School of Agriculture and Environmental Sciences

Shobhit University, Gangoh

(Established by UP Shobhit University Act No. 3, 2012)

Schoolof Agriculture And Environmental Sciences

Ordinances,Regulations&Syllabus

For

Bachelor of Science in Agriculture
(B.Sc.Ag.)FourYearProgramme SemesterPattern
(w.e.f.session2013-14)

Revised andapprovedin the year2019(13th Meeting of the BoardofStudies)

Examinationand Evaluation System

- Fifth Deans' Committee deliberated on the examination and evaluation system beingfollowedby differentuniversities.The Committee recommendsUniformGradingsystem to be followed with uniform OGPA requirements for award of degrees at alllevels and uniform conversion formulae to be followed for declaration of I, II and IIIdivisions, distinctions etc. Declaration of division in the degree certificate to be madecompulsorybyall universities:

Examination

- External theory(50%)
- Internal Theory+ Practical(50%)
- CourseswithTheoryandPractical:Mid-termExam(30%)+Assignment(5%)inpracticaloriented courses+Practical(15%)
- CourseswithonlyTheory:Mid-termExam(40%) +Assignment(10%)
- CourseswithonlyPractical: (100%)Internal
- Paper to be set by external: HOD shall ensure the coverage of syllabus. If neededmoderation can bedone.
- Evaluation to bedoneinternally by the faculty other than theCourseInstructor.Syllabus of the concerned course shall be sent to the external examiner, who shallpreparethequestionpapers.Forpractical,itisrecommendedthatexaminationshallbe conducted bycourse instructor(s)and one teachernominatedbyHOD.

Evaluation

Degree	Percentageof Marks Obtained	Conversion into Points
All	100	10 Points
	90 to <100	9 to <10
	80 to <90	8 to <9
	70 to <80	7 to <8
	60 to <70	6 to <7
	50 to <60	5 to <6
	<50(Fail)	<5
	Eg.80.76	8.076
	43.60	4.360
	72.50(but shortage in attendance)	Fail(1point)

OGPA	Division
5.000 – 5.999	Pass
6.000 – 6.999	IIdivision
7.000 – 7.999	Idivision
8.000andabove	I division with distinction

- GPA=Totalpointsscored/Totalcredits(for1semester)
- CGPA=∑Totalpointsscored/Coursecredits
- OGPA=∑Total pointsscored (afterexcludingfailurepoints)/ Coursecredits
- % ofMarks=OGPA x100/10

B.Sc.(Ag.) SEMESTER-I

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-101	FundamentalsofHorticulture	2	1	0	2
2.	BAG-103	FundamentalsofPlantBiochemistryand Biotechnology	3	2	0	2
3.	BAG-105	Fundamentalsof Soil Science	3	2	0	2
4.	BAG-107	Introduction to Forestry	2	1	0	2
5.	BAG-109/ BAG-109A/ BAG-109B/ BAG-109C/	Comprehension&Communication Skillsin English/ English Grammar-I/ Soft Skills-I/ Life Management-I/	2	1	0	2
6.	BAG-111	FundamentalsofAgronomy	4	3	0	2
7.	BAG-113	IntroductoryBiology*	1	1	0	0
8.	BAG-115/ BAG-115A BAG-115B	ElementaryMathematics*/ Fundamentals of Statistics/ Statistical Thinking and Data Analysis	2	2	0	0
9.	BAG-117	AgriculturalHeritage*	1	1	0	0
10.	BAG-119/ BAG-119A/ BAG-119B/ BAG-119C	Rural Sociology&Educational Psychology/ Science, Technology, and Society/ Women's and Gender Studies/ Geography of the Global Economy	2	2	0	0
11.	BAG-121/ BAG-121A/ BAG-121**B/** BAG121C/	HumanValues&Ethics(non gradial)/ Global Climate Policy and Sustainability/ Planetary Change and Human Health/ Tools for Sustainable Design	1	1	0	0
12.	BAG123/ BAG-123A/ BAG-123B/ BAG-123C	NSS/ NCC/ PhysicalEducation&Yoga Practices**/ Water, Sanitation and Hygiene	2	0	0	4
	Total		**25**	**17**	**0**	**16**
R:Remedial course;**NC: Non-gradial courses- 18+03*+03*						

B.Sc.(Ag.) SEMESTER-II

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-102	Fundamentalsof Genetics	3	2	0	2
2.	BAG-104	AgriculturalMicrobiology	2	1	0	2
3.	BAG-106	SoilandWater ConservationEngineering	2	1	0	2
4.	BAG-108	Fundamentals of CropPhysiology	2	1	0	2
5.	BAG-110	FundamentalsofAgriculturalEconomics	2	2	0	0
6.	BAG-112	Fundamentals ofPlantPathology	4	3	0	2
7.	BAG-114	Fundamentals of Entomology	4	3	0	2
8.	BAG-116	FundamentalsofAgriculturalExtension Education	3	2	0	2
9.	BAG-118/ BAG-118A/ BAG-118B/ BAG-118C	CommunicationSkillsand PersonalityDevelopment/ English Grammar-II/ Soft Skills-II/ Life Management-II/	2	1	0	2
	Total		**24**	**16**	**0**	**16**

B.Sc.(Ag.) SEMESTER-III

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-201	Crop Production Technology–I(Kharif Crops)	2	1	0	2
2.	BAG-203	FundamentalsofPlantBreeding	3	2	0	2
3.	BAG-205	AgriculturalFinanceandCooperation	3	2	0	2
4.	BAG-207	Agri- Informatics	2	1	0	2
5.	BAG-209	FarmMachineryand Power	2	1	0	2
6.	BAG-211	Production Technologyfor Vegetables and Spices	2	1	0	2
7.	BAG-213	Environmental Studiesand DisasterManagement	3	2	0	2
8.	BAG-215/ BAG-215A/ BAG-215B/ BAG-215C	Statistical Methods/ Introduction to Mathematical Programming/ Introduction to Modeling and Simulation/ Algebraic Techniques and Semidefinite Optimization	2	1	0	2
9.	BAG-217	Livestock andPoultryManagement	4	3	0	2
	Total		**23**	**14**	**0**	**18**

B.Sc.(Ag.) SEMESTER-IV

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-202	Crop ProductionTechnology–II(Rabi Crops)	2	1	0	2
2.	BAG-204	Production TechnologyforOrnamentalCrops,MAP andLandscaping	2	1	0	2
3.	BAG-206	Renewable EnergyandGreenTechnology	2	1	0	2
4.	BAG-208	Problematic Soilsand theirManagement	2	1	0	0
5.	BAG-210	ProductionTechnologyforFruitandPlantation Crops	2	1	0	2
6.	BAG-212	PrinciplesofSeedTechnology	3	2	0	2
7.	BAG-214	FarmingSystem&Sustainable Agriculture	1	1	0	0
8.	BAG-216	AgriculturalMarketingTrade&Prices	3	2	0	2
9.	BAG-218	IntroductoryAgro-meteorology&ClimateChange	2	1	0	2
10.	BAG-220	Elective Course	3	2	0	2
	Total		**22**	**13**	**0**	**16**

B.Sc.(Ag.) SEMESTER-V

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-301	PrinciplesofIntegratedPestandDiseaseManagement	3	2	0	2
2.	BAG-303	Manures,Fertilizers andSoil FertilityManagement	3	2	0	2
3.	BAG-305	PestsofCropsandStoredGrainand their Management	3	2	0	2
4.	BAG-307	DiseasesofField and HorticulturalCrops and their Management–I	3	2	0	2
5.	BAG-319	Crop Improvement-I(KharifCrops)	2	0	0	4
6.	BAG-311/ BAG-311A/ BAG-311B/ BAG-311C	EntrepreneurshipDevelopmentandBusinessCommunication/ English Grammar-III/ Soft Skills-III/ Life Management-III	2	1	0	2
7.	BAG-313	Geo-informatics,Nano-technologyandPrecision Farming	2	1	0	2
8.	BAG-315	PracticalCrop Production –I(Kharif crops)	2	1	0	2
9.	BAG-317/ BAG-317A/ BAG-317B	IntellectualPropertyRights/ Research Methodology/ Publication Ethics and Emerging trends in Research	1	1	0	0
10.	BAG-319	Elective Course	3	2	0	2
	Total		**24**	**14**	**0**	**20**

B.Sc.(Ag.) SEMESTER-VI

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-302	RainfedAgriculture&WatershedManagement	2	1	0	2
2.	BAG-304	Protected Cultivation and SecondaryAgriculture	2	1	0	2
3.	BAG-306	DiseasesofField and HorticulturalCrops and their Management-II	3	2	0	2
4.	BAG-308	Post-harvestManagementandValue AdditionofFruits andVegetables	2	1	0	2
5.	BAG-310	ManagementofBeneficialInsects	2	1	0	2
6.	BAG-312	Crop Improvement-II(Rabicrops)	2	1	0	2
7.	BAG-314	PracticalCrop Production –II(Rabi crops)	2	1	0	2
8.	BAG-316	PrinciplesofOrganicFarming	2	1	0	2
9.	BAG-318	FarmManagement, Production&Resource Economics	2	1	0	2
10.	BAG-320	Principles ofFood Scienceand Nutrition	2	2	0	0
11.	BAG-321	Elective Course	3	2	0	2
	Total		**24**	**14**	**0**	**20**

B.Sc.(Ag.) SEMESTER-VII

S. No	Subject Code	Rural Agricultural Work Experience and Agro-industrial Attachment(RAWE&AIA)		
		Activities	No. of weeks	Credit Hours
1.	BAG-401	General orientation&On campustrainingbydifferent faculties	1	14
2.	BAG-403	Villageattachment	8	
3.	BAG-405	UnitattachmentinUniv./College.KVK/ResearchStation Attachment	5	
4.	BAG-407	Plant clinic	2	02
5.	BAG-409	Agro-IndustrialAttachment	3	04
6.	BAG-411	Project ReportPreparation,Presentationand Evaluation	1	
	TotalweeksforRAWE&AIA		**20**	**20**

- Agro- Industrial Attachment: The students would be attached with the agro-industriesfor a period of 3 weeks to get an experience of the industrial environment andworking.
- Educational tour will be conducted in break between IV & V Semester or VI & VIISemester

RAWE

Component-I:VillageAttachmentTrainingProgramme

S. No	Activity	Duration
1.	Orientation andSurveyofVillage	1week
2.	AgronomicalInterventions	1 week
3.	PlantProtection Interventions	1 week
4.	SoilImprovement Interventions(Soil samplingand testing)	1week
5.	FruitandVegetableproductioninterventions	1 week
6.	FoodProcessingand Storageinterventions	
7.	AnimalProductionInterventions	1 week
8.	Extension andTransferofTechnologyactivities	1 week

Component–II:AgroIndustrial Attachment

- Students shall be placed in Agro and Cottage industries and CommoditiesBoardsfor 03 weeks.
- IndustriesincludeSeed/Saplingproduction,Pesticides-insecticides,Postharvest-processing-valueaddition,Agri-financeinstitutions,etc.

B.Sc.(Ag.) SEMESTER-VIII

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-402	ProductionTechnologyfor Bioagentsand Biofertilizer	1	0	0	2
2.	BAG-404	SeedProductionandTechnology	1	0	0	2
3.	BAG-406	Mushroom CultivationTechnology	1	0	0	2
4.	BAG-408	Soil, Plant,Water and SeedTesting	1	0	0	2
5.	BAG-410	CommercialBeekeeping	1	0	0	2
6.	BAG-412	PoultryProductionTechnology	1	0	0	2
7.	BAG-414	CommercialHorticulture	1	0	0	2
8.	BAG-416	Floriculture and Landscaping	1	0	0	2
9.	BAG-418	FoodProcessing	1	0	0	2
10.	BAG-420	AgricultureWaste Management	1	0	0	2
11.	BAG-422	OrganicProductionTechnology	1	0	0	2
12.	BAG-424	CommercialSericulture	1	0	0	2
	Total		**12**	**0**	**0**	**24**

EvaluationofExperientialLearningProgramme/Hands-onTraining(HOT)

S. No	Parameters	Max.Marks
1.	Project PlanningandWriting	10
2.	Presentation	10
3.	Regularity	10
4.	MonthlyAssessment	10
5.	Output delivery	10
6.	TechnicalSkill Development	10
7.	EntrepreneurshipSkills	10
8.	Business networkingskills	10
9.	Report WritingSkills	10
10.	FinalPresentation	10
	Total	**100**

Elective Courses

- Astudentcanselectthreeelectivecoursesoutofthefollowingandofferduring4th(BAG-220),5th(BAG-319) and 6th(BAG-321) semesters.

S. No.	Courses	Credit Hours
1.	AgribusinessManagement	3(2+1)
2.	Agrochemicals	3(2+1)
3.	CommercialPlantBreeding	3(1+2)
4.	Landscaping	3(2+1)
5.	Food Safetyand Standards	3(2+1)
6.	Biopesticides&Biofertilizers	3(2+1)
7.	ProtectedCultivation	3(2+1)
8.	MicropropagationTechnologies	3(1+2)
9.	Hi-tech.Horticulture	3(2+1)
10.	WeedManagement	3(2+1)
11.	System Simulation and Agro-advisory	3(2+1)
12.	AgriculturalJournalism	3(2+1)

ProgrammeEducationalObjectives (PEOs)

PEO1Foundational Knowledge: Graduates will possess a strong understanding of agricultural sciences, including plant and animal biology, soil science, and agricultural economics, enabling them to address challenges in the agricultural sector.

PEO2Practical Skills: Graduates will develop practical skills in modern agricultural practices, including crop production, pest management, and sustainable farming techniques, allowing them to effectively contribute to agricultural productivity.

PEO3Research and Innovation: Graduates will be equipped to engage in research and innovation, utilizing scientific methods to solve agricultural problems and contribute to advancements in the field.

PEO 4Sustainability and Environmental Stewardship: Graduates will understand the principles of sustainable agriculture and environmental conservation, promoting practices that ensure food security while preserving natural resources.

PEO 5Communication and Leadership: Graduates will possess effective communication and leadership skills, enabling them to work collaboratively in diverse teams and to advocate for agricultural development and policy changes.

PEO6Lifelong Learning: Graduates will be prepared for lifelong learning and professional development, adapting to emerging trends and technologies in agriculture to remain relevant in their careers.

ProgrammeSpecificObjectives(PSO's)

PSO 1 To impart a strong foundation in agricultural science, including plant biology, soil science, and animal husbandry.

PSO2 To develop practical skills through hands-on training in farming techniques, crop management, and animal care.

PSO 3 To encourage students to engage in research and innovation to address contemporary agricultural challenges, such as food security and sustainable farming.

PSO 4 To promote sustainable agricultural practices that protect the environment and enhance productivity.

PSO5 To familiarize students with the latest agricultural technologies, including precision farming, biotechnology, and data analytics.

PSO6 To provide insights into agricultural economics, marketing, and policy, enabling students to make informed decisions in the agricultural sector.

PSO7 To develop critical thinking and problem-solving skills necessary for effective decision-making in agriculture.

ProgrammeOutcomeObjectives(POO's)

POO1Knowledge Application: Demonstrate a comprehensive understanding of agricultural sciences, including plant and animal biology, soil science, and agricultural engineering.

POO 2Research Skills: Conduct research using scientific methods, including data collection, analysis, and interpretation, to solve agricultural problems.

POO3Sustainable Practices: Promote sustainable agricultural practices that enhance productivity while preserving environmental health and biodiversity.

POO4Technical Proficiency: Utilize modern agricultural technologies and tools for efficient farming practices, including precision agriculture and biotechnology.

POO5Critical Thinking: Analyze and evaluate agricultural policies, practices, and issues critically, fostering informed decision-making.

POO 6Communication Skills: Communicate effectively, both verbally and in writing, to diverse audiences, including farmers, policymakers, and the general public.

POO7Teamwork and Leadership: Work collaboratively in teams, demonstrating leadership skills in agricultural projects and initiatives.

POO8Economic Understanding: Understand the economic principles related to agricultural production, marketing, and management.

POO 9Ethics and Responsibility: Uphold ethical standards in agricultural practices, considering social responsibilities and the impact on communities.

POO 10Lifelong Learning: Foster a commitment to continuous learning and professional development in the agricultural sector.

CourseStructure

OrdinanceandRegulations

BAG-101: Fundamentals of Horticulture

CO: COURSE OBJECTIVE

CO-1Understanding Horticulture Basics: Define horticulture and its importance in agriculture and daily life. Differentiate between horticulture and other branches of plant science.

