodity Interest Groups (CIGs), Farmers Producer Group (FPG). • Rural Development: concept, meaning, definition; various rural development programs launched by Govt. of India. • Community Development: meaning, definition, concept, and principles, Philosophy of C.D.	**3** 1 1 1	Power point presentations / Lectures
Module IV: • Rural Leadership: concept and definition, types of leaders in rural context; Method of identification of Rural Leader. • Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programs. • Transfer of technology: concept and models, capacity building of extension personnel.	**3** 1 1 1	Power point presentations / Lectures
Module V: • Extension Teaching Methods: meaning, classification, individual, group, and mass contact methods, ICT Applications in TOT (New and social media). media mix strategies. • Communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication, Agriculture Journalism • Diffusion and Adoption of Innovation: Concept and meaning, process and stages of adoption, adopter categories, attributes of Innovation.	**3** 1 1 1	Power point presentations / Lectures

Learning Resources	
1.	Adivi Reddy, A. 2001. Extension Education, Sree Lakshmi Press, Bapatla.
2.	Dahama, O. P. and Bhatnagar, O.P. 1998. Education and Communication for Development, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.
3.	Jalihal, K. A. and Veerabhadraiah, V. 2007. Fundamentals of Extension Education and Management in Extension, Concept Publishing Company, New Delhi.
4.	Muthaiah Manoraharan, P. and Arunachalam, R., Agricultural Extension, Himalaya Publishing House (Mumbai).
5.	Sagar Mondal and Ray, G. L., Textbook on Rural Development, Entrepreneurship and Communication Skills, Kalyani Publications.
6.	Rathore, O. S. et al. 2012. Handbook of Extension Education, Agrotech Publishing Academy, Udaipur.
7.	Dudhani, C.M., Hirevenkatgoudar, L.V., Manjunath, L., Hanchinal, S.N. and Patil, S.L. 2004. Extension Teaching Methods and Communication Technology, UAS, Dharwad.
8.	Sandhu, A.S. 1993. Textbook on Agricultural Communication: Process and Methods. Oxford and IBH Publishing Pvt. Ltd, New Delhi.
9.	Singh, A.K., Lakhan Singh, R., and Roy Burman. 2006. Dimensions of Agricultural Extension. Aman Publishing House, Meerut.

FUNDAMENTALS OF NEMATOLOGY

Credits: 1 **Semester: III**

Subject Code: AG26305 **No. of lecture hours: 15**

Objective:

- To impart knowledge to the students on plant parasitic nematodes, morphology, biology, host parasitic relationship of nematodes.
- To impart knowledge on nematode pests of different crops and their management

COURSE OUTCOMES:

1. To get acquainted with history, general characteristics of plant parasitic nematodes and their economic importance
2. To acquaint the students with morphology, taxonomy, classification of plant parasitic nematodes
3. To impart knowledge on biology and symptomatology of different plant parasitic nematodes
4. To study the different plant parasitic nematodes affecting fruit, vegetable, ornamental, spice and plantation crops
5. To get acquainted with nematode disease interactions and integrated nematode management

Course Content	Hours Allotted	Pedagogy
Module-I • Introduction to Phyto nematology • History of Phyto nematology and study about the habitat and diversity of Nematodes • Economic importance of Nematodes	**3** **1** **1** **1**	Power point presentations / Lectures
Module-II • General characteristics of plant parasitic nematodes • Nematode: definition, general morphology and Biology • Classification of nematodes up to family level	3 1 1 **1**	Power point presentations / Lectures
Module-III • Important plant parasitic nematodes • Classification of nematodes on the basis of feeding/ parasitic habits. • Symptoms Caused by Nematodes (symptomology)	**3** **1** **1** **1**	Power point presentations / Lectures

Module-IV • Role of nematodes in disease development • Nematode pests of crops rice • Nematode Pests of Vegetable Crops	3 **1** **1** **1**	Power point presentations / Lectures
Module-V • Nematodes of pulses and oilseed crops • Nematode pests of fruit and plantation crops • Different methods of nematode management and INM	3 1 1 1	Power point presentations / Lectures

Learning Resources	
1	J.M. Webster 1972. Economic Nematology, Academic Press, New York
2	Zukerman, Mai, Rohde 2012. Plant Parasitic Nematodes (Vol-1), Academic Press, New York
3	R.K. Walia and H.K. Bajaj 2014. Textbook on Introductory Plant Nematology, IARI, NEW DELHI
4	Gopal Swarup, D. R. Dasgupta, P. K. Koshy 2025 Plant Parasitic Nematodes of India: Problems and Progress, IARI, NEW DELHI

FARM POWER AND MACHINERY

Credits: 1 **Semester: III**

Subject code: AG26306 **No of Lecture Hours: 15**

Course Objective:

To enable the students to understand the need of farm power, basic principles and parts of IC engine, different tillage, sowing, intercultural, plant protection equipment, working principles of threshers, harvesting of field and horticultural crops.

Course Outcome: At the end of the course, the students will be able to

CO1: To understand the role of mechanization, sources of farm power, and engine systems in improving agricultural productivity, efficiency, and sustainability, especially in the Indian farming context.

CO2: To gain a clear understanding of the different systems, working principles, and main components of I.C. engines, enabling them to identify, operate, and maintain engines used in agricultural machinery.

CO3: To understand the use of bio-diesel and bio-ethanol as alternative fuels and gain familiarity with tractors, tillage implements, and energy-efficient tools used in natural and sustainable farming systems**.**

CO4: To become familiar with ergonomically improved hand tools, plant protection equipment, and threshing and shelling machinery, enabling efficient, safe, and drudgery-reducing farm operations.

CO5: To gain knowledge of animal-drawn farm equipment, seed drills, planters, cultivators, and indigenous technical knowledge (ITKs) in farm tools, promoting cost-effective and locally adaptable farming practices

Course Content	Hours Allotted	Pedagogy
Module-I • Mechanization in agriculture: its potential and prospects, • Sources of farm power, Draught animal power and its relevance to Indian Agriculture • Familiarization with different engine systems	**(3)** 1 1 1	Power point presentations / Lectures
Module-II • Familiarization with different systems of I.C. engines • Working principles of I C engines, • Components of IC engine,	**(3)** 1 1 1	Power point presentations / Lectures

Module-III • Use of bio- diesel/bio-ethanol as alternative fuel for engines • Familiarization with tractor, Introduction to primary and secondary tillage equipment, • Energy efficient improved tools and equipment's in natural farming: Introduction to rotavator, planter, vegetable transplanter, bed former, disk harrow, mulch laying equipment	**(3)** 1 1 1	Power point presentations / Lectures
Module-IV • Ergonomically improved hand tools for intercultural operations: wheel hoe, long handle hoe, garden tools, labour saving/drudgery reducing tools • Plant protection equipment: knapsack sprayer, power sprayer • Threshing and shelling machinery	**(3)** 1 1 1	Power point presentations / Lectures
Module-V • Animal drawn farm equipment/tools: Animal drawn bund former • Seed drill, Planters, cultivator • ITK in farm machinery, ITKs on farm tools	**(3)** 1 1 1	Power point presentations / Lectures

Learning Resources	
1	Akshay Krishi Parivar (2022). Bhumi Suposhan-Commemorative Publication of the Nationwide Bhumi Suposhan and Samrakshan Abhiyan. AKP Publication No.11. pp212.
2	Dakshinkar N.P. and M. Singh, (2022). Draught Animal Power and its relevance to Indian Agriculture. In: Bhumi Suposhan, Akshay Krishi Parivar. pp 80-87.
3	Das, P., Das, S.K., Arya, H.P.S., Reddy, G. Subba, Mishra, A. and others: Inventory of Indigenous Technical Knowledge in Agriculture: Mission Mode Project on Collection, Documentation and Validation of Indigenous Technical Knowledge, Document 1 to 7, Indian Council of Agricultural Research, New Delhi.
4	Peshwe D.R., Ram Kumar Sing, K.A. Deshmukh and S. Chopra. 2018. Advances and Research in Agricultural Tools. Publ: MME Publishing House Nagpur.
5	Pimental D. (1980). Handbook of Energy Utilization in Agriculture, CRC
6	Rahudkar WB (2007). Ancient Agricultural Implements. Nene YL. ed. Glimpses of the Agricultural Heritage of India. Asian Agri-History Foundation. pp. 389-396.
7	Rathore NS, Joshi S and Choudhary N (2022). Digital Technologies for Agriculture, NIPA Genx Electronic, Recourses and Solutions Pvt. Ltd.
8	Sahay J (2006). Elements of Agricultural Engineering, Standard Publishers Distributers, New Delhi.
9	Sangwan Satpal. (2007). Level of Agricultural Technology in India (1757- 1857). Nene YL. ed. Glimpses of the Agricultural Heritage of India. Asian Agri-History Foundation.pp.397-413.
10	Tillage and Interculture Management/Farm Implements. In: Inventory of Indigenous Technical Knowledge inAgricultureDocument1;Document2;Document 2 (Supplement 1 & 2); Document 3; Publ: ICAR New Delhi.

AGRICULTURAL INFORMATICS AND ARTIFICIAL INTELLIGENCE

Credits: 2 **Semester: III**

Subject Code: AG26307 **No. of Lecture Hours: 30**

Objective: To introduce agricultural students to basic computer concepts, hardware components, memory, and operating systems.

Course Outcomes: After completion of the course, students will be able to

CO1: Explain the basic components of computer systems, memory types, and operating system functions.

CO2: Create, edit, and present agricultural data using MS Word, Excel, PowerPoint, and Access.

CO3: Use Internet and online agricultural portals to access information and digital services.

CO4: Apply ICT tools, E-Agriculture solutions, and mobile applications for farm advisory and agri-management.

CO5: Describe fundamental AI concepts, intelligent agents, and AI applications relevant to agriculture.

Course Content	Hours Allotted	Pedagogy
Module-I • Definition of Computer-Advantages and Disadvantages, Anatomy of Computers • Input and Output Devices, Memory- Primary, Secondary, cache memory • Operating Systems and its types, Windows OS – Features – Desktop – Icons etc • Ms-office, MS-word-creating, editing, saving and formatting a new document	6 1 2 2 1	Power point presentations / Lectures
Module-II • MS Word - Features of good word processor • Mail merge – Drop cap- Auto text Track changes – Equation editor etc. • MS- Excel - Data presentation, Tabulation – Merging of cells and graph creation - Mathematical expressions • MS- Excel - Data analysis tool pack – Pivot table and graph etc.	6 1 2 2 1	Power point presentations / Lectures
Module-III • MS Access – Database - concepts and types • MS Access - creating database • Database Concepts, Types of Databases	6 1 1 1	Power point presentations /

• Uses of DBMS in agriculture. • Internet and World Wide Web (WWW) – Concepts – Components	1 2	Lectures
Module-IV • Programming languages: Concepts and standard input/output operations • E-Agriculture - Concepts and applications, • Use of information and communication technologies in Agriculture. • IT application - Computer controlled devices (automated systems) for Agri-input management • Smartphone mobile apps in Agriculture for farm advises - Market price - Postharvest management etc,	6 2 1 1 1 2	Power point presentations / Lectures
Module-V • Introduction to Artificial Intelligence: Definition, history and applications • Intelligent Agents: Concept of agent, types of agent • Types of AI: Narrow AI, General AI, Strong AI vs Weak AI • Turing Test	6 1 2 2 1	Power point presentations / Lectures

Learning Resources	
1	Pradeep K. Sinha and Priti Sinha. 2014. *Computer Fundamentals*. 6th Edition. New Delhi: BPB Publications
2	Joan Lambert. 2016. *Microsoft Office 2016 Step by Step*. New Delhi: Microsoft Press
3	*Information Technology for Agriculture*. 2018. New Delhi: Indian Council of Agricultural Research
4	Ela Kumar, *Artificial Intelligence*, I.K. International Publishing House

PRINCIPLES OF ORGANIC FARMING (GE)
PRACTICALS

Credits: 1 **Semester: III**
Subject Code: G19AG1P **No. of lecture hours: 30**

Objective: To experience practically the constraints in Organic crop production by raising a crop in the field.

Outcome: Students will be able to learn preparation of Plant protection formulations

1. Identification of manures and bio-fertilizers
2. Preparation of FYM
3. Preparation of Compost
4. Preparation of Vermicompost
5. Application of Biofertilizers
6. Preparation of Jeevamrutham and its application
7. Plant protection in organic farming - botanical pesticides-
8. Preparation of Beejamrutham
9. Preparation of Panchagavya and its application
10. Preparation of Neemastram and its application
11. Preparation of Brahmastram and its application
12. Organic cultivation of crops – Cereals, Millets, Pulses and Vegetables.
13. Cost of organic cultivation of crops
14. Certification of organic produce- need of certification, procedure, quality standards.

CROP PRODUCTION TECHNOLOGY -1 (KHARIF CROPS) PRACTICALS

Credits: 1 **Semester: III**

Subject Code: AG26308 **No. of lecture hours: 30**

Objective: To experience practically the constraints in crop production by raising a crop in the field.

Outcome: Students will be able to learn various crop production techniques starting from land preparation to harvest**.**

1. Identification of crops, crop seeds and forage crops.
2-3 Allotment of individual fields for land preparation and sowing crops.
4. Calculation of seed rate and fertilizer requirements.
5. Rhizobium inoculation and seed treatment.
6. Thinning, Weeding, Gap filling, and recording the germination Percentage.
7. Identification and management of weeds.
8. Recording the biometric observations.
9-10. Methods of raising rice nurseries.
11. Study of agronomic characters of rice varieties.
12. Study of agronomic characters of Sorghum and maize varieties and millet crop varieties.
13. Study of agronomic characters of pulse crop varieties.
14-15. Harvesting of crop in individual fields and recording yield.

PRODUCTION TECHNOLOGY OF FRUITS AND PLANTATION CROPS

PRACTICALS

Credits: 1 **Semester: III**
Subject Code: AG26309 **No. of lecture hours: 30**

Course Objective: To prepare students with practical knowledge of identification, propagation, nutrition, and management practices of major fruit and plantation crops.

Course Outcome: Students will be able to identify important varieties, perform propagation techniques, recognize physiological disorders and pests, and understand commercial production practices of fruit and plantation crops.

1. Description and Identification of fruits
2. Description and Identification of Plantation crops
3. Identification and description of varieties of mango, banana and citrus
4. Identification and description of varieties of guava, papaya and sapota
5. Identification and description of varieties of grapes, pomegranate and jackfruit
6. Identification and description of varieties of plantation crops
7. Propagation methods of fruits crops
8. Micro propagation, protocol for mass multiplication and hardening of fruit crops
9. Propagation methods of plantation crops
10. Fertilizer application of fruits and plantation crops
11. Preparation and application of plant growth regulators
12. Physiological disorders of fruit crops
13. Physiological disorders of plantation crops
14. Visit to commercial orchard industries
15. Visit to commercial plantation industries

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PRINCIPLES OF GENETICS
PRACTICALS

Credits: 1 **Semester: III**
Subject Code: AG26310 **No. of practical hours: 30**

Objective: To gain practical knowledge on cell organelles, Mendelian inheritance, gene interactions and chi-square (c^2) analysis.

Outcome: Students will be able to apply chi-square (c^2) test for testing the fitness of data, construct linkage maps based on test cross data.

1. Study of Microscope and cell structure
2. Study of cell organelles
3. Study of cell organelles
3. Experiments on Monohybrid.
4. Experiments on di-hybrid ratio.
5. Test cross, back cross,
6. Experiments on gene interactions (monohybrid).
7. Experiments on gene interactions (di-hybrid)
8. Experiments on epistatic gene interactions
9. Experiments on probability.
10. Experiments on Chi-square test.
11. Determination of Linkage and cross-over analysis through 2-point test cross data.
12. Determination of Linkage and cross-over analysis through 3-point test cross data.
13. Sex-linked inheritance in Drosophila
14. Study of models on DNAstructure
15. Study of models on RNAstructure

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FUNDAMENTALS OF EXTENSION EDUCATION

PRACTICALS

Credits: 1 **Semester: III**
Subject Code: AG26311 **No. of Practical Hours: 30**

Objective:

At the end of this practical course, students will be able to understand the university extension system and rural development institutions, effectively communicate agricultural and rural development messages using group methods, audio-visual aids, extension literature, and mass media, and apply participatory approaches to identify rural leaders and analyze village-level problems for sustainable development.

Practical

1. To get acquainted with the university extension system.

2 & 3. Group discussion – exercise

4. Identification of rural leaders in a village situation

5. Preparation and use of av aids, preparation of extension literature (leaflet, booklet, folder, pamphlet, news stories, and success stories)

6. Presentation skills exercise.

7. Micro teaching exercise

8. A visit to the village to understand the problems being encountered by the villagers/ farmers.

9. To study the organization and functioning of DRDA/PRI and other development departments at the district level.

10. Visit to NGO/FO/FPO and learning from their experience in rural development.

11. Understanding PRA techniques and their application in village development planning

12 & 13. Exposure to mass media: a visit to a community radio station and a television studio to understand the process of programme production.

14 & 15. Script writing, writing for print and electronic media, and developing scripts for radio and television.

FUNDAMENTALS OF NEMATOLOGY

PRACTICALS

Credits : 1 **Semester: III**

Subject Code : AG26312 **No. of practical hours: 30**

Objective: To isolate nematodes from different sources and to maintain pure cultures in the laboratory.

Outcome: Students will be able to isolate plant parasitic nematodes and their symptoms will be observed.

1. Importance of nematode pests of crops
2. Different sampling methods for collection of soil/root samples for estimating nematode population
3. Collection of soil and plant samples for estimation of nematode population
4. Extraction of nematodes from soil and plant tissue following Cobb's sieving and decanting method
5. Extraction of nematodes from soil and plant tissue following Baermann's funnel method
6. Picking and counting of plant parasitic nematodes
7. Identification of economically important plant nematodes up to generic level with the help of keys
8. Identification of root knot nematode, *Meloidogyne* cyst nematode, *Heterodera* and *Globodera* lesion nematode, *Pratylenchus,* citrus nematode, *Tylenchulus,* dagger nematode *Xiphenima* and spiral nematode, *Helicotylenchus etc*
9. Study of above ground symptoms caused by important nematode pests
10. Study of below ground symptoms caused by important nematode pests
11. Study of symptoms caused by nematode pests of cereals and pulses
12. Study of symptoms caused by nematode pests of vegetables
13. Study of symptoms caused by nematode pests of fruits and plantation crops *etc.*
14. Methods of application of nematicides and organic amendments
15. Integrated nematode management and visit to nematology laboratory/NIPHM

FARM POWER AND MACHINERY
PRACTICALS

Credits : 1 **Semester: III**
Subject code : AG26313 **No. of lecture hours: 30**

1. Study of different engine systems
2. Study of the different components of IC engines
3. Familiarization with tractor

4,5. Familiarization with tools and equipment for input production in field with tractor drawn primary and secondary tillage implements,

6. Familiarization with animal drawn primary and secondary tillage implements
7. Familiarization with tractor drawn seed -cum- fertilizer drills their seed metering mechanism and calibration
8. Familiarization with animal drawn seed-cum-fertilizer drills their seed metering mechanism and calibration
9. Familiarization with planters
10. Familiarization with transplanters
11. Familiarization with different inter-cultivation equipment
12. Familiarization with different types of sprayers
13. Familiarization with different types of dusters
14. Familiarization with harvesting machinery
15. Familiarization with threshing machinery.

AGRICULTURAL INFORMATICS AND ARTIFICIAL INTELLIGENCE PRACTICALS

Credits: 1 **Semester: III**

Subject Code: AG26314 **No. of Lecture Hours: 30**

1. Introduction to Computer System-Identifying parts of a computer (CPU, monitor, keyboard, mouse), Switching ON/OFF safely, Understanding desktop, icons, taskbar
2. Working with Windows Operating System-Creating, renaming, deleting files and folders, Copy, move, and search files
3. Input, Output & Memory Devices - Using keyboard shortcuts, Connecting USB devices (pen drive, printer – demo)
4. MS Word -Creating, saving, opening documents, Font styles, paragraph formatting, page setup
5. Advanced MS Word -Tables, images, headers & footers, Equation editor (basic equations)
6. MS Excel-Creating worksheets Formulas, Functions & Charts, Data Analysis Tools-Sorting and filtering data, Pivot table and pivot chart (simple dataset)
7. Creating a table - Merging of cells - columns and row width - Formats etc.
8. MS- Excel - Creating a spreadsheet - Alignment of rows - columns and cells using format tool bar.
9. Entering formula expression through formula tool bar and use of in-built functions Sum – Average – Stdev –Maximum and minimum.
10. MS- Power Point - Creating slides, Design, Animations, Transitions, Slide Show, SmartArt *etc.*
11. Database & Internet Applications-Creating a simple database, Creating tables (farmer details, crop records),Data entry and viewing records
12. Internet & WWW-Using web browsers, searching agricultural information, accessing government agriculture portals, Internet concepts - Creating Email - Search Engines
13. Text Generation Tools: Prompt Engineering
14. AI Tools- ChatGPT, Google Gemini
15. Perplexity
16. AI-Generated images for photo creation-bing images
17. Gemini Canvas

ORGANIC PRODUCTION TECHNOLOGY
PRACTICALS

Credits : 2 **Semester: III**
Subject code : AG26315 **No. of lecture hours: 60**

1. Prepare **vermicompost** and explain the procedure.
2. Preparation of **Jeevamrit / Panchagavya / Beejamrit**.
3. Preparation of **Neem Seed Kernel Extract (NSKE)**.
4. Preparation of enriched compost.
5. Field preparation and layout
6. Indigenous technological knowledge (ITK) for weed management
7. Preparation of Neemastra and Brahmastra
8. Indigenous technological knowledge (ITK) for disease management
9. Quality aspect, grading, packaging and handling of organic produce
10. Preparation of Amritpani
11. Multiplication of Blue Green Algae (BGA)
12. Seed inoculation with bio-fertilizer.
13. Multiplication of Azolla
14. Quality analysis of compost and vermicompost
15. Seed treatment and sowing

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE
B.Sc. (Hons.) AGRICULTURE
FOURTH SEMESTER
ACADEMICYEAR-2026-27 OF 2025-29 BATCH (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours /week	Duration of Exam (hr)	Marks			Credits
						Internal	External	Total	
THEORY									
1	I	AG26401	Entrepreneurship development and Business communication (core-19)	2	3	40	60	100	2
2	II	AG26402	Crop ProductionTechnology-2 (Rabi crops) (core-20)	2	3	40	60	100	2
3	II	AG26403	Production Technology of vegetables and spices (core-21)	2	3	40	60	100	2
4	II	AG26404	Principles of Agricultural Economics and Farm Management (core-22)	2	3	40	60	100	2
5	II	AG26405	Principles and practices of Natural Farming (core-23)	1	3	40	60	100	1
6	II	AG26406	Water management (core-24)	1	3	40	60	100	1
7	II	AG26407	Problematic soils and their management (core-25)	1	3	40	60	100	1
8	II	AG26408	Basics of plant breeding (core-26)	2	3	40	60	100	2
PRACTICALS									
9	II	AG26409	Entrepreneurship development and Business communication (core-19)	2	3	40	60	100	1
10	II	AG26410	Crop ProductionTechnology-2 (Rabi crops) (core-20)	2	3	40	60	100	1
11	II	AG26411	Production Technology of vegetables and spices (core-21)	2	3	40	60	100	1
12	II	AG26412	Principles and practices of natural Farming (core-23)	2	3	40	60	100	1
13	II	AG26413	Water management (core-24)	2	3	40	60	100	1
14	II	AG26414	Problematic soils and their management (core-25)	2	3	40	60	100	1
15	II	AG26415	Basics of plant breeding (core-26)	2	3	40	60	100	1
16	II	AG26416	Protected cultivation (SEC-6)	4	3	40	60	100	2
Total				**31**		640	960	1600	**22**

ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION

Credits : 2 **Semester: IV**
Subject Code: AG26401 **No. of Lecture Hours: 30**

Course Objective:
To provide students with a basic understanding of entrepreneurship and equip them with the knowledge and skills needed to establish, manage, and develop financially viable agribusiness ventures.

Course outcomes: At the end of this course, students will learn to

CO1: Understand key concepts and processes of entrepreneurship and business development.
CO2: Know the processes of differences between small and large firms and the economic environment.
CO3: Analyze the Govt policies, programs, and schemes for the establishment of enterprises.
CO4: Gain knowledge on the establishment of Micro, Small & Medium Enterprises.
CO5: Improve their communication and managerial skills in managing enterprises.

Course Content	Hours Allotted	Pedagogy
Module I: • Development of entrepreneurship, motivational factors, social factors, and environmental factors. • Characteristics of entrepreneurs. • Entrepreneurial attributes/competencies. • Concept, need for and importance of entrepreneurial development. • Evolution of entrepreneurship, objectives of entrepreneurial activities, types of entrepreneurs. • Functions of entrepreneurs, and the process of entrepreneurship development.	6 Hrs 1 1 1 1 1 1	Power point presentations / Lectures
Module II: • Environment scanning and opportunity identification need for scanning: spotting of opportunity. • Scanning of the environment. • Identification of product/service: starting a project. • factors influencing sensing the opportunities. • Infrastructure and support systems: good policies. • Schemes for entrepreneurship development.	6 Hrs 1 1 1 1 1 1	Power point presentations / Lectures
Module III: • Role of financial institutions and other agencies in entrepreneurship development. • Steps involved in the functioning of an enterprise. • Selection of the product/services, selection of the form of ownership. • Registration, selection of the site, and capital sources. • Acquisition of manufacturing know-how, • Packaging and distribution.	**6 Hrs** 1 1 1 1 1	Power point presentations / Lectures

	1	
Module IV: • Planning of an enterprise, project identification, selection, and formulation of a project. • Project report preparation and Enterprise Management. • Production management: product, levels of products, product mix. • Quality control, cost of production, production controls. • Material management. raw material costing, inventory control. • Personal management: manpower planning, labour turnover, wages/salaries.	**6 Hrs** 1 1 1 1 1 1	Power point presentations / Lectures
Module V: • Financial management/accounting: funds, fixed capital, and working capital, • Costing and pricing, long-term planning and short-term planning, • bookkeeping, journal, ledger, subsidiary books, • Annual financial statement, taxation. • Marketing management: market, types, marketing assistance, market strategies. • Crisis management: raw material, production, leadership, market, finance, natural, etc.	**6 Hrs** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources:	
1.	Charantimath, P.M. 2009, Entrepreneurship Development and Small Business Enterprises. Pearson Publications, New Delhi.
2.	Desai, V. 2015, Entrepreneurship: Development and Management, Himalaya Publishing House.
3.	Gupta, C.B. 2001. Management Theory and Practice. Sultan Chand & Sons.
4.	Indu Grover. 2008. Handbook on Empowerment and Entrepreneurship. Agrotech Public Academy.
5.	Khanka, S.S. 1999. Entrepreneurial Development. S. Chand & Co.
6.	Mehra, P. 2016, Business Communication for Managers. Pearson India, New Delhi.
7.	Pandey, M. and Tewari, D. 2010, The Agribusiness Book. IBDC Publishers, Lucknow. Singh, D. 1995. Effective Managerial Leadership. Deep & Deep Publ.
8.	Singhal, R.K. 2013, Entrepreneurship Development & Management, Katson Books.
9.	Tripathi, P.C. and Reddy, P.N. 1991. Principles of Management. Tata McGraw-Hill.
10.	Vasant Desai, 1997. Small-Scale Industries and Entrepreneurship. Himalaya Publ. House

CROP PRODUCTION TECHNOLOGY-II (*RABI CROPS*)

Credit : 2 **Semester: IV**

Subject code : AG26402 **No. of lecture hours: 30**

Objective: To impart knowledge on crop production techniques from sowing to harvest and to get knowledge about the soils and climatic requirements and various cropping systems

Outcome: Students will be able to gain knowledge on various crop production techniques from sowing to harvest.

Course Outcomes:

CO1: Elaborate production technology of oil seed crops

CO2: Demonstrate Raising of crop production techniques from sowing to harvest for various cereal crops

CO3: Explains various crop production techniques from sowing to harvest for various legume crops

CO4: Explains various crop production techniques from sowing to harvest for fibre crops

CO5: Illustrate Production techniques from sowing to harvest for commercial crops

Course Content	Hours Allotted	Pedagogy
Module I: • Agronomy of Groundnut • Agronomy of Sunflower • Agronomy of Safflower • Agronomy of Rapeseed and Mustard • Agronomy of Linseed and Niger	6 1 1 1 1 2	Power point presentations / Lectures
Module II: • Agronomy of Wheat • Agronomy of Barley • Agronomy of Oats • Agronomy of Quinoa	6 2 2 1 1	Power point presentations / Lectures
Module III: • Agronomy of Chickpea • Agronomy of Rabi Redgram • Agronomy of Lentil • Agronomy of Peas • Agronomy of Rajmah • Agronomy of Berseem & Lucerne	**6** 1 1 1 1 1 1	Power point presentations / Lectures
Module IV: • Agronomy of Mesta – retting - fiber extraction – fiber	6	Power point presentations /

quality characters • Agronomy of Sunhemp • Agronomy of Agave – retting- fiber extraction • Agronomy of Tobacco. • Tobacco – methods of curing – quality characters	1 1 1 2 1	Lectures
Module V: • Agronomy of sugarcane • Sugarcane - ratoon crop management – Jaggery making • Agronomy of Sugar beet. • Agronomy of Potato	6 2 2 1 1	Power point presentations / Lectures

Learning Resources	
1	Rao, I.S. 1964. Crop Husbandry. Bapatla, Andhra Pradesh: Sri Lakshmi Press
2	Chidda Singh.1983. Modern Techniques of Raising Field Crops. New Delhi: Oxford and IBH Publishing Co
3	Rajendra Prasad (Tech.Editor). 2002. Text Book of Field Crops Production. New Delhi: ICAR.
4	Singh, S.S. 1988. Crop Management. Ludhiana: Kalyani Publishers
5	Reddy, S.R. 2004. Agronomy of Field Crops. Ludhiana: Kalyani Publishers.
6	Singh, N.P. and Singh, R.A. 2002. Scientific Crop Production. Ludhiana: Kalyani Publishers
7	Yadav, R.L. 1993. Agronomy of Sugarcane - Principles and Practices. Lucknow: International Book Distribution Co

PRODUCTION TECHNOLOGY OF VEGETABLES AND SPICES

Credits: 1 **Semester: IV**
Subject Code: AG26403 **No. of lecture hours: 15**

Course Objective: To educate about different forms of classification of vegetables, to impart knowledge about origin, area, climate, soil, improved varieties, cultivation practices and physiological disorders of vegetables and spices.

Course outcomes:

CO1: Describe various production techniques in Solanaceous vegetables

CO2: Apply various cultural operations to produce cruciferous and leguminous vegetables

CO3: Explain different cultivation practices in Cole, bulb and root crops

CO4: Demonstrate production practices in tuber crops, leafy vegetables and perennial vegetables

CO5: Explain different cultivation practices in spice crops.

Course Content	Hours Allotted	Pedagogy
Module I: Importance of vegetables in human nutrition and national economy-Types of vegetable gardens. Origin, climate, soil, improved varieties, cultivation practices, such as time of sowing/nursery raising, transplanting, method of planting, season of planting, distance of planting, fertilizer requirements, irrigation, weed management, harvesting, yield and physiological disorders of **Tomato, Brinjal, Chilli, Capsicum and Okra**	**3**	Power point presentations / Lectures
Module II: Origin, climate, soil, improved varieties, cultivation practices, such as time of sowing/nursery raising, transplanting, method of planting, season of planting, distance of planting, fertilizer requirements, irrigation, weed management, harvesting, yield and physiological disorders of **Cucumber, Gourds, Melons, Pumpkin and Cole crops such as Cabbage, Cauliflower, Knol khol**.	**3**	Power point presentations / Lectures
Module III: Origin, climate, soil, improved varieties, cultivation practices, such as time of sowing/nursery raising, transplanting, method of planting, season of planting, distance of planting, fertilizer requirements, irrigation, weed management, harvesting, yield and physiological disorders of **Beans** – French bean, Dolichos bean	**3**	Power point presentations / Lectures

and Cluster bean – **Peas**- Green peas, Cowpea **Bulb crops** - Onion and Garlic **Root crops** – Carrot, Radish, Beetroot		
Module IV: Origin, climate, soil, improved varieties, cultivation practices, such as time of sowing/nursery raising, transplanting, method of planting, season of planting, distance of planting, fertilizer requirements, irrigation, weed management, harvesting, yield and physiological disorders of **Tuber crops** – Potato – Sweet potato-Colocasia - Cassava **Leafy vegetables** – Amaranthus-Basella- Palak **Perennial vegetables** – Moringa, Coccinia	**3**	Power point presentations / Lectures
Module V: Origin and distribution - importance –Botany -Plant part used – varieties – propagation – climate – soil, preparation of land – systems of planting –Planting seasons – seed rate – spacing – sowing – mulching irrigation – manuring – intercultural operations – provision of shade – intercropping –rotations – harvesting – processing – preservation of seed material of **Spice crops** like Black pepper, Cardamom, Turmeric, Ginger, Cumin, Coriander, Fenugreek, Fennel, Clove, Nutmeg, Cinnamon, Curry leaf, Tamarind and Herbal spices (Basil, Mint, Rosemary, Thyme and Oregano)	**3**	Power point presentations / Lectures

Learning Resources	
1	S. Thamburaj and Narendra Singh 2018. Vegetables Tuber crops and Spices by
2	J.Kabir, T.K.Bose, M.G.Som Vegetable crops
3	N. Kumar Introduction to Spices, Plantation crops, Medicinal and Aromatic Plants
4	M.S. Fragaria, B.R. Chowdhury, R.S. Dhaka Vegetable crops (Production technology, Vol II)
5	K.P. Singh, Anant Bahadur OLERICULTURE, Fundamentals of Vegetable Production (Vol.1)
6	K.G. Shanmugavelu, N. Kumar and K.V. Peter Production Technology of Spices and Plantation Crops -

PRINCIPLES OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT

Credits: 2 **Semester IV**

Subject Code: AG26404 **No. of lecture hours: 30**

Course Objective: To make sure the students about broad areas covered under agricultural Economics and farm Management and knowledge on judicious use of resources for optimum production

Course Outcome:

C01 : Students will understand the principles of agricultural economics

C02 : Students will understand micro economic concepts

C03 : Students will understand farm management with focus on efficient use of resources.

C04 : Students will understand macro-economic concepts

C05 : They will be able to apply economic concepts to farm decision-making for achieving optimum and sustainable production.

Course Content	Hours Allotted	Pedagogy
Module I • Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis. • Micro- and macro-economics, positive and normative analysis. Nature of economic theory. • Rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. • Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. • Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. • Agricultural planning and development in the country	**6** 1 1 1 1 1 1	Power point presentations / Lectures
Module II: • Demand: meaning, law of demand, demand schedule and demand curve, determinants, utility theory. • Law of diminishing marginal utility, Equi-marginal utility principle. • Consumer's equilibrium and derivation of demand curve • Concept of consumer surplus. • Elasticity of demand: concept and measurement • Price elasticity, income elasticity and cross elasticity	6 1 1 1 1 1 1	Power point presentations / Lectures

Module III: • Production: process, creation of utility, factors of production, input output relationship • Laws of returns: Law of variable proportions and law of returns to scale. • Cost: Cost concepts, short run and long run cost curves. • Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply. • Distribution theory: meaning, factor market and pricing of factors of production. • Concepts of rent, wage, interest and profit	**6** 1 1 1 1 1 1	Power point presentations / Lectures
Module IV: • National income: Meaning and importance, circular flow • Concepts of national income accounting and approaches to measurement • Difficulties in Measuring NI • Population: Importance, Malthusian and Optimum population theories • Natural and socio-economic determinants • Current policies and programs on population control	**6** 1 1 1 1 1 1	Power point presentations / Lectures
Module V: • Money: Barter system of exchange and its problems, evolution, meaning and functions of money, • Classification of money, money supply, general price index, inflation and deflation. • Economic systems: Concepts of economy and its functions, • Important features of capitalistic, socialistic and mixed economies • Elements of economic planning. Forms of business organizations, international trade and balance of payments. • GST and its implication on Indian economy	**6** 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1	**Agricultural Economics**, II Edition by S. Subbareddy, Raghuram, T.V. NeelakantaSastry, I. Bhavani Devi (Oxford and IBH Publications)
2	Dewett, K.K. and Varma, J.D. 1986. **Elementary Economics**. S. Chand and Co., New Delhi
3	Dewett, K.K. and Chand, A. 1979. **Modern Economic Theory**. S. Chand and Co., New Delhi
4	Jhingan, M.L. 1990. **Advanced Economic Theory**. Vikas Publishing House, New Delhi.

PRINCIPLES AND PRACTICES OF NATURAL FARMING

Credits:1 **Semester: IV**

Subject Code: AG26405 **No. of lecture hours:15**

Objective:

- To provide comprehensive understanding and knowledge to students about natural farming.
- To teach students the concept, need and principles of native ecology-based production under natural farming.
- To impart practical knowledge of natural farming and related agricultural practices in Indian and global environmental and economic perspectives.

Outcome: Students will be able to gain knowledge on farming and various concepts of livelihood, various farming system in agro-climatic zones, agricultural organizations in India.

Course Outcomes:

CO1: Understand the concept, principles, and historical background of natural farming and its relevance to climate resilience, soil health, biodiversity, and SDGs

CO2: Analyze the ecological and economic design of natural farms including cropping systems, biodiversity, ecological engineering, and ecosystem services.

CO3: Demonstrate knowledge of nutrient, pest, disease, and weed management practices using natural, farm-based, and indigenous inputs.

CO4: Evaluate the market potential, certification standards, and government/NGO initiatives supporting natural and chemical-free agriculture

CO5: Apply practical skills in preparing on-farm inputs, managing natural farming operations, and conducting ecosystem and financial budgeting of natural farming systems.

Course Content	Hours Allotted	Pedagogy
Module I: • Indian Heritage of Ancient Agriculture, History of Natural Farming, Importance of natural farming in view of climate change, soil health • Water use carbon sequestration, biodiversity conservation, food security and nutritional security and sustainable development goals (SDGs • Concept of natural farming; Definition of natural farming; Objective of natural farming	**3** **1** **1** **1**	Power point presentations / Lectures
Module II: • Essential characteristics and Principles of natural farming; Scope and importance of natural farming. • Main Pillars of natural farming; Methods/ types/schools of natural farming. • Characteristics and design of a natural farm, Concept of	3 **1** **1**	Power point presentations / Lectures

ecological balance, ecological engineering and community responsibility in natural versus other farming systems.	**1**	
Module III: • Introduction to concept of ecological, water, carbon and nitrogen foot prints • Concept and evaluation of ecosystem services, Integration of crops, trees and animals, cropping system approaches • Biodiversity, indigenous seed production, farm waste recycling, water conservation	**3** **1** **1** **1**	Power point presentations / Lectures
Module IV: • Renewable energy use approaches on a natural farm, Rearing practices for animals under natural farming nutrient management in natural farming and their sources, Insect, pest, disease and weed management under natural farming. • Mechanization in natural farming, Processing, labelling, economic considerations and viability, certification and standards in natural farming • Marketing and export potential of natural farming produce and products.Initiatives taken by Government (central/state), NGOs and other organizations for promotion of natural farming	3 1 1 **1**	Power point presentations / Lectures
Module V: • Marketing and export potential of natural farming produce and products., • Initiatives taken by Government (central/state), NGOs and other organizations for promotion of natural farming • Case studies and success stories in natural farming and chemical free traditional farming, Entrepreneurship opportunities in natural farming	3 1 1 1	Power point presentations / Lectures

Learning Resources	
1	Ayachit, S.M. 2002. Kashyapi Krishi Sukti (A Treatise on Agriculture by Kashyapa). Brig Sayeed Road, Secunderabad, Telangana: Asian Agri-History Foundation 4: 205
2	Boeringa, R. (Eed.). 1980. Alternative Methods of Agriculture. Elsevier, Amsterdam, 199 pp
3	Das, P., Das, S.K., Arya, H.P.S., Reddy, G. Subba, Mishra, A. and others: Inventory of Indigenous Technical Knowledge in Agriculture: Mission mode Project on Collection, Documentation and

	Validation of Indigenous Technical Knowledge, Document 1 To 7, Indian Council of Agricultural Research, New Delhi
4	Ecological Farming -The seven principles of a food system that has people at its heart. May 2015, Greenpeace
5	Ecological Farming, The Seven principles of a food system that has people at its heart. May 2015, Greenpeace
6	FAO. 2018. The 10 elements of agro-ecology: guiding the transition to sustainable food and agricultural system.https://www.fao.org/3/i9037en/i9037en.pdf Agro ecosystem Analysis for Research and Development Gordon R. Conway.1985
7	Fukuoka, M. 1978. The One-Straw Revolution: An Introduction to Natural Farming. Rodale Press, Emmaus, PA. 181 pp
8	Fukuoka, M. 1985. The Natural Way of Farming: The Theory and Practice of Green Philosophy. Japan Publications, Tokyo, 280 pp
9	INFRC. 1988. Guidelines for Nature Farming Techniques. Atami, Japan. 38 pp
10	Malhotra R. and S.D. Babaji. 2020. Sanskrit Non Translatable- The importance of Sanskritizing English. Amaryllis, New Delhi India
11	Nalini, S. 1996. Vrikshayurveda (The Science of Plant Life) by Surapala. AAHF Classic Bulletin 1. Asian Agri-History Foundation, Brig Sayeed Road, Secunderabad, AP (now Telengana), India. 94pp
12	Natural Asset Farming: Creating Productive and Biodiverse Farms by David B. Lindenmayer, Suzannah M. Macbeth, et al. (2022)

WATER MANAGEMENT

Credits: 1 **Semester: IV**

Course Code: AG26406 **No of Lecture Hours: 15**

Course Objective:

To study the important properties of soil affecting water availability to crops and water requirement for optimum growth and development**.** different methods of irrigation and water management practices of both field and horticultural crops and drainage. soil moisture conservation practices including management of rain water, watershed and command areas.

Course Outcome: At the end of the course, the students will be able to

CO1:. Understand soil-water-plant relationship

CO2: Gain knowledge on crop water requirement and soil moisture measurements.

CO3: Get familiarized with different irrigation methods.

CO4: Gain knowledge on water quality and its management.

CO5: Understand the irrigation and water use efficiency, water logging and agricultural drainage.

Course Content	Hours Allotted	Pedagogy
Module I: • Irrigation: definition and objectives; Importance: Functior water for plant growth, water resources and irriga development for different crops in India. • Soil plant water relationships; Available and unavailable soil moisture, distribution of soil moisture. • Water budgeting, rooting characteristics, moisture extraction pattern, effect of moisture stress on crop growth.	**(3)** 1 1 1	Power point presentations / Lectures
Module II: • Methods of soil moisture estimation • Evapotranspiration and crop water requirement, effective rainfall • Different approaches of scheduling of irrigation	**(3)** 1 1 1	Power point presentations / Lectures
Module III: • Methods of irrigation: surface and sub-surface • Pressurized methods, viz., sprinkler and drip irrigation, their suitability, merits and limitations • Fertigation, economic use of irrigation water	**(3)** 1 1 1	Power point presentations / Lectures

Module IV: • Layout of different irrigation systems, • Irrigation efficiency and water use efficiency, conjunctive use of water • Irrigation water quality and its management	**(3)** 1 1 1	Power point presentations / Lectures
Module V: • Water management of different crops (rice, wheat, maize, groundnut, sugarcane, mango, banana and tomato). • Quality of irrigation water, irrigation management practices for different soils and crops, drip, sprinkler. • Layout of underground pipeline system, Irrigation automation, Artificial Intelligence and climate-based irrigation practices and its management	**(3)** 1 1 1	Power point presentations / Lectures

Learning Resources	
1	Rao, Y.P. and Bhaskar, S.R. Irrigation technology. Theory and practice. Agrotech publishing Academy, Udaipur.
2	Dilip Kumar Mujmdar. Irrigation water management: Principles and Practices. Prentice Hall of India Pvt. Ltd.,
3	S.V. Patil &Rajakumar, G. R., Water Management in Agriculture and Horticultural Crops. Satish serial publishing House, Delhi
4	Carr M. K. V. and Elias Fereres. Advances in Irrigation Agronomy. Cambridge University Press.

PROBLEMATIC SOILS AND THEIR MANAGEMENT

Credits:1 **Semester: IV**

Subject code: AG26407 **No. of Lecture hours:15**

Objective: To impart knowledge on problem soils and quality of irrigation water and their management techniques**.**

Outcome: The students will be able to understand the concepts of formation of problem soils and quality of irrigation water and remedies to overcome those problems.