CO-2 Introduction to Horticultural Crops: Familiarize with various horticultural crops, including fruits, vegetables, flowers, and ornamental plants. Learn the classification of horticultural plants based on their growth habits, lifecycle, and economic importance.

CO-3 Environmental Factors and Plant Growth: Understand the influence of light, temperature, water, soil, and nutrients on the growth and development of horticultural crops. Study the effects of biotic and abiotic stresses on horticultural plants.

CO-4 Horticultural Practices: Learn the basic principles of plant propagation, including sexual and asexual methods. Understand the basics of nursery management, pruning, training, and crop management

CO-5 Soil and Water Management: Explore soil preparation techniques for horticultural crops. Study the importance of irrigation, drainage, and water conservation techniques.

CO-6 Plant Nutrition and Health: Learn about fertilizers, manures, and their application in horticulture. Understand integrated pest and disease management practices.

CO-7Economic and Aesthetic Value of Horticulture:Recognize the role of horticulture in improving economic well-being and environmental sustainability.Study the use of ornamental plants in landscaping, floriculture, and urban gardening.

CO-8 Sustainability and Modern Techniques:Introduce sustainable horticultural practices such as organic farming and precision horticulture.Familiarize with advancements in biotechnology, tissue culture, and protected cultivation (e.g., greenhouses, playhouses).

COURSE CONTENTS

Unit- I:

- Horticulture-
  Itsdefinitionandbranches,importanceandscope;horticulturalandbotanicalclassification; climateand soilfor horticultural crops

Unit- II:

- Plantpropagation-
  methodsandpropagatingstructures;Seeddormancy,Seedgermination,principles of orchard establishment;

Unit- III:

- Principlesandmethodsoftrainingandpruning,juvenilityandflowerbuddifferentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization andparthenocarpy;medicinaland aromatic plants;

Unit- IV:

- Importanceofplantbio-regulatorsinhorticulture.Irrigation–
  methods,Fertilizerapplicationinhorticulturalcrops.

Practical:

Identification of garden tools.Identification of horticultural crops.Preparation of seed bed/nurserybed.Practiceofsexualandasexualmethodsofpropagationincludingmicro-propagation. Layout and planting of orchard.Training and pruning of fruit trees.Preparation ofpottingmixture.Fertilizerapplicationindifferentcrops.Visitstocommercialnurseries/orchard.

BAG-103: FundamentalsofPlantBiochemistryandBiotechnology

CO: COURSE OBJECTIVE

CO-1Understand Plant Biochemical Processes: Develop a foundational understanding of the biochemical processes and pathways that drive plant growth, development, and metabolism.

CO-2Explore Plant Metabolism: Analyze the roles of primary and secondary metabolites in plants, including their synthesis, regulation, and functional significance.

CO-3Study Enzymatic Mechanisms: Learn the principles of enzymatic reactions and their applications in regulating plant physiological and biochemical processes.

CO-4Integrate Biochemistry and Biotechnology: Explore the intersection of plant biochemistry with modern biotechnological tools for crop improvement, disease resistance, and sustainable agriculture.

CO-5Apply Molecular Biology Tools: Gain proficiency in molecular techniques such as gene cloning, CRISPR, and recombinant DNA technology for studying and manipulating plant systems.

CO-6Evaluate Plant Stress Responses: Understand biochemical mechanisms plants use to respond and adapt to biotic and abiotic stresses, and how these can be managed through biotechnology.

CO-7Promote Sustainable Practices: Apply biotechnological advances to improve agricultural productivity, reduce environmental impact, and address global challenges like food security and climate change.

COURSE CONTENTS

Unit- I:
Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importanceandclassification.StructuresofMonosaccharides,Reducingandoxidizingpropertiesof Monosaccharides,Mutarotation;StructureofDisaccharidesandPolysaccharides.Lipid:Importanc e and classification; Structures and properties of fatty acids; storage lipids andmembrane lipids.

Unit- II:
Proteins: Importance of proteins and classification; Structures, titration and zwitterions natureofaminoacids;Structuralorganizationofproteins.Enzymes:Generalproperties;Classificati on; Mechanism of action; Michaelis&Menten and Line Weaver Burk equation &plots;Introductiontoallostericenzymes.Nucleicacids:Importanceandclassification;Structure ofNucleotides,A, B& ZDNA;RNA:Typesand Secondary&Tertiarystructure.

Unit- III:
Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transportchain.Metabolism of lipids: Beta oxidation, Biosynthesis offattyacids.

Unit- IV:
Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cellsuspension culture, callus culture, anther culture, pollen culture and ovule culture and theirapplications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seedsand their significance; Embryo rescue and its significance; somatic hybridization and cybrids;Somaclonalvariation anditsusein crop improvement;cryo-preservation,

Unit- V:
Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEGmediated)andAgrobacteriummediatedgenetransfermethods;Transgenicsanditsimportanc e in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR;MarkerAssistedBreedingin crop improvement;Biotechnologyregulations.

Practical:
Preparationofsolution,pH&buffers,Qualitativetestsofcarbohydratesandaminoacids.Quantitativ e estimation of glucose/ proteins. Titration methods for estimation of aminoacids/lipids, Effect of pH, temperature and substrate concentration on enzyme action, Paperchromatography/TLCdemonstrationforseparationofaminoacids/Monosaccharides.Sterili zation techniques.Composition of various tissue culture media and preparation of stocksolutionsforMSnutrientmedium.Callusinductionfromvariousexplants.Micro-propagation,hardeningandacclimatization.DemonstrationonisolationofDNA.Demonstrationof gel electrophoresis techniquesandDNA finger printing.

BAG-105: Fundamentalsof Soil Science

CO: COURSE OBJECTIVE

CO-1Understand Soil Formation and Properties: Develop an understanding of the processes of soil formation, including physical, chemical, and biological factors, and identify key soil properties that influence its classification and use.

CO-2 Analyze Soil Components: Examine the composition of soil, including minerals, organic matter, water, and air, and explain their roles in supporting plant growth and maintaining ecological balance.

CO-3 Explore Soil Classification Systems: Learn to classify soils based on their physical, chemical, and biological properties using standard classification systems such as Soil Taxonomy or FAO guidelines.

CO-4 Study Soil-Water Relationships: Investigate the movement, retention, and availability of water in soils and its impact on plant growth and agricultural productivity.

CO-5 Understand Soil Nutrients and Fertility: Analyze the role of essential soil nutrients, nutrient cycles, and soil amendments in maintaining soil fertility for sustainable agricultural practices.

CO-6 Evaluate Soil Degradation and Conservation: Identify the causes and consequences of soil degradation, including erosion, salinization, and pollution, and propose soil conservation strategies to enhance sustainability.

CO-7 Apply Soil Science to Environmental Issues: Explore the role of soil in addressing global environmental challenges, such as carbon sequestration, waste management, and ecosystem restoration.

COURSE CONTENTS

Unit- I:

- Soil as a natural body, Pathological and edaphological concepts of soil; Soil genesis:soil forming rocks and minerals; weathering, processes and factors of soil formation;SoilProfile, components of soil;

Unit- II:

- Soilphysicalproperties:soil-texture,structure,densityandporosity,soilcolour,consistence and plasticity; Elementary knowledge of soil taxonomy classification andsoils of India; Soil water retention, movement and availability; Soil air, composition,gaseousexchange, problem and plantgrowth,

Unit- III:

- Soil temperature; source, amount and flow of heat in soil; effect on plant growth, Soilreaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability;soil colloids-inorganic and organic; silicate clays: constitution and properties;
  sourcesofcharge;ionexchange,cationexchangecapacity,basesaturation;soilorganicmatter:composition,propertiesanditsinfluenceonsoilproperties;humicsubstances -Natureandproperties;

Unit- IV:

- Soil organisms: macro and microorganisms, their beneficial and harmful effects; Soilpollution-
  behaviorofpesticidesandinorganiccontaminants,preventionandmitigationof soilpollution.

Practical:

Study of soil profile in field. Study of soil sampling tools, collection of representative soilsample, its processing and storage. Study of soil forming rocks and minerals. Determinationof soil density, moisture content and porosity. Determination of soil texture by feel andBouyoucos Methods. Studies of capillary rise phenomenon of water in soil column and watermovement in soil. Determination of soil pH and electrical conductivity. Determination ofcation exchange capacityof soil.Studyof soil map.Determination ofsoilcolour.

Demonstration ofheattransferinsoil. Estimation of organic mattercontent of soil

BAG-107: Introduction to Forestry

CO: COURSE OBJECTIVE

CO-1Understand the Basics of Forestry: Explain the definition, history, and importance of forestry in ecological and economic contexts.\

CO-2Explore Forest Ecosystems: Identify the components of forest ecosystems, including flora, fauna, soil, and climate interactions.

CO-3Comprehend Forest Management Practices: Analyze sustainable forest management principles and practices, including conservation, afforestation, and silviculture techniques.

CO-4Evaluate Forest Resources and Their Uses: Discuss the economic, recreational, and environmental significance of forest products and services.

CO-5Analyze the Role of Forestry in Climate Change Mitigation: Examine how forests contribute to carbon sequestration, biodiversity conservation, and climate resilience.

CO-6Understand Forestry Policies and Regulations: Assess national and international forestry policies, laws, and their impact on conservation and forest management.

CO-7Develop Skills in Forest Assessment and Monitoring: Practice using tools and techniques for forest inventory, mapping, and monitoring forest health.

CO-8 Explore Career Opportunities in Forestry: Discuss various career paths in forestry, ranging from field-based roles to research, policy-making, and environmental advocacy

COURSE CONTENTS

Unit- I:

- Introduction – definitions of basic terms related to forestry, objectives of silviculture,forest classification, salient features of Indian Forest Policies. Forest regeneration,Natural regeneration - natural regeneration from seed and vegetative parts, coppicing,pollarding,root suckers

Unit- II:

- Artificial regeneration – objectives, choice between natural and artificial regeneration,essentialpreliminaryconsiderations.Crownclassification.Tend ingoperations–weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning.Forest mensuration – objectives, diameter measurement, instruments used in diametermeasurement

Unit- III:

- Non instrumental methods of height measurement - shadow and single pole method;Instrumentalmethodsofheightmeasurement-geometricandtrigonometricprinciples, instruments used in height measurement; tree stem form, form factor, formquotient, measurement of volume of felled and standing trees, age determination oftrees

Unit- IV:

- Agroforestry – definitions, importance, criteria of selection of trees in agroforestry,different agroforestry systems prevalent in the country, shifting cultivation, taungya,alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices oftwoimportant fastgrowingtree species of the region.

Practical:

Identificationoftree-species.Diametermeasurementsusingcalipersandtape,diametermeasurements of forked, buttressed, fluted and leaning trees. Height measurement of standingtrees by shadow method, single pole method and hypsometer. Volume measurement of logsusing various formulae. Nursery lay out, seed sowing, vegetative propagation techniques.Forestplantations and theirmanagement. Visits ofnearbyforestbased industries.

BAG-109: Comprehension&Communication Skillsin English

CO: COURSE OBJECTIVE

CO-1 Develop Strong Comprehension Skills: Improve the ability to read, understand, and analyze texts, identifying main ideas, themes, and arguments.

CO-2 Enhance Vocabulary and Grammar: Expand vocabulary and strengthen grammar usage to enable more effective communication.

CO-3 Master Listening Skills: Develop the ability to comprehend spoken English in various contexts, such as lectures, conversations, and media.

CO-4 Improve Speaking Abilities: Build confidence and fluency in verbal communication, including presenting ideas clearly and engaging in discussions.

CO-5 Refine Writing Skills: Strengthen the ability to write well-structured essays, reports, and creative pieces.

CO-6 Increase Cultural Awareness: Understand the nuances of language use in different cultural contexts and improve cross-cultural communication.

CO-7 Practice Effective Argumentation: Learn to construct and present well-reasoned arguments, supported by evidence and coherent logic.

CO-8 Enhance Interpersonal Communication: Improve interpersonal communication skills through role-play, debates, and group discussions to foster collaboration and teamwork.

COURSE CONTENTS

Unit- I:

- War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at scienceRaymondB.Fosdick.YouandYourEnglish– SpokenEnglishandbrokenEnglish G.B.Shaw.

Unit- II:

- ReadingComprehension,Vocabulary- Antonym,Synonym,Homophones,Homonyms, often confused words.Exercises toHelp the studentsin theenrichmentof vocabularybased on TOEFLand other competitiveexaminations.

Unit- III:

- Functionalgrammar:Articles,Prepositions,Verb,SubjectverbAgreement,Transformation, Synthesis, Direct and Indirect Narration. Written Skills: Paragraphwriting,Precise writing,Reportwritingand Proposal writing.

Unit- IV:

- The Style: Importance of professional writing. Preparation of Curriculum Vitae andJobapplications.SynopsisWriting.Interviews:kinds,Importance andprocess.

Practical:

Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercialand general in nature). Oral Communication: Phonetics, stress and intonation, Conversationpractice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness&Readingskills:readingdialogues,rapidreading,intensivereading,improvingreadingskills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. GroupDiscussions.

BAG-109 A: English Grammar-I

CO: COURSE OBJECTIVE

CO-1 Understand Basic Grammar Concepts: To introduce students to fundamental concepts of English grammar, including sentence structure, parts of speech, and punctuation.

CO-2 Enhance Sentence Formation: To develop the ability to construct grammatically correct and varied sentences, with a focus on clarity and coherence.

CO-3 Master Verb Tenses: To help students understand and accurately use different verb tenses, including present, past, and future forms, in both simple and continuous aspects.

CO-4 Improve Vocabulary and Word Usage: To expand students' vocabulary and guide them in using words appropriately within different grammatical contexts.

CO-5 Grasp Subject-Verb Agreement: To teach the rules of subject-verb agreement and how to apply them in diverse sentence structures.

CO-6 Learn Sentence Types and Functions: To provide knowledge of different types of sentences (declarative, interrogative, imperative, and exclamatory) and their functions in communication.

CO-8 Practice Pronouns and Their Functions: To familiarize students with the correct usage of pronouns, including personal, possessive, and reflexive forms, and how they function in sentences.

CO-8 Develop Punctuation Skills: To improve students' understanding and correct usage of punctuation marks (periods, commas, semicolons, colons, quotation marks, etc.) to enhance written communication.

COURSE CONTENTS

Unit I

Introduction to Grammar, Overview of grammar and its importance, Parts of speech: nouns, pronouns, verbs, Types of nouns: common, proper, collective.

Unit II

Pronouns: subject, object, possessive, Verb types: action, linking, auxiliary, Tenses: present, past, future, Functions of adjectives and adverbs, Comparative and superlative forms.

Unit III

Basic sentence components: subject, predicate, Types of sentences: simple, compound, complex, Commas, periods, question marks, exclamation points, Quotation marks and apostrophes.

Unit IV

Subject-verb agreement, Misplaced modifiers, Sentence fragments and run-ons, Comprehensive review of topics covered, Practice exercises and quizzes

BAG-109 B: Soft Skills-I

CO: COURSE OBJECTIVE

CO-1 Enhance Communication Skills: Develop verbal, non-verbal, and written communication techniques to express ideas clearly and effectively.

CO-2 Build Teamwork and Collaboration: Foster the ability to work collaboratively in diverse groups, understanding group dynamics and conflict resolution.

CO-3 Improve Time Management: Learn strategies to prioritize tasks, manage time efficiently, and meet deadlines in professional and personal contexts.

CO-4 Develop Emotional Intelligence: Cultivate self-awareness, empathy, and the ability to manage emotions in interpersonal relationships and challenging situations.

CO-5 Strengthen Critical Thinking and Problem-Solving: Encourage analytical thinking to evaluate situations and propose creative, practical solutions.

CO-7 Boost Confidence and Public Speaking Skills: Build self-confidence and refine public speaking skills to present ideas effectively in formal and informal settings.

CO-8 Cultivate Professional Ethics and Workplace Etiquette: Understand and apply ethical principles and appropriate behavior in professional environments.

COURSE CONTENTS

Unit I

Presentation Skills, Speaking to a small group and large audience, Barriers to communication and non- verbal communication, Language skills, Types of presentation and use of aids, Effective public speaking.

Unit II

Memory Skills, Memory system, Short term and long term memory, Causes of memory problems, Methods of improving memory, preventing loss of memory.

Unit III

Technical Writing Skills, Defining Technical Communication and Organizing Information, Language in Technical Communication.

Unit IV

Description Vs Narration Vs Instruction, Letters, Memos, Electronic Communication, Formal and Informal Reports

BAG-109 C: Life Management-I

CO: COURSE OBJECTIVE

CO-1 Self-Awareness Development: Understand personal strengths, weaknesses, values, and goals. Develop emotional intelligence to manage self and relationships effectively.