Course outcomes:

CO1: To understand the formation of problematic soils

CO2: To understand the quality of irrigation water

CO3: To formulate various management methods to reclaim problem soils

CO4: To evaluate quality of irrigation water and management methods

CO5: Application of technology to evaluate problem soils

Course Content	Hours Allotted	Pedagogy
Module I:	**3**	Power point presentations / Lectures
• Soil quality-soil health – definition – criteria for judging health and quality. Problem soils categorization and classification based on types of problems-distribution of different problem soils and waste lands in India and Telangana	**1**	
• Salt affected soils – types – saline, alkali and saline alkali soils – properties and diagnostic criteria – history and nomenclature. Origin of saline soils – effect of soil salinity on soil conditions and plant growth – relative crop tolerance to soil salinity	**1**	
• Reclamation of saline soils – leaching- leaching requirement – Mechanical and agronomic practices – crops suitable	**1**	

Module II: • Alkali soils – origin – effect on soil conditions and plant growth – relative crop tolerance to sodicity. Reclamation of alkali soils – different practices – amendments- gypsum requirement – crops suitable • Saline alkali soils – characterization – effect on soil conditions and plant growth – reclamation and management • Acid soils – characteristics – origin and causes of soil acidity – effect on plant growth – reclamation of acid soils – benefits of liming – harmful effects of over liming	3 1 1 **1**	Power point presentations / Lectures
Module III: • Acid sulphate soils – characterization, effect on soil conditions and plant growth – Reclamation • Physical problems in soils and management- crusting and compaction, hard pans – light soils – soil erosion –eroded soils • Physical problems - soil and management – shallow soils – ill drained and flooded soils	**3** 1 1 1	Power point presentations / Lectures
Module IV: • Biological degradation/ problems in soils –polluted soils • Irrigation water – criteria for judging quality – salinity of irrigation water – use of saline water for irrigation • Irrigation water – sodium content of irrigation water – effect on soil – use of high sodium water for irrigation	3 1 1 1	Power point presentations / Lectures
Module V: • Irrigation water – specific ion effect toxicity in irrigation water – their contents and effect on soil and plant growth • Land suitability classification and land capability classification – bioremediation – use of multipurpose trees – problem soils in different agro ecosystems • Remote sensing and GIS – role in detection and management of problems soils	3 1 1 1	Power point presentations / Lectures

Learning Resources	
1	Soil Science – An Introduction 2015 Indian Society of Soil Science, IARI, NewDelhi
2	Saline and alkaline soils of India R.P. Agarwal, J.S.P. Yadav and R.N. Gupta 1968 IARI, New Delhi
3	Saline and Alkaline soils Richard, L.A. 1997 USDA, Oxfords & IBMpublishers
4	Nature , properties and management of saline and alkali soils G.L. Maliwal and L.L.Sumani 2014 Agrotech PublishingAcademy
5	Soil Testing Manual Dhyan Singh, Chonkar, P.K and Pandey, R.N. 2010 IARI, NewDelhi
6	Reclamation of Alkali soils in India K.K. Mehta. Oxford and IBHPublishing
7	Acid soils management M.A. Mohsin, A.K. Sarkar and B.S. Mathal. KalyaniPublishers
8	Methods of Analysis of Soils, Plant, water, and Fertilizers. Tandon, H.L.S. 1993 FDCO. Greater Kaliash, New Delhi

BASICS OF PLANT BREEDING

Credits: 2 **Semester : IV**

Subject Code: AG26408 **No. of lecture hours: 30**

Objective: To impart knowledge on the principles and procedures of plant breeding in self and cross-pollinated crops to develop the high-yielding varieties/hybrids

Outcome: Students will be able to acquaint with the various breeding methods for crop improvement.

Course-outcomes:

CO-1: Recognizes the benefits of plant breeding and crop genetic resources

CO-2: Interpret the methods of breeding and to illustrate the methods

CO-3: Explain the importance of different breeding methods

CO-4: Compare the methods of population improvement

CO-5: Formulate special breeding methods

Course Content	Hours Allotted	Pedagogy
Module I:	**6**	point presentations / Lectures
• Plant Breeding - Definition, Concept, Nature, Aims, objectives and role. Major Achievements and future prospects of plant breeding. History and development of Plant Breeding - Scientific contributions of eminent scientists	1	
• Genetics in relation to plant breeding Modes of reproduction – Asexual reproduction (vegetative reproduction and apomixis) and sexual reproduction – their classification and significance in plant breeding	1	
• Modes of pollination – classification of crop species on the basis of mode of pollination –self-pollination and cross pollination– mechanisms promoting self and cross pollination	1	
• Self-incompatibility – classification – heteromorphic, homomorphic(gametophytic and sporophytic) systems of incompatibility – mechanisms of self-incompatibility – Relevance of self-incompatibility – methods to overcome self-incompatibility – advantages and disadvantages – utilization in crop improvement	1	
• Male sterility – different types – genetic, cytoplasmic and cytoplasmic genetic male sterility –inheritance and maintenance – Utilization of male sterile lines in hybrid seed production – their limitations, advantages and disadvantages	1	
• Genetic consequences of self-pollination, cross-pollination and often cross-pollinated crops.	1	

Module II: • Domestication, Acclimatization and Plant Introduction - Types, history, purpose, procedure, merits and demerits - plant introduction agencies in India - NBPGR and its activities • Components of genetic variation - additive, dominance and epistatic variance - differences between additive and dominance variance. Heritability and Genetic advance • Selection – natural and artificial selection – basic principles of selection – basic characteristics and requirements of selection – selection intensity – selection differential – heritability – genetic advance and Genetic basis and breeding methods in self-pollinated crops • Mass selection – procedure for evolving a variety by mass selection – modification of mass selection – merits, demerits and achievements • Genetic basis of pure line selection– general procedure for evolving a variety by pure line selection– merits, demerits and achievements – comparison between mass and pure line selection – • Johannsen's pure line theory and its significance – origin of variation in pure lines –characters of pure lines – progeny test	**6** 1 1 1 1 1 1	Power point presentations / Lectures
Module III: • Hybridization – aims and objectives – types of hybridization – pre-requisites for hybridization –procedure / steps involved in hybridization • Handling of segregating generations – pedigree method – procedure – modifications of pedigree method – merits, demerits and achievements • Handling of segregating generations – bulk method – procedure – merits, demerits and • Achievements of bulk method – comparison between pedigree and bulk method – single seed descent method • Back cross method - requirements and applications, procedure for transfer of dominant and recessive gene - merits, demerits and achievements, comparison between pedigree and back-cross methods • Population genetics - concepts, Hardy Weinberg law, factors affecting equilibrium frequencies in random mating populations	**6** 1 1 1 1 1 1	Power point presentations / Lectures

Module IV: • Methods of breeding in Cross-pollinated crops Modes of selection- – selection without progeny testing – selection with progeny testing • Recurrent selection – different types –procedure of simple recurrent selection and other recurrent selection methods • Composites and synthetics - production procedures, merits and demerits, achievements. • Heterosis - heterosis and hybrid vigour, luxuriance, manifestation of heterosis, genetic basis - dominance, over dominance and epistasis hypotheses, objections and their explanations- commercial utilization of heterosis in different crops. • Inbreeding depression - brief history, effects of inbreeding depression, degrees of inbreeding depression –development of inbred lines and their evaluation • Methods of breeding for vegetatively propagated crops – clone – characteristics of clones-Clonal selection and hybridization	**6** 1 1 1 1 1 1 1	Power point presentations / Lectures
Module V: • Wide hybridization – history – objectives – barriers to the production of distant hybrids – techniques for production of distant hybrids – applications of wide hybridization in crop improvement. • Polyploidy breeding– autopolyploids – origin and production – morphological and cytological features of autopolyploids – applications of autopolyploidy and Allopolyploidy in crop improvement – limitations • Mutation breeding – spontaneous and induced mutations – characteristic features of mutations –procedure of mutation breeding – applications – advantages, limitations and achievements • Breeding for resistance to biotic stresses – disease resistance – mechanisms of disease resistance in plants causes of disease resistance – genetic basis of disease resistance – sources of disease resistance – breeding methods– achievements – • Insect resistance – mechanism of insect resistance in plants– genetics of insect resistance – horizontal and vertical – genetics of resistance – sources of insect resistance – • breeding methods for insect resistance – problems in breeding for insect resistance – achievements • Breeding for resistance to abiotic stresses – drought resistance – ideotype for flooded areas – breeding methods– Breeding for salt tolerance -Cold tolerance – chilling resistance • Molecular markers – Definition – Brief description of different types of molecular markers, RFLP,AFLP, RAPD and SSR markers– Importance, procedure and applications • DNA finger printing - procedure, applications - MAS and its applications in plant breeding	**6** 1 1 1 1 1 1 1 1 1	Power point presentations / Lectures

Learning Resources	
1	Singh, B.D. 2006. Plant Breeding: Principles and Methods. Kalyani Publishers, New Delhi.
2	Allard, R.W. 1960. Principles of Plant Breeding. John Wiley and Sons, New York.
3	Phundan Singh, 2006. Essentials of Plant Breeding. . Kalyani Publishers, New Delhi
4	Poehlman, J.M. and Borthakur, D. 1995. Breeding Asian Field Crops. Oxford and IBH Publishing Co., New Delhi
5	Sharma, J.R.1994. Principles and Practice of Plant Breeding. Tata McGraw Hill Publishing Company Ltd., New Delhi

ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION PRACTICALS

Credits: 1 **Semester: IV**

Subject Code: AG26409 **No. of Lecture Hours: 30**

Objective: To impart firsthand information on various entrepreneurial activities and business communication.

Outcome: Students will be able to study successful enterprises, develop project proposals and prepare project reports

Practical

1. Simulation exercise on assessing entrepreneurial traits
2. Practical exercise on problem-solving skills.
3. Practical exercise on managerial skills.
4. Achievement motivation and goal setting.
5. Business communication and negotiation.
6. Organization skills and leadership skills.
7. Practical exercise on time management.
8. Practical exercise on decision making.
9. Visit small-scale industries/ agro-industries.
10. SWOT analysis of selected enterprise.
11. Interaction with successful entrepreneurs/ agri-entrepreneurs.
12. Visit to financial institutions/ support agencies.
13. Identification and selection of business ideas.
14. Preparation of a project proposal for funding by different agencies.

Presentation of project proposal.

CROP PRODUCTION TECHNOLOGY-II (RABI CROPS)

PRACTICALS

Credits: 1 **Semester : IV**

Subject code: AG26410 **No. of practical hours: 30**

Objective: To experience practically the constraints in crop production by raising crops in the field.

Outcome: Students will be able to learn various crop production techniques starting from land preparation to harvest.

1. Identification of crops and seed material.
2-3. Allotment of individual plots for land preparation and sowing of crops.
4. Fertilizer application and sowing the crop
5. Observation for germination and gap filling in individual plots.
6-7. Inter cultural operations – Thinning and weeding.
8. Collection of biometric data - 1
9. Raising of tobacco nursery
10. Sowing methods of sugarcane
11. Harvesting of crops in individual plots and recording yield
12. Study of varietal characters of cereals and oil seed crops.
13. Study of varietal characters of Pulses and fodder crops.
14. Study of varietal characters of Sugarcane, potato and Tobacco
15. Visit to nearby farmers' fields.

PRODUCTION TECHNOLOGY OF VEGETABLES AND SPICES PRACTICALS

Credits: 1 **Semester: IV**

Subject Code: AG26411 **No. of practical hours: 30**

Course Objective: To provide practical experience in identifying vegetables and spices, their seeds, varieties, methods of propagation, planting, fertilizer application, harvesting and post-harvest practices in Vegetables and Spices.

Course Outcome: Students will gain practical skills in identifying morphological characters, Seeds, methods of propagation and cost of cultivation of Vegetables and Spices.

1. Identification of vegetables and their seeds
2. Identification of spices and their seeds
3. Description of varieties of vegetables and spices
4. Study of morphological characters of different vegetables
5. Study of morphological characters of different spices
6. Nursery raising, direct seed sowing and planting methods in vegetables
7. Different Propagation methods, seed extraction and collection methods in vegetables
8. Different Propagation methods in spices
9. Seed extraction and collection methods in spice crops, rapid multiplication techniques in pepper and cardamom
10. Study of manures and fertilizer application methods in vegetables and spices
11. Study of harvesting and post-harvest practices in vegetables
12. Study of harvesting and post-harvest practices in spices
13. Economics of vegetables cultivation
14. Economics of spices cultivation
15. Visit to commercial vegetable farms
16. Visit to commercial spice farms

PRINCIPLES AND PRACTICES OF NATURAL FARMING
PRACTICALS

Credits : 1 **Semester: IV**
Subject code : AG26412 **No. of lecture hours: 30**

1. Visit of natural farm and chemical free traditional farms
2. To study the various components and operations of natural farming principles at the farm
3. Indigenous technical knowledge (ITK) for seed, tillage
4. Indigenous technical knowledge (ITK) for water, nutrients
5. Indigenous technical knowledge (ITK) for insect-pests
6. Indigenous technical knowledge (ITK) for diseases
7. Indigenous technical knowledge (ITK) for weed management.
8. On-farm inputs preparation methods and protocols, Studies in green manuring in-situ and green leaf manuring,
9. Studies on different types of botanicals and animal urine and dung based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management
10. Weed management practices in natural farming
11. Techniques of Indigenous seed production- storage and marketing,
12. Partial and complete nutrient and financial budgeting in natural farming
13. Evaluation of ecosystem services in natural farming (Crop, Field and System)

WATER MANAGEMENT
PRACTICALS

Credits:1 **Semester: IV**

Subject code: AG26413 **No. of practical hours: 30**

1. Determination of bulk density by field method
2. Determination of soil moisture content by gravimetric method
3. Installation of tensiometer in cropped field
4. Installation and working of electrical resistance block and neutron moisture meter in cropped field.
5. Determination of field capacity by field method
6. Determination of permanent wilting point
7. Measurement of irrigation water by using water measuring devices viz., flumes, weirs, notches, orifices
8. Calculation of irrigation water requirement (Problems)
9. Determination of infiltration rate
10. Demonstration of furrow method of irrigation (check basin and basin method of irrigation)
11. Visit to farmers' field and cost estimation of drip irrigation system
12. Demonstration of filter cleaning, fertigation, injection and flushing of laterals
13. layout for different methods of irrigation, Erection and operation of sprinkler irrigation system
14. Measurement of emitter discharge rate, wetted diameter and calculation of emitter discharge variability
15. Visit to irrigation research Centre/ station and visit to command area

PROBLEMATIC SOILS AND THEIR MANAGAMENT
PRACTICALS

Credits: 1 **Semester: IV**
Subject code: AG26414 **No. of practical hours:30**

Objective: To impart knowledge on different soil sampling methods for identifying problematic soils.
Outcome: Students will be able to analyze chemical properties of problematic soils and irrigation water and can be able to interpret the favorable conditions for crop growth

1. Collection of water samples for analysis for assessing the quality of irrigation water
2. Determination of pH and Electrical Conductivity of irrigation water sample
3. Determination of carbonates and bicarbonates in irrigation water sample
4. Determination of chlorides in irrigation water sample
5. Determination of calcium and magnesium in irrigation water sample
6. Determination of sodium content in irrigation water sample
7. Determination of boron content in irrigation water sample
8. Determination of pH and electrical conductivity of soil
9. Determination of cation exchange capacity in soil
10. Determination of exchangeable Na in alkali soils
11. Determination of lime requirement of acid soils
12. Determination of gypsum requirement of alkali soils
13. Determination of bulk density at different depths in soil
14. Determination of soil strength
15. Assessment of irrigation water quality and management required

BASICS OF PLANT BREEDING
PRACTICALS

Credits : **1** **Semester: IV**

Subject code: AG26415 **No. of practical hours: 30**

Objective: To impart practical knowledge on breeding methods

Outcome: Students will be able to

1. Study of megasporogenesis and microsporogenesis, fertilization and life cycle of an angiosperm plant
2. Plant Breeder's kit for hybridization
3. Types of Male Sterility-Transfer of Male sterile cytoplasm and restorer gene into a normal strain
4. Self-incompatibility: Types
5. Pedigree method
6. Bulk method
7. Backcross method
8. Recurrent Selection-Types
9. Field layout of experiments-Analysis of RBD
10. Field Trials-Maintenance of Records and registers
11. Basic statistics, commonly used in plant breeding - Mean, range, variance, Phenotypic Coefficient of Variation (PCV), Genotype Coefficient of Variation (GCV), Heritability and genetic advance.

12&13. Calculation of heterosis, hetero-beltiosis, standard heterosis and inbreeding depression.

14. Calculation of general combining ability, specific combining ability, variances and effects
15. Visit to RARS / local research station / ICAR institute to acquaint about the handling of segregating generations -pedigree, bulk and backcross methods bulk and back cross methods - PYT, AVT and other methods-PVT, AVT and other methods.

PROTECTED CULTIVATION

Credits:1 **Semester: IV**

Subject Code: AG26416 **No. of practical hours: 60**

Objective

To educate students on the scientific and commercial cultivation of important value-added products in protected cultivation

1. Protected cultivation- importance and scope, status of protected cultivation in India and World,
2. types of protected structure based on site and climate.
3. Cladding material involved in greenhouse/ poly house.
4. Greenhouse design, environment control, artificial lights, Automation.
5. Soil preparation and management, Substrate management.
6. Types of benches and containers, Irrigation and fertigation management.
7. Propagation and production of quality planting material of horticultural crops.
8. Greenhouse cultivation of important horticultural crops-
9. Raising of seedlings and saplings under protected conditions,
10. Use of portrays in quality planting material production,
11. Bed preparation and planting of crop for production.
12. Inter cultural operations,
13. Soil EC and pH measurement.
14. Regulation of irrigation
15. Regulation of fertilizers through drip
16. Regulation of fogging and misting.
17. Visit to Centre of excellence

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE
B.Sc. (Hons.) AGRICULTURE
FIFTH SEMESTER
ACADEMIC YEAR-2026-27 OF 2024-28 BATCH (CBCS)

Sl. No.	Part	Subject Code	Titleof theSubject	Hours/ week	Duration of Exam(hrs.)	Marks			Credits
						Internal	External	Total	
1	II	AG20501	Rainfed Agriculture .& Watershed Management(Core-28)	1	3	40	60	100	1
2	II	AG20502	Crop Improvement –I Kharif crops(Core-29)	2	3	40	60	100	2
3	II	AG20503	Entrepreneurship.Devpt.&Business. Communication.(Core-30)	1	3	40	60	100	1
4	II	AG20504	Diseases of Field crops , Horticultural crops & their Management.(Core-31)	2	3	40	60	100	2
5	II	AG20505	Principles of IPDM(Core-32)	1	3	40	60	100	1
6	II	AG20506	Prod. Tech.o f Fruits & Plantation. Crops (Core-33)	1	3	40	60	100	1
7	II	AG20507	Pests of Crops , stored grains & their Management (Core-34)	2	3	40	60	100	2
8	II	AG20509	Renewable Energy & Green Technology.(SEC-5)	1	3	40	60	100	1
9	II	AG20510 A	Weed Science.& their Management (DSE-2)	2	3	40	60	100	2
		AG22510 B	Soil, water, Plant and Seed testing (DSE-2)						
PRACTICALS									
11	II	AG20511	Rainfed Agriculture.& Watershed Management(Core-28)	2	3	40	60	100	1
12	II	AG20512	Crop Improvement –I Kharif crops(Core-29)	2	3	40	60	100	1
13	II	AG20513	Entrepreneurship.Devpt .&Business. Communication.(Core-30)	2	3	40	60	100	1
14	II	AG20514	Diseases of Field crops , Horticultural crops &their Management.(Core-31)	2	3	40	60	100	1
15	II	AG20515	Principles of IPDM(Core-32)	2	3	40	60	100	1
16	II	AG20516	Prod.Tech.Of Fruits &Plantation. Crops (Core-33)	2	3	40	60	100	1
17	II	AG20517	Pests of Crops,stored grains & Their Management(Core-34)	2	3	40	60	100	1
18	II	AG26518	Practical Crop Production-I (SEC-5)	2	3	40	60	100	1
19	II	AG20519	Renewable Energy & Green Technology (SEC-6)	2	3	40	60	100	1
20	II	AG20520 A	Weed Science.& their Management (DSE-2)	2	3	40	60	100	1
		AG22520 B	Soil, Water, Plant and Seed Testing (DSE-2)						
Total				**33**		760	1140	1900	**23**

RAINFED AGRICULTURE AND WATERSHED MANAGEMENT

Credits: 1 **Semester: V**
Course Code: AG20501 **No of Lecture Hours: 15**

Course Objective: To impart knowledge on Rainfed Agriculture

Course Outcome:

CO1: Describe watershed concepts and classify drought
CO2: Explains problems of crop production in drylands
CO3: Explain fertilizer use in dry land agriculture and contingent crop planning
CO4: Explain water harvesting techniques and watershed management
CO5: Classify alternate land use systems

Course Content	Hours Allotted	Pedagogy
Module I: • Rainfed Agriculture: Introduction, types, history of rainfed agriculture • History of watershed concept in India – guidelines for Integrated watershed management programme, Problems and prospects of rainfed agriculture in India • Drought: types, classification, effect of water deficit on physio-morphological characteristics of the plants	(3) 1 1 1	PowerPoint presentations / Lectures
Module II: • Mechanism of crop adaptation under moisture deficit condition • Problems of crop production in drylands - Climatic parameters- Rainfall- Variability- Temperature and other parameters • Problems of crop production in dry lands- Soil characteristics and their problems, cultivation practices, weed infestation, lack of suitable varieties, socio-economic constraints	(3) 1 1 1	Case Studies / Review of research articles
Module III: • Fertilizer use in dry lands; fertilizer use efficiency in dryland agriculture • Management of crops and cropping systems in rainfed areas • Contingent crop planning for aberrant weather conditions	(3) 1 1 1	Assignments
Module IV: • Efficient utilization of water through soil and crop management practices • Water harvesting, importance and its techniques • Concept and objectives of water shed management	(3) 1 1 1	Lectures
Module V: • Principles of water shed management • Components of watershed management- soil and water conservation, water harvesting, crop management, and alternate uses stems • Alternate land use systems- different types of ALUS based on land capability Classification	(3) 1 1 1	Assignments / Lectures

Learning Resources	
1.	Amon, 1972, Crop Production in dry Regions – (Vol.I.) Leonard Hill., Pub., Co., London.
2.	Dhruva Narayana, V.V. Shastri, G.S. and Patnail, V.V, 1990. Watershed management in India.ICAR, New Delhi.
3.	Gupta U.S. 1975. Physiological Aspects of Dryland Farming – Oxford & IBH Publishers, Co.,Ltd., New Delhi
4.	ICAR, 1970. A New Technology for Dryland Farming. New Delhi.

CROP IMPROVEMENT – I (*Kharif crops*)

Credits: 2 **Semester: V**

Subject code: AG20502 **No. of Lecture hours: 30**

Objective: To impart knowledge on the origin, distribution and breeding objectives of various crops

Course outcomes:

CO1: Understand the objectives of breeding in different crops
CO2: Explain various approaches to hybrid seed production technology of different crops
CO3: Identify origin and progenitors of different crops
CO4: Apply breeding methods for the introgression of biotic stress
CO5: Apply breeding methods for the introgression of abiotic stress

Course Content	Hours Allotted	Pedagogy
Module I:	**(6)**	Power point presentations / Lectures
• Introduction-definition, aim, objectives and scope of crop improvement-	**1**	
• Breeding strategies and concepts of breeding self-pollinated, cross-pollinated, and vegetatively propagated crops.	**1**	
• Centers of origin-Law of homologous series-Types of centers of diversity-gene sanctuaries- genetic erosion-reasons of genetic erosion-extinction.	**1**	
• Introgression-gene banks –types and distribution of crop species.	**1**	
• Centers of origin, distribution of species, wild relatives, breeding objectives, and breeding methods in Rice.	**1**	
• Centers of origin, distribution of species, wild relatives, breeding objectives and breeding methods Maize	**1**	
Module II:	**(6)**	Case Studies / Review of research articles
• Centers of origin, distribution of species, wild relatives, breeding objectives and methods in Sorghum.	**1**	
• Centers of origin, distribution of species, wild relatives, breeding objectives and methods in Bajra	**1**	
• Centers of origin, distribution of species, wild relatives, breeding objectives and methods in Ragi.	**1**	
• Centers of origin, distribution of species, wild relatives, breeding objectives and methods in Red gram.	**1**	
• Centers of origin, distribution of species, wild relatives, breeding objectives and methods in urd bean, mung bean	**1**	
• Centers of origin, distribution of species, wild relatives, breeding objectives and methods in Soybean.	**1**	
Module III:	(6)	Assignments
• Centers of origin, distribution of species, wild relatives, breeding objectives and methods in Groundnut.	1	
• Centers of origin, distribution of species, wild relatives,		

breeding objectives and methods in Sesame. • Centers of origin, distribution of species ,wild relatives, breeding objectives, breeding methods in Castor. • Centers of origin, distribution of species, wild relatives, breeding objectives, breeding methods in Napier grass and para grass • Centers of origin, distribution of species, wild reltives, breeding objectives, breeding methods in Cotton. • Centers of origin, distribution of species, wild relatives, breeding Objectives, breeding methods in Tobacco.	1 1 1 1 1	
Module IV: • Centers of origin, distribution of species, wild relatives, breeding Objectives, breeding methods in Chilli, tomato • Centers of origin, distribution of species, wild relatives, breeding Objectives, breeding methods in Brinjal, Bhendi. • Centers of origin, distribution of species, wild relatives, breeding Objectives, breeding methods in Mango, Papaya • Centers of origin, distribution of species, wild relatives, breeding Objectives, breeding methods in Banana, Guava. • Study of qualitative and quantitative characters and Important concepts of breeding self-pollinated, cross pollinated and propagated crops. • Breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, stability, adaptability, abiotic and biotic Stress tolerance and quality (physical, chemical and nutritional	(6) 1 1 1 1 1 1	Lectures
Module V: • Seed production technology in self-pollinated, cross-pollinated, and vegetatively propagated crops • Hybrid Seed production technology in maize and rice • Hybrid Seed production technology in Sorghum, Bajra • Hybrid Seed production technology in red gram • Ideotype concept • Climate resilient crop varieties for future Breeding for drought, salinity, waterlogging, high temperature and low temperature tolerant varieties in different crops.	(6) 1 1 1 1 1 1 1	Assignments / Lectures

Learning Resources	
1.	Allard, R.W. 1960. Principles of Plant Breeding. John Wiley and Sons, New York.
2.	Phundan Singh, 2006. Essentials of Plant Breeding. Kalyani Publishers, New Delhi.
3.	Poehlman, J.M. and Borthakur, D. 1995. Breeding Asian Field Crops. Oxford and IBH Publishing Co., New Delhi.
4.	Sharma, J.R. 1994.Principles and Practice of Plant Breeding. Tata McGraw Hill, Publishing Company Ltd., New Delhi.
5	Singh, B.D. 2006. Plant Breeding: Principles and Methods. Kalyani Publishers, New Delhi

ENTREPRENEURSHIP DEVELOPMENT & BUSINESS COMMUNICATION

Credits: 1 **Semester: V**

Subject Code: AG20503. **No. of lecture hours: 15**

Objective: To improve the knowledge level of the students on entrepreneurship development and business communication skills.

Course outcomes:

CO1: Understand core concepts of entrepreneurship and Agri-entrepreneurship

CO2: Gain knowledge of Entrepreneurship Development Programmes (EDPs) and the development of essential organizational skills

CO3: Develop entrepreneurial competencies such as achievement motivation, problem-solving-solving ability, time management, SWOT analysis, business communication, and negotiation skills for managing an enterprise

CO4: Acquire essential managerial and leadership skills, along with the knowledge of institutional support systems and venture capital for entrepreneurship.

CO5: Demonstrate the ability to design and evaluate projects, and apply concepts of supply chain management and total quality management to improve business performance

Course Content	Hours Allotted	Pedagogy
Module I: • Entrepreneur, entrepreneurship, Agri-entrepreneurship: Concept, need, & scope and opportunities of Rural and Agri Enterprises • Entrepreneurial Characteristics • Impact of economic reforms on agribusiness & Agri enterprise and overview of Agri Business in the country	(3) 1 1 1	PowerPoint presentations / Lectures
Module II: • Entrepreneurship Development Programmes (EDPs): Objectives, phases, government policies, programmes and schemes • Process of EDP: Various stages • Developing organizational skills: Controlling, Supervision, Monitoring and Evaluation	(3) 1 1 1	Case Studies / Review of research articles
Module III: • Achievement Motivation and Problem-solving skills. • Managing an enterprise, SWOT Analysis, and Time management. • Business written communication skills and Negotiation skills.	(3) 1 1 1	Assignments
Module IV: • Managerial skills for Entrepreneurship Development: Planning, Budgeting, Coordination and Decision making. • Financing an Enterprise and Venture Capital. • Institutional support to entrepreneurs and Business Leadership Skills – communication, direction and motivation skill	(3) 1 1 1	Lectures

Module V: • Project – Meaning, importance, project formulation, project report components And preparation. • Supply Chain Management – Meaning, definition, process, advantages & disadvantages • Total quality management: Meaning, definition, process and Advantages	(3) 1 1 1	Assignments / Lectures

Learning Resources	
1.	Anil Kumar S, Poornima S C, Mini K Abraham, and Jayashree K, Entrepreneurship development, New Age International Publishers,2003, New Delhi-110002
2.	Dipak De, Basava Prabhu Jirli, Dynamics of entrepreneurship development in Agriculture - Basics to advances, Ganga Kaveri Publishing house, Varanasi.2008
3.	Gupta C. B. Management Theory & Practice, Sultan Chand &Sons.2001.
4.	Indu Grover, Handbook on Empowerment & Entrepreneurship, Agrotech Public Academy, 2008.
5	Jasmir Singh Saini, Entrepreneurship Development Programmes and Practices, Deep Publications, New Delhi., 1996.
6	Entrepreneurship in Action 2nd edition, Prentice Hallof India, New Delhi, Mary Coulter
7	Fundamentals of Entrepreneurship, Prentice Hall of India, New Delhi, Mohanty S K, 2009
8	Effective Managerial Leadership, Deep & Deep Publ, Singh D.,1995.
9	Dynamics of entrepreneurial development & Management, Vasanta Desai, 2000
10	Small Scale Industries & Entrepreneurship, Himalaya Publ. House., 1997, Vasanta Desai
11	Reading Material of Personality Development Training Programme, 2004, EEI, ANGRAU, R‘nagar, Hyderabad

DISEASES OF FIELD CROPS, HORTICULTURAL CROPS-I AND THEIR MANAGEMENT

Credits: 2 **Semester: V**
Subject code: AG20504 **No of lecture hours: 30**

Objective: To impart knowledge on the diseases of field crops and their management

Course outcomes:

CO1: Identify different diseases of cereal crops and gain knowledge about their management
CO2: Recommend management practices of different diseases of sugarcane, Cotton, Tobacco, Castor and Groundnut.
CO3: Identify different diseases of oil seeds and gain knowledge about their management
CO4: Recommend management practices of different diseases of pulse crops and gain knowledge about their management
CO5: Identify different diseases of fruit crops and gain knowledge about their management

Course Content	Hours Allotted	Pedagogy
Module I: • Rice: Blast, brown spot, bacterial blight, sheath blight, Stem rot, Sheath rot, False smut, Khaira & tungro. • Maize: Stalk rot, Downy mildew, Leaf blight. • Sorghum: smut, grain mold and anthracnose, Rust, Downy mildew, Striga. • Bajra: Downy mildew and ergot, Blast; Finger millet: Blast and leaf spot (*Helminthosporium* & *Cercospora)* • Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight and ear cockle	(6) 1 1 1 1 1 1	PowerPoint presentations / Lectures
Module II: • Sugarcane: root rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng, Ring spot. • Cotton: anthracnose, vascular wilt (Fusarium & Verticillum) and black arm, leaf spots-Alternaria, Cercospora, Grey mildew. • Tobacco: black shank, black root rot and mosaic, Frog eye leafspot. • Castor: Phytophthora blight, Wilt, Grey mould. • Groundnut: Early and late leaf spots, Wilt, Stem rot, rust, Kalahasthi malady, Bud and stem necrosis	(6) 1 2 1 1 1	Case Studies / Review of research articles
Module III: • Soybean: *Rhizoctonia* blight, bacterial spot, seed and seedling rot, mosaic and rust • Sesamum: Phyllody, Powdery mildew, *Alternaria* leaf spot • Sunflower: *Sclerotinia* stem rot and Alternaria blight,	(6) 2 1 1	Assignments

downy mildew. • Safflower: *Alternaria* leaf spot, wilt. • Mustard: *Alternaria* blight, white rust, downy mildew and *Sclerotinia* stem rot	 1 1	
Module IV: • Pigeon pea: Phytophthora blight, wilt, and sterility mosaic. • Black & green gram: *Cercospora* leaf spot and anthracnose. • Black & green gram: Web blight and yellow mosaic, *Corynespora* leafspot. • Gram: wilt, grey mould and *Ascochyta* blight, *Macrophomina* stem and root rot. • lentil: rust and wilt; Pea: downy mildew, powdery mildew, and rust.	**(**6) 1 1 2 1 1	Lectures
Module V: • Mango: Anthracnose, Malformation, Bacterial blight, Powdery mildew, Sooty mold, redrust, Loranthus. • Citrus: Canker, Gummosis, Tristeza, Greening, Dry Root Rot, Felt, Scab, Twig blight • Guava: Wilt and Anthracnose. • Banana: Panama wilt, Bacterial wilt, Sigatoka, Bunchy top, Erwinia rhizome rot, Banana mosaic, Banana Bract mosaic, Anthracnose. • Papaya: Foot rot, Leaf curl, mosaic, Powdery mildew, Anthracnose	(6) 2 1 1 1 1	Assignments / Lectures

Learning Resources	
1.	Cook, A.A. 1981. Diseases of Tropical and Subtropical Field, Fibre and Oil plam. Mac Millan Publishing Co., New York.
2.	Rangaswamy, G. and Mahadevan, K. 2001. Diseases of Crop Plants in India. Prentice Hall of India Pvt. Ltd., New Delhi. Singh, R.S.2005.
3.	Plant Diseases. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
4.	Pathak V N 1980. Diseases of fruit crops. Oxford and IBH Publ Co. New Delhi. 2. Sohi H S 1992.
5	Diseases of ornamental plants in India. ICAR, NewDelhi.3. SinghRS1994.
6	Diseases of vegetable crops. Oxford and IBH Publ Co. New Delhi.
7	Upadhyaya K.P. and Kusum Dwivedi. 1996. **A Text Book of Plant Nematology**. Meerut: Aman Publishing House.
8	Vasantharaj David, B. 2003. **Elements of Economic Entomology**. Coimbatore: Popular BookDepot.
9	Vasantha raj David, B and Aanatha krishnan, T.N. 2006.
10	**General and Applied Entomology**.New Delhi: Tata Mc Graw-Hill Publishing House.

PRINCIPLES OF INTEGRATED PEST & DISEASE MANAGEMENT

Credits: 1 **Semester: V**

Subject Code: AG20505 **No of lecture hours:15**

Objective: To impart knowledge on basic concepts of pest management practices.

COURE OUTCOME

CO1: Recall introduction strategies and concepts of IPM with examples
CO2: Relate host plant resistance and different cultural and mechanical control of IPM
CO3: Identify other tools and limitations of IPM
CO4: Analyse different control methods of Integrated disease management
CO5: Design different methods of disease forecasting and the implementation of different IDM Modules.

Course Content	Hours Allotted	Pedagogy
Module I: • IPM – Introduction history- importance-collapse of control systems, patterns of crop protection, environmental contamination and evolution. Concepts and principles of IPM and different categories of pests based on occurrence. • Host plant resistance- horizontal and vertical resistance and types. Mechanisms of genetic resistance- Non-preference (Antixenosis), Antibiosis and tolerance. Tools of IPM – Cultural control- Normal cultural practices to control the pests and agronomic practices against the pests with examples. • Mechanical control-Different mechanical methods of pest control with examples. Physical control against pests with examples. Legal control- importance of quarantine-examples of exotic pests	(3) 1 1 1	Power point presentations / Lectures
Module II: • Biological control - types of biological control – introduction, augmentation and conservation– parasite – parasitoid- parasitism. • Grouping of parasitoids based on nature of host, stage of host, site of parasitization, duration of attack, degree of parasitization and food habits –Kinds of parasitism– qualities/attributes of an effective parasitoid to be successful one. • Biological control - Predators–predatism–qualities of insect predator – differences between predator and parasitoid. Microbial control- Bacteria, virus, fungi, nematodes and protozoa- important species of microorganisms against major pests in IPM. Entomo pathogenic nematodes- important species- mode of infectivity - advantages and disadvantages of biological control.	(3) 1 1 1	Case Studies / Review of research articles

Module III: • Limitations of IPM - political, social and legal implications of IPM and Case studies of IPM for important crops. • IDM: Introduction, importance, difference between control and management concepts, principles of IDM. Economic importance of diseases. • Methods of detection and diagnosis of diseases, and Assessment of disease severity and Calculation of disease incidence level.	(3) 1 1 1	Assignments
Module IV: • Methods of control: Cultural methods (rouging, eradication of alternate and collateral host, crop rotation, manure and fertilizer management, mixed cropping, sanitation, summer ploughing, soil amendments, time of sowing, seed rate and plant density, irrigation and drainage). • Methods of control: Physical (Solarization and hot water treatment), legislative (Seed treatment, inspection and certification, plant quarantine– plant quarantine and inspection, quarantine rules and regulations). Biological control (mechanisms–competition, antibiosis, hyper parasitism and Induced Systemic Resistance (ISR), fungal and bacterial biocontrol agents– Plant Growth Promoting Rhizobacteria (PGPR) against phytopathogens). • Methods of control: Chemical control–fungicides, antibiotics, methods and time of applications and Host plant resistance (Importance and advantage of resistant varieties, selection, hybridization and mutation, sources of resistance-meaning of vertical, horizontal, monogenic, oligogenic and polygenic resistance), Biotechnology.	(3) 1 1 1	Lectures
Module V: • Survey, surveillance and forecasting of diseases, Pest risk analysis. • IDM strategies for plant parasitic nematodes. • Implementation and impact of IDM module for disease. Case histories of important IDM programmes	(3) 1 1 1	Assignments / Lectures

Learning Resources	
1.	Vasanthrai David, B. 2003. Elements of Economic Entomology. Popular Book Depot, Coimbatore.
2.	Nair KK, Anantha Krishnan TN and BV David 1976. General and applied entomology, Tata McGraw Hill publishing co. Ltd, New Delhi
3.	Yazdani, S.S and Agarwal, M.L.1979. Elements of Insect Ecology. Narosa Publishing House, New Delhi.

PRODUCTION TECHNOLOGY OF FRUITS AND PLANTATION CROPS

Credits: 1 **Semester: V**
Course Code: AG20506 **No. of lecture hours: 15**

Objective: To impart knowledge on production technology of fruit crops and plantation crops.

COURSE OUTCOMES:

CO1: Identify problems in raising of Mango, Banana and Citrus crops.
CO2: Demonstrate the Raising of Grape, Guava, Papaya & Pomegranate and select suitable training and pruning methods for Grape, Pomegranate.
CO3: Explain Production technology in Apple, Pear, Peach, Ber, Phalsa and Custard apple
CO4: Elaborate Production of Pineapple, Litchi, Sapota, and Jack fruit
CO5: Relate the production and processing of plantation crops.

Course Content	Hours Allotted	Pedagogy
Module I: • **Mango** – origin – importance – climate – soils – varieties – propagation – land preparation – planting –HDP - spacing – irrigation – manuring – inter cultivation and inter-cropping – training and pruning – flowering – pollination – fruit set – cropping – harvesting – maturity indices – yield – physiological disorders black tip or mango necrosis, mango malformation, spongy tissue and fruit drop – causes and remedies – alternate or biennial bearing and irregular bearing. • **Banana** – origin – importance – climate – soils – varieties – propagation – propagating material – suckers (water and sword suckers) and rhizomes– planting – land preparation – system of planting – spacing – application of manures – season of planting – inter cultivation – de suckering – trashing – mattocking – wrapping of bunches – removal of male bud – removal of floral remnants – propping – earthing-up – weeding – harvesting – maturity indices– yield • **Citrus** – origin – importance – different citrus species – climate – soils – varieties – propagation–land preparation – method of planting – spacing - irrigation – manuring – pruning and training – inter cultivation – inter-cropping – flowering – bahar treatment – cropping – fruit drop – causes and control– harvesting – maturity indices – yield.	**(3)** 1 1 1	Power point presentations / Lectures
Module II: • **Grape** – origin – importance – climate – soils – varieties – propagation – different methods of propagation – different rootstocks used – planting – land preparation – system of planting – spacing – application of manures – season of planting – training – different methods of training – head, arbour, kniffin, and	**(3)** 1	Case Studies / Review of research articles

telephone trellis system – advantages and disadvantages of each system. Pruning – irrigation–manuring–inter-cultivation–fruit-thinning–use of growth regulators in increasing fruit set, berry size, cluster size and maturity harvesting – maturity indices – yield. • **Guava** – origin – importance – climate – soils – varieties – Propagation – different methods of propagation – commercial method of propagation – planting – land preparation – system of planting – spacing – application of manures – season of planting – flowering – seasons of flowering – crop regulation – irrigation – manuring – training – pruning for encouraging new shoots and for sanitation – pollarding, bending inter cultivation and inter cropping – harvesting – maturity indices– yield. • **Papaya**-origin–importance–climate–soils–varieties – sex expression–climate–soils–propagation raising of seedlings – planting – land preparation – system of planting – spacing – digging of pits – filling of pits – season of planting – irrigation – manuring – inter cultivation and inter cropping – flowering and fruiting – harvesting – maturity indices – yield – papain – uses and its extraction. • **Pomegranate** – origin–importance – climate soils – varieties – propagation–methods of propagation commercial method of propagation – planting – land preparation – system of planting – spacing– application of manures – season of planting – irrigation – manuring – cropping – harvesting – maturity indices – yield – physiological disorder – fruit ***cracking and its control***	**1** **1**	
Module III: • Apple, Pear and peach - origin – importance –climate – soils – varieties – propagation – methods of propagation root stocks – planting – land preparation – system of planting – spacing – application of manures – training and pruning – irrigation – inter cultivation and inter cropping – harvesting – maturity indices – yield. • Custard Apple – origin – importance – different species of annonaceous fruits – climate – soils – varieties – propagation – raising of seedlings – land preparation – system of planting – spacing – application of manures – training and pruning – irrigation – inter cultivation and intercropping – flowering – factors affecting fruit set – fruiting – harvesting – maturity indices – yield. • Ber & Phalsa – origin – importance – climate – soils –varieties – propagation–method of propagation raising of seedlings and rootstocks used – planting – land preparation – system of planting – spacing – application of manures – training –method of training	**(3)** **1** **1** **1**	Assignments

– pruning for sanitation and bearing – time of pruning – irrigation – inter-cultivation and inter cropping –flowering and fruiting – harvesting–maturity indices – yield;		
Module IV: • **Pineapple –** origin – importance – climate – soils – varieties – propagation – propagation material – commercial method of propagation – planting – land preparation – systems of planting – spacing – application of manures – season of planting – irrigation – inter cultivation – induction of flowering – harvesting – maturity indices–yield. • **Litchi -**. origin – importance – climate – soils – varieties – propagation – methods of propagation – commercial method of propagation – planting – land preparation – systems of planting – spacing – application of manures – season of planting – training and pruning system of training adopted, irrigation – inter cultivation –intercropping – harvesting – maturity indices–yield. • **Sapota & jack fruit** – origin – importance – climate – soils – varieties – propagation – different rootstocks used– planting -land preparation – system of planting – spacing – season of planting – irrigation – manuring – inter cultivation and intercropping – flowering and cropping – harvesting – maturity indices– yield. • **Coconut** – botanical name – family – origin – economic part – importance – botany – varieties – tall, dwarf and hybrids–climate– soil–planting–manuring–irrigation–inter cultivation–harvesting and yield	(3) 1 1 1	Lectures
Module V: • **Arecanut** – Botanical name –family –origin - economic part – importance –botany –varieties –climate –soil - preparation of land – planting – irrigation – manuring – inter cultivation – inter cropping –harvesting – yield–processing. • **Cashew nut** – Botanical name –family –origin - economic part – importance –botany –varieties –climate –soil-preparation of and– planting–irrigation–manuring–inter cultivation–inter cropping– training and pruning – cropping – harvesting – yield– processing. • **Oil palm**– botanical name – family – origin – economic part – importance – botany – varieties – climate – soil – propagation and planting – irrigation – inter cultivation – harvesting – yield– processing. • **Cacao** – botanical name – family – origin – importance – botany – varieties – forastero, criollo and other types – climate – soil – propagation – preparation of land – planting – irrigation – weeding – mulching – pruning – inter cropping – cover cropping – manuring – harvesting – yield – processing.	(3) 1 1 1	Assignments / Lectures

Learning Resources	
1.	Ranjit Singh. 1969. **Fruits**. National Book Trust of India, NewDelhi
2.	Shanmugavelu, K.G. **Production Technology of fruits**. Oxford and IBH, NewDelhi
3.	Hays, W.B. 1953. **Fruit Growing in India**. Kitabistan-Allahabad
4	Bose, T.K.N. and Mitra, S.K. 1990. **Fruits- Tropical and SubTropical**
5	Shanmugavelu, K. and Madhavarao, V.N. 1977. **Spices and Plantation Crops**. Popular Bookdepot, Madras.
6	Thampan, P.K. 1980. **Coconut**. Oxford and IBM Publishing Co. NewDelhi.
7	Kumar, N., Abdul Khader, J.B.M, Ranga Swami, P. and Irulappan, I. 1991. **Spices, Plantation Crops. Medicinal and Aromatic plants**. Oxford and IBH Co., New Delhi and Kolkata.

PESTS OF CROPS, STORED GRAINS AND THEIR MANAGEMENT

Credits: 2 **Semester: V**

Subject code: AG20507 **No. of lecture hours:30**

Objective: Economic importance and popular classification, distribution, biology, nature, and systems of damage and control measures of insect pests listed under I to IV units.