CO-2 Time and Priority Management: Learn strategies for effective time management. Set realistic goals and prioritize tasks to enhance productivity.

CO-3 Stress and Emotional Regulation: Identify sources of stress and implement techniques to manage it. Develop coping mechanisms for emotional well-being.

CO-4 Communication Skills: Build effective verbal and non-verbal communication skills. Enhance active listening and interpersonal communication abilities.

CO-5 Decision-Making and Problem-Solving: Learn frameworks for making informed decisions. Cultivate problem-solving skills to handle life challenges.

CO-6 Work-Life Balance: Understand the importance of balancing personal and professional life. Implement strategies to achieve harmony and avoid burnout.

CO-7 Personal Growth and Goal Setting: Set and achieve short-term and long-term personal goals. Develop a growth mindset and strategies for continuous improvement.

CO-8 Health and Well-Being: Recognize the importance of physical and mental health. Learn basic wellness practices for a balanced lifestyle.

COURSE CONTENTS

Unit I

Life Style & its Basics, Purpose of life & its dimensions, Importance of Self-Evaluation; (Daily routine, Food habits, Dressing Sense, Habit formation, Company, Etiquettes), Duties & Commitment of Self, Family and Society, Adjustment with Self & Environment.

Unit II

Work Efficiency, Positive way of thinking, Tools & techniques for Positive thinking, Karma & Karma PhalSidhanta, Behavioral Skill.

Unit III

Personality Skills, Self-Assessment Techniques, Adjustment Skills, Art of Positive Thinking.

Unit IV

Environmental Awareness, Basic Concept of Environment & Ecology, Natural Resources, Environmental Ethics.

Unit V

Life and Deeds of Pt. Shriram Sharma Acharya and Mataji, GayatriPariwar and its Branches, VicharKranti, AtmdevSadhna: Atmbodh and Tatvabodh, Pranayama: Nadishodhan, Pranakarshan, Diary Writing.

BAG-111: FundamentalsofAgronomy

CO: COURSE OBJECTIVE

CO-1 Understanding Crop Growth and Development: Learn about the life cycle of crops and factors influencing their growth. Study the physiological and morphological characteristics of crops.

CO-2 Basics of Soil Science: Understand soil properties, classification, and its role in crop production. Learn about soil fertility, nutrient management, and amendments.

CO-3 Crop Management Practices: Gain knowledge about crop planting methods, spacing, and cropping systems. Understand weed control, irrigation, and pest management practices.

CO-4Climate and Agriculture: Explore the impact of weather and climate on crop production. Study agro climatic zones and their significance in crop planning.

CO-5Sustainable Agriculture: Learn principles of sustainable land use, conservation practices, and integrated nutrient management. Focus on resource efficiency and minimizing environmental impact.

CO-7Introduction to Agronomic Tools and Techniques: Understand the role of technology and tools in modern agronomy. Familiarize with concepts like precision agriculture and remote sensing.

CO-8Crop Improvement: Basics of crop breeding and genetic enhancement for better yields and resilience.

COURSE CONTENTS

Unit- I:

- Agronomyanditsscope,seedsandsowing,tillageandtilth,cropdensityandgeometry,

Unit- II:

- Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil-plant-waterrelationship,cropwaterrequirement,wateruseefficiency,irrigation-schedulingcriteriaand methods, qualityof irrigation water,logging.

Unit- III:

- Weeds-importance,classification,cropweedcompetition,conceptsofweedmanagement-principlesandmethods,herbicides-classification,selectivityandresistance,allelopathy.

Unit- IV:

- Growth and development of crops, factors affecting growth and development, plantideotypes, crop rotation and its principles, adaptation and distribution of crops, cropmanagementtechnologies inproblematic areas,harvesting andthreshingofcrops.

Practical:

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro-climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizerapplication,Studyofyieldcontributingcharactersandyieldestimation,Seed germinationand viability test, Numerical exercises on fertilizer requirement, plant population, herbicidesand water requirement, Use of tillage implements-reversible plough, one way plough, harrow,leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity,bulkdensityand infiltration rate, Measurement ofirrigation water.

BAG-113:IntroductoryBiology

CO: COURSE OBJECTIVE

CO-1 Understand Core Biological Concepts: Explore the structure and function of cells, including prokaryotic and eukaryotic cells. Examine the molecular basis of life (e.g., DNA, RNA, proteins). Understand energy transformations in biological systems (e.g., photosynthesis and cellular respiration)

CO-2Develop Knowledge of Organismal Biology: Learn about the diversity of life and classification systems (taxonomy).Study how organisms grow, reproduce, and interact with their environments. Understand the principles of evolution and natural selection.

CO-3 Explore Genetics and Heredity: Learn the basics of Mend Elian and molecular genetics.Understand patterns of inheritance and the role of genetic variation in populations.

CO-4. Examine Ecology and Environmental Biology: Study ecosystems, energy flow, and nutrient cycles.Explore the interdependence of organisms and their environments.Understand human impacts on ecosystems and biodiversity.

CO-5Develop Scientific Inquiry Skills: Learn how to design experiments, analyze data, and interpret results.Apply the scientific method to biological questions.Enhance critical thinking and problem-solving skills.

CO-6Prepare for Advanced Biological Studies: Build a foundation for specialized topics in biology, such as microbiology, genetics, and biochemistry.Develop an appreciation for the scope and relevance of biology in everyday life.

COURSE CONTENTS

Unit- I:

- Introductiontothe livingworld, diversityand characteristicsoflife,originoflife,

Unit- II:

- EvolutionandEugenics.BinomialnomenclatureandclassificationCellandcel ldivision.

Unit- III:

- Morphologyofflowingplants. Seed andseed germination.

Unit- IV:

- Plantsystematic-viz;Brassicaceae,FabaceaeandPoaceae.Roleofanimalsinagriculture.

Practical:

Morphology of flowering plants – root, stem and leaf and their modifications. Inflorence,flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Studyofspecimensandslides.Description ofplants-Brassicaceae,FabaceaeandPoaceae.

BAG-115: ElementaryMathematics

CO: COURSE OBJECTIVES

CO-1 Develop Number Sense and Operations: To help students understand and apply basic arithmetic operations (addition, subtraction, multiplication, and division) with whole numbers, fractions, and decimals.

CO-2 Introduce Geometric Concepts: To enable students to identify and analyze basic geometric shapes, understand their properties, and explore concepts of symmetry, area, and perimeter.

CO-3 Understand Measurement: To teach students how to measure length, weight, volume, and time using both standard and non-standard units of measurement, fostering an understanding of units and conversions.

CO-4 Explore Data and Probability: To introduce students to data collection, organization, and representation using graphs (bar charts, pictograms, and line graphs), and basic concepts of probability.

CO-5 Introduce Problem-Solving Strategies: To develop students' ability to solve word problems by applying mathematical operations and logical reasoning to everyday situations.

CO-6 Enhance Mathematical Communication: To encourage students to articulate mathematical ideas clearly using correct terminology and notation, and explain their thinking through reasoning.

CO-7 Promote Critical Thinking: To strengthen students' ability to make logical connections between concepts, recognize patterns, and apply mathematical concepts to real-world contexts.

COURSE CONTENTS

Unit- I:

- Straight lines : Distance formula, section formula (internal and external division),Change of axes (only origin changed), Equation of co-ordinate axes, Equation of linesparallel to axes, Slope-intercept form of equation of line, Slope-point form of equationof line, Two point form of equation of line, Intercept form of equation of line, Normalform of equation of line, General form of equation of line, Point of intersection of twost. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle ofbisectorsbetween two lines, Area oftriangleand quadrilateral.

Unit- II:

- Circle: Equation of circle whose centre and radius is known, General equation of acircle, Equation of circle passing through three given points, Equation of circle whosediameters is line joining two points (x_1, y_1) & (x_2, y_2), Tangent and Normal to a givencircle at given point (Simple problems), Condition of tangency of a line y = mx + c tothegivencircle$x^2+y^2=a^2$.

Unit- III:

- DifferentialCalculus:Definitionoffunction,limitandcontinuity,Simpleprobl emson limit, Simple problems on continuity, Differentiation of x^n , e^x , sin x &cos x fromfirst principle, Derivatives of sum, difference, product and quotient of two functions,Differentiation of functions of functions (Simple problem based on it), Logarithmicdifferentiation (Simple problem based on it), Differentiation by substitution methodand simple problems based on it, Differentiation of Inverse Trigonometric functions.Maxima and Minima of the functions of the form y=f (x) (Simple problems based onit).

Unit- IV:

- Integral Calculus : Integration of simple functions, Integration of Product of twofunctions,Integrationbysubstitutionmethod,DefiniteIntegral(simplepro blemsbasedon it),Areaundersimplewell-known curves(simpleproblemsbasedon it).

Unit- V:

- MatricesandDeterminants:DefinitionofMatrices,Addition,Subtraction,Mul tiplication,TransposeandInverseupto3rdorder,Propertiesofdeterminantsupt o 3rd orderand their evaluation.

BAG-115 A: Fundamentals of Statistics

CO: COURSE OBJECTIVES

CO-1 Understand Key Statistical Concepts: Explain fundamental statistical concepts, including data types, measures of central tendency, and measures of dispersion.

CO-2 Data Collection and Organization: Apply methods for collecting, organizing, and summarizing data using appropriate statistical tools.

CO-3 Probability Basics: Understand and calculate probabilities to analyze random events and understand their role in statistical analysis.

CO-4 Inferential Statistics: Perform hypothesis testing, confidence interval estimation, and inferential techniques to draw conclusions from data.

CO-5 Data Visualization: Construct and interpret graphical representations of data, such as histograms, scatterplots, and boxplots.

CO-6 Statistical Software Utilization: Use statistical software or tools to analyze data effectively and interpret output.

CO-7 Real-World Application: Apply statistical methods to solve real-world problems in diverse fields, enhancing decision-making skills.

COURSE CONTENTS

Unit-I

Introduction: Meaning of statistics, Nature of statistics, Importance of statistics, Relation with some allied subjects, Uses of statistics, Misuses of statistics, Types of data: Primary and Secondary data, Quantitative data and Qualitative data, Discrete data and continuous data, Time series , Spatial series data and cross-sectional data, ordinal data and nominal data, Illustration with examples.

Unit-II

Collection of data: Questionnaire and its basic characteristics, Definition of Schedule and pilot survey, Designing a questionnaire and schedule, concept of outliers, Presentation of data: Textual representation, Tabular representation, Diagrammatic representation (line diagram, Multiple axes diagram and multiple line diagram), Bar diagram (Horizontal and vertical bar diagrams, multiple and divided bar diagrams), Pie diagram.

Unit-III

Frequency distribution, Cumulative frequency distribution and their graphical representation (Column diagram, Step diagram, ogive, Histogram, frequency curve of different types, Stem and leaf diagram). Concept of Central Tendency (Mean, Mode and Median) and its measures with properties including $AM \geq GM \geq HM$.

Unit-IV

Measures of Dispersion: Range, Mean deviation, Standard deviation, Quartile deviation, Coefficient of variation, Quantile and Percentile with relation between different measures, Definition of Probability: Classical and Relative frequency approach to probability with limitations. Axiomatic Definition of Probability (Statement only) Theorem of Total Probability, Bonferroni's inequality, Boole's inequality.

BAG-115 B: Statistical Thinking and Data Analysis

CO: COURSE OBJECTIVES

CO-1 Understand Fundamental Statistical Concepts: Develop a clear understanding of basic statistical terms, principles, and methodologies, including descriptive statistics, probability, and inferential techniques.

CO-2 Data Collection and Sampling: Learn appropriate methods for designing experiments, conducting surveys, and collecting data, while understanding the importance of sampling techniques and potential biases.

CO-3 Exploratory Data Analysis: Gain proficiency in visualizing and summarizing data using graphical and numerical methods to uncover underlying patterns, trends, and insights.

CO-4 Statistical Modeling and Inference: Apply statistical models to make inferences about populations from sample data, focusing on hypothesis testing, confidence intervals, and regression analysis.

CO-5 Integration of Computational Tools: Utilize statistical software and programming languages (e.g., R, Python, or Excel) to conduct data analysis efficiently and interpret outputs effectively.

CO-6 Decision-Making Under Uncertainty: Develop the ability to apply statistical reasoning to solve real-world problems and support decision-making in uncertain environments.

CO-7 Communicating Statistical Findings: Master the art of presenting data analysis results clearly and effectively to both technical and non-technical audiences, emphasizing evidence-based conclusions.

COURSE CONTENTS

Unit I

Statistical Thinking, Examples of Statistical Thinking, Numerical Data, Summary Statistics, From Population to Sampled Data, Different Types of Biases, Introduction to Probability, Introduction to Statistical Inference

Unit II

Association and Dependence**,** Association and Causation**,** Conditional Probability and Bayes Rule**,** Simpsons Paradox, Confounding**,** Introduction to Linear Regression**,** Special Regression Models

Unit III

Exploratory Data Analysis and Visualization, Goals of statistical graphics and data visualization, Graphs of Data, Graphs of Fitted Models, Graphs to Check Fitted Models, What makes a good graph, Principles of graphics

Unit IV

Introduction to Bayesian Modeling, Bayesian inference: combining models and data in a forecasting problem, Bayesian hierarchical modeling for studying public opinion, Bayesian modeling for Big Data

BAG-117: AgriculturalHeritage

CO: COURSE OBJECTIVES

CO-1 Understand Historical Significance: Explore the historical development of agriculture and its impact on human civilization, from ancient practices to modern advancements.

CO-2 Recognize Traditional Knowledge: Identify and appreciate the importance of traditional agricultural practices and indigenous knowledge systems in sustaining ecosystems and enhancing crop diversity.

CO-3 Evaluate Cultural Contributions: Analyze the cultural, social, and economic contributions of agriculture in shaping societies across different regions and eras.

CO-4 Study Agricultural Evolution: Investigate the evolution of farming systems, tools, and techniques in response to changing environmental and social needs.

CO-5 Learn Sustainability Principles: Examine historical agricultural practices for their relevance to contemporary issues like sustainability, climate change, and food security.

CO-6 Preserve Biodiversity: Highlight the role of agricultural heritage in conserving biodiversity and promoting sustainable resource management.

CO-7 Promote Awareness and Application: Encourage the integration of agricultural heritage principles into modern farming to create a balance between tradition and innovation.

COURSE CONTENTS

Unit- I:

- IntroductionofIndianagriculturalheritage;Ancientagriculturalpractices,Relevanceofheritageto present dayagriculture.

Unit- II:

- Pastandpresentstatusofagricultureandfarmersinsociety;JourneyofIndianagriculture and its development frompastto modernera.

Unit- III:

- Plantproductionandprotectionthroughindigenoustraditionalknowledge;CropvoyageinIndia andworld; Agriculture scope.

Unit- IV:

- ImportanceofagricultureandagriculturalresourcesavailableinIndia;Cropsignificanceand classifications;National agriculture setupinIndia.

Unit- V:

- CurrentscenarioofIndianagriculture;Indianagriculturalconcernsandfuturerospects. RuralSociology&Educational Psychology.

BAG-119: Rural Sociology&Educational Psychology

CO: COURSE OBJECTIVES

CO-1 Understand Rural Society: To explore the structure, functions, and characteristics of rural communities and their role in society.

CO-2 Analyze Social Change: To examine the processes and patterns of social change and development in rural areas.

CO-3 Study Cultural Practices: To understand the cultural norms, values, traditions, and practices of rural societies.

CO-4 Assess Rural Problems: To identify and analyze the challenges faced by rural communities, such as poverty, illiteracy, and unemployment.

CO-5 Promote Rural Development: To understand the role of education, policy-making, and technology in enhancing rural life.

CO-6 Learn Research Techniques: To equip students with methodologies for conducting sociological research in rural settings.

CO-7 Foster Community Engagement: To prepare students to work effectively with rural populations and contribute to community development initiatives.

COURSE CONTENTS

Unit- I:

- SociologyandRuralsociology:Definitionandscope,itssignificanceinagriculture extension,SocialEcology.

Unit- II:

- Ruralsociety,SocialGroups,SocialStratification,Cultureconcept,SocialInstitution,SocialChange&Development.

Unit- III:

- Educational psychology: Meaning & its importance inagriculture extension. Behavior:Cognitive,affective,psychomotordomain, Personality,Learning,Motivation.

Unit- IV:

- TheoriesofMotivation,Intelligence.

BAG-119 A: Science, Technology, and Society

CO: COURSE OBJECTIVES

CO-1 Understand Interconnections: Explain the interdependent relationship between science, technology, and society, and how they shape one another.