COURSE OUTCOMES

CO1: Identify marks, nature of damage, damaging symptoms and control measures of pests of cereal crops

CO2: Analyze identification marks, nature of damage, damaging symptoms and control measures of pests of oilseed and fiber crops

CO3: Summarize identification marks, nature of damage, damaging symptoms and control measures of pests of fruit crops

CO4: Explain identification marks, nature of damage, damaging symptoms and control measures ofpests of vegetable crops

CO5: Compare identification marks, nature of damage, damaging symptoms and control measures of pests of flower crops and store grain pests

Course Content	Hours Allotted	Pedagogy
Module I: • Introduction to economic entomology and economic classification of insect pest of cereal crops • Paddy: Paddy stem borer, Gall midge, Hispa, Green leaf Hoppers, leaf roller and Gundhi bug, panicle mite, IPM practices of rice. • Sorghum and other millets: Shoot fly, stem borer, midge and ear head bug, ragi cut worm, ragi pink borer, wheat ghujia weevil. • Maize: Stem borer and Cob worm • Sugarcane: Early shoot borer, Topshoot borer, Internodal borer, scales, mealy bug, termites, leaf hoppers, wooly aphid	(6) 2 2 1 1	Power point presentations / Lectures
Module II: • Cotton: Boll worms, Thrips & White fly, Jassids, Aphids, Thrips, Mites, whiteflies, red cotton bug, leaf roller, dusky cotton bug, IPM In cotton. • Groundnut: Leaf Miner, Root grubs, Thrips, Jassids, Aphids, *Spodoptera*, *Helicoverpa*, Hairy caterpillars. • Sesamum: Pod borer, Vectors of phyllody. • Safflower Aphids caterpillar. • Mustard saw fly, pests of sunflower: Helicoverpa and Spodoptera • Castor: Semilooper, shoot & capsule borer, jassids and *Spodoptera* • Pulses: Gram pod borer, pod fly, plume moth and Blue butterfly, Aphids, Spotted pod Borer.	(6) 1 1 1 1 1 1 1	Case Studies / Review of research articles
Module III: Coconut: Black headed caterpillar, Rhinoceros beetle and Red palm weevil.	(6) 2	Assignments

Mango: Hoppers, nut weevil & stem borer ,leaf webber, fruit fly. Citrus: Citrus butterfly, leaf miner, fruit sucking moths, Anar butterfly. Guava: Fruit fly apple wooly aphid, coddling moth	2 1 1	
Module IV: • Pest of Grape (Flea beetle, mealybug, stem girdler & thrips), Banana (Rhizome weevil), Sapota (leaf webber) cashew (stem borer) Pests of Chilli (Thrips, mites & fruit borer), moringa hairy caterpillar, Tomato (Fruit borer), cucurbit fruit fly. • Tobacco: Aphids & Tobacco caterpillar, leaf miner, • Brinjal: Shoot & Fruit Borer, Epilachna beetle • Cabbage: Diamond back moth, Borer, Webber, • Pests of Ber, custard apple, Turmeric, ginger, potato (tuber moth), sweet potato (weevil), Bhendi (fruit borer) and onion (thrips)	(6) 1 1 1 1 1 1	Lectures
Module V: • Pests of Coffee (Borers, scales) and tea (mosquito bug) • Pests of Rose (Thrips, scales, chaffer beetles), Jasmine (budworm) and chrysanthemum (aphids) • Stored grain pests and their management • Locusts – phases, breeding places, migration, damage & control. **Note: 1.** Detailed Biology will be dealt for major pests only. Mentioning of minor pests.	(6) 1 2 1 1 1	Assignments / Lectures

Learning Resources	
1.	Atwal, A.S. 1976. **Agricultural Pests of India and South East Asia**. Ludhiana: Kalyani Publishers.
2.	Butani, D.K. and Jotwani, M.G. 1984. **Insects in Vegetables**. New Delhi: Periodical ExportBook Agency.
3.	Butani, D. K. 1984. **Insects and Fruits**. New Delhi: Periodical Export Book Agency.
4	Dennis S. Hill. 1987. New York. **Agricultural Insect Pests of tropics and their control**.Cambridge University Press.
5	Khare, S.P. 1993. **Stored Grain Pests and Their Management**. Ludhiana: Kalyani Publishers.
6	Nair, M.R.G.K. 1986. **Insects and Mites of crops in India**. New Delhi.ICAR.
7	Ramakrishna Ayyar, T.V. 1963. **Handbook of Economic Entomology for South India**. Madras: Government Press.
8	Upadhyaya K.P. and Kusum Dwivedi. 1996. **A Text Book of Plant Nematology**. Meerut:Aman Publishing House.
9	Vasantharaj David, B. 2003. **Elements of Economic Entomology**. Coimbatore: Popular Book Depot.
10	Vasantharaj David, B and Aanatha krishnan, T.N. 2006. **General and Applied Entomology**.New Delhi: Tata McGraw-Hill Publishing House.

RENEWABLE ENERGY AND GREEN TECHNOLOGY

Credits: 1 **Semester: V**

Subject code: AG20509 **No. of lecture hours: 15**

Objective: To impart knowledge on renewable energy sources

Course outcome:

CO1: Introduction to energy sources

CO2: Explain different types of biogas plants, gasifiers, solar water and air heaters, solar cookers, and solar dryers.

CO3: Design Briquette and Solar Collectors

CO4: Interpret Solar energy applications

CO5: Explain types of windmills, biodiesel, and ethanol production.

Course Content	Hours Allotted	Pedagogy
Module I: • Introduction to different renewable energy sources - classification, advantages and disadvantages. • Biomass - importance of biomass, classification of energy production, • Principle of combustion, pyrolysis and gasification.	**(3)** **1** **1** **1**	Power point presentations / Lectures
Module II: • Biogas - principle of biogas production, advantages, disadvantages, and its utilization. • Biomass plants – classification, types, and constructional details of biogas plants. • Gasifier - types of gasifiers, producer gas, and its utilization	**(3)** 1 1 1	Case Studies / Review of research articles
Module III: • Briquette - types of briquetting machine and uses of briquettes. • Mode of heat transfer – conduction, convection and radiation. • Solar collectors- flat plate collectors and focusing type collectors	**(3)** 1 1 1	Assignments
Module IV: • Solar energy applications – working principle of solar water heater, • solar air heater, solar dryers, solar distillation, solar pond and solar cooker. • Solar photovoltaic system – solar lantern, streetlights, fencing and pumping system	**(3)** **1** **1** **1**	Lectures
Module V: • Wind energy – windmills, parts of wind mill, types, terms used and their applications	**(3)** 1	Assignments / Lectures

• Bio-fuels-bio-diesel production (transesterification process). • utilization of biodiesel in IC engines, ethanol production from agricultural waste and uses	1 1	

Learning Resources	
1.	Non-Conventional Energy Sources - Rai G. D., 1984. Khanna Publishers, New Delhi.
2.	Renewable Energy Sources and Conversion Technology - Bansal N. K., 1990. Tata McGraw Hill publications CO. Ltd., New Delhi.
3.	Solar Energy Utilization - Rai G. D., 1984. Khanna Publishers, New Delhi.
4	Solar Energy - Sukatme S. P., 1985. Tata McGraw Hill publications CO. Ltd., New Delhi.
5	Production of biodiesel from Jatropha Carcus oil by using pilot biodiesel plant - Ramesh D, Samapathrajan A and Venkatachalam P., 2009. TNAU Coimbatore.
6	Biotechnology and other Alternate Technology Chakravarthi A, 1989.OxfordIBHpublications CO.Ltd., New Delhi.

WEED SCIENCE AND THEIR MANAGEMENT

Credits: 2 **Semester: V**

Subject Code: AG20510A **No. of lecture hours: 30Hrs**

Objective: To impart knowledge on various aspects of weeds and different methods of weed management for sustainable and higher crop production and also to develop reasonably good technical expertise and competence on weed management

Course outcomes:

CO1: Classify weeds and weed dispersal

CO2: Summarize Crop weed competition and Integrated weed management

CO3: Compare and contrast herbicides

CO4: Interpret mode of herbicide action

CO5: Recommend weed management practices in various crops

Course Content	Hours Allotted	Pedagogy
Module I: • **Introduction**: Definition of weed, harmful and beneficial effects of weeds. • Classification of weeds based on taxonomy (morphology), life cycle, habitat, origin, soil pH with suitable examples. • Propagation of weeds sexual-asexual-vegetative reproduction. • Dissemination of weeds seed and fruits dispersal agents-wind and water-animal-man-manures-farm implements and silage-dispersal of vegetative propagules. • Weed biology-characteristic features of weeds. • Weed ecology-definitions –persistence of weeds-climatic, edaphic and biotic factors	(6) 1 1 1 1 1 1	Power point presentations / Lectures
Module II: • Crop weed competition-principles-factors-critical period of crop of crop-weed competition in someimportant crops. • Allelopathy and its application for weed management. • Methods of weed management-preventive weed control measures. • Physical/mechanical, cultural weed management practices. • Chemical and biological methods of weed control-bio herbicide and their application in agriculture. • Integrated weed management-concept and components	(6) 1 1 1 1 1 1 1	Case Studies / Review of research articles
Module III: • Herbicides: definition, advantages, disadvantages & limitations of herbicide usage in India. • Herbicide classification-based on chemical nature-time	(6) 1 1	Assignments

and method of application, and selectivity-spectrum • Translocation-residual nature-soil sterilant and fumigants. • Types of formulations of herbicide-Soluble concentrate (SC), Soluble liquid (SL), Soluble powder (SP), Wettable powder (WP), Suspension/flowable concentrates, Water Dispersal granules(WDG), Emulsifiable concentrate (EC), Micro-emulsifiable concentrate. • Nomenclature of herbicides - commonly available herbicides in India. • Adjuvants-definition, their use in herbicide application	1 1 1 1	
Module IV: • Mode of action of herbicides, important bio-chemical modes of action of herbicides interfering with photosynthetic reactions, respiration, enzymatic inhibition etc. • Selectivity of herbicides – fundamental principles of selectivity. Differential rate of absorption of herbicides – differences in morphology and growth habits of plants-rate of translocation of herbicides. • Selectivity of herbicides-differential rate of of deactivation of herbicides-reverse metabolism- conjugation-protoplasm resistance to the specific herbicide. • Herbicidal resistance and management - Definition of resistance-Development of herbicide resistance in weeds and their management. • Herbicide rotation, mixtures and relevance in agriculture. • Compatibility of herbicides with agro-chemicals and their application. • Herbicide residue management-persistence and residue of herbicides-management of herbicide residue in soil-cultural and mechanical- enhancing biodegradation - deactivation of herbicides	(6) 1 1 1 1 1 1	Lectures
Module V: • New developments in herbicides-micro herbicides and nano herbicides. • weed management in cereals and millets. • Weed management in pulses and oil seeds, sugarcane and cotton. • weed management in orchards, vegetables and non-cropped areas. • Shift of weed flora in crops and cropping systems. • Aquatic weeds and their management. • Problematic weeds and management.	(6) 1 1 1 1 1 1	Assignments / Lectures

Learning Resources	
1.	Crafts, and Robbins, WW. 1973.Weed Control. New Delhi: Tata McGraw-Hill Publishing Co.Ltd.
2.	Gupta, OP. 1984. **Scientific Weed Management**. New Delhi: Today and Tomorrow Printers and Publishers
3.	Gupta, OP. 2004. **Modern Weed Management**. Jodhpur: Agro Bios (India).
4	Rao, VS. 2000. **Principles of Weed Science**. New Delhi: Oxford & IBH Publishing Co.
5	Subramanian, S., Ali Mohammed, A. and Kumar Jaya, R. 1991. Ludhiana**: All About Weed Control**. Kalyani Publishers
6	Tadulingam, C. and Venkat narayana, D. 1955. **A Handbook of Some South Indian Weeds**. Madras: Government Press
7	Thakur, C. 1977. **Weed Science**. New Delhi: Metropolitan Book Co. Pvt. Ltd.

SOIL, WATER, PLANT AND SEED TESTING

Credits: 2 **Semester: V**

Course code: AG22510B **No. of lectures:30**

Objective: To impart knowledge on soil, plant, water and seed testing methods

COURSE OUTCOMES:

CO1: Analyse chemical properties of soil and their importance on Plant growth

CO2: Analyse physical properties of soil and their importance on Plant growth

CO3: Interprets analytical data of various chemical and physical properties of soils

CO4: Demonstrate DRIS methods and its importance

CO5: Explain significance of seed and its characters on crop productivity

Course Content	Hours Allotted	Pedagogy
Module I: • pH definition, principle - pH scale – soil pH, its importance in crop nutrition. • Rating chart - working problems on pH and H^+ and OH^- ion concentrations, measurements of pH in soils and irrigation water. • EC, definition, Principles of wheatstone bridge – effect of EC on seed germination, water and nutrient uptake, measurement of EC of soils and irrigation waters. • Working principle of spectrophotometer – calorimetry, beer lambart law. • Working principles of flame photometer – Emission spectrometry – Absorption spectroscopy merits and demerits, precautions.	(6) 1 1 1 1 2	Power point presentations / Lectures
Module II: • Soil analysis – objectives – sampling of soil, procedure and precautions – advantages and limitations. • Soil texture, definition, determination – importance of soil texture on plant growth. • Soil structure, definition, determination - importance of soil structure on plant growth. • Bulk density and porosity - definition, determination and importance on plant growth • Soil air, importance, composition, characterization of soil aeration – ODR. • Soil temperature, importance, measurement - diurnal variations of soil temperature at different soil depths	(6) 1 1 1 1 1 1	Case Studies / Review of research articles

Module III: • Interpretation of analytical data viz., pH, EC, Organic carbon – N, P, K, S and micronutrients – nutrient index and their relative optimum values. • Interpretation of analytical data viz., Soil texture, structure, aeration, soil temperature and their relative optimum values. • Plant analysis – sampling stages and plant part to be sampled in various agriculture and horticultural crops. • Analysis of nutrients – quantitative rating of plant analysis data and interpretation of results – critical Nutrient concentration – critical nutrient ranges.	(6) 2 1 1 2	Assignments
Module IV: • DRIS, nutrient ratios, DRIS chart – benefits and limitations • Water analysis – quality criteria – classification. • suitability of irrigation water – water quality index. Use of soil testing kit for major and micro-nutrient analysis.	(6) 2 2 2	Lectures
Module V: • Floral biology - anthesis – pollination – fertilization, seed formation – filling – physiological maturity and harvest maturity of field crops. • Physiological – biochemical – metabolic processes during seed development and transformation – seed morphological features. • Seed structures – composition and functional components of seed- seed viability and seedling vigour, and storage • Seed quality and its significance on crop productivity – germination – physical purity – genetic purity – Seed health and moisture content assessment and prescribed standards	(6) 2 1 1 2	Assignments / Lectures

Learning Resources	
1.	Soil Science – An Introduction 2015 Indian Society of Soil Science, IARI, New Delhi
2.	Saline and alkaline soils of India R.P. Agarwal, J.S.P. Yadav and R.N. Gupta 1968 IARI, New Delhi
3.	Saline and Alkaline soils Richard, L.A. 1997 USDA, Oxfords & IBM publishers
4	Nature, properties and management of saline and alkali soils G.L. Maliwal and L.L. Sumani 2014 Agrotech Publishing Academy
5	Thomson, J.R. 1979. **An Introduction to Seed Technology**. London: Leonard Hill.
6	Agrawal, P.K. and Dadlani. 1986. **Techniques in Seed Science and Technology**. New Delhi: South AsianPublishers.

RAINFED AGRICULTURE AND WATERSHED MANAGEMENT

PRACTICALS

Credits: 1 **Semester: V**
Subject code: AG20511 **No. of Lecture hours:30**

Objective: To gain knowledge on rainfall pattern and soil & moisture conservation measures

Outcome: Students will be able to analyze rainfall pattern and learn various soil and moisture conservation measures for better crop production

Practical

1. Studies on climate classification,
2. Studies on rainfall pattern in rainfed areas of the country
3. Pattern of onset and withdrawal of monsoons.
4. Studies on cropping pattern of different rainfed areas in the country
5. Demarcation of rainfed area on map of India.
6. Interpretation of meteorological data
7. Scheduling of supplemental irrigation on the basis of evapotranspiration demand of crops.
8. Critical analysis of rainfall and possible drought period in the country
9. Effective rainfall and its calculation.
10. Studies on cultural practices for mitigating moisture stress.
11. Characterization and delineation of model watershed.
12. Field demonstration on soil & moisture conservation measures.
13. Field demonstration on construction of water harvesting structures.
14. Visit to rainfed research station/watershed.

CROP IMPROVEMENT – I (Kharif crops)

PRACTICALS

Credits :1 **Semester: V**

Subject code: AG20512 **No. of practical hours:30**

Objective: To impart knowledge on origin, distribution and breeding objectives of various crops

Outcome: Students will be able to understand the concepts of breeding objectives for various stresses and hybrid seed production in different crops.

PRACTICAL

1. Floral biology-Types of inflorescence, flower structure of monocots and dicots, floral formula and diagram.
2. Emasculation and hybridization techniques in Rice and Maize
3. Emasculation and hybridization techniques in Jowar, Bajra, and Ragi
4. Emasculation and hybridization techniques in Red gram, blackgram, Greengram and Cowpea
5. Emasculation and hybridization techniques in Groundnut, Soybean and Sesame
6. Emasculation and hybridization techniques in Castor, Cotton ,Tobacco
7. Maintenance breeding of different kharif crops Rice, Maize, Jowar, Red gram, Groundnut
8. Maintenance breeding of different kharif crops: Castor, Cotton, Tobacco.
9. Handling of germplasm and segregating generations by different methods-Pedigree, Bulk and SSD methods.
10. Study of field techniques for varietal seed production and hybrid seed production in rice and maize..
11. Study of field techniques for varietal seed production and hybrid seed production in sorghum and red gram.
12. Study of field techniques for varietal seed production and hybrid seed production in castor and cotton.
13. Estimation of heterosis, inbreeding depression and heritability.
14. Layout of field experiments.
15. Study of quality characters, donor parents for different traits in different kharif crops and Visit to seed production plots- ACRIP plots for different kharif crops.

ENTREPRENEURSHIP DEVELOPMENT & BUSINESS COMMUNICATION

PRACTICALS

Credits: 1 **Semester: V**

Subject Code:AG20513 **No. of lecture hours:30**

Objective: To impart first-hand information on various entrepreneurial activities and business negotiation.

Outcome: Students will be able to study successful enterprises, develop project proposals and prepare project reports.

Practical Topics

1. Simulation exercise on assessing entrepreneurial traits
2. Practical exercise on problem-solving skills
3. Practical exercise on managerial skills
4. Achievement motivation and goal setting
5. Identification and selection of business ideas
6. Practical exercise on decision-making
7. Planning, Preparation of business plan, and proposal writing
8. Monitoring and supervision of entrepreneurial activities
9. Presentation of business proposal
10. Practical exercises on time Management /time Audit
11. SWOT analysis of selected enterprise
12. Leadership Skills: organization skills
13. Visit to the Entrepreneurship Development Institute
14. Business Communication and Negotiation
15. Field Visit to Successful Enterprise - Study of Characteristics of Successful Entrepreneurs - Case Study.

DISEASES OF FIELD CROPS, HORTICULTURE CROPS-I & THEIR MANAGEMENT PRACTICALS

Credits :1 **Semester:V**

Subject code:AG20514 **No of Practical hours:30**

Objective: To diagnose the plant disease based on symptomatology and to understand the etiology and host-parasite relationship.

Outcome: Students will be able to gain knowledge on various diseases of field crops and their management

1. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measures of diseases of rice
2. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of sorghum
3. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of pearl millet and wheat
4. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of finger millet and maize
5. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of sugarcane
6. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of tobacco
7. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of groundnut
8. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measures of diseases of safflower and sunflower
9. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of castor and sesamum
10. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of mustard
11. Study of symptoms, cause, etiology, host-parasitic relationship, and specific control measures of diseases of cotton
12. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measures of diseases of red gram, green gram and black gram
13. Study of symptoms, cause, etiology, host-parasitic relationship and specific control measuresof diseases of Bengal gram, Pea, Lentil and soybean
14. Diseases of Mango, citrus, Apple, Grape
15. Field visits at appropriate time during the semester.
16. Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation ofplant diseased specimens for herbarium.

Note: Students should submit 50 pressed and well-mounted specimens.

PRINCIPLES OF INTEGRATED PEST & DISEASE MANAGEMENT

PRACTICALS

Credits: 1 **Semester: V**

Subject code: AG20515 **No. of lecture hours: 30**

Objectives:

- To gain practical knowledge of insect population distribution
- To attain knowledge on factors influencing insect population
- To know the calculations on concentrations of different insecticides
- To gain knowledge on different insecticide formulations

ENTOMOLOGY

1. Methods of diagnosis and detection of various insect pests
2. Sampling techniques for estimation of insect population and damage
3. Pest surveillance through light traps, pheromone traps and forecasting of pest incidence.
4. Calculation of doses/concentrations of different insecticidal formulations.
5. Acquaintance of insecticide formulations
6. Mass multiplication techniques of important parasitoids.
7. Mass multiplication techniques of important predators.
8. Mass multiplication techniques of important microbial pathogens.
9. Insecticide classification, safety measures of insecticide application and specific antidotes.
10. Methods of diagnosis and detection of plant diseases

PATHOLOGY

11. Methods of plant disease measurement- phyto-pathometry, monitoring, assessment of disease severity and calculation of incidence levels
12. Forecasting of plant diseases
13. Isolation and Identification of biocontrol agents. Mass multiplication of *Trichoderma, Pseudomonas*
14. Study of fungicides and their formulations.
15. Methods of application and Safety issues in Fungicide uses. Calculation of fungicide sprays concentrations.

Laboratory manuals

- Dhaliwal GS and Ramesh Arora 2001. Integrated pest management. Concepts and approaches, Kalyani Publishers Ludhiana
- Gautam, R.D 2008 Biological Pest Suppression. Westville publishing House NewDelhi.
- Yazdani, S.S and Agarwal, M.L.1979. Elements of Insect Ecology. Nervosa PublishingHouse, NewDelhi.

PRODUCTION TECHNOLOGY OF FRUITS AND PLANTATION CROPS

PRACTICALS

Credits:1 **Semester: V**

Subject Code: AG20516 **No. of lecture hours:30**

Objective: To impart knowledge on production technology of fruit crops and plantation crops.

Outcome: Students will be able to gain knowledge on propagation methods in Fruit and Plantation crops and their varieties.

1. Identification and description of fruits
2. Identification and description of Plantation crops
3. Identification and description of varieties of Mango, Guava,
4. Identification and description of varieties of Guava Papaya,
5. Identification and description of varieties of Sapota, Banana and Citrus, and Pomegranate
6. Identification and description of varieties of Coconut, Arecanut, and Cashewnut
7. Propagation methods of fruit crops
8. Propagation methods of Plantation crops.
9. Seed propagation –scarification and stratification of seed
10. Physiological disorders of fruit crops
11. Identification and description of varieties of Grape
12. Preparation of plant bio-regulators and their use
13. 14, 15 Visit to orchards/ Fruit Research Stations/ Commercial plantations.

PESTS OF CROPS, STORED GRAINS AND THEIR MANAGEMENT PRACTICALS

Credits:1 **Semester: V**

Subject code: AG20517 **No. of practical hours:30**

Objective: To know the nature and symptoms of damage of pests in different crops.

Outcome: Students will be able to identify insect and non-insect pests and diagnose the different insect pests based on symptoms of damage.

1. Typical symptoms of damage by various phytophagous insects
2. Identification of major insect pests of cereals & millets and their damage symptoms
3. Identification of insect pests of sugarcane & pulses and their damage symptoms
4. Identification of insect pests of cotton & other fibre crops and their damage symptoms
5. Identification of insect pests of oil seed crops and their damage symptoms
6. Identification of insect pests of vegetables and their damage symptoms
7. Identification of insect pests of mango, cashew & banana and their damage symptoms
8. Identification of insect pests of citrus, sapota & ber and their damage symptoms
9. Identification of insect pests of grapevine, pomegranate & guava and their damage symptoms
10. Identification of insect pests of coconut, turmeric, and betelvine.
11. Identification of insect pests of onion, ginger & tobacco and their damage symptoms
12. Identification of insect pests of flower & ornamental plants and their damage symptoms
13. Identification of insect pests of stored grains & their products and their damagesymptoms

14 & 15. Assessment of losses due to insects in storage. Fumigation of grain store/godown.

PRACTICAL CROP PRODUCTION-I
PRACTICALS

Credits: 1 **Semester: V**

Subject code: AG26518 **No. of practical hours: 30**

PRACTICAL

1. Crop planning in multiple cropping systems.
2. Field preparation and layout of experiment plots.
3. Seed treatment and nursery raising in paddy.
4. Sowing of crops in individual plots.
5. Time and method of fertilizer application for *kharif* crops.
6. Recording bio-metric observations
7. Water management for different *kharif* crops.
8. Study of weed control methods in *kharif* crops (Rice, redgram, , cotton etc.)
9. Study of plant protection measures in *kharif* crops (Rice, cotton, etc,)
10. Methods of harvesting, yield recording and post-harvest care.
11. & 12. Visit to seed production farm.
13. Visit to Integrated Farming system unit.
14. Visit to farm mechanization unit.
15. Preparation of Balance sheet

RENEWABLE ENERGY AND GREEN TECHNOLOGY

Credits: 1 **Semester: V**
Subject code: AG20519 **No. of lecture hours:30**

Objective: To impart knowledge on sources of renewable energy.

Outcome: The students will able to gain knowledge on different types of biogas plants, gasifiers, briquetting, solar still, solar water heaters, solar cookers, solar dyers, wind mills and biodiesel production.

PRACTICALS

1. Constructional details of KVIC and Janata type biogas plants.
2. Constructional details of Dheen Bandu type biogas plants.
3. Constructional details of different types of gasifiers.
4. Study the performance of gasifiers.
5. Study the briquettes preparation from biomass.
6. Study the efficiency of solar cooker.
7. Study the performance of a solar still.
8. Study the performance of a solar dryers.
9. Study the working of solar photovoltaic pumping system.
10. Study the performance evaluation of domestic solar water heater.
11. Study the performance evaluation of solar lantern.
12. Study the performance evaluation of solar streetlight.
13. Study the performance of different types of windmills.
14. Field visit to biogas plants and windmills.
15. Study the processing of bio diesel production from Jatropha.

WEED SCIENCE AND THEIR MANAGEMENT

PRACTICALS

Credits: 1 **Semester: V**
Subject Code: AG20520A **No. of practical hours: 30**

Objective: To develop mastery of weed identification and get acquainted with different herbicides.

Outcome: Students will be able to develop mastery of weed identification and technical know-how oncomputation of herbicide doses.

PRACTICALS

1. Identification of weeds and study of losses due to weeds
2. Biology and survey of weeds in cropped area and other habitats
3. Techniques of weed preservation-Herbarium preparation
4. Determination of critical period of crop weed competition under field conditions and study of crop-associated weeds
5. Estimation of weed population dynamics and efficacy of herbicides (WCE and WI)
6. Study of biology of important problematic weeds
7. Study of biology of parasitic and aquatic weeds
8. Study of weed flora study in long term experiments
9. Study of commonly available herbicides in the market, their nomenclature and label information.
10. Study of herbicide formulation and mixture of herbicides
11. Computation of herbicide doses and Herbicide residue analysis
12. Study of herbicides application equipment and calibration
13. Herbicide application methods and precautionary measures
14. Herbicides phytotoxicity scoring under field conditions and its compatibility with agrochemicals
15. Field study of weed control in cropped and cropped areas.

SOIL, WATER, PLANT, AND SEED TESTING PRACTICALS

Credits :1 **Semester: V**

Subject Code: AG22520B **No. of practical hours: 30**

Objective: To gain in depth understanding and hands -on experience on soil, water, plant and seed testing

Outcome: Students will be able to analyse the soil quality in terms of available nutrients, judge the quality of irrigation water and determine the plant analysis in terms of absorbing nutrients and know the seed quality

PRACTICALS

1. Collection and preparation of soil samples
2. Estimation of pH and EC in soil sample
3. Estimation of soil organic carbon (qualitative and quantitative)
4. Estimation of available nitrogen by Subbaih and Asija method
5. Estimation of available soil phosphorus by Olsens methods
6. Estimation of available soil potassium by flame photometer method
7. Estimation of nitrogen in plant sample
8. Estimation of phosphorus in plant sample
9. Estimation of potassium in plant sample
10. Estimation of pH and EC and chlorides in irrigation water
11. Study the Floral biology of major field crops
12. Physical purity test – purification of seeds, inert matter, weed seeds, other crop seeds
13. Genetic purity and grow-out tests
14. Determination seed moisture content and seed health tests
15. Seed vigour and viability tests

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE
B.Sc. (Hons.) AGRICULTURE
SIXTH SEMESTER
ACADEMIC YEAR-2026-27 OF 2024-28 BATCH (CBCS)

Sl. No.	Part	Subject Code	Title of the Subject	Hours/ week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	AG20601	Farming Systems and Organic farming for Sustainable Agriculture (Core 38)	2	3	40	60	100	2
2	II	AG20602	Geo-informatics and Nano technology for Precision Farming (SEC -4)	1	3	40	60	100	1
3	II	AG20603	Management of Beneficial insects (Core 39)	1	3	40	60	100	1
4	II	AG18604	Protected Cultivation & Secondary Agriculture (Core - 40)	1	3	40	60	100	1
5	II	AG20605	Livestock, poultry and fisheries management (Core 41)	2	3	40	60	100	2
6	II	AG20606	Diseases of Horticulture crops - II & their Management. (Core-42)	2	3	40	60	100	2
7	II	AG20607	Post harvest Management & VA of Fruits and Vegetables. (SEC-6)	1	3	40	60	100	1
8	II	AG20608	Comm. skills and Personality. Development. (SEC-7)	1	3	40	60	100	1
9	II	AG19609 A	Agri chemicals (DSE-3)	2	3	40	60	100	2
		AG20609 B	Commercial Plant Breeding (DSE-3)						
PRACTICALS									
10	II	AG20610	Farming Systems and Organic Farming for Sustainable Agriculture (Core 38)	2	3	40	60	100	1
11	II	AG20611	Geo-informatics and Nano technology for Precision Farming (SEC -4)	2	3	40	60	100	1
12	II	AG20612	Practical crop production -II (Rabi Crops) (SEC-5)	2	3	40	60	100	1
13	II	AG20613	Management of Beneficial Insects (Core 39)	2	3	40	60	100	1
14	II	AG18614	Protected Cultivation & Secondary Agriculture (Core - 40)	2	3	40	60	100	1
15	II	AG20615	Livestock, poultry, and fisheries management (Core 41)	2	3	40	60	100	1
16	II	AG20616	Diseases of Horticulture crops-II & their Management. (Core 42)	2	3	40	60	100	1
17	II	AG20617	Post-harvest Management &VA of fruits and vegetables (SEC-6)	2	3	40	60	100	1
18	II	AG20618	Communication Skills and Personality Development (SEC-7)	2	3	40	60	100	1
19	II	AG19619 A	Agri Chemicals (DSE-3)	2	3	40	60	100	1
		AG20619 B	Commercial Plant Breeding (DSE-3)						
Total				**33**		560	840	1400	**23**

FARMING SYSTEMS AND ORGANIC FARMING FOR SUSTAINABLE AGRICULTURE

Credits: 2 **Semester: VI**
Course Code: AG20601 **No of Lecture Hours: 30**

Course Objective: To impart knowledge on the fundamentals of farming systems and organic farming towards sustainable agriculture to improve the economic conditions of the farmer.

Course Outcome:

CO1: Explain the concepts of Farming systems &allied enterprises
CO2: Understand the significance of sustainable Agriculture& Integrated farming systems
CO3: Explains Resource use efficiency, need – scope – principles – characteristics - relevance to modern Agriculture
CO4: Explains insect pest, disease and weed management under organic mode of production-cultural biological and non-chemical pest and disease management
CO5: Explains Marketing and export, Inspection-certification- and accreditation procedures for organic products

Course Content	Hours Allotted	Pedagogy
Module I: • Farming system – introduction - scope, importance and concept-principles of farming system related • Types of farming systems-advantages and limitations-suitability-factors affecting the farming system • Farming systems-system approach- determinants of farming system-cropping systems-and related terminology. • Allied enterprises-significance of integrating crop and livestock enterprises-components and maintenance- dairying and sheep and goat rearing-breeds-housing-feed and fodder requirements - biogas plant. • Allied enterprises poultry farming-breeds housing-feed and fodder requirements-apiculture-species and management • Allied enterprises – sericulture - moriculture and silkworm rearing- agro-forestry systems suitable for dry land farming • Tools for determining production and efficiencies in different farming and cropping systems.	(6) 1 1 1 1 1 1	PowerPoint presentations / Lectures
Module II: • Adverse effects of modern agriculture -sustainable agriculture-definition-concept-goals-elements. • Problems related to soil water and environment-adaption and mitigation strategies-indicators of sustainability • Conservation agriculture-concepts-need-management of natural resources-land water and vegetation	(6) 1 1 1	Case Studies / Review of research articles

• Techniques for sustainability - Low External Input Agriculture (LEIA) and Low External Inputs for sustainable agriculture (LEISA) and HEIA (High External Input Agriculture). • Integrated Farming System - Historical background, objectives, characteristics, and advantages. • Site-specific development of IFS models for different agro - climatic zones of India and Telangana	1 1 1	
Module III: • Resource use efficiency-optimization of resource use by different methods in IFS • Resource cycling-flow of energy in different farming systems. • Organic farming - definition – need – scope – principles - characteristics - relevance to modern agriculture • Different eco-friendly farming systems - biological farming natural farming, regenerative agriculture – permaculture - biodynamic farming. • Initiatives taken by state and central government, NGO's and other organizations for promotion of organic agriculture. • Organic eco systems and their concepts-organic nutrient sources-organic manures and methods of composting.	(6) 1 1 1 1 1 1	Assignments
Module IV: • Green manures-bio-fertilizers-types, methods of application-benefits and limitations. • Nutrient management in organic farming. • Choice of crops and varieties in organic farming-crop rotations-multiple cropping-need and benefits. • Fundamentals of insect pest, disease and weed management under organic mode of production-cultural biological and non-chemical pest and disease management. • Botanicals –pyrethrum, neem seed kernel extract, neem seed powder, neem oil and neem formulations.	(6) 1 1 1 2 1	Lectures
Module V: • Marketing and export potential of organic products-opportunities and constraints. • Operational structure of NPOP- other agencies for organic production. • Inspection-certification - and accreditation procedures for organic products. • Processing- labelling and economic considerations and viability.	**(6)** 1 2 2 1	Assignments / Lectures

Learning Resources	
1.	Arun K. Sharma. 2006. **A Handbook of Organic Farming**. Jodhpur: Agrobios (India).
2.	Dahama, A.K. 2007. **Organic Farming for Sustainable Agriculture**.Jodhpur: Agrobios (India).
3.	Deb, D.L. 1994. **Natural Resources Management for Sustainable Agriculture and Environment**.New Delhi: Angkor Publishers.
4.	Ruthenburg, H. 1971. **Farming Systems in Tropics**. London: Clarendon Press
5.	Saroja Raman. 2006. **Agricultural Sustainability – Principles, Processes & prospects**. New York: Food Products Press.
6.	Subramaniyan, S. 2004. **Globalization and Sustainable Agriculture**. Ludhiana: Kalyani Publishers
7.	Thampan, P.K. 1993. **Organics in Soil Health and Crop Production**.Cochin: Peekay Tree Crops Development Foundation.
8.	Dushyent Gehlot. 2005. **Organic farming - standards, accreditation, certification and inspection**. Agrobios, India.357p
9.	Reddy SR2017. **Farming system and sustainable agriculture** Kalyani publishers. (India)
10.	Reddy SR2017. **Principles of organic farming** Kalyani publishers.(India)

GEO-INFORMATICS AND NANOTECHNOLOGY FOR PRECISION FARMING

Credits: 1 **Semester: VI**

Course Code: AG20602 **No of Lecture Hours:15**

Course Objective: To impart knowledge on GIS, GPS, and Crop simulation models, Remote sensing in Precision Farming

Course Outcome:

CO1: Explains the concepts of geo-informatics in precision agriculture
CO2: Illustrates GIS data modeling and graphic representation of spatial data
CO3: Analyses Remote sensing and Global Positioning System (GPS) concepts, and applications in Agriculture
CO4: Distinguish Crop Simulation Models
CO5: Classify nanoparticles and their applications in agriculture

Course Content	Hours Allotted	Pedagogy
Module I: • Precision Agriculture - Concepts and techniques - their issues and concerns for Indian Agriculture • Geo-informatics – definition, concepts- Tools and techniques - Applications of Geoinformatics and its use in Precision Agriculture • Crop discrimination and yield monitoring – Spectral signatures, NDVI concept and Principles, yield monitors, GPS receiver	(3) 1 1 1	PowerPoint presentations / Lectures
Module II: • Soil mapping and fertilizer recommendation using geospatial technologies - Supervised and unsupervised mapping and classification • Spatial data and their management in GIS–Stages of GIS data modeling-graphic representation of spatial data, Vector& Raster • GIS models and their comparison –database management systems-GIS data file management; database models and storage	(3) 1 1 1	Case Studies / Review of research articles
Module III: • Remote sensing concepts and application in Agriculture– Principles, Remote sensing process- electromagnetic spectrum-atmospheric interactions with electromagnetic radiation-remote sensing platforms and sensors-key elements of visual image interpretation - applications in agriculture. • Image processing and interpretation – Characters of digital image, pre-processing, corrections, image registration, enhancement, filtering & transformations, Image	(3) 1 1 1	Assignments

classification. • Global positioning system (GPS), components and its functions- Maps, classification and scale of maps, spatial referencing system, linkage between RS, GPS and GIS		
Module IV: • Introduction to Crop Simulation Models – Concepts and principles- their use for optimization of Agricultural Inputs • STCR approach for Precision Agriculture – Assessing, defining, monitoring and amending the variability in STCR approach • Introduction and Historic developments and Fundamentals of Nano-science & Nanotechnology – Nano-scale materials – definition and properties	**(3)** **1** **1** **1**	Lectures
Module V: • Natural nano-particles and their occurrence, manufacturing and characterization of nano-particles, Nano- pesticides, nano-fertilizers, nano-sensors – Types and strategies for synthesis of nano- materials • Use of nano-technology in tillage, seed, water, fertilizer, plant protection for scaling up of farm productivity, Nano-Biosensors, Nanotechnology in precision farming • Nanotech Delivery systemsfor pests Pests (nano-pesticides), Nutrients (nano-fertilizers) and Plant Hormones – Biosafety of nanoscale material – Environmental regulation of nano-materials.	**(3)** **1** **1** **1**	Assignments / Lectures

Learning Resources	
1.	Text Book of Remote Sensing and Geographical Information Systems by M. Anji Reddy.
2.	Precision Agriculture Technologies for Food Security and Sustainability By A El-Kader, M Sherine, M El-Basioni and M Basma.
3.	Principles and Theory of Geoinformatics by P.K. Garg. Khanna Publishers. 296p
4.	Advances in Geoinformatics Remote Sensing and GIS by Bhunia, Gouri Sankar, Uday Chatterjee and Gopal Krishna Panda. BIO GREEN

MANAGEMENT OF BENEFICIAL INSECTS

Credits: 1 **Semester: VI**

Course Code: AG20603 **No of Lecture Hours: 15**

Course Objective: To impart knowledge on rearing of Silk worms, Honey bees, Lac insects and their products.

Course Outcome:

CO1: Explain importance of sericulture, Mori culture and grainage technology
CO2: Explain silkworm rearing types, rearing house, pests and disease management
CO3: Explain post cocoon technology, types of reeling and importance of bee industry
CO4: Explain honey bee rearing equipment, management and extraction of honey
CO5: Explain Lac culture, and important predators, parasitoids and pollinators

Course Content	Hours Allotted	Pedagogy
Module I: • Importance of sericulture – types of silkworms with their host plants, biology and lifecycle. • Mori culture–varieties of mulberry, initial establishment of mulberry and package of practices. Pest and diseases of mulberry and their management. • Silkworm grain age technology – production of DFLs- hibernation and methods to overcome – Acid treatment	(3) 1 1 1	Power point presentations / Lectures
Module II: • Silkworm rearing – rearing house – equipment and appliances. • Types of rearing – young age and late age – feeding, spacing, bed cleaning, hygiene and climatic factors, moulting. • Silkworm enemies and diseases and their management.	(3) 1 1 1	Case Studies / Review of research articles
Module III: • Post cocoon technology – stifling, storing, cooking and processing of reeling. • Types of reeling – country charka, cottage basin and filature. Uses of silk and byproducts. • Beekeeping as rural industry -importance– species wild and domesticated, Life cycle of the honeybee with cast distinction.	(3) 1 1 1	Assignments
Module IV: • Equipment of apiary – colony activities round the year. Establishment of a new colony– location, swarn prevention and management of apiary.	(3) 2	Lectures

• Extraction of honey, its composition and uses. Enemies and diseases of honeybees	1	
Module V: • Lac insects – biology and behavior of lac insect, host plants, extraction of lac and enemies of lac • Predators and Parasitoids: Insect orders bearing predators and parasitoids used in insect control. • Important species of pollinators, weed killers and scavengers and their importance in agriculture.	(3) 1 1 1	Assignments / Lectures

Learning Resources	
1.	**Sericulture manuals** – FAO.
2.	Ganga and Sulochana Shetty. **Introduction to Sericulture.**
3.	Narsimhanna and Ullal. **Handbook of Practical Sericulture.** CSR &TI.
4.	Vasanth Raj and David. **Elements of Economic Entomology.**

PROTECTED CULTIVATION AND SECONDARY AGRICULTURE

Credits: 1 **Semester: VI**

Course Code: AG18604 **No of Lecture Hours: 15**

Course Objective: To impart knowledge on protected cultivation

Course Outcome:

CO1: Introduction to greenhouse technology and study of different types of greenhouses.
CO2: Explain design criteria and constructional details of greenhouse
CO3: Explain environmental parameters to be controlled with-in greenhouse.
CO4: Explain the cultivation of important horticultural crops, medicinal and aromatic plants.
CO5: Explain the attack of insect, pest and disease management factors in greenhouses.

Course Content	Hours Allotted	Pedagogy
Module I: • Protected cultivation - importance and scope, status of protected cultivation in India and the world. • Types of protected structure based on site and climate – glasshouse, polyhouse, rain shelters, poly tunnels, hotbeds and cold flames, shade nets. • Introduction to greenhouses - history, definition, greenhouse effect, advantages of greenhouses.	(3) 1 1 1	Power point presentations / Lectures
Module II: • Types of greenhouses - based on shape, utility, construction covering/cladding material. • Cladding material involved in greenhouse/poly house - glass, flexible plastic film, Polyethylene film, ethylene vinyl acetate, poly vinyl chloride, poly vinyl fluoride films, acrylic sheet, tefzel T^2 film, reinforced plastic, rigid plastic sheet and polycarbonate rigid panel. • Greenhouse –locating a green house, green house orientation, layout of greenhouse, material requirement.	(3) 1 1 1	Case Studies / Review of research articles
Module III: • Environmental control - natural sunlight, supplemental Lightning - incandescent lamps, fluorescent lamps, high - intensity discharge lamps, • temperature control, heat distribution, ventilation, and cooling in the greenhouse - naturally ventilated, fan and pad cooling, forced air cooling etc. Relative humidity, carbon dioxide level.	(3) 1 2	Assignments
Module IV: • Soil preparation and management – soil sterilization methods, soil and soilless media (cocopeat, vermicompost, perlite, vermiculite, charcoal, pumice, rockwool etc.), substrate management. • Types pf benches and containers – benches - no bench, raised benches, ground benches, arrangement of benches – longitudinal, cross-	(3) 1	Lectures

benching • peninsula arrangement, movable benches, pyramid benches, containers -types of containers	2	
Module V: • Automation – types of greenhouse control – step control, integrated control, feedback, proportional, integral, derivative, feed forward, energy balance, sensors (Temperature, light, CO_2, RH, irrigation, etc.) • Irrigation and fertigation management – irrigation – water application methods, hand watering and automatic watering systems, tube watering, capillary mat, overhead sprinklers, perimeter watering, drip system, misting. • Fertigation - dry – dry and liquid fertilizers, methods of application of liquid fertilizers, carbon dioxide fertilization.	(3) 1 1 1	Assignments / Lectures

Learning Resources	
1.	The complete Book of Greenhouse Gardening-Cavendish M 1974. Marshal Cavendish Books, London
2.	Greenhouse Management for Flowers and Plant Production-Kennard S and Nelson B A 1977. International printers and publishers Inc., Illinois.
3.	Greenhouse Technology and Applications-Vilas M. Salone and Ajay K. Sharma, 2012.

LIVESTOCK, POULTRY AND FISHERIES MANAGEMENT

Credits: 2 **Semester: VI**

Course Code: AG20605 **No of Lecture Hours: 30**

Course Objective: To impart knowledge to the students on dairy farming, poultry, sheep and goat farming, prawn, swine and fish production.