CO-2 Analyze Ethical Implications: Evaluate the ethical, environmental, and social impacts of scientific discoveries and technological advancements.

CO-3 Explore Historical Contexts: Examine the historical evolution of science and technology and its influence on societal development.

CO-4 Foster Critical Thinking: Develop critical thinking skills to assess the benefits, risks, and unintended consequences of technological innovation.

CO-5 Promote Responsible Innovation: Understand the role of individuals, organizations, and governments in fostering responsible science and technology practices for sustainable development.

CO-6 Recognize Global Perspectives: Explore the global dimensions of science and technology, considering issues such as equity, accessibility, and cultural diversity.

CO-7 Encourage Lifelong Learning: Cultivate a mindset for continuous inquiry into the advancements of science and technology and their potential to address societal challenges.

COURSE CONTENTS

Unit I

Science as Culture, Methods of Science, Issues and Perspectives. Social Context of Production of Scientific Knowledge, Demarcation, Autonomy and Cognitive Authority of Science. Challenges: Cognitive, Legal, Ethical, Feminist and Ideological, Discussion and Forum.

Unit II

Science as Social Institution and Ethos of Science, Inequalities in Science, Critique of the Mertonian Paradigm, Knowledge Production: Social and Cultural Contexts, Discussion and Forum.

Unit III

Society and Culture, Resources and Legitimation of Knowledge, Social Legitimation, Meanings, Interests, Values and the Modern State, Discussion and Forum.

Unit IV

Perspectives on Science - Technology Relationship, Hierarchical, Symbiotic and Coalescing. Science and Technology, and their Human Roots, Philosophy of Science and Technology. Technology as Knowledge, Technological Shaping of Society and Social Shaping of Technology, Discussion and Forum.

Unit V

Emerging Technologies: Information and Communication Society - Implications for Work, Social Relations, Governance and Control. Biotechnology - Implications for the Meanings of Life and Life. Processes, Application in Agriculture, Healthcare and Environment Discussion and Forum.

BAG-119 B: Women's and Gender Studies

CO: COURSE OBJECTIVES

CO-1 Understand Core Concepts and Theories: Develop an understanding of key concepts, theories, and frameworks in Women's and Gender Studies, including feminism, intersectionality, and social constructionism.

CO-2 Analyze Gender and Power Dynamics: Examine the ways gender, sexuality, race, class, and other social categories shape individual experiences and societal structures.

CO-3 Critique Social Inequalities: Critically analyze historical and contemporary systems of oppression and privilege, such as patriarchy, sexism, heteronormativity, and colonialism.

CO-4 Engage in Interdisciplinary Approaches: Explore how Women's and Gender Studies intersects with fields such as sociology, history, literature, political science, and cultural studies to provide a holistic view of gender-related issues.

CO-5 Promote Social Justice and Advocacy: Build skills in activism and advocacy by exploring strategies for promoting equity, inclusion, and social justice on both local and global scales.

CO-6 Evaluate Representations of Gender: Analyze how gender and sexuality are represented in media, literature, and cultural practices, and consider their implications for societal norms and behaviors.

CO-7 Apply Knowledge to Real-World Issues: Use the knowledge gained to critically engage with and address real-world issues related to gender, such as gender-based violence, reproductive rights, workplace inequality, and LGBTQ+ rights.

COURSE CONTENTS

Unit I

Emergence of Women's Studies in lndia Establishment of Centre for Women's Studies under UGC guidelines Wornen's Studies in Intemational Settings Growth and changing perspectives of Women's Studies and Research.

Unit II

Basic Concepts “Understanding Sex- Gender, Understanding Sexism and Androcentrism, Understanding Patriarchy and Theories of Patriarchy, Private - Public diohotorny Patriarchy practices in different institutions and Text Books.

Unit III

Representation of Women in Culture and Media. Women and Print Media. Women and Electronic Media ' Women and Films, Advertisements. Women and Mega Serials.

Unit IV

Women and Literature, Women's Writings in India, Wornen's Representation in Literary Texts: With special reference to Novels of Ashapurna Devi: Trilogy- 'PrathamPratishruti',' Subarnalata' and'Bakulkatha'.

Unit V

Concept and definition of Social Work, Emergence of professional Social Work in India, Scope and concerns of Social Work practice, Role and Challenges of Social Workers in working with Women with disabilities.

BAG-119 C: Geography of the Global Economy

CO: COURSE OBJECTIVES

CO-1 Understand the Spatial Dynamics of the Global Economy: Analyze the geographic distribution of economic activities and their interconnectedness at local, national, and global scales.

CO-2 Examine Global Trade Patterns: Explore the causes and consequences of international trade, including trade agreements, tariffs, and the role of global supply chains.

CO-3 Analyze Economic Inequality: Investigate the spatial dimensions of wealth and poverty, focusing on disparities between and within regions.

CO-4 Evaluate the Role of Globalization: Assess the impact of globalization on economic development, cultural exchanges, and the environment.

CO-5 Explore Industrial and Technological Change: Study the geographic implications of industrialization, deindustrialization, and the rise of digital economies.

CO-6 Investigate Environmental and Economic Interactions: Understand how economic activities influence and are influenced by environmental factors, including climate change, resource extraction, and sustainability practices.

CO-7 Develop Geographic Analytical Skills: Utilize tools such as GIS (Geographic Information Systems) and spatial data analysis to interpret and visualize economic patterns and trends.

COURSE CONTENTS

Unit I

Basic concepts and trends, Overview: geographies of global change, The structure and organization of economies, Growth and development: concepts and measures, Mapping the world economy, Recent patterns and trends: a global perspective, Recent patterns and trends: a Canadian perspective countries trade.

Unit II

Emergence of a world economy and economic development, early commercial expansion, the colonial world economy, Development theories and pathways.

Unit III

Population and resources, Global population dynamics, Population and migration, Natural resources and primary commodities, Population & resources I: food and agriculture, Population & resources II: oil and minerals.

Unit IV

The spatial organization of the new world economy, the diffusion of the industrial revolution, the changing organization of industry: Fordism, The changing organization of industry: post-Fordism, On externalities, transactions and firm linkages, Agglomeration and new industrial spaces.

Unit V

The resource curse and Dutch disease, Global food systems, the global land rush, Tropical deforestation, Fair trade: principles and realities, Global trade institutions and agreements, Local-global geographies of the financial crisis, the economy-environment interface, Globalization and inequality

BAG-121: Human Values and Ethics

CO: COURSE OBJECTIVES

CO-1 Understanding Ethical Foundations: To provide students with a comprehensive understanding of the fundamental concepts, principles, and theories of ethics and human values.

CO-2 Developing Critical Thinking: To enable students to critically analyze ethical dilemmas and challenges in personal, professional, and societal contexts.

CO-3 Fostering Moral Awareness: To cultivate a sense of moral responsibility by identifying and reflecting on the importance of values in decision-making and behavior.

CO-4 Promoting Integrity and Accountability: To emphasize the role of integrity, honesty, and accountability in personal and professional life.

CO-5 Encouraging Respect for Diversity: To teach students to appreciate and respect diverse perspectives, cultures, and values in a globalized society.

CO-6 Enhancing Ethical Decision-Making: To equip students with tools and frameworks to make ethical decisions and resolve conflicts effectively.

CO-7 Building Social Responsibility: To inspire students to contribute positively to society by addressing social, environmental, and global ethical challenges.

COURSE CONTENTS

Unit- I:

- ValuesandEthics-AnIntroduction,GoalandMission ofLife.

Unit- II:

- VisionofLife,Principlesand Philosophy,SelfExploration.

Unit- III:

- SelfAwareness,SelfSatisfaction,DecisionMaking.

Unit- IV:

- Motivation,Sensitivity,Success,SelflessService.Case

Unit- V:

- StudyofEthicalLives,PositiveSpirit,Body,MindandSoul, AttachmentandDetachment, SpiritualityQuotient, Examination.

BAG-121 A: Global Climate Policy and Sustainability

CO: COURSE OBJECTIVES

CO-1 Understand the Science of Climate Change: Gain a comprehensive understanding of the scientific principles behind climate change, including its causes, impacts, and implications for natural and human systems.

CO-2 Analyze Global Climate Policies: Explore key international agreements and frameworks such as the Paris Agreement, Kyoto Protocol, and IPCC reports, and assess their role in addressing climate change.

CO-3 Evaluate Policy Approaches: Compare and contrast policy approaches at global, regional, and national levels, focusing on mitigation strategies, adaptation planning, and policy implementation challenges.

CO-4 Examine Sustainable Development Goals (SDGs): Investigate the interconnections between climate action and the SDGs, emphasizing the need for integrated strategies to achieve sustainability.

CO-5 Assess the Role of Stakeholders: Identify the roles of various stakeholders, including governments, businesses, non-governmental organizations, and civil society, in advancing climate policy and sustainability efforts.

CO-6 Develop Critical Thinking on Equity and Justice: Analyze issues of climate justice, equity, and inclusivity, focusing on how climate policies affect different communities, particularly vulnerable populations.

CO-7 Design Practical Solutions: Equip students with the tools and frameworks to design innovative and practical solutions for climate challenges, fostering sustainable practices in various sectors.

COURSE CONTENTS

Unit I

Introduction to Climate Change and Sustainable Development: Principles and Approaches, Global Climate System, Climate Change: Causes and Consequences, Sustainable Development: Scope and Emerging Trends, Climate and Sustainable Development: An Interface.

Unit II

Climate Change: Challenges and Choices, Climate Change and Water, Climate Change: Forest and Biodiversity, Climate Change: Coastal Ecosystem, Climate Change: Agriculture and Food Security.

Unit III

Climate Change and Sustainable Development: Policies and Programmes, Sustainable Development Goals: An overview, Climate Change and Sustainable Development: National and State Policies, Achieving Sustainable Development Goals: Role of Various Stakeholders, Building Partnership for Climate Change and Sustainable Development.

Unit IV

Climate Change and Sustainable Development: Stories of Success, Cross Country Experiences, National Experiences, Regional Experiences, and Community led Experiences.

Unit V

Climate Change Policy, Climate change policy of countries, Uncertainty and climate change policy, Policy implications, Cost-benefit analysis in the context of climate change.

BAG-121 B: Planetary Change and Human Health

CO: COURSE OBJECTIVES

CO-1 Understand the Relationship between Planetary Health and Human Health: Explore how changes in natural systems—such as climate change, biodiversity loss, and pollution—impact human health and well-being.

CO-2 Identify Key Drivers of Environmental Change: Examine the social, economic, and political factors driving planetary change, including industrialization, urbanization, and resource exploitation.

CO-3 Assess the Impacts of Climate Change on Health: Analyze the direct and indirect effects of climate change on human health, such as heat-related illnesses, vector-borne diseases, and food and water insecurity.

CO-4 Examine the Role of Biodiversity in Public Health: Investigate how the loss of biodiversity affects ecosystems and the services they provide, including implications for medicine, nutrition, and disease regulation.

CO-5 Develop an Understanding of Environmental Justice: Recognize how planetary change disproportionately affects vulnerable populations and contributes to health inequities worldwide.

CO-6 Evaluate Adaptation and Mitigation Strategies: Explore strategies to mitigate the adverse effects of planetary change on human health, including policy interventions, technological innovations, and community-based approaches.

CO-7 Promote Interdisciplinary Problem-Solving: Foster collaboration across disciplines to address the complex interconnections between environmental change and human health, integrating insights from public health, environmental science, and social sciences.

COURSE CONTENTS

Unit I

Introduction to Planetary Health, Current changes in the Earth's natural systems, the paradox of improved health and natural systems deterioration. Mapping the environmental determinants of human health.

Unit II

Main risks of environmental change for human health, Introduction to writing an essay on planetary health, Environmental impacts of health systems, Challenges for Planetary Health, A planetary health approach to environmental health risks.

Unit III

Food systems: a planetary health approach, Food security and nutrition, Climate change and health, Climate change and urban environment, COVID-19, a disease of the Anthropocene, Atmospheric and chemical pollution.

Unit IV

Governance for a sustainable society, Sustainability, Sustainable development goals, Co-creation Activity for the Planetary Heath course, Extreme weather events, Influence of global change in infectious diseases transmitted by water, zoonosis, and vectors.

BAG-121 C: Tools for Sustainable Design

CO: COURSE OBJECTIVES

CO-1 Introduce Sustainable Design Concepts: Provide students with a foundational understanding of sustainability principles and how they apply to design across various disciplines (e.g., architecture, industrial design, product design, urban planning).

CO-2 Explore Tools for Sustainable Design: Familiarize students with a variety of design tools, software, and techniques that support sustainable design practices, including energy modeling, lifecycle assessment (LCA), material selection tools, and environmental impact calculators.

CO-3 Promote Resource Efficiency: Teach students how to design for resource conservation, including minimizing waste, optimizing energy use, and selecting renewable and recyclable materials.

CO-4 Assess Environmental Impacts: Enable students to evaluate the environmental impacts of design decisions through tools like LCA, carbon footprint analysis, and other environmental metrics.

CO-5 Integrate Social and Ethical Considerations: Encourage students to consider social sustainability in design, including fair labor practices, inclusivity, and the well-being of communities affected by design choices.

CO-6 Foster Innovation and Creativity in Sustainable Design: Develop students' ability to innovate sustainable solutions that address environmental, economic, and social challenges through design thinking and problem-solving techniques.

CO-7 Enable Real-World Application: Equip students with the practical skills needed to apply sustainable design tools and methods to real-world projects, from product development to building design and urban planning.

CO-8 Encourage Critical Thinking and Reflection: Help students critically analyze design decisions and their long-term impacts on the environment and society, fostering a mindset of continuous improvement and adaptability in sustainable design practices.

BAG-121 C: Tools for Sustainable Design

CO: COURSE OBJECTIVES

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COURSE CONTENTS

Unit I

Sustainable Design Sustainability and related terms, Design process and sustainable development, approaches to sustainability, sustainable design principles, application of sustainable design principles in product design, tools for sustainable design.

Unit II

Developments in design methods History of design methods, Introduction to various design methods by: Alexander, Banathy, Nigel Cross, IDEO, Double Diamond by UK Design Council. Introduction to social innovation, Product Service Systems, and Lifecycle analysis.

Unit III

Model of the Design Innovation Process. Seven Modes of the Design Innovation Process: (1) Sense Intent, (2) Know Context, (3) Know People, (4) Frame Insights, (5) Explore Concepts, (6) Frame Solutions, (7) Realize Offerings.

Unit IV

Interaction design process and methodology for designing interactive solutions. Interaction models. Paradigms for interaction. Services and events: products to be used in groups, products used in public places, products for future use, design of tangible, gestural, multimodal, and expressive interfaces, products that enrich user experience.

Unit V

Inter-disciplinary approach drawing upon human factors, cognitive sciences, human psychology, product design, visual communication, and computer science. Exploration of alternatives and pushing the envelope of what is known to improve user experience and make the design more inclusive.

BAG-123: NSS

CO: COURSE OBJECTIVES

CO-1 Develop Social Responsibility: NSS aims to build a sense of responsibility among students toward society by involving them in activities that directly impact the community's welfare.

CO-2 Promote Volunteerism: The course encourages students to actively participate in community service projects such as literacy campaigns, environmental protection, health programs, and rural development.

CO-3 Foster National Integration: NSS helps students understand the importance of national unity, integrity, and communal harmony by engaging them in projects across diverse communities and regions.

CO-4 Enhance Personality Development: By participating in NSS activities, students develop qualities like leadership, teamwork, discipline, and communication, which contribute to their overall personal growth.

CO-5 Create Awareness of Social Issues: The course aims to raise awareness about various social issues, such as poverty, health, education, and gender equality, helping students understand the challenges faced by marginalized communities.

CO-6 Strengthen the Link between Campus and Community: NSS provides an avenue for students to connect with the broader community beyond their academic environment, helping bridge the gap between theory and real-life issues.

CO-7 Promote Sustainable Development: Through service-oriented activities, NSS helps in promoting the values of sustainable development by involving students in eco-friendly and socially beneficial initiatives.

CO-8 Encourage Civic Participation: NSS nurtures the habit of active participation in civic responsibilities, fostering the spirit of democracy and participation in local governance.