Course Outcome:

CO1: Students will be able to gain knowledge on dairy farming, poultry, sheep and goat farming, prawn, swine and fish production

CO2: Knowledge on different types of breeds which are suitable to our local climate area. How to run profitable dairy, poultry, sheep, goat farming

CO3: Clear idea about economics of livestock production and management

Course Content	Hours Allotted	Pedagogy
Module I: • Role of livestock in the Indian economy- Statistics, Livestock development programmes, Operation Flood Programme • Different systems of livestock rearing – Extensive, Semi-intensive, Intensive, and Mixed • Classification of breeds of livestock and poultry with characteristics • Transportation of livestock and poultry	**(6)** 1 1 3 1	Power point presentations / Lectures
Module II: • Reproductive systems of livestock and poultry-signs of estrous, Artificial Insemination and Parturition • Factors affecting the onset of puberty, fertility, and milk production in cattle • Selection and breeding methods, Qualitative & Quantitative traits	**(6)** 1 1 2 2	Case Studies / Review of research articles
Module III: • Digestive systems in ruminants, swine &poultry- feeding requirements • Classification of feedstuffs for livestock & poultry, feed ingredients for balanced rations • Anti-nutritional factors and feed additives in feeds, Management practices for calves, pregnant animals & diseased animals. • Management practices of sheep, goat, and swine	**(6)** 1 1 1 2 1	Assignments
Module IV: • Housing systems/principles-space requirements-raring systems • Poultry management-incubation, brooding, hatching, biosecurity measures. • Diseases of livestock & poultry, their control measures- vaccination	**(6)** 1 2 1	Lectures

and sanitation • Project report on economics of livestock • Brief note on rabbit, quail, emu, and duck farming	 1 1	
Module V: • Fishery resources in India-statistics • Types of fishes and prawns found in India • Inland, Brackish and sea production of fishes and prawns • Integrated raring of fish-Fish and Prawn Product Technology • Production-breeds-inland&sea production	(6) 1 1 2 1 1	Assignments / Lectures

Learning Resources	
1.	Banerjee G. C. 1982. **A Textbook of Animal Husbandry**. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.
2.	Sastry, M. R, Thomas C. K and Singh R.A. 1986. **Farm Animal Management and Poultry Production**. New Delhi: Vikas Publishing House Pvt Ltd.
3.	Srinivasaiah, P.V. 1998. **Scientific Poultry Production**. Bangalore: IBH Prakasam

DISEASES OF HORTICULTURE CROPS-II & THEIR MANAGEMENT

Credits: 2 **Semester: VI**

Course Code: AG20606 **No of Lecture Hours:30**

Course Objective: To impart knowledge on the diseases of field crops and their management

Course Outcome:

CO1: Identify different diseases of Grapevine, Apple, Pomegranate, Crucifers, Cucurbits and gain knowledge about their management

CO2: Identify different diseases of Brinjal, Chilli, Tomato, Bhendi and gain knowledge about their management

CO3: Identify different diseases of Onion, Potato, Bean, Turmeric, Ginger and gain knowledge about their management

CO4: Identify different diseases of Coconut, Tea, Rose, Marigold and gain knowledge about their management

CO5: Identify different diseases of Jasmine, Crossandra, Betelvine, Mulberry and gain knowledge about their management

Course Content	Hours Allotted	Pedagogy
Module I: • Grapevine: Downy mildew, Powdery mildew, Anthracnose, Alternaria Leaf spot, Rust • Apple: Scab, Powdery mildew, Fire blight, Crown gall, Peach: leaf curl, • Pomegranate: Bacterial blight, Anthracnose, Strawberry: Leaf spot Ber: Powdery Mildew and Sooty Mold • Crucifers: Alternaria leaf spot, Black rot, Club root, Downy mildew, Powdery mildew, White rust • Cucurbits: Downy mildew, Powdery mildew, Wilt, Cucumber mosaic virus, Cercospora leaf spot, Alternaria leaf spot, Fruit rot	**(6)** 2 1 1 1 1	Power point presentations / Lectures
Module II: • Brinjal: Phomopsis blight and fruit rot, Sclerotinia blight, little leaf, Bacterial wilt • Tomato: Damping off, Wilt, Early and late blight, Buck eye rot, Leaf curl, Mosaic, Septoria leaf spot, Tomato spotted wilt, Bacterial fruit canker, Root knot nematode, Stemphylium leaf blight • Chillies: Anthracnose and fruit rot, Wilt, Leaf curl, Damping off, Powdery mildew, Choanephora blight, Chilli virus complex, Bacterial leaf spot, Cercospora leaf spot, Alternaria leaf spot • Bhendi: Yellow vein mosaic virus, Cercospora leaf Spot, Powdery mildew	(6) 1 2 2 1	Case Studies / Review of research articles

Module III: • Onion and Garlic: Purple blotch, Stem phylium blight, Smudge, Smut • Potato: Early and late blight, Black scurf, Leaf roll, Mosaic, Common scab, Brown rot, Wart, Potato spindle tuberviroid • Beans: Anthracnose, Bacterial blight, Rust, Mosaic (Green mosaic And Yellow mosaic) • Turmeric: Leaf spot, Leaf blotch, Rhizome rot, Ginger: Soft rot, Phyllosticta leafspot	**(6)** **1** 2 1 2	Assignments
Module IV: • Coconut: Wilt, Bud rot, Ganoderma basal stem Rot, Stem Bleeding, Tatipaka disease, grey blight, Oil palm: Bunch rot, spear rot • Tea: Blister blight, Coffee: Rust, Colocasia: Phytophthora blight, Coriander: Stem gall • Rose: Die back, Powdery mildew, Black leaf spot Marigold: Botrytis blight, Cercospora leaf spot	**(6)** 2 2 2	Lectures
Module V: • Jasmine: Rust, Cercospora leaf spot, Chrysanthemum: Septoria blotch, Stunt, Fusarium Wilt, Alternaria leaf spot • Crossandra: Fusarium wilt, Cercospora leaf spot, Anthracnose Betelvine: Wilt, Anthracnose, Root rot, Leaf rot and foot rot • Mulberry: Powdery mildew, Cercospora leaf spot, Bacterial leaf spot, Mosaic	**(6)** 2 2 2	Assignments / Lectures

Learning Resources	
1.	Cook, A.A. 1981. Diseases of Tropical and Subtropical Field, Fibre and Oilplam. Mac Millan Publishing Co., New York.
2.	Rangaswamy, G. and Mahadevan, K. 2001. Diseases of Crop Plants in India. Prentice Hall of India Pvt. Ltd., New Delhi. Singh, R.S. 2005
3.	Plant Diseases. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
4.	Pathak V N 1980. Diseases of fruit crops. Oxford and IBH Publ Co. New Delhi. 2. Sohi H S 1992
5.	Diseases of ornamental plants in India. ICAR, New Delhi. Singh R S 1994. Diseases of vegetable crops. Oxford and IBH Publ Co. New Delhi

POST-HARVEST MANAGEMENT AND VALUE ADDITION OF FRUITS AND VEGETABLES

Credits: 1 **Semester: VI**

Course Code: AG20607 **No of Lecture Hours: 15**

Course Objective: To impart basic knowledge on Pre & post-harvest factors affecting the quality and post- harvest shelf life of fruits and vegetables

Course Outcome:

CO1: Define food processing and preservation, Classify foods for processing and preservation

CO2: List out methods of food preservation

CO3: Explain processing methods of cereals, millets and legumes

CO4: Explain processing methods of fruits and vegetables and oilseeds

CO5: Explain processing methods of spices and plantation crops

Course Content	Hours Allotted	Pedagogy
Module I: • Importance of post-harvest technology of horticulture crops – meaning and importance of post-harvest technology – causes of post-harvest losses. • Pre-harvest factors affecting the quality and post-harvest shelf life of fruits and vegetables – environment factors (temperature, light, rain, wind and humidity) – mineral nutrients (Ca, Mg, Zn, B and Cu) growth regulators (auxins, gibberellins, cytokinin's, ethylene and growth retardants) - rootstock, irrigation, pruning, thinning, girdling, varieties, pests and diseases, pesticides, maturity and mechanical injury • Ripening – definition – types of fruits based on ripening – changes occurring during ripening – maturation of seed/change in seed colour, water content, carbohydrates, organic acids, proteins, texture, taste, aroma, abscission, development of surface wax, respiration rate, chemical changes and enzymes – factors affecting ripening of fruits and vegetables – temperature CO_2, O_2 radiation, air humidity, volatiles, growth regulators – chemicals used for hastening and delaying ripening of fruits and vegetables.	(3) 1 1 1	PowerPoint presentations / Lectures
Module II: • Factors responsible for deterioration of harvested fruits and vegetables – respiration, transpiration, ethylene, mechanical damage, pest and diseases • Harvesting and post-harvesting of fruits and vegetables – methods of harvesting (hand and mechanical) – their advantages and	**(3)** 1	Case Studies / Review of research articles

disadvantages – curing – degreening – precooling –washing and drying – sorting and grading – disinfestations – post harvest treatments and waxing • Methods of storage – low temperature storage (cellar refrigeration and freezing) – controlled atmospheric storage – hypobaric storage – irradiation and low-cost storage structure – zero energy cool chamber – storage in pits – storage in wind breaks –*in situ* – storage I cellars – clamp storage.	1 1	
Module III: • Packaging – definition – purpose of packaging – methods of packaging – packaging materials different materials for fresh fruits and vegetables – specific packaging for export of mango, banana, grapes, kinnow, sweet orange and mandarin; cushioning materials – introduction – purpose of using cushioning material – characteristics of cushioning materials various kinds of cushioning materials. • Value addition concept - Importance and scope of preservation of fruits and vegetables in India - principles and methods of preservation – principles – methods – asepsis – preservation by high temperature, drying, filtration, chemicals, salt, sugar, oil, acid fermentation, carbonation, antibiotics and irradiation • Preservation by canning and bottling – selection of fruits and vegetables – sorting and grading – washing – peeling (hand peeling, mechanical peeling by heat, lye peeling and flame peeling)- cutting and blanching and their advantages and disadvantages – can filling – syruping or bringing glidding or clinching – exhausting – sealing – processing labeling, packing – storing – flowchart for canning and bottling – containers for canning and bottling – tin containers, glass containers, lacquers, acid resistant, Sulphur resistant, Other containers, plywood container, string opening, composite containers and self- heating can	**(3)** 1 1 1	Assignments

Module IV: • Spoilage of canned food – swell, hydrogen, springer, flipper, leakage, breather and bursting – discoloration of canned foods – metallic contamination – ferric tennate, iron sulphide and copper sulphide combined with hydrogen– biological causes – enzymes and chemical reaction – Maillard reaction – spoilage due to physical and chemical changes – microbial spoilage • Drying and dehydration of fruits and vegetables – definition – factors affecting rate of drying – advantages of dehydration over sun drying and other methods principles of drying and dehydration • Flow chart for drying / dehydration of fruits and vegetables – blanching – sulphuring and spoilage of dried product – freezing of fruits and vegetables – methods of freezing – sharp freezing, quick freezing, direct immersion, indirect immersion, air blast freezing cryogenic freezing, dehydro freezing and freeze-drying Intermediate moisture food, Jam Jelly and Marmalade –Concepts standards.	**(3)** 1 1 1	Lectures
Module V: • Intermediate moisture food preserve candy. • Pickles – methods of pickling preservation with salt, vinegar, oil and spices – problems in pickle making – preserve – candy ad crystallized fruits and vegetables– glazed fruits and vegetables – chutneys and sauces / ketchups – flowchart for ketchup- flow chart for sauce • Fruit juices, squashes and cordial – preparation – selection of fruit, washing, extraction of juice, deaeration, straining, filtration and clarification and preservation – preservatives ad colours permitted and prohibited in India.	**(3)** 1 1 1	Assignments / Lectures

Learning Resources	
1.	Preservation of Fruits and Vegetables – Giridharilal, G.S., Siddappa and Tondon, G.L.2007.
2.	Post harvest Biology and Handling- Hard, N.F, and Salunkhe, D.K. 1980
3.	Handling, Transportation and Storage of Fruits andvegetables (Vol.2) – Lloyd Ryoll, A.M.S. and Pentzer W.T.M.S.1982.
4.	Post Harvest Physiology and Storage of Tropical and Subtropical Fruits – Mitra, S.K.2005.
5.	Hand Book of Fruit Science and Technology - Salunkhe, D.K. and Kadam, S.S. 1995
6.	Fruit and Vegetable Preservation: Principles and Practices. - Srivastava, R.P. and SanjeevKumar.2002.
7.	Packaging of Fruits and Venkatarathnam, L.1988. Vegetables in India

COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

Credits: 1 **Semester: VI**
Course Code: AG20608 **No of Lecture Hours: 15**

Course Objective: To improve the knowledge level of the students on various communication skills & personality development

Course Outcome:

CO1: Understand the meaning & concepts of communication skills- hard and soft skills.
CO2: Identify and understand various non-verbal communication skills.
CO3: Gain understanding of the skills of learning and presentation
CO4: Know the importance of personality development and identify the different personality traits.
CO5: Understand the different dimensions of personality development, like attitude, team work, management of conflicts, stress, and time, etc.

Course Content	Hours Allotted	Pedagogy
Module I: • Communication: Meaning, Process and its forms • Communication skills: Meaning and overview of hard & soft skills • Verbal and non-verbal communication: Verbal – oral and written skills, Non-verbal communication skills: Concept, meaning, forms, functions and importance	**(3)** **1** **1** **1**	Power point presentations / Lectures
Module II: • Listening skill: Meaning, concept, types of listening, barriers in listening & note taking • Oral presentation skills: Impromptu presentation &extempore presentation • Effective Public Speaking	**(3)** **1** **1** **1**	Case Studies / Review of research articles
Module III: • Group Discussion: Procedure, principles, purpose, advantages and disadvantages • Small group discussion techniques • Writing of technical articles, field diary, lab record, indexing, footnote and bibliographic procedures	**(3)** **1** **1** **1**	Assignments
Module IV: • Personality development: Meaning, definition and overview of personality Traits • Questioning skills	**(3)** **1**	Lectures

• Attitude: Meaning, functions of attitude and developing positive attitude	**1** **1**	
Module V: • Team building, time management and techniques of time management • Conflict management: Meaning, concept, causes and managing of conflict • Stress management: Meaning, definition and management of stress	**(3)** **1** **1** **1**	Assignments / Lectures

Learning Resources	
1.	Communication Skills. Sanjay Kumar. 2011. Oxford Publication. ISBN9780198069324
2.	Extension Communication and Management- Ray G L 1991 Naya Prakasham, Kolkata.
3.	Communication of Innovations- Rogers EM and Floyd F Shoemaker 1971 Free Press, a division of Macmillan Publishing Co
4.	Education and communication for development Dahama O P and Bhatnagar O P 1980 Oxford and IBH publishing Co., Delhi
5.	Communication Rayudu C S 1997 Himalaya publishing house, Hyderabad
6.	Personality Development and Soft skills. Barun K. Mitra. 2011. Oxford Publication. ISBN130198066217
7.	Soft Skills for Professional Excellence – Personality Development – Vol I and II, CRTD Publications, Hyderabad
8.	A Youngsters' guide to personality development.S.P. Sharma 2013 V&S Publishers Delhi

AGRICHEMICALS

Credits: 2 **Semester: VI**
Course Code: AG19609A **No of Lecture Hours: 30**

Course Objective: To impart knowledge to the students on different agricultural chemicals used in agriculture.

Course Outcome:

CO1: Differentiate organic compounds and inorganic compounds

CO2: Classify inorganic insecticides with examples

CO3: Illustrate various organic, natural and synthetic insecticides

CO4: Understands various organochlorine, carbamate and phosphorus compounds

CO5: Analyzes various fungicides and pesticide residues influence on environment

Course Content	Hours Allotted	Pedagogy
Module I: • Introduction agrochemicals – classification, type and role of agrochemicals in agriculture – Introduction to insecticides and classification of insecticides based on chemical nature with examples • Botanical insecticides – examples, advantages, disadvantages' – chemicals in neem and insecticidal action of neem • Natural pyrethrum – sources, extraction, chemistry and insecticidal action • Nicotine and Rotenone – sources, chemistry and mode action • Organochlorine insecticides – structure, properties and insecticidal activity of BHC, DDT, Endosulfan	**(6)** 2 1 1 1 1	Power point presentations / Lectures
Module II: • Organophosphorus insecticides – mode of action – classification with structures of acids and examples of their derivatives – structure-activity relationships of thiophosphoricacid derivative insecticides - structure and properties of DDVP, phosphamidon, chlorpyriphos, Malathion, phorate, profenofos, methyl parathion, acephate, monocrotophos • Carbamate insecticides – chemistry – mode of action – structure and properties of Carbaryl, carbofuran • Synthetic pyrethroids – examples, uses, advantages and	**(6)** 2 1 1 2	Case Studies / Review of research articles

disadvantages • Neonicotinoids – chemistry and insecticidal action – properties and uses of neonicotinoid insecticides imidacloprid, acetamaprid. • Herbicides – classification with examples selectivity of herbicides –- Mode of action of herbicides with examples		
Module III: • Structure and properties of important herbicides – Atrazine, butachlor, 2, 4-D, glyphosate - Fate of herbicides • Fungicides – classification with examples. Inorganic fungicides – characteristics, preparation, mode of action and use of sulphur fungicides • Characteristics, preparation, mode of action and use of copper fungicides – Bordeaux mixture and copper oxy chloride • Organic fungicides – Dithiocarbamates - mode of action – structure, preparation, properties and use of zineb, maneb, thiram and ziram • Systemic fungicides – structure, characteristics and use of benomyl, carboxin, oxycarboxin, metalaxyl, carbendazim • Insecticide Act and rules - Pesticides banned, withdrawn and restricted use.	**(6)** 1 1 1 1 1 1	Assignments
Module IV: • Plant growth regulators – examples and uses - Biorationals, biopesticides, reduced risk insecticides - Bio-insect repellents - Animal origin insecticides • Fertilizers – classification with examples – their importance in agriculture. • Nitrogenous fertilizers – Haber-Bosch process – feed stocks for ammonia synthesis, Feed stocks and manufacturing process of ammonium sulphate, ammonium nitrate, calcium ammonium nitrate, ammonium chloride • Feed stocks and manufacturing process of urea, slow release N-fertilizers • Phosphatic fertilizers – Feed stocks and manufacturing process of SSP – Preparation of bone meal and basic slag	**(6)** 2 1 1 1 1	Lectures
Module V: • Potassic fertilizers – natural sources – manufacturing of potassium chloride, potassium sulphate • Complex fertilizers – manufacturing of ammonium phosphates, nitrophosphates, potassium nitrate and NPK complexes • Mixed fertilizers – sources and compatibility – preparation of major, secondary and micronutrient mixtures • Fertilizer control order- fertilizer logistics - fertilizer	**(6)** 1 1 1	Assignments / Lectures

subsidy - fertilizer marketing Persistence of agrochemicals – fate and effect of their use on the environment, soil, human health and animal health	2	
• Merits and demerits of use of chemicals in agriculture – management of agrochemicals for sustainable agriculture	1	

Learning Resources	
1.	Thomson, WT. 1980. **Agricultural Chemicals-Fungicides (Vol.5).** USA: Thomas publications
2.	Worthington, CA. 1985. **The Pesticide Manual British Crop Protection**. UK: A world Compendium Council
3.	Nene, YL. And Thapliyal, PN. 1993. **Fungicides in plant disease control**. New Delhi: Oxford & IBH Pub. Co.
4.	SreeRamulu, US. 1991. **Chemistry of insecticides and fungicides**. New Delhi: Oxford & IBH Pub. Co.
5.	Rao, VS.1992. Principles of weed science. New Delhi: Oxford &IBH Pub. Co

COMMERCIAL PLANT BREEDING

Credits: 2 **Semester: VI**
Course Code: AG20609B **No of Lecture Hours: 30**

Course Objective: To impart knowledge on hybrid seed production techniques and quality testing

Course Outcome:

CO1: Understand the types of reproduction and pollination

CO2: Analyze the advances in hybrid seed production of cereals

CO3: Analyze the advances in hybrid seed production of oilseeds and pulses

CO4: Appraise the alternate methods of developing a line

CO5: Understand the principles of seed quality

Course Content	Hours Allotted	Pedagogy
Module I: • Modes of plant reproduction and classification of crops based on Pollination. • Line development and maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production. • Genetic purity test of commercial hybrids	**(6)** 2 2 2	Power point presentations / Lectures
Module II: • Advances in hybrid seed production of rice • Advances in hybrid seed production of maize • Advances in hybrid seed production of sorghum	**(6)** 2 2 2	Case Studies / Review of research articles
Module III: • Advances in hybrid seed production of pearl millet • Advances in hybrid seed production of castor, sunflower and brassica • Advances in hybrid seed production of cotton and pigeon pea	**(6)** 2 2 2	Assignments
Module IV: • Quality seed production of vegetable crops under open and protected environment • Alternative strategies for the development of the line and cultivars: Haploid inducer and tissue culture techniques • Alternative strategies for the development of the line and cultivars: Biotechnological tools IPR issues in commercial plant breeding	**(6)** 2 2 2	Lectures

Module V: • DUS testing and registration of varieties under PPV & FR Act • Variety testing, release and notification systems in India • Principles and techniques of seed production, types of seeds, quality testing in self-pollinated crops. • Principles and techniques of seed production, types of seeds, quality testing in cross pollinated crops	**(6)** 1 1 2 2	Assignments / Lectures

Learning Resources	
1.	Allard, R.W. 1960. *Principles of Plant Breeding*. John Wiley and Sons, New York.
2.	Phundan Singh, 2006. *Essentials of Plant Breeding* . Kalyani Publishers, New Delhi.
3.	Poehlman, J.M. and Borthakur, D. 1995. *Breeding Asian Field Crops*. Oxford and IB H Publishing Co., New Delhi
4.	Sharma, J.R. 1994.*Principles and Practice of Plant Breeding*. Tata McGraw Hill, Publishing Company Ltd., NewDelhi
5.	Singh, B.D. 2006. Plant Breeding: Principles and Methods. Kalyani Publishers, New Delhi

FARMING SYSTEMS AND ORGANIC FARMING FOR SUSTAINABLE AGRICULTURE PRACTICALS

Credits : 1 **Semester: VI**

Subject code: AG20610 **No. of practical hours: 30**

Objective: To impart practical skills involved in vermi-composting, biofertilizers and other components of organic farming.

Outcome: Students will be able to implement the methods involved in vermi-composting, biofertilizers and other components of organic farming, farming systems and sustainable agricultural practices.

1. Components of organic ecosystem-soil water environment and biodiversity
2. Compost making-aerobic and anaerobic methods.
3. Preparation of enriched farmyard manure
4. Vermicompost and enriched Vermicompost methods from crop residues and organic wastes
5. Biofertilizers production techniques and its application methods.
6. Methods of application of bio pesticides (Trichoderma, Bt, NPV).
7. Preparation of neem products and other botanicals for pest and disease control
8. Preparation of green pesticides (Panchagavya, Beejamrutham, Jeevamrutham etc.,)
9. Case studies of Indigenous Technical knowledge (ITK) for nutrient and weed management.
10. Case studies of Indigenous Technical knowledge (ITK) for pest and disease.
11. Study of quality parameters of organic products.
12. Economic analysis of organic production system.
13. Visit to the IFS units of the nearby state Agri. University/Institutes and farmers field.
14. Visit to organic farms to study the various components and their utilization.
15. Grading, labeling, and packaging of organic products.

GEO-INFORMATICS AND NANOTECHNOLOGY FOR PRECISION FARMING

PRACTICALS

Credits :1 **Semester: VI**

Subject code: AG20611 **No. of Lecture hours:30**

Objective: To impart knowledge on GIS, GPS, Crop simulation models, Remote sensing in Precision Farming,

Outcome: The students will be able to gain knowledge on Tools, techniques, applications of Geo-informatics, nanotechnology and remote sensing

Practicals:

1. Introduction to GIS software
2. Spatial data creation and editing
3. Introduction to image processing software
4. Visual and digital interpretation of remote sensing images
5. Generation of spectral profiles of different objects
6. Supervised and unsupervised classification and acreage estimation
7. Multispectral remote sensing for soil mapping
8. Creation of thematic layers of soil fertility based on GIS
9. Creation of productivity and management zones based on GIS
10. Fertilizers recommendations based on VRT and STCR techniques
11. Crop stress (Abiotic/Biotic) monitoring using geospatial technology
12. Use of GPS for agricultural survey
13. Formulation and characterization of nano-particles
14. Different nano-particles and its application in agriculture
15. Smart nano-scale systems for targeted delivery of nutrients and pesticides

PRACTICAL CROP PRODUCTION-II (RABI CROPS)

PRACTICALS

Credits: 1 **Semester: VI**

Subject code: AG20612 **No. of practical hours: 30**

OBJECTIVE: To impart knowledge on layout of experimental plots, nursery raising and seed sowing, fertilizer application, weed control methods, water management, plant protection and harvesting of rabi crops

Outcomes: Students will able gain knowledge on crop production technology practices of field crops

PRACTICALS

1. Preparation of cropping plan/scheme in multiple cropping system.
2. Field preparation and layout of experiment plots.
3. Seed treatment, nursery raising and sowing of field crops.
4. Time and method of fertilizer application for Rabi crops.
5. Weed control methods in Rabi crops.
6. Water management for different Rabi crops.
7. Recording biometric observations in crops.
8. Plant protection measures in Rabi crops.
9. Yield attributes and estimation of yield in different crops.
10. Harvesting, recording of yield
11. Post-harvest operations in different field crops.
12. Visit to seed production farm.
13. Visit to Integrated Farming System unit.
14. Visit to farm mechanization unit.
15. Economic analysis and preparation of balance sheet.

MANAGEMENT OF BENEFICIALINSECTS

PRACTICALS

Credits : 1 **Semester: VI**
Subject code: AG20613 **No. of practical hours: 30 Hrs**

Objective: To impart knowledge on rearing of silkworms, honey bees, lac insects and their products.

Outcome: Students will be able to gain knowledge on rearing of silkworms, honey bees, lac insects, their concerned pests, diseases and their management.