COURSE CONTENTS

CourseTitle:NationalServiceSchemeI

Unit- I:

- Introduction and basic components of NSS: Orientation: history, objectives,principles,symbol,badge;regularprogrammes underNSS,organizationalstructureofNSS, code of conduct for NSS volunteers, points to be considered by NSS volunteersawarenessabouthealth

Unit- II:

- NSS programmes and activities: Concept of regular activities, special camping, daycamps,basisofadoptionofvillage/slums,conductingsurvey,analysinggui dingfinancial patterns of scheme, youth programme/ schemes of GOI, coordination withdifferentagencies and maintenance of diary

Unit- III:

- Understanding youth: Definition, profile, categories, issues and challenges of youth;andopportunitiesforyouth who is agentof the social change

Community mobilisation: Mapping of community stakeholders, designing the message as perproblemsandtheirculture;identifyingmethodsofmobilisationinvolvingyouth-adultpartnership

Unit- IV:

- Social harmony and national integration: Indian history and culture, role of youth innation building, conflict resolution and peace-building

Volunteerismandshramdan:Indiantraditionofvolunteerism,itsneed,importance,motivationand constraints; shramdan aspart of volunteerism

Unit- V:

- Citizenship, constitution and human rights: Basic features of constitution of India,fundamentalrightsandduties, human rights, consumer awareness andrightsandrights to information. Family and society: Concept of family, community (PRIs andother communitybased organisations)and society.

PhysicalEducationandYogaPractices

1. TeachingofskillsofFootball– demonstration,practiceoftheskills,correction,involvementin game situation (Forgirls teaching ofTennikoit)
2. TeachingofdifferentskillsofFootball– demonstration,practiceoftheskills,correction,involvementin game situation (Forgirls teaching ofTennikoit)
3. TeachingofadvanceskillsofFootball– involvementofalltheskillsingamesituationwithteachingof rules ofthe game
4. TeachingofskillsofBasketball– demonstration,practiceoftheskills,correctionofskills,involvementin gamesituation
5. TeachingofskillsofBasketball– demonstration,practiceoftheskills,involvementingamesituation
6. TeachingofskillsofBasketball– involvementofalltheskillsingamesituationwithteachingofrule ofthe game
7. TeachingofskillsofKabaddi– demonstration,practiceoftheskills,correctionofskills,involvementin game situation
8. TeachingofskillsofKabaddi– demonstration,practiceoftheskills,correctionofskills,involvementin game situation
9. TeachingofadvanceskillsofKabaddi– involvementofalltheskillsingamesituationwith teachingof rule ofthegame
10. Teaching of skills of Ball Badminton – demonstration, practice of the skills, correction ofskills,involvementin gamesituation
11. TeachingofskillsofBallBadminton– involvementofalltheskillsingamesituationwith teachingof rule ofthegame
12. Teachingof some of Asanas – demonstration, practice,correction and practice
13. Teachingof somemore ofAsanas– demonstration,practice, correctionandpractice
14. TeachingofskillsofTableTennis– demonstration,practiceofskills,correctionandpracticeand involvementin game situation
15. TeachingofskillsofTableTennis– demonstration,practiceofskills,correctionandpracticeand involvementin game situation
16. TeachingofskillsofTableTennis– involvementofalltheskillsingamesituationwithteachingofrule ofthe game
17. Teaching– Meaning, Scopeandimportanceof Physical Education
18. Teaching–Definition, TypeofTournaments
19. Teaching–PhysicalFitnessandHealthEducation
20. Constructionandlayingoutofthetrackandfield(*ThegirlswillhaveTennikoitand ThrowBall).

BAG-123 A: NCC

CO: COURSE OBJECTIVES

CO-1 Develop Leadership Skills: NCC aims to cultivate leadership qualities and team-building skills among cadets by involving them in various activities that require decision-making, responsibility, and management.

CO-2 Promote Physical Fitness: Physical training, including drills, marches, and physical fitness routines, is a central component of the NCC course, aiming to keep cadets healthy, fit, and active.

CO-3 Foster Discipline and Punctuality: The NCC course instills a sense of discipline, punctuality, and respect for rules and regulations among cadets. This is achieved through regular training and adherence to strict schedules.

CO-4 Cultivate Social Responsibility: NCC encourages cadets to become responsible citizens by promoting social service, environmental awareness, and community involvement.

CO-5 Develop a Sense of Patriotism: Through exposure to national defense services, cadets are encouraged to develop a sense of patriotism, pride, and respect for the country.

CO-6 Enhance Outdoor and Adventure Skills: The course includes various outdoor activities, such as trekking, camping, and adventure sports, that develop survival skills, teamwork, and resilience.

CO-7 Provide Exposure to Military and Para-military Training: The NCC offers cadets exposure to basic military training, discipline, and knowledge of armed forces activities, which can inspire interest in defense careers.

CO-8 Promote National Integration: NCC aims to foster unity and national integration by bringing together young people from diverse backgrounds, regions, and communities.

CO-9 Build Confidence and Self-reliance: Through various training modules and field exercises, cadets gain confidence in their abilities and develop problem-solving skills, helping them to become self-reliant individuals.

COURSE CONTENTS

Unit: 1 Personality Development

(i) Thinking- Meaning and Concept of thinking, Reasoning, Process of thinking. (ii) Critical Thinking- Meaning & concept of critical thinking, Features of critical thinking, Process of critical thinking. (iii) Creative thinking- Meaning & concept of creative thinking, Features of creative thinking, Process of creative thinking, levels of Creativity, Characteristics of creative person.

Unit: 2 Leadership Development

(i) Leadership capsule. (ii) Important Leadership traits, Indicators of leadership and evaluation. (iii) Motivation- Meaning & concept, Types of motivation. Factors affecting motivation. (iv) Ethics and Honor codes.

Unit: 3 Social Service and Community Development

(i) Protection of Children & Women Safety. (ii) Road/Rail Safety. (iii) New Government Initiatives. (iv) Cyber and mobile Security Awareness.

Unit: 4 Group Discussion

Coping with Stress & Emotions, time Management, Social Skills, Team Work, Career Counselling, SSB Procedure & Interview Skills, Public Speaking.

Unit: 5 CAMP (Practical)

Ceremonial and Weapon Training, Swachh Bharat Abhiyan.

BAG-123 B: Physical Education & Yoga Practices

CO: COURSE OBJECTIVES

CO-1 Enhance Physical Fitness: To improve students' overall physical fitness, including strength, flexibility, endurance, balance, and coordination, through a variety of physical education and yoga activities.

CO-2 Promote Health and Well-being: To encourage lifelong health habits by educating students on the importance of regular physical activity, proper nutrition, mental well-being, and stress management through yoga.

CO-3 Develop Yoga Skills and Techniques: To teach students various yoga postures (asanas), breathing techniques (pranayama), meditation practices, and relaxation techniques to enhance physical and mental well-being.

CO-4 Foster Mind-Body Connection: To cultivate awareness of the connection between body and mind, enabling students to understand how physical activity and yoga can influence emotional and mental health.

CO-5 Incorporate Yoga Philosophy: To introduce students to the fundamental philosophy behind yoga, including concepts like mindfulness, self-discipline, non-violence (ahimsa), and ethical conduct, which promote personal growth.

CO-6 Develop Personal Fitness Goals: To assist students in setting and achieving individualized fitness goals through both physical education and yoga practices, encouraging self-motivation and goal setting.

CO-7 Promote Lifelong Activity: To instill an understanding of how regular participation in physical education and yoga can lead to a healthier lifestyle, reducing the risk of chronic diseases and improving long-term health.

COURSE CONTENTS

Unit: 1 Physical Education

Meaning, Definition, Aim and Objective, Misconception about Physical Education, Need, Importance and Scope of Physical Education in the Modern Society, Physical Education Relationship with General Education, Physical Education in India before Independence. Physical Education in India after Independence.

Unit: 2 Concept of Fitness and Wellness

Meaning, Definition and Importance of Fitness and Wellness, Components of Fitness, Factor Affecting Fitness and Wellness.

Weight Management, Meaning and Definition of Obesity, Causes of Obesity, Management of Obesity, Health problems due to Obesity.

Lifestyle: Meaning, Definition, Importance of Lifestyle, Factor affecting Lifestyle, Role of Physical activity in the maintains of Healthy Lifestyle.

Unit: 3 Yoga and Meditation

Historical aspect of yoga, Definition, types scopes & importance of yoga, Yoga relation with mental health and value education, Yoga relation with Physical Education and sports, Definition of Asana, differences between asana and physical exercise, Definition and classification of pranayama, Difference between pranayama and deep breathing, Practical: Asana, Suraya-Namaskar, Bhujang Asana, Naukasana, Halasana, Vajrasan, Padmasana, Shavasana, Makrasana, Dhanurasana, Tad Asana. Pranayam: Anulom, Vilom.

Unit: 4 Traditional Games of India

Meaning, Types of Traditional Games Gilli- Danda, Kanche, Stapu, Gutte, etc

Importance/ Benefits of Traditional Games, How to Design Traditional Games.

Recreation in Physical Education, Meaning, Definition of Recreation, Scope and Importance of Recreation, General Principles of Recreation, Types of Recreational Activities, Aerobics and Zumba. (Fir India Movement).

BAG-123 C: Water, Sanitation and Hygiene

CO: COURSE OBJECTIVES

CO-1 Understand the Importance of WASH: Explore the impact of poor WASH on disease transmission, health, and socio-economic development.

CO-2 Study Water Management Systems: Understand water quality standards and the treatment of water for safe consumption.

CO-3 Examine Sanitation Systems: Understand different sanitation systems, such as sewage treatment, waste disposal, and the management of human excreta.

CO-4 Promote Hygiene Practices: Learn about the significance of hygiene behaviors, including hand washing, safe food handling, and personal cleanliness.

CO-5 Investigate Environmental and Social Impacts: Explore the environmental effects of inadequate sanitation and water management (e.g., pollution, contamination).

CO-6 Understand WASH Policy and Governance: Study the roles of various stakeholders (government, NGOs, local communities) in the development and implementation of WASH projects.

CO-7 Develop Practical Skills in WASH Implementation: Gain hands-on experience in designing, implementing, and evaluating WASH programs.

CO-8 Promote Sustainability: Investigate methods for ensuring the long-term sustainability of WASH projects through community engagement and capacity building.

COURSE CONTENTS

Unit I

Introduction to Sanitation and Hygiene for Health, Definitions and Concepts, Global, national and regional perspective, Relation between health, hygiene & sanitation, Relevance & importance of health, hygiene in the contemporary times.

Unit II

Occupational Health and Hygiene, Concept, definition and its role, Link between occupational hygiene, risk assessment & risk management. Sanitation problems of the workplace: industries, academic institutions, corporate, hospitals, Public spaces etc.

Unit III

Health Hygiene Promotion & Education, Hygiene Behavior promotion & education- concept and its importance, Hygiene promotion & education in children & adolescence, Government initiatives & policies in rural & urban area.

Unit IV

Health, hygiene practices in India and in North East India, Present scenario of health hygiene in India, Reproductive & sexual health of the women, Indigenous hygiene & sanitation practices, Cultural beliefs of the people of NE India in relation to health & hygiene- role & impacts.

BAG-102: Fundamentals of Genetics

CO: COURSE OBJECTIVE

CO-1 Introduction to Genetic Principles: Understand the foundational principles of inheritance, including Mendelian and non-Mendelian genetics.

CO-2 Chromosomal Basis of Inheritance: Explore the structure and function of chromosomes and their role in heredity.

CO-3 Molecular Genetics: Analyze the molecular structure of DNA and RNA and their roles in replication, transcription, and translation.

CO-4 Gene Expression and Regulation: Understand how genes are regulated and expressed in prokaryotic and eukaryotic systems.

CO-5 Mutations and Genetic Variation: Study types of mutations, their mechanisms, and their effects on organisms.

CO-6 Population Genetics: Learn about genetic variation within populations and the principles of Hardy-Weinberg equilibrium.

CO-7 Genetic Tools and Technologies: Explore modern genetic tools such as CRISPR, PCR, and gene sequencing techniques.

Course Content

Unit- I:

- PreandPostMendelianconceptsofheredity,Mendelianprinciplesofheredity. Architectureofchromosome;chromonemata,chromosomematrix,chromomeres,centromere,secondaryconstriction andtelomere;specialtypes ofchromosomes.

Unit- II:

- Chromosomal theory of inheritance- cell cycle and cell division- mitosis and meiosis.ProbabilityandChi-square.Dominancerelationships,Epistaticinteractionswithexample.

Unit- III:

- Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage,sexlimitedandsexinfluencedtraits,Bloodgroupgenetics,Linkageand itsestimation,crossingovermechanisms, chromosome mapping.

Unit- IV:

- Structuralandnumericalvariationsinchromosomeandtheirimplications,Use ofhaploids,dihaploidsanddoubledhaploidsinGenetics.Mutation,classification,Methods of inducing mutations & CIB technique, mutagenic agents and induction ofmutation.Qualitative&Quantitativetraits,Polygenesandcontinuousvariations,multiplefactor hypothesis,Cytoplasmicinheritance.Genetic disorders.

Unit- V:

- Nature, structure & replication of genetic material. Protein synthesis, Transcriptionandtranslationalmechanismofgeneticmaterial,Geneconcept: Genestructure,functionand regulation, Lacand Trp operons.

Practical:

Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experimentsonmonohybrid,dihybrid,trihybrid,testcrossandbackcross,Experimentsonepistaticinteractions including test cross and back cross, Practice on mitotic and meiotic cell division,Experiments on probability and Chi-square test. Determination of linkage and cross-overanalysis (through two point test cross and three point test cross data). Study on sex linkedinheritancein Drosophila. Studyof models on DNA andRNAstructures.

BAG-104:Agricultural Microbiology

CO: COURSE OBJECTIVE

CO-1Soil Microbiology: The study of microorganisms in the soil, their role in nutrient cycling, and their impact on soil health and fertility.

CO-2Plant-Microbe Interactions: The relationship between microorganisms and plants, including beneficial interactions (such as nitrogen-fixing bacteria) and harmful ones (such as plant pathogens).

CO-3Microbial Ecology: The diversity and ecology of microbes in agricultural environments, and how they interact with each other and the plants they affect.

CO-4Biological Control of Pests and Diseases: The use of microorganisms to control plant diseases and pests in an environmentally friendly way.

CO-5Microbial Biotechnologies in Agriculture: How biotechnology and genetic engineering are used to enhance beneficial microbial functions in agriculture (e.g., bio fertilizers, bio pesticides).

CO-6Waste Management in Agriculture: The role of microorganisms in decomposing organic waste and producing compost or bioenergy.

CO-7Food Safety and Microbes: The study of microorganisms involved in food production, processing, and preservation, including beneficial probiotics and harmful pathogens.

Course Contents

Unit- I:

- Introduction.Microbialworld:Prokaryoticandeukaryoticmicrobes.Bacteria: cellstructure,chemoautotrophy, photoautotrophy,growth. Bacterialgenetics:

Unit- II:

- Geneticrecombination-transformation,conjugationandtransduction,plasmids,transposon.

Unit- III:

- Roleofmicrobesinsoilfertilityandcropproduction:Carbon,Nitrogen,Phosphorusand Sulphur cycles.

Unit- IV:

- Biologicalnitrogenfixation-symbiotic,associativeandasymbiotic.Azolla,bluegreenalgaeand mycorrhiza.Rhizosphere and phyllosphere.

Unit- V:

- Microbesinhumanwelfare:silageproduction,biofertilizers,biopesticides,biofuelproductionand biodegradation of agro-waste.

Practical:

Introduction to microbiology laboratory and its equipments; Microscope- parts, principles ofmicroscopy, resolving power and numerical aperture. Methods of sterilization. Nutritionalmedia and their preparations. Enumeration of microbial population in soil-bacteria, fungi,actinomycetes.Methodsofisolationandpurificationofmicrobialcultures.IsolationofRhizobiumfromlegumerootnodule.IsolationofAzotobacterfromsoil.IsolationofAzospirillumfromroots.IsolationofBGA.Stainingandmicroscopicexaminationofmicrobes.

BAG-106:Soil and Water Conservation Engineering

CO: COURSE OBJECTIVE

CO-1Understand the principles of soil and water conservation: Learn about the erosion process, types of erosion, and factors affecting soil erosion. Study the impact of erosion on agriculture, environment, and infrastructure.

CO-2 Examine soil-water relationships: Understand soil-water retention and its effect on soil fertility and crop production. Study infiltration, percolation, and water holding capacity of soils.

CO-3Learn about soil erosion control techniques: Study various erosion control methods like contour plowing, terracing, and grass waterways. Understand vegetative, structural, and mechanical erosion control measures.

CO-4Explore water conservation strategies: Understand the techniques used to conserve water in agricultural systems, such as rainwater harvesting, water storage, and irrigation efficiency. Learn about water management practices like mulching and soil moisture management.

CO-5Assess land and water resources: Understand methods for evaluating soil erosion risk, water availability, and land suitability for conservation practices. Learn to design conservation measures based on site-specific conditions.

CO-6Introduce water harvesting techniques: Study methods of water harvesting in dry land farming and its relevance to sustainable agriculture.

CO-7Foster knowledge of sustainable agricultural practices: Understand the relationship between conservation techniques and sustainable farming systems. Learn about agroforestry, cover crops, and crop rotation as part of soil and water conservation.

CO-8Analyze the socio-economic aspects: Understand the socio-economic importance of soil and water conservation in rural development. Study the policies and practices related to water conservation at regional and global levels.

Course Content

Unit- I:

- IntroductiontoSoilandWaterConservation,causesofsoilerosion.Definitiona ndagentsofsoil erosion, water erosion.

Unit- II:

- Formsofwatererosion.Gullyclassificationandcontrolmeasures.Soillossesti mation byuniversalLoss.

Unit- III:

- SoilEquation.Soillossmeasurementtechniques.Principlesoferosioncontrol: Introductionto contouring, strip cropping. Contour bund.

Unit- IV:

- Gradedbundandbenchterracing.Grassedwaterwaysandtheirdesign.Waterha rvestingand itstechniques.

Unit- V:

- Winderosion:mechanicsofwinderosion,typesofsoilmovement.Principlesof winderosioncontrol and its control measures.

Practical:

General status of soil conservation in India. Calculation of erosion index. Estimation of soilloss. Measurement of soil loss. Preparation of contour maps. Design of grassed water ways.Designofcontourbunds.Designofgradedbunds.Designofbenchterracingsyst em.Problem onwind erosion.

BAG-108:Fundamentals of Crop Physiology

CO: COURSE OBJECTIVE

CO-1 Photosynthesis and Respiration: Understanding how plants convert light into energy, the process of respiration, and how these processes affect crop growth and yield.

CO-2 Water Relations and Stress Physiology: Exploring how water is absorbed, transported, and utilized in crops, as well as the effects of water stress on plant health and productivity.

CO-3 Nutrient Uptake and Metabolism: Examining how crops absorb nutrients from the soil, how these nutrients are utilized in plant growth, and the physiological effects of nutrient deficiencies.

CO-4 Reproductive Physiology: Studying the processes of flowering, pollination, fertilization, and seed development, which are crucial for crop production.

CO-5 Environmental Interactions: Investigating how factors like light, temperature, humidity, and soil conditions affect crop physiology and how plants adapt to different environments.

CO-6 Growth Regulators and Hormones: Analyzing the role of plant hormones in regulating growth, development, and responses to environmental stimuli.

CO-7 Crop Yield and Improvement: Understanding the physiological basis of crop yield, including factors that influence productivity, and how crop physiology can inform breeding and management practices to improve yields.

CO-8 Stress Physiology: Investigating how crops respond to abiotic and biotic stresses, including drought, salinity, pests, and diseases, and how these responses impact crop productivity.

Course Content

Unit- I:

- Introductiontocropphysiology anditsimportance inAgriculture;Plantcell:anOverview; Diffusion and osmosis; Absorption of water, transpiration and StomatalPhysiology;Mineral nutrition ofPlants:

Unit- II:

- Functionsanddeficiencysymptomsofnutrients,nutrientuptakemechanisms; Photosynthesis:Light and Darkreactions, C3, C4and CAM plants;

Unit- III:

- Respiration: Glycolysis, TCA cycle and electron transport chain; Fat Metabolism:FattyacidsynthesisandBreakdown;Plant growth regulators:

Unit- IV:

- Physiologicalrolesandagriculturaluses,Physiologicalaspectsofgrowthandd evelopmentof majorcrops:

Unit- V:

- Growthanalysis,Role of Physiologicalgrowthparametersincropproductivity.

Practical:

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis,measurementofrootpressure,rateoftranspiration,Separationofphotosyntheticpigm entsthrough paper chromatography, Rate of transpiration, photosynthesis, respiration,tissuetestformineralnutrients,estimationofrelativewatercontent,Measurementofph otosyntheticCO2 assimilation byInfraRed Gas Analyser(IRGA).

BAG-110: Fundamentals of Agricultural Economics

CO: COURSE OBJECTIVE

CO-1Understanding Economic Principles: Introducing basic concepts in economics, such as supply and demand, market equilibrium, and price mechanisms. Understanding the role of agriculture in the broader economy and its relationship with sectors like manufacturing, services, and trade.

CO-2Analyzing Agricultural Markets: Understanding how agricultural markets function, including commodity markets (e.g., grains, livestock).Exploring the factors that affect the supply and demand of agricultural products.Studying market structures like perfect competition, monopoly, and oligopoly within agriculture.

CO-3 Evaluating Farm Production and Cost Structures: Analyzing farm production functions, and the relationship between inputs (land, labor, capital) and outputs (crops, livestock).Understanding cost structures in farming, including fixed and variable costs, total costs, and profitability.

CO-4Examining Agricultural Policy and Government Intervention: Studying government policies in agriculture such as subsidies, tariffs, and price supports.Understanding the impact of trade policies and international agricultural markets.Analyzing the role of public institutions like agricultural extension services and rural development programs.

CO-5AgriculturalRisk and Uncertainty: Exploring sources of risk in agriculture (e.g., climate, pest outbreaks, and market fluctuations) and how farmers manage these risks.Understanding insurance, futures markets, and diversification strategies.

CO-6Farm Management and Decision-Making: Teaching techniques for optimizing resource allocation, production decisions, and financial management on farms.Understanding decision-making tools like budgeting, break-even analysis, and financial forecasting.

CO-7Sustainability and Agricultural: Economics exploring the economic aspects of sustainable farming practices and natural resource management.Studying the economics of environmental concerns like soil conservation, water use, and climate change.

Course Content

Unit- I:

- Economics: Meaning, scope and subject matter, definitions, activities, approaches toeconomic analysis; micro and macro economics, positive and normative analysis.Nature of economic theory; rationality assumption, concept of equilibrium, economiclawsas generalization of human behavior

Unit- II:

- Basic concepts: Goods and services, desire, want, demand, utility, cost and price,wealth, capital, incomeand welfare. Agricultural economics: meaning,definition,characteristicsofagriculture,importanceanditsroleineconomicdevelopment.Agricultural planning and development in the country. Demand: meaning, law ofdemand, schedule and demand curve, determinants, utility theory; law of diminishingmarginalutility,equi-marginalutilityprinciple.Consumer'sequilibriumandderivationofdemandcurve,conceptofconsumersurplus.Elasticityofdemand:concept and measurement of price elasticity, income elasticity and cross elasticity.Production:process,creationofutility,factorsofproduction,inputoutputrelationship.

Unit- III:

- Lawsofreturns:Lawofvariableproportionsandlawofreturnstoscale.Cost:concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply,schedule, supply curve, determinants of supply, elasticity of supply. Market structure:meaning and types of market, basic features of perfectly competitive and imperfectmarkets.Pricedeterminationunderperfectcompetition;shortrunandlongrunequilibriumoffirmand industry,shutdownandbreakeven points. Distributiontheory: meaning, factor market and pricing of factors of production. Concepts of rent,wage,interest and profit.

Unit- IV:

- National income: Meaning and importance, circular flow, concepts of national incomeaccounting and approaches to measurement, difficulties in measurement.
  Population:Importance,MalthusianandOptimumpopulationtheories,naturalandsocio-economicdeterminants,currentpoliciesandprogrammesonpopulationcontrol.Money:Bartersystemofexchangeanditsproblems,evolution,meaningandfunctions of money, classification of money, supply, general price index, inflation anddeflation.

Unit- V:

- Banking: Role in modern economy, types of banks, functions of commercial andcentral bank, credit creation policy. Agricultural and public finance: meaning,

microv/smacrofinance,needforagriculturalfinance,publicrevenueandpublicexpenditure.Tax:meaning,directandindirecttaxes,agriculturaltaxation,VAT.Economic systems: Concepts of economy and its functions, important features ofcapitalistic,socialisticand mixed economies, elementsof economicplanning.

BAG-112:FundamentalsofPlantPathology

CO: COURSE OBJECTIVE

CO-1Understanding the Principles of Plant Pathology:Introduce the basic concepts of plant pathology, including disease causation, host-pathogen interactions, and disease development.

CO-2Identification of Pathogens:Study different types of plant pathogens such as fungi, bacteria, viruses, nematodes, and phytoplasmas.Learn techniques for identifying these pathogens and understanding their life cycles.

CO-3Mechanisms of Disease Development:Explore the process of infection, how pathogens attack plants, and the factors that influence disease progression.

CO-4Symptoms and Diagnosis of Plant Diseases:Learn to recognize and diagnose various symptoms of plant diseases, such as lesions, wilting, chlorosis, and necrosis.

CO-5Epidemiology of Plant Diseases:Study the factors that influence the spread of diseases, such as environmental conditions, crop rotation, and human activities.

CO-6Plant Disease Management:Examine different methods of controlling plant diseases, including chemical, biological, cultural, and genetic approaches.

CO-7Impact of Plant Diseases:Understand the economic and ecological impact of plant diseases on agriculture, forestry, and natural ecosystems.

CO-8Research and Advances in Plant Pathology:Discuss the latest developments in the field, including new technologies for pathogen detection and disease management strategies.

Course Contents

Unit- I:

- Introduction: Importance of plant diseases, scope and objectives of Plant Pathology.History of Plant Pathology with special reference to Indian work. Terms and conceptsin Plant Pathology. Pathogenesis. Causes / factors affecting disease development:disease triangle and tetrahedron and classification of plant diseases. Important plantpathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria,phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasitesandnematodeswithexamplesofdiseasescausedbythem.Diseasesandsymptomsdueto abiotic causes.

Unit- II:

- Fungi: general characters, definition of fungus, somatic structures, types of fungalthalli,fungaltissues,modificationsofthallus,reproduction(asexualandsexual).Nomenclature,Binomialsystemofnomenclature,rulesofnomenclature,classificationoffungi. Keyto divisions, sub-divisions, ordersand classes.

Unit- III:

- Bacteriaandmollicutes:generalmorphologicalcharacters.Basicmethodsofclassificationandreproduction.Viruses:nature,structure,replicationandtransmission. Studyof phanerogamic plant parasites.

Unit- IV:

- Nematodes:Generalmorphologyandreproduction,classification,symptomsandnature of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina,Radopholusetc.) Growth and reproduction of plant pathogens. Liberation / dispersalandsurvivalofplantpathogens.Typesofparasitismandvariabilityinplantpathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in diseasedevelopment.Defense mechanism inplants.

Unit- V:

- Epidemiology:Factorsaffectingdiseasedevelopment.Principlesandmethodsofplantdiseasemanagement.Nature,chemical combination,classification,mode ofactionand formulationsof fungicides andantibiotics.

Practical:

Acquaintance with various laboratory equipments and microscopy. Collection andpreservationofdiseasespecimen.Preparationofmedia,isolationandKoch'spostulates

.General study of different structures of fungi. Study of symptoms of various plant diseases.Studyofrepresentativefungalgenera.Stainingandidentificationofplantpathogenicbacteria.Transmission ofplantviruses.Studyof phanerogamic plantparasites.

Studyofmorphologicalfeaturesandidentificationofplantparasiticnematodes.Samplingand extraction of nematodes from soil and plant material, preparation of nematode mounting.Studyoffungicidesandtheirformulations.Methodsofpesticideapplicationandtheirsafe use.Calculation of fungicide sprays concentrations.

BAG-114: Fundamentals of Entomology

CO: COURSE OBJECTIVES

CO-1 **Understand the Basic Concepts of Entomology**: Gain knowledge of the fundamental principles of entomology, including the role of insects in ecosystems, human society, and the environment.

CO-2 **Identify and Classify Insect Species**: Develop the ability to identify, classify, and distinguish between major insect orders and families, including understanding their morphological and anatomical features.

CO-3 **Study Insect Physiology**: Learn about the physiological processes of insects, including digestion, respiration, excretion, reproduction, and nervous systems.

CO-4 **Understand Insect Behavior**: Investigate the behavior of insects, including communication, mating, social structures (such as in ants or bees), and response to environmental stimuli.

CO-5 **Explore Insect Ecology**: Understand the ecological roles of insects, including their impact on pollination, decomposition, pest control, and as vectors of diseases.

CO-6 **Investigate Insect Evolution and Development**: Examine the evolutionary history of insects and their development from egg to adult, including metamorphosis and adaptations to various environments.

CO-7 **Learn the Role of Insects in Agriculture and Medicine**: Understand the economic importance of insects, both beneficial (e.g., pollinators) and harmful (e.g., agricultural pests, disease vectors), and their management in pest control and medical contexts.

Course Contents

Unit- I:

- History of Entomology in India. Major points related to dominance of Insecta inAnimal kingdom. Classification of phylum Arthropodaupto classes. Relationship ofclassInsectawithotherclassesofArthropoda.Morphology:Structureandfunctionsofinsect cuticleandmolting.Body segmentation.Structure ofHead,thoraxandabdomen. Structure and modifications of insect antennae, mouth parts, legs, Wingvenation, modifications and wing coupling apparatus. Structure of male and femalegenitalorgan.

Unit- II:

- Metamorphosis and diapause in insects. Types of larvae and pupae. Structure andfunctionsofdigestive,circulatory,excretory,respiratory,nervous,secretary(Endocrine) and reproductive system, in insects. Types of reproduction in insects.Major sensoryorgans likesimpleand compound eyes,chemoreceptor.

Unit- III:

- InsectEcology:Introduction,Environmentanditscomponents.Effectofabioticfactors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and aircurrents.Effectofbioticfactors–foodcompetition,naturalandenvironmentalresistance.

Unit- IV:

- CategoriesofpestsConceptofIPM,Practices,scopeandlimitationsofIPM.Classification of insecticides, toxicity of insecticides and formulations of insecticides.Chemicalcontrol-importance,hazardsandlimitations.Recentmethodsofpestcontrol, repellents, anti feed ants, hormones, attractants, gamma radiation. InsecticidesAct 1968- Important provisions. Application techniques of spray fluids. Symptoms ofpoisoning,first aid andantidotes.

Unit- V:

- Systematics:Taxonomy–importance,historyanddevelopmentandbinomialnomenclature.DefinitionsofBiotype,Sub-species,Species,Genus,FamilyandOrder. Classification of class Insectaupto Orders, basic groups of present day insectswithspecialemphasistoordersandfamiliesofAgriculturalimportancelikeOrthoptera:Acrididae,Tettigonidae,Gryllidae,Gryllotalpidae;Dictyoptera:Mantidae,Blattidae; Odonata;Isoptera:Termitidae;Thysanoptera:

BAG-116: FundamentalsofAgriculturalExtension Education

CO: COURSE OBJECTIVES

CO-1Understand the Role of Agricultural Extension: To provide students with an understanding of the importance and role of agricultural extension in enhancing agricultural productivity, promoting sustainable practices, and improving rural livelihoods.

CO-2 Learn Key Principles of Agricultural Extension: To introduce students to the fundamental principles, concepts, and theories that guide agricultural extension services and their application in diverse agricultural settings.

CO-3 Examine Extension Models and Approaches: To analyze various extension models, approaches, and methodologies used to communicate agricultural knowledge and practices to farmers, communities, and stakeholders.

CO-4 Develop Communication Skills for Extension Work: To enhance students' communication and interpersonal skills, including methods for delivering information and facilitating participatory learning within rural communities.

CO-5 Explore Extension Program Planning and Management: To teach students how to plan, implement, monitor, and evaluate extension programs and projects that aim to address agricultural and rural development challenges.

CO-6 Identify Key Stakeholders in Agricultural Extension: To familiarize students with the key stakeholders in agricultural extension (farmers, government agencies, NGOs, and private sector entities) and their roles in agricultural development.

CO-7 Promote Critical Thinking in Agricultural Innovation: To encourage students to critically evaluate agricultural innovations and technologies, assessing their relevance, sustainability, and effectiveness in different socio-economic and environmental contexts.

Course Content

Unit- I:

- Education: Meaning, definition & Types; Extension Education- meaning, definition,scopeandprocess;objectivesandprinciplesofExtensionEducation;ExtensionProgrammeplanning-Meaning,Process,PrinciplesandStepsinProgrammeDevelopment.

Unit- II:

- Extension systems in India: extension efforts in pre-independence era (Sriniketan,Marthandam,FirkaDevelopmentScheme,GurgaonExperiment,etc.)andpost-independenceera(EtawahPilotProject,NilokheriExperiment,etc.);variousextension/ agriculture development programmes launched by ICAR/ Govt. of India(IADP, IAAP, HYVP, KVK, IVLP, ORP, ND,NATP, NAIP, etc.). New trends inagriculture extension: privatization extension, cyber extension/ e-extension, market-ledextension, farmer-led extension, expertsystems, etc.

Unit- III:

- RuralDevelopment:concept,meaning,definition;variousruraldevelopmentprogrammeslaunchedbyGovt.ofIndia.CommunityDev.-meaning,definition,concept & principles, Philosophy of C.D. Rural Leadership: concept and definition,types of leaders in rural context; extension administration: meaning and concept,principlesand functions.

Unit- IV:

- Monitoringandevaluation:conceptanddefinition,monitoringandevaluationofextension programmes; transfer of technology: concept and models, capacity buildingofextensionpersonnel;extensionteachingmethods:meaning,classification,individual, group and mass contact methods, ICT Applications in TOT (New andSocialMedia),media mixstrategies;communication:meaningand definition;

Unit- V:

- Principles and Functions of Communication, models and barriers to communication.Agriculture journalism; diffusion and adoption of innovation: concept and meaning,processand stages of adoption, adopter categories.

Practical:

To get acquainted with university extension system. Group discussion- exercise; handling anduse of audio visual equipments and digital camera and LCD projector; preparation and use ofAV aids, preparation of extension literature – leaflet, booklet, folder, pamphlet news storiesand success stories; Presentation skills exercise; micro teaching exercise; A visit to village tounderstand the problems being encountered by the villagers/ farmers; to study organizationand functioning of DRDA and other development departments at district level; visit to NGOand learning from their experience in rural development; understanding PRA techniques andtheirapplicationinvillagedevelopmentplanning;exposuretomassmedia:visittocommunityradioandtelevisionstudioforunderstandingtheprocessofprogrammeproduction; script writing, writing for print and electronic media, developing script for radioand television.

BAG-118: CommunicationSkillsand PersonalityDevelopment

CO: COURSE OBJECTIVES

CO-1Enhance Verbal Communication: To develop effective spoken communication skills, enabling students to express themselves clearly, confidently, and persuasively in various contexts, including public speaking, interviews, and presentations.

CO-2 Improve Non-Verbal Communication: To foster an understanding of non-verbal cues such as body language, facial expressions, posture, and eye contact, and how they impact communication.

CO-3 Develop Listening Skills: To strengthen active listening abilities, emphasizing the importance of listening for understanding, feedback, and engagement in both personal and professional interactions.

CO-4 Enhance Written Communication: To improve written communication skills, including grammar, structure, clarity, and tone, in various formats such as emails, reports, and formal correspondence.

CO-5 Boost Confidence and Self-Presentation: To build self-awareness and self-confidence through personal grooming, positive body language, and effective self-presentation techniques in social and professional settings.

CO-6 Foster Emotional Intelligence: To develop emotional intelligence skills such as empathy, emotional regulation, and social awareness, enhancing interpersonal relationships and communication effectiveness.

CO-7 Cultivate Critical Thinking and Problem-Solving: To encourage critical thinking in communication, allowing students to analyze situations, solve problems effectively, and make informed decisions in both professional and personal environments.

Course Contents

Unit- I:

- Communication Skills: Structural and functional grammar; meaning and process ofcommunication,verbal and nonverbal communication;

Unit- II:

- Listening and note taking, writing skills, oral presentation skills; field diary and labrecord;indexing, footnote and bibliographic procedures.

Unit- III:

- Readingandcomprehensionofgeneralandtechnicalarticles,precisewriting,summarizing,abstracting;individualandgrouppresentations,impromptupresentation,publicspeaking; Group discussion.

Unit- IV:

- Organizingseminarsand conferences.

Practical:

Listening and note taking, writing skills, oral presentation skills; field diary and lab record;indexing, footnote and bibliographic procedures. Reading and comprehension of general andtechnicalarticles,precisewriting,summarizing,abstracting;individualandgroup presentations.

BAG-118 A: English Grammar-II

CO: COURSE OBJECTIVES

CO-1Enhance Advanced Understanding of Grammar: Develop a deeper understanding of complex English grammar structures, including advanced tenses, voice, mood, and conditionals.

CO-2 Improve Sentence Construction: Teach students to construct clear, concise, and grammatically correct sentences with an emphasis on variety and sophistication.

CO-3 Master Complex Sentence Structures: Explore and practice complex sentence types, including compound-complex sentences, subordination, and coordination.

CO-4 Refine Use of Modifiers and Clauses: Equip students with the skills to effectively use adjectives, adverbs, relative clauses, and other modifiers for clarity and precision in writing.

CO-5 Analyze Punctuation and Syntax: Develop proficiency in the correct use of punctuation marks (commas, semicolons, colons, etc.) to enhance meaning and readability.

CO-6 Strengthen Vocabulary through Grammar: Help students improve vocabulary usage through context and grammar, emphasizing word formation, collocations, and correct usage.

CO-7 Foster Critical Grammar Application in Writing: Enable students to apply grammar rules effectively in academic, professional, and creative writing to produce error-free texts.

Course Content

Unit I

Review of Basic Grammar, Parts of speech, sentence structure, and punctuation, Verb Tenses, Present, past, future, and perfect aspects, Modifiers, Adjectives, adverbs, and their placement,

Unit II

Clauses and Sentence Types, Independent, dependent, and compound-complex sentences, Agreement, Subject-verb and pronoun-antecedent agreement, Active vs. Passive Voice, When to use each effectively, Common Grammatical Errors, Misplaced modifiers, comma splices, etc.

Unit III

Punctuation, Advanced usage of commas, semicolons, colons, and dashes, Style and Tone, How grammar affects writing style and audience engagement, Editing and Proofreading Techniques,

Unit IV

Application in Professional Writing, Grammar in resumes, cover letters, and reports,
Strategies for self-editing and peer review, Final Review and Assessment

BAG-118 B: Soft Skills-II

CO: COURSE OBJECTIVES

CO-1Enhance Communication Skills: Improve verbal, non-verbal, and written communication abilities to ensure clarity, effectiveness, and professionalism in various settings.

CO-2 Develop Teamwork and Collaboration: Foster the ability to work effectively in diverse teams, focusing on cooperation, conflict resolution, and mutual respect in a group environment.

CO-3 Refine Time Management Techniques: Teach practical strategies for prioritizing tasks, meeting deadlines, and maintaining productivity in both personal and professional settings.

CO-4 Cultivate Leadership Abilities: Develop leadership skills, including decision-making, motivating others, delegating tasks, and leading by example to inspire and guide teams.

CO-5 Build Emotional Intelligence: Strengthen self-awareness, empathy, and emotional regulation to better understand oneself and interact with others in a professional environment.

CO-6 Improve Problem-Solving and Critical Thinking: Equip students with strategies to approach problems systematically, think critically, and find innovative solutions in a variety of situations.

CO-7 Promote Conflict Resolution Skills: Teach effective techniques for managing and resolving conflicts, fostering positive relationships and a harmonious work environment.

Course Contents

Unit I

Presentation Skills, Speaking to a small group and large audience, Barriers to communication and non- verbal communication, Language skills, Types of presentation and use of aids, Effective public speaking.

Unit II

Memory Skills, Memory system, Short term and long term memory, Causes of memory problems, Methods of improving memory, preventing loss of memory.

Unit III

Technical Writing Skills, Defining Technical Communication and Organizing Information, Language in Technical Communication.

Unit IV

Description Vs Narration Vs Instruction, Letters, Memos, Electronic Communication, Formal and Informal Reports.

BAG-118 C: Life Management-II

CO: COURSE OBJECTIVES

CO-1Enhance Time Management Skills: To equip students with advanced techniques for managing their time effectively, prioritizing tasks, and balancing various aspects of life, including work, education, and personal commitments.

CO-2 Develop Emotional Intelligence: To help students understand and manage their emotions, build empathy, and improve their interpersonal relationships both personally and professionally.

CO-3 Master Decision-Making and Problem-Solving: To teach students methods for making informed and effective decisions, as well as strategies for solving complex life problems with confidence and clarity.

CO-4 Financial Management and Planning: To provide students with the knowledge and skills necessary to manage personal finances, including budgeting, investing, and planning for long-term financial goals.

CO-5 Promote Health and Wellness: To encourage students to develop habits for maintaining physical, mental, and emotional health through exercise, nutrition, mindfulness, and stress management techniques.

CO-6 Cultivate Leadership and Social Responsibility: To foster leadership qualities, enhance teamwork skills, and inspire students to take an active role in their communities through social responsibility initiatives.

CO-7 Set and Achieve Personal and Professional Goals: To guide students in setting realistic, measurable, and meaningful short-term and long-term goals, and to provide them with the tools and strategies to achieve them effectively.

Course Contents

Unit I

Basics of Life Management, Ways of Life Management, Effective Reading & Writing, Emotional development, Basics of Character Building.

Unit II

Developing Tools of Life Management, Way to Creative Excellence, Effective Communication & Public Speaking, Developing Ideal Leadership Skill.

Unit III

Spiritual Potential of Personality, Ideal of a successful Personality, Adjustment & Behavioral Skill.

Unit IV

Workshop in campus and local areas.

BAG-201:Crop Production Technology–I(Kharif Crops)

CO: COURSE OBJECTIVES

CO-1 Understanding of Kharif Crops:

- To provide students with an in-depth knowledge of the different Kharif crops, their classification, and characteristics.

CO-2 Soil and Climate Requirements:

- To familiarize students with the soil types, climatic conditions, and environmental factors required for successful cultivation of Kharif crops.

CO-3 Crop Improvement:

- To explore strategies for improving crop yield, quality, and resistance to pests and diseases through breeding programs.

CO-4 Nutrient Management:

- To teach the application of appropriate fertilizers and manure for enhancing soil fertility and crop yield.

CO-5Management of Pests and Diseases:

- To introduce students to the common pests and diseases affecting Kharif crops and their management through both organic and chemical means.

CO-6 Crop Yield and Post-Harvest Technology:

- To impart knowledge on harvesting techniques, post-harvest handling, and storage practices specific to Kharif crops.

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CO-7 Economics and Market Trends:

- To make students aware of the economics of growing Kharif crops, including cost-benefit analysis, marketing strategies, and market trends for these crops.

Course Contents

Unit- I:

- Origin, geographical distribution, economic importance, soil and climaticrequirements,varieties, culturalpracticesandyield ofKharifcrops.

Unit- II:

- Cereals–rice,maize,sorghum,pearlmilletandfingermillet,pulses-pigeonpea,mungbeanand urdbean;

Unit- III:

- Oilseeds-groundnut,andsoybean;fibrecrops-cotton&jute;

Unit- IV:

- Foragecrops-sorghum,cowpea,clusterbeanandnapier.

Practical:

Rice nursery preparation, transplanting of rice, sowing of soybean, pigeonpea and mungbean.maize, groundnut and cotton, effect of seed size on germination and seedling vigour of kharifseasoncrops,effectofsowingdepthongerminationofkharifcrops,identificationofweedsin kharif season crops, top dressing and foliar feeding of nutrients, study of yield contributingcharactersandyieldcalculationofkharifseasoncrops,studyofcropvarietiesand importantagronomicexperimentsatexperimentalfarm.studyofforageexperiments,morphologicaldescriptionofkharifseasoncrops,visittoresearchcentresofrelated crops.

BAG-203:Fundamentalsof PlantBreeding

CO: COURSE OBJECTIVES

CO-1 Understanding Genetic Principles: To provide students with a solid foundation in the principles of genetics and heredity as they relate to plant breeding.

CO-2 Breeding Methods: To familiarize students with various plant breeding techniques, including traditional and modern methods such as hybridization, selection, and biotechnology.

CO-3 Crop Improvement: To explore strategies for improving crop yield, quality, and resistance to pests and diseases through breeding programs.

CO-4 Evaluation of Breeding Lines: To teach students how to evaluate and select superior breeding lines based on phenotypic and genotypic traits.

CO-5Plant Breeding Research: To develop skills in designing and conducting breeding experiments, including data collection and analysis.

CO-6 Ethical Considerations: To instill an understanding of the ethical implications and societal impacts of plant breeding practices.

CO-7 Application of Biotechnological Tools: To introduce students to biotechnological tools and techniques, such as molecular markers and genetic engineering, used in modern plant breeding.

Course Contents

Unit- I:

- Historicaldevelopment,concept,natureandroleofplantbreeding,majorachievements and future prospects; Genetics in relation to plant breeding, modes ofreproductionandapomixes,self-incompatibilityandmalesterility-geneticconsequences,cultivaroptions. Domestication,

Unit- II:

- Acclimatization and Introduction; Centres of origin/ diversity, components of Geneticvariation; Heritability and genetic advance; Genetic basis and breeding methods inself- pollinated crops - mass and pure line selection, hybridization techniques andhandlingof segregatingpopulation;

Unit- III:

- Multilineconcept.ConceptsofpopulationgeneticsandHardy-WeinbergLaw,Genetic basis and methods of breeding cross pollinated crops, modes of selection;PopulationimprovementSchemes-Eartorowmethod,ModifiedEartoRow,recurrent selection schemes; Heterosis and inbreeding depression, development ofinbredlines and hybrids,compositeandsyntheticvarieties;

Unit- IV:

- Breeding methods in asexually propagated crops, clonal selection and hybridization;Maintenance of breeding records and data collection; Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding, mutation breeding-methods anduses;

Unit- V:

- Breedingforimportantbioticandabioticstresses;Biotechnologicaltools-DNAmarkersandmarkerassistedselection.Participatoryplantbreeding;IntellectualPropertyRights, Patenting, Plant Breeders and&Farmer'sRights.

Practical:

Plant Breeder's kit, Study of germplasm of various crops. Study of floral structure of self-pollinated and cross pollinated crops. Emasculation and hybridization techniques in self &crosspollinatedcrops.Consequencesofinbreedingongeneticstructureofresultingpopulations.
Study of male sterility system. Handling of segregation populations. Methods ofcalculating mean, range, variance, standard deviation, heritability. Designs used in plantbreeding experiments, analysis of Randomized Block Design. To work out the mode ofpollination in a given crop and extent of natural out-crossing. Prediction of performance ofdoublecrosshybrids.

BAG-205:AgriculturalFinanceandCooperation

CO: COURSE OBJECTIVES

CO-1 Understanding Agricultural Finance:

- To introduce students to the concept and importance of agricultural finance in supporting farm operations and rural development.

CO-2 Familiarization with Credit Systems:

- To understand various sources of credit available to farmers, including institutional (banks, cooperatives) and non-institutional (moneylenders, informal sources).

CO-3 Financial Management Skills:

- To develop financial management skills necessary for effective resource allocation, budgeting, and planning in agricultural enterprises.

CO-4 Cooperative Structure and Functioning:

- To understand the formation, operation, and management of agricultural cooperatives and their impact on rural economies.

CO-5 **Policy and Government Support:**

- To analyze the role of government policies, subsidies, and programs in promoting agricultural finance and cooperative development.

Course Contents

Unit- I:

- Agricultural Finance- meaning, scope and significance, credit needs and its role inIndian agriculture. Agricultural credit: meaning, definition, need, classification. Creditanalysis: 4 R's, and 3C's of credits. Sources of agricultural finance: institutional andnon-institutionalsources,commercialbanks,socialcontrolandnationalizationofcommercialbanks, Micro financingincluding KCC.

Unit- II:

- Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higherfinancing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and CreditGuarantee Corporation of India. Cost of credit. Recent development in agriculturalcredit.

Unit- III:

- Preparationandanalysisoffinancialstatements–BalanceSheetandIncomeStatement. Basic guidelines for preparation of project reports- Bank norms – SWOTanalysis.

Unit- IV:

- AgriculturalCooperation–Meaning,brief history ofcooperativedevelopmentinIndia, objectives, principles of cooperation, significance of cooperatives in Indianagriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives,farmingcooperatives,cooperativewarehousing;roleofICA,NCUI,NCDC,NAFED.

Practical:

Determinationofmostprofitablelevelofcapitaluse.Optimumallocationoflimitedamountofcapital amongdifferententerprise.Analysisofprogressandperformanceofcooperativesusingpublishedda ta.Analysisofprogressandperformanceofcommercialbanksand RRBsusingpublisheddata.Visitto acommercialbank,cooperativebankandcooperativesocietytoacquirefirsthandknowledgeoftheir management,schemesandprocedures.Estimationofcredit requirement of farm business – A case study. Preparation and analysis of balance sheetAcasestudy.Preparationandanalysisofincomestatement– Acasestudy.Appraisalofaloanproposal.Acasestudy.Techno-economicparametersforpreparationofprojects.PreparationofBankableprojectsforvariousagricultu ralproductsanditsvalueaddedproducts.Seminar on selected topics.

BAG-207:Agri- Informatics

CO: COURSE OBJECTIVES

CO-1 Application of Technology in Agriculture: Equip students with knowledge on the use of modern technologies like Geographic Information Systems (GIS), remote sensing, big data analytics, and precision farming techniques to enhance agricultural production and resource management.

CO-2Data Management & Analysis: Train students to handle large agricultural datasets, analyze them and extract actionable insights to improve farm management practices, crop yield predictions, pest control, and soil health.

CO-3 Development of Agricultural Software Solutions: Develop the capability to design and implement software tools for various agricultural sectors, such as crop modeling, irrigation scheduling, market prediction systems, and supply chain management.

CO-4 Sustainable Agriculture Practices: Promote understanding of sustainable farming practices by leveraging data-driven technologies to reduce waste, minimize environmental impact, and promote long-term productivity in agriculture.

CO-5Enhancing Decision-Making in Agriculture: Foster the ability to make informed decisions based on data, supporting farmers in improving crop management, optimizing inputs (e.g., water, fertilizers), and maximizing overall farm profitability.

CO-6 Innovation and Research: Encourage students to engage in research and innovation in agri-informatics, exploring new ways to use technology to address global agricultural challenges such as climate change, resource scarcity, and food security.

Course Contents

Unit- I:

- Introduction to Computers, Operating Systems, definition and types, Applications ofMS- Office for document creation & Editing, Data presentation, interpretation andgraph creation, statistical analysis, mathematical expressions, Database, concepts andtypes, usesof DBMSin Agriculture, World WideWeb (WWW):

Unit- II:

- Conceptsandcomponents.Introductiontocomputerprogramminglanguages,conceptsand standardinput/outputoperations.E-Agriculture,conceptsandapplications,Use ofICTin Agriculture.

Unit- III:

- ComputerModelsforunderstandingplantprocesses.ITapplicationforcomputationof water and nutrient requirement of crops, Computer-controlled devices (automatedsystems)forAgri-inputmanagement,SmartphoneAppsinAgricultureforfarmadvises,market price,postharvest management etc;

Unit- IV:

- Geospatialtechnologyforgeneratingvaluableagri-information.Decisionsupportsystems, concepts, components and applications in Agriculture, Agriculture ExpertSystem, Soil Information Systems etc for supporting Farm decisions. Preparation ofcontingentcrop-planning using ITtools.

Practical:

StudyofComputerComponents,accessories,practiceofimportantDOSCommands.Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files &Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing andpresenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statisticaltools, writing expressions, creating graphs, analysis of scientific data. MS-ACCESS: CreatingDatabase,preparingqueriesandreports,demonstrationofAgri-informationsystem.Introduction to World Wide Web (WWW).Introduction of programming languages. Hands onCrop Simulation Models (CSM) such as DSSAT/Crop-Info/CropSyst/ Wofost;

ComputationofwaterandnutrientrequirementsofcropusingCSMandITtools.IntroductionofGeospatialTechnologyforgeneratingvaluableinformationforAgriculture.HandsonDecisionSupport System. Preparation ofcontingent cropplanning.

BAG-209:FarmMachineryand Power

CO: COURSE OBJECTIVES

CO-1 Understanding Farm Machinery: To provide in-depth knowledge about various types of farm machinery (tractors, plows, harvesters, etc.) and their applications in modern agriculture.

CO-2Power Systems in Agriculture: To study the power sources used in agriculture, including the operation and maintenance of engines, motors, and alternative energy systems (solar, bioenergy, etc.).

CO-3 Technology Integration: To introduce students to cutting-edge technology such as automated systems, robotics, GPS, and precision farming tools used to optimize agricultural processes**.**

CO-4 Machinery Maintenance and Management: To teach students how to manage, maintain, and repair farm machinery, ensuring optimal performance and reducing downtime in farming operations.

CO-5Design and Innovation: To equip students with the knowledge to design and innovate new farming tools and machinery that can solve existing challenges in agriculture and improve efficiency.

CO-6Sustainable Agriculture: To promote sustainable farming practices by focusing on energy-efficient machinery, reduced environmental impact, and the incorporation of green technologies.

CO-7Improving Productivity: To enable students to use machinery effectively to increase farm productivity, reduce labor costs, and enhance overall agricultural output.

Course Contents

Unit- I:

- StatusofFarmPowerinIndia,SourcesofFarmPower ,I.C.engines,workingprinciplesof ICengines,comparison oftwo stroke and fourstrokecycle engines,

Unit- II:

- Study of different components of I.C. engine, I.C. engine terminology and solvedproblems,Familiarization withdifferentsystemsofI.C.engines:

Unit- III:

- Aircleaning,cooling,lubrication,fuelsupplyandhydrauliccontrolsystemofatractor, Familiarization with Power transmission system : clutch, gear box, differentialand final drive of a tractor,

Unit- IV:

- Tractor types, Cost analysis of tractor power and attached implement, FamiliarizationwithPrimaryandSecondaryTillageimplement,Implementforhillagricultu re,implementfor interculturaloperations,

Unit- V:

- Familiarization with sowing and planting equipment, calibration of a seed drill andsolved examples, Familiarization with Plant Protection equipment, Familiarizationwithharvesting and threshingequipment.

Practical:

Study of different components of I.C. engine. To study air cleaning and cooling system ofengine, Familiarization with clutch, transmission, differential and final drive of a tractor,Familiarization with lubrication and fuel supply system of engine, Familiarization with brake,steering, hydraulic control system of engine, Learning of tractor driving, Familiarization withoperation of power tiller, Implements for hill agriculture, Familiarization with different typesof primary and secondary tillage implements: mould plough, disc plough and disc harrow .Familiarizationwithseed-cum-fertilizerdrillstheirseedmeteringmechanismandcalibration, planters and transplanter Familiarization with different types of sprayers anddustersFamiliarizationwithdifferentinter-cultivationequipment,Familiarizationwithharvestingand threshing machinery.

BAG-211:Production Technologyfor Vegetables and Spices

CO: COURSE OBJECTIVES

CO-1Understanding the Basics of Vegetable and Spice Production:

- Provide foundational knowledge of the various vegetables and spices, their classification, and importance in human nutrition and economy.

CO-2Cultivation Practices and Techniques:

- Develop skills in selecting suitable varieties of vegetables and spices for different regions.

CO-3 Soil and Climate Requirements:

- Equip students with the understanding of the specific soil, temperature, and climatic conditions needed for optimum growth of vegetables and spices.

CO-4 Innovative Production Practices:

- Introduce advanced and innovative production techniques, such as hydroponics, vertical farming, and protected cultivation, to improve productivity and sustainability.

CO-5 Integrated Pest Management (IPM) and Disease Control:

- Educate students on integrated pest management (IPM) strategies and organic practices to minimize the use of chemical pesticides and enhance food safety.

CO-6Post-Harvest Management:

- Focus on proper harvesting, handling, packaging, and storage techniques to minimize losses and preserve the quality of vegetables and spices for both local consumption and export.

CO-7Sustainable Agricultural Practices:

- Promote environmentally sustainable practices, water conservation methods, and climate-resilient strategies in vegetable and spice production.

Course Contents

Unit- I:

- Importance of vegetables & spices in human nutrition and national economy, kitchengardening,brief about origin, area, climate, soil

Unit- II:

- Improved varieties and cultivation practices such as time of sowing, transplantingtechniques, planting distance, fertilizer requirements, irrigation, weed management,harvestingandyield, physiologicaldisorders,

Unit- III:

- Important vegetable and spices such as Tomato, Brinjal, Chilli, Capsicum, Cucumber,Melons,Gourds,Pumpkin,Frenchbean,Peas;ColecropssuchasCabbage,Cauli flower,Knol-khol;

Unit- IV:

- Bulbcropssuch asOnion,Garlic; Rootcrops such asCarrot,Raddish,Beetroot;Tuber crops such as Potato; Leafy vegetables such as Amaranth, Palak. Perennialvegetables

Practical:

Identificationofvegetables&spicecropsandtheirseeds.Nurseryraising.Directseedsowing and transplanting. Study of morphological characters of different vegetables & spices.Fertilizers applications. Harvesting & preparation for market. Economics of vegetables andspicescultivation.

BAG-213:Environmental Studiesand DisasterManagement

CO: COURSE OBJECTIVES

CO-1Understanding the Basics of Vegetable and Spice Production:

- Provide foundational knowledge of the various vegetables and spices, their classification, and importance in human nutrition and economy.

CO-2Cultivation Practices and Techniques:

- Develop skills in selecting suitable varieties of vegetables and spices for different regions.

CO-3 Soil and Climate Requirements:

- Equip students with the understanding of the specific soil, temperature, and climatic conditions needed for optimum growth of vegetables and spices.

CO-4 Innovative Production Practices:

- Introduce advanced and innovative production techniques, such as hydroponics, vertical farming, and protected cultivation, to improve productivity and sustainability.

CO-5 Integrated Pest Management (IPM) and Disease Control:

- Educate students on integrated pest management (IPM) strategies and organic practices to minimize the use of chemical pesticides and enhance food safety.

CO-6Post-Harvest Management:

- Focus on proper harvesting, handling, packaging, and storage techniques to minimize losses and preserve the quality of vegetables and spices for both local consumption and export.

CO-7Sustainable Agricultural Practices:

- Promote environmentally sustainable practices, water conservation methods, and climate-resilient strategies in vegetable and spice production.

Course Contents

Unit- I:

- Multidisciplinary nature of environmental studies Definition, scope and importance.Natural Resources: Renewable and non-renewable resources, Natural resources andassociated problems. a) Forest resources: Use and over-exploitation, deforestation,case studies. Timber extraction, mining, dams and their effects on forest and tribalpeople.b) Water resources: Use and over-utilization of surface and ground water,floods, drought, conflicts over water, dams-benefits and problems.c) Mineralresources: Use and exploitation, environmental effects of extracting and using mineralresources,case studies.

Unit- II:

- d)Foodresources:Worldfoodproblems,changescausedbyagricultureandovergrazing,effectsofmodernagriculture,fertilizer-pesticideproblems,waterlogging, salinity, case studies. e) Energy resources: Growing energy needs, renewableand non- renewable energy sources, use of alternate energy sources. Case studies. f)Land resources: Land as a resource, land degradation, man induced landslides, soilerosionanddesertification.•Roleofanindividualinconservationofnaturalresources.• Equitableuse ofresourcesfor sustainable lifestyles.

Unit- III:

- Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem,Producers, consumers and decomposers, Energyflowintheecosystem.

Unit- IV:

- Ecological succession, Food chains, food webs and ecological pyramids. Introduction,types, characteristic features, structure and function of the following ecosystem: a.Forest ecosystem b. Grassland ecosystem c. Desertecosystemd. Aquatic ecosystems(ponds,streams, lakes,rivers, oceans, estuaries)

BAG-215:Statistical Methods

CO: COURSE OBJECTIVES

CO-1Descriptive Statistics: This method involves summarizing and describing the main features of a dataset. It includes measures like mean, median, mode, variance, standard deviation, and range to describe the central tendency and spread of data.

CO-2Inferential Statistics: This approach makes inferences or predictions about a population based on a sample of data. It involves hypothesis testing, confidence intervals, and regression analysis to draw conclusions beyond the sample data.

CO-3Probability Theory: The study of randomness and uncertainty. Probability distributions (such as normal, binomial, or Poisson distributions) are used to model and predict the likelihood of various outcomes.

CO-4Regression Analysis: A method for modeling the relationship between one dependent variable and one or more independent variables. Linear regression, logistic regression, and other types of regression are used to predict or explain the behavior of a variable.

CO-5Analysis of Variance (ANOVA): ANOVA is used to test for differences between two or more groups or treatments. It compares means across groups and helps determine if at least one group mean is significantly different from the others.

CO-6Chi-Square Test: A statistical test used to determine if there is a significant association between categorical variables. It is often used in testing hypotheses about the relationship between observed and expected frequencies.

CO-7Time Series Analysis: This method involves analyzing data points collected or recorded at specific time intervals. It is used for forecasting and understanding trends, seasonality, and cyclic behaviors in data.

Course Contents

Unit- I:

- IntroductiontoStatisticsanditsApplicationsinAgriculture,GraphicalRepresentationof Data,Measures ofCentralTendency&Dispersion,

Unit- II:

- DefinitionofProbability,AdditionandMultiplicationTheorem(withoutproof).SimplePro blems Based on Probability.Binomial&Poisson Distributions,

Unit- III:

- Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation.Linear Regression Equations. Introduction to Test of Significance, One sample & twosample test t for Means, Chi-Square Test ofIndependence of Attributes in 2 ×2ContingencyTable.

Unit- IV:

- IntroductiontoAnalysisofVariance,AnalysisofOneWayClassification.Introduction to Sampling Methods, Sampling versus Complete Enumeration, SimpleRandom Sampling with and without replacement, Use of Random Number Tables forselection of SimpleRandom Sample.

Practical:

Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) withCalculationofQuartiles,Deciles&Percentiles.MeasuresofCentral Tendency (Groupeddata)withCalculationofQuartiles,Deciles&Percentiles.MeasuresofDispersion(Ungro uped Data).Measures of Dispersion (Grouped Data).Moments, Measures of Skewness&Kurtosis(UngroupedData).Moments,MeasuresofSkewness&Kurtosis(GroupedDat a).Correlation & Regression Analysis. Application of One Sample t-test. Application ofTwoSampleFisher'st-test.Chi-SquaretestofGoodnessofFit.Chi-SquaretestofIndependenceofAttributesfor 2×2contingency table.AnalysisofVariance OneWayClassification. Analysis of Variance Two Way Classification. Selection of random sampleusingSimple Random Sampling.

BAG-215A Introduction to Mathematical Programming

CO: COURSE OBJECTIVES

CO-1Understand the Basics of Mathematical Programming:

- Learn the fundamental concepts of mathematical programming, including optimization problems, decision variables, constraints, and objective functions.

CO -2 Formulate Optimization Problems:

- Develop the ability to translate real-world problems into mathematical programming models. This includes identifying objectives and constraints in practical situations.

CO-3 Learn Different Types of Optimization Problems:

- Explore various types of optimization problems, such as linear programming (LP), integer programming (IP), and nonlinear programming (NLP).

CO-4 Understand and Apply Linear Programming Techniques:

- Gain proficiency in solving linear programming problems using methods like the Simplex algorithm, graphical methods, and duality theory.

CO -5 Explore Integer and Mixed-Integer Programming:

- Learn how to solve problems involving integer constraints, and understand the challenges and techniques for solving mixed-integer programming (MIP) problems.

CO-6Interpret and Analyze Results:

- Develop the skills to analyze the results of optimization problems, including sensitivity analysis, interpreting dual variables, and evaluating the quality of the solution.

CO -7 Introduction to Software and Tools for Mathematical Programming:

- Become familiar with software tools (like Excel Solver, Python, Gurobi, or CPLEX) for modeling and solving optimization problems, and understand how to apply these tools to practical problems.

Course Contents

Unit I
Introduction to the field of mathematical programming. Basic concepts and notation. Linear programs formulation through examples from engineering / business decision making problems;preliminary theory and geometry of linear programs, basic feasible solution.

Unit II
simplex method, variants of simplex method, like two phase method and revised simplex method; duality and its principles, interpretation of dual variables, dual simplex method, primal-dual method; complexity of simplex method.

Unit III
linear integer programs, their applications in real decision making problems, cutting plane and branch and bound methods, transportation problems, assignment problems, network maximum flow problems.

Unit IV
Ellipsoid method, Karmarkar's interior point method;
nonlinear programming, Lagrange multipliers, Farkas lemma, constraint qualification, KKT optimality conditions, sufficiency of KKT under convexity;
quadratic programs.

Unit V
Wolfe method, applications of quadratic programs in some domains like portfolio optimization and support vector machines, etc. Integer programming problems, the branch and bound method. Formulating the mathematical model for linear problems, primaldual relationship. Sensitivity analysis.

BAG-215BIntroduction to Modeling and Simulation

CO: COURSE OBJECTIVES

CO-1Understanding the Basics of M&S:
Learn the foundational concepts of modeling and simulation, including different types of models (physical, mathematical, and computational) and the role of simulation in understanding complex systems.

CO-2Differentiate between Types of Models:
Understand the distinction between continuous and discrete models, deterministic and stochastic models, and their respective applications in real-world systems.

CO-3Identify Components of a Simulation:
Gain insight into the key elements of a simulation, such as input data, model logic, and output analysis. Recognize the importance of each in the simulation process.

CO-4Application of M&S in Various Fields:
Explore how modeling and simulation are used in industries such as aerospace, healthcare, economics, manufacturing, and environmental science for decision-making and problem-solving.

CO-5Learn