1. Study of important species of honey bees and caste of honey bees.
2. Study of different types of beehives, beekeeping appliances & seasonal management of bees
3. Study of enemies & diseases of honeybees
4. Study of bee pasturage, foraging and communication in bees.
5. Study of mulberry varieties and preparation of planting material of mulberry.
6. & 7. Raising of mulberry nursery & planting of mulberry in main field
8. Study of methods of harvesting and preservation of leaves
9. Study of different species of mulberry & non-mulberry silk worms
10. Rearing equipment and appliances used in sericulture
11. Dissection of silkworm larvae for study of silk glands
12. Study of lac insect, types of lac and host plants
13. Collection & identification of important pollinators, weed killers and scavengers
14. Visit to silkworm rearing station and reeling unit
15. Visit to biocontrol laboratory

PROTECTED CULTIVATION AND SECONDARY AGRICULTURE
PRACTICALS

Credits: 1 **Semester: VI**

Subject code: AG18614 **No. of lecture hours: 30**

Objective: To impart knowledge on protected cultivation.

Outcome: The students will able to gain knowledge on different types of greenhouses based on shape, construction and cladding material. Calculation of ventilation and air exchange rates with-in greenhouse, study of irrigation system and fertigation management in green house.

PRACTICALS

1. Study of different types of greenhouses based on shape.
2. Study of different types of greenhouses based on construction.
3. Study of different types of greenhouses based on cladding material.
4. Study of materials for construction of Greenhouses.
5. Study of construction of pipe framed greenhouse.
6. Measurement of environmental parameters inside greenhouse.
7. Calculation of ventilation rates in active summer cooling system.
8. Calculation of rate of air exchange in active summer cooling system.
9. Field visit to green house
10. Raising of seedlings and saplings under protected conditions.
11. Use of portrays in quality planting material production.
12. Bed preparation and planting crop for production.
13. Intercultural operations.
14. Soil EC and pH measurement.
15. Regulation of irrigation.
16. Fertilizers through drip, fogging and misting.

LIVESTOCK, POULTRY AND FISHERIES MANAGEMENT

PRACTICALS

Credits: 1 **Semester: VI**

Subject Code: AG20615 **No. of practical hours: 30 Hrs**

Objective: To impart knowledge on identification marks of body parts of live-stock and different breeds, both indigenous and exotic breeds of livestock, and suitability, selection of good quality breeds and different diseases of livestock and control.

Outcome: Students will be able to gain knowledge on different types of breeds and selection methods, combat diseases of livestock and finally students will be able to run profitable dairy farm, sheep and goat farming with their knowledge.

Practicals

1	External body parts of cattle, buffalo, sheep, goat, swine, poultry and fishes
2-3	Study of livestock breeds
4-5	Handling and restraining methods of livestock
6-7	Identification methods of farm animals & poultry
8-9	Judging & Grading-Elimination and culling of livestock, poultry and fishes
10-11	Familiarization with routine farm operations and farm records
12	Feed analysis & ration formulation
13	Planning, layout and construction of livestock & poultry farm houses and fishponds
14	Clean milk production and different milking methods
15	Visit to Livestock units

DISEASES OF HORTICULTURE CROPS-II & THEIR MANAGEMENT PRACTICALS

Credits: 1 **Semester: VI**

Subject code: AG20616 **No of Practical hours: 30 Hrs**

Objective: To impart knowledge on the diseases of field crops and their management

Outcome: Students will be able to gain knowledge on various diseases of field crops and their management

1. Diseases of Ber, Guava
2. Diseases of Sapota, Papaya
3. Diseases of Banana and Pomegranate
4. Diseases of Strawberry and Chilli
5. Diseases of Brinjal and Bhendi
6. Diseases of Potato and Tomato
7. Field visit
8. Diseases of Crucifers of Cucurbits
9. Diseases of Betel vine, Onion and garlic
10. Diseases of Coconut, Oil Palm and Colocassia
11. Diseases of Tea, Coffee and Coriander
12. Diseases of Turmeric, Ginger, Mulberry and Beans
13. Diseases of Rose, Jasmine, Chrysanthemum and Crossandra
14. Field visit.

POST HARVEST MANAGEMENT AND VALUE ADDITION OF FRUITS AND VEGETABLES
PRACTICALS

Credits :1 **Semester: VI**
Subject code: AG20617 **No. of Lecture hours:30**

Objective: To impart knowledge of processing and preservation of various foods.

Outcome: Students will independently perform different processing and preservation techniques of foods.

PRACTICAL

1. Visit to Rythu bazaar for vegetable harvesting indices
2. Application of different types of packaging containers for shelf life extension
3. Effect of temperature on shelf life and quality of produce
4. Demonstration of chilling and freezing injury in fruits and vegetables
5. Extraction and preservation of pulp and juices
6. Preparation of Jam and jelly
7. RTS, Nectar and Squash
8. Preparation of osmotically dried products, fruit bar and candy
9. Preparation of tomato products
10. Quality evaluation of products – Physico chemical
11. Quality evaluation of products – sensory evaluation
12. Visit to processing unit or industry
13. Studies on physiological loss of weight
14. Analysis of TSS, Acidity in different fruits
15. Analysis of Ascorbic acid in different fruits

COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT

PRACTICALS

Credits: 1 **Semester: VI**

Subject Code:AG20618 **No. of lecture hours:30**

Objective: To inculcate effective communication skills, reading skills, comprehension skills and creative skills among students.

Outcome: Students will be able to get knowledge on communication skills and personality development.

1. Simulation exercise for non- verbal communication & students feedback
2. Listening & note taking & student feedback
3. Exercise on reading & comprehension & students feedback
4. Exercise on impromptu presentation & students feedback
5. Group discussion – Practical exercises
6. Group discussion – Practical exercises
7. Exercise on writing of technical articles& students feedback
8. Identification of personality types- role play & psychological tests & students feedback
9. Attitude-Role play- analysis of attitude & student feedback
10. Working in learners- management games
11. Simulation exercise on time management
12. Simulation exercise on conflict management
13. Interview Skills – Mock interviews
14. Interview Skills – Mock interviews
15. Simulation exercise on creativity

AGRICHEMICALS

PRACTICALS

Credits: 1 **Semester: VI**

Subject code: AG19619 A **No. of practical hours: 30 Hrs**

Objective: To impart knowledge to the students on different agricultural chemicals used in agriculture.

Outcome: Students will be able to gain knowledge on various insecticides, synthetic pyrethroides, organo-chlorine insecticides, carbamates and fungicides used in agriculture and pesticide residues influence on soil, water, air, animals and human beings.

PRACTICALS

1. Sampling of fertilizers and pesticides for analysis
2. Pesticide application technology – pesticide application appliances
3. Pesticide formulations - formulations of pesticides available in market
4. Quick tests for identification of fertilizers – identification of cations
5. Quick tests for identification of fertilizers – identification of anions
6. Estimation of nitrogen content of urea
7. Estimation of phosphorous content in SSP by colourimetry
8. Estimation of potassium content of potassic fertilizers using flame photometer
9. Determination of calcium content of fertilizers
10. Standardization of sodium thiosulphate by iodimetry
11. Determination of iodine content of test solution by iodometry
12. Determination of purity of copper oxy chloride
13. Determination of purity of sulphur fungicide
14. Determination of purity of malathion
15. Calculations of fertilizer application and preparation of fertilizer mixtures
16. Calculation of doses of pesticides to be used

COMMERCIAL PLANT BREEDING
PRACTICALS

Credits : 1 **Semester: VI**

Subject code: AG20619 **No. of practical hours: 30**

Objective: To impart knowledge on hybrid seed production techniques and quality testing

Outcome: The students will be able to understand the concepts of hybrid seed production techniques of various crops

PRACTICAL

1. Techniques of seed production in self and cross-pollinated crops using A/B/R system
2. Techniques of seed production in self and cross-pollinated crops using two-line system
3. Learning techniques in hybrid seed production using male-sterility in field crops.
4. Tools and techniques for optimizing hybrid seed production
5. Concept of rouging in seed production plots
6. Concept of line and its multiplication and purification in hybrid seed production
7. Role of pollinators in hybrid seed production
8. Hybrid seed production techniques in cereals
9. Hybrid seed production techniques in millets
10. Hybrid seed production techniques in oil seeds
11. Hybrid seed production techniques in pulses
12. Hybrid seed production techniques in fibre crop

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE
B.Sc. (Hons.) AGRICULTURE
SEVENTH SEMESTER
ACADEMIC YEAR-2026-27 OF 2023-27 BATCH (CBCS)

SECTION -A

Sl. No.	Part	Subject Code	Title of the Subject	Hours/ week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	AG18701	Rural Agricultural Work Experience Program (SEC-5,6,7, 8 & 9)	18	3	40	60	100	12
2	II	AG18702	Industry Internship Programme (DSE-4)	12	3	40	60	100	8
				30		**80**	**120**	**200**	**20**

SECTION - B

Sl. No.	Part	Subject Code	Title of the Subject	Hours/ week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	Agricultural Experiential Learning Programme (AELP) (DSE-5)		30	3	40	60	100	20
		AG 18703A	1. Mushroom Cultivation Technology						
		AG 18703B	2. Raising of Commercial Nursery						
		AG 18703C	3. Vermi-Composting						
		AG 18703D	4. Organic Production Technology						
		AG 18703E	5. Food Processing						
		AG 24703F	6. Commercial Crop Production						
				30		**80**	**120**	**200**	**20**

Self - learning course: Farmers' Welfare Schemes in India

RURAL AGRICULTURAL WORK EXPERIENCE PROGRAMME

(80 Working Days)

SECTION-A

Credits: 12 **Semesters: VII**

Subject code: AG18701

Objective:

- To provide the students with an opportunity to gain practical knowledge incrop production and crop protection.
- To familiarize the students with the socio-economic conditions of the farmer and institutions involved in rural development.
- To develop effective communication skills using extension training methods in the transfer of technology.

Outcome: Students will be able to get first-hand experience of various agricultural operations involved in crop production and crop protection and learn actual farming in order to develop a proper perspective.

Course outcomes:

- Apply the knowledge of the various agricultural operations involved in crop production
- Apply the knowledge of Crop Protection techniques in the host farmers' fields
- Survey on the socio-economic status of farmers in the village
- Organize method demonstration and agricultural exhibition in the villages for the benefit of farmers
- Prepare a report in the prescribed format in crop production, crop protection, Agricultural Economics, Agriculture Extension, and KVK activities

In this programme, students are required to stay in villages attached to an Agricultural Research Station / Krishi Vigyana Kendra and interact with farmers of the village by visiting them regularly. They are required to collect information in a prescribed proforma and also perform extension activity in the village in small groups. A team of experienced specialists supervises and guides their activities during these programmes.

At the end of the programme, each student is required to submit a report detailing the work done and knowledge gained with a sound basic background. This practical field experience equips the students with the desired professional skills enabling them to serve the Farming Community in a better way.

ACTIVITIES:

- Each student will take up an Agro-Economic Survey of the Village. The student will conduct a farm Holding Survey.
- The student shall maintain a Record of Daily Work Done.
- Bio-metrical observation shall be recorded.
- Record of Land Protection Work undertaken.
- Collect and submit 15 Herbarium specimens, each of insect damage and plant disease symptoms.
- Conduct Result Demonstration and Method Demonstrations.
- Preparation of relevant charts for Farmer's Knowledge. The student shall arrange the Farmer's Training Programme.
- Students shall establish an Information Corner in the Village. Celebrate Farmers' Day
- The students shall involve themselves in Actual Day to day-to-day agricultural operations along with their Host Farmers.
- Participate in Village Service Activity.

INDUSTRY INTERNSHIP PROGRAMME

(50 Working Days)

SECTION-A

Credits : 8 **Semester: VII**
Subject code: AG18702

Objective: To expose the students to an agri-related industry/ company so that they gain working knowledge, which will enable them to easily get into jobs in the agri-based industry.

Outcome: Students will be able to learn techniques and skills to find suitable placements in agro-based Industries/institutions.

Course outcomes:

- Select the agro-industry based on the interest of the students
- Apply various techniques and skills in Agro-Industry
- Formulate a research proposal
- Makeup of project report
- Defend the research project

The objective of this programme is to provide the students with an opportunity to gain first-hand knowledge of industrial work, to learn techniques and skills, and to train them for assignments after completion of graduation. As part of this, each student will be attached to an Industry or an Organization in the field of Agriculture, Animal Husbandry, etc. At the end of the semester, each student shall submit a report detailing the work done and the knowledge gained.

AGRICULTURAL EXPERIENTIAL LEARNING PROGRAMME (AELP)

SECTION-B

Credits: 20 **Semester: VII**
Subject code: AG18703

Experiential learning

a) Concept

The word 'experiential' essentially means that learning and development are achieved through personally determined experience and involvement, rather than on received teaching or training, typically in a group, by observation, study of theory or hypothesis, bringing in innovation or some other transfer of skills or knowledge. Experiential learning is a business curriculum–related endeavor which is interactive.

EL is for building (or reinforcing) skills in project development and execution, decision – making, individual and team coordination, uproots to problem solving, accounting, marketing and resolving conflicts, etc. The program has end to end approach. Carefully calibrated activities move participants to explore and discover their own potential. Both activities and facilitation play a critical role in enhancing team performance.

b) Objectives:

EL provides the students an excellent opportunity to develop analytical and entrepreneurial skills, and knowledge through meaningful hands-on experience, and confidence in their ability to design and execute project work.

The main objectives of EL are:

- To promote professional skills and knowledge through meaningful hands-on experience.
- To build confidence and to work in project mode
- To acquire enterprise management capabilities

c) Duration:

The experiential learning programme will be offered for one semester period in the final year. As the programme is enterprise-oriented, students and faculty are expected to attend the activities of the enterprise even on institutional holidays with total commitment, and without any time limit or restriction of working hours for ELP. The Experiential Learning Programme shall be run for full year by making two groups and rotating activities of the final year in two groups. Each student shall register for two modules carrying 10 credits each.

d) Attendance:

The minimum attendance required for this programme is 85%. The attendance of the student will be maintained at the EL unit. The students will be eligible for the final evaluation of EL only when the attendance requirement is met. Any student in the event of a recording shortage of attendance hasto re-register for the EL when offered next by paying the assigned fee.

e) Students' eligibility:

The assignment /allotment of the EL programme shall be based on the merit of the student at the end of the 5th semester. A separate certificate should be issued to the students after successful completion of the EL course. In this work experience, students will know the exact problems of farming and suggest appropriate technology, and finally be useful in enhancing productivity and profitability for farmers' end.

Subject code: AG 18703A MUSHROOM PRODUCTION TECHNOLOGY

Subject code: AG 18703B RAISING OF COMMERCIAL NURSERY

Subject code: AG 18703C VERMI-COMPOSTING

Subject code: AG 18703D ORGANIC PRODUCTION TECHNOLOGY

Subject code: AG 18703E FOOD PROCESSING

Subject code: AG 24703F COMMERCIAL CROP PRODUCTION

FARMERS' WELFARE SCHEMES IN INDIA

Semester: VII
No. of lecture hours:15

Objective: To provide awareness on various available schemes in India for farmers' welfare.

Outcome: Students will be able to understand the importance of different schemes that are being provided by the Government of India for agricultural development in general and the strengthening of farmers in particular.

Syllabus:

1. Doubling of Farmers' Income
2. Soil Health Card Scheme
3. Pradhan Mantri Fasal Bima Yojna/Restructured Weather-Based Crop Insurance Scheme
4. Neem Coated Urea
5. National Agriculture Market (e-NAM)
6. Micro Irrigation Fund
7. District Agriculture Contingency Plan
8. Rainfed Area Development Programme
9. National Watershed Development Project for Rainfed Areas (NWDPRA)
10. National Mission for Sustainable Agriculture (NMSA)
11. Livestock Insurance Scheme
12. Gramin Bhandaran Yojna
13. Parampargat Krishi Vikas Yojna
14. Rastriya Krsihi Vikas Yojna
15. National Scheme on Welfare of Fishermen

References

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http://agricoop.gov.in/ministry-major-schemes/soil-health-card
https://pmfby.gov.in/
https://pib.gov.in/newsite/printrelease.aspx?relid=159903
http://dmi.gov.in/Nam.aspx
https://pib.gov.in/Pressreleaseshare.aspx?PRID=1532269
http://www.agricoop.nic.in/agriculture-contingency-plan-listing
http://agricoop.nic.in/sites/default/files/RADP5913.pdf
http://agricoop.nic.in/sites/default/files/NMSA5913.pdf
https://pib.gov.in/newsite/PrintRelease.aspx?relid=186559
http://dadf.gov.in/related-links/livestock-insurance
https://pib.gov.in/newsite/mberel.aspx?relid=96201
https://pib.gov.in/newsite/PrintRelease.aspx?relid=177758
http://rkvy.nic.in/
http://dahd.nic.in/related-links/centrally-sponsored-national-scheme-welfare-fishermen

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF COURSE

B.Sc. (Hons.) AGRICULTURE

EIGHTH SEMESTER

ACADEMIC YEAR-2026-27 OF 2023-27 BATCH (CBCS)

SECTION-A

Sl. No.	Part	Subject Code	Title of the Subject	Hours/ week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	Agricultural Experiential Learning Programme (AELP) (DSE-5)		30	3	40	60	100	20
		AG 18803A	1. Mushroom Cultivation Technology						
		AG 18803B	2. Raising of Commercial Nursery						
		AG 18803C	3. Vermi-Composting						
		AG 18803D	4. Organic Production Technology						
		AG 18803E	5. Food Processing						
		AG 24803F	6. Commercial Crop Production						
				30		**80**	**120**	**200**	**20**

SECTION -B

Sl. No.	Part	Subject Code	Title of the Subject	Hours/ week	Duration of Exam (hrs.)	Marks			Credits
						Internal	External	Total	
1	II	AG18801	Rural Agricultural Work Experience Program (SEC-5,6,7,8, & 9)	18	3	40	60	100	12
2	II	AG18802	Industry Internship Programme (DSE-2)	12	3	40	60	100	8
				30		**80**	**120**	**200**	**20**

AGRICULTURAL EXPERIENTIAL LEARNING PROGRAMME

SECTION-A

Credits: 20 **Semester: VIII**

Subject code: AG18803

Experiential learning

a) Concept

The word 'experiential' essentially means that learning and development are achieved through personally determined experience and involvement, rather than on received teaching or training, typically in a group, by observation, study of theory or hypothesis, bringing in innovation or some other transfer of skills or knowledge. Experiential learning is a business curriculum–related endeavor which is interactive.

EL is for building (or reinforcing) skills in project development and execution, decision – making, individual and team coordination, uproots to problem solving, accounting, marketing and resolving conflicts, etc. The program has end to end approach. Carefully calibrated activities move participants to explore and discover their own potential. Both activities and facilitation play a critical role in enhancing team performance.

b) Objectives:

EL provides the students an excellent opportunity to develop analytical and entrepreneurial skills, and knowledge through meaningful hands-on experience, and confidence in their ability to design and execute project work.

The main objectives of EL are:

- To promote professional skills and knowledge through meaningful hands-on experience.
- To build confidence and to work in project mode
- To acquire enterprise management capabilities

c) Duration:

The experiential learning programme will be offered for one semester period in the final year. As the programme is enterprise-oriented, students and faculty are expected to attend the activities of the enterprise even on institutional holidays with total commitment, and without any time limit or restriction of working hours for ELP. The Experiential Learning Programme shall be run for full year by making two groups and rotating activities of the final year in two groups. Each student shall register for two modules carrying 10 credits each.

d) Attendance:

The minimum attendance required for this programme is 85%. The attendance of the student will be maintained at the EL unit. The students will be eligible for the final evaluation of EL only when the attendance requirement is met. Any student in the event of a recording shortage of attendance hasto re-register for the EL when offered next by paying the assigned fee.

e) Students' eligibility

The assignment /allotment of the EL programme shall be based on the merit of the student at the end of the 5th semester. A separate certificate should be issued to the students after successful completion of the EL course. In this work experience, students will know the exact problems of farming and suggest appropriate technology, and finally be useful in enhancing productivity and profitability for farmers' end.

Subject code: AG 18803A MUSHROOM PRODUCTION TECHNOLOGY

Subject code: AG 18803B RAISING OF COMMERCIAL NURSERY

Subject code: AG 18803C VERMI-COMPOSTING

Subject code: AG 18803D ORGANIC PRODUCTION TECHNOLOGY

Subject code: AG 18803E FOOD PROCESSING

Subject code: AG 24803F COMMERCIAL CROP PRODUCTION

RURAL AGRICULTURAL WORK EXPERIENCE PROGRAMME

(80 Working Days)

SECTION-B

Credits: 12 **Semesters: VIII**
Subject code: AG18801

Objective:

- To provide the students with an opportunity to gain practical knowledge inCrop Production and Crop Protection.
- To familiarize the students with the socio-economic conditions of the farmer and institutions involved in rural development.
- To develop effective communication skills using extension training methodsin the transfer of technology.

Outcome: Students will be able to get first-hand experience of various agricultural operations involved in crop production and crop protection and learn actual farming in order to develop a proper perspective.

Course outcomes:

- Apply the knowledge of the various agricultural operations involved in crop production
- Apply the knowledge of Crop Protection techniques in the host farmers' fields
- Survey on the socio-economic status of farmers in the village
- Organize method demonstration and agricultural exhibition in the villages for the benefit of farmers
- Prepare a report in th e prescribed format in crop production, crop protection, Agricultural Economics, Agriculture Extension, and KVK activities

In this programme, students are required to stay in villages attached to an Agricultural Research Station / Krishi Vigyana Kendra and interact with farmers of the village by visiting them regularly. They are required to collect information in a prescribed proforma and also perform extension activity in the village in small groups. A team of experienced specialists supervises and guidestheir activities during these programmes.

At the end of the programme, each student is required to submit a report detailing the work done and knowledge gained with a sound basic background. This practical field experience equips the students with the desired professional skills enabling them to serve the Farming Community in a better way.

ACTIVITIES:

- Each student will take up an Agro-Economic Survey of the Village. The student will conduct a Farm Holding Survey.
- The student shall maintain a Record of Daily Work Done.
- Bio-metrical observation shall be recorded.
- Record of Land Protection Work undertaken.
- Collect and submit 15 Herbarium specimens, each of insect damage and plant disease symptoms.
- Conduct Result Demonstration and Method Demonstrations.
- Preparation of relevant charts for Farmer's Knowledge. The student shall arrange the Farmer's Training Programme.
- Students shall establish an Information Corner in the Village. Celebrate Farmers' Day
- The students shall involve themselves in Actual Day to day-to-day agricultural Operations along with their Host Farmers.
- Participate in Village Service Activity.

INDUSTRY INTERNSHIP PROGRAMME

(50 Working Days)

SECTION-B

Credits : 8 **Semester: VIII**
Subject code: AG18802

Objective: To expose the students to an agri-related industry/ company so that they gain working knowledge, which will enable them to easily get into jobs in the agri-based industry.

Outcome: Students will be able to learn techniques and skills to find suitable placements in agro-based Industries/institutions.

Course outcomes:

- Select the agro-industry based on the interest of the students
- Apply various techniques and skills in Agro-Industry
- Formulate a research proposal
- Makeup of project report
- Defend the research project

The objective of this programme is to provide the students with an opportunity to gain first-hand knowledge of industrial work, to learn techniques and skills, and to train them for assignments after completion of graduation. As part of this, each student will be attached to an Industry or an Organization in the field of Agriculture, Animal Husbandry, etc. At the end of the semester, each student shall submit a report detailing the work done and the knowledge gained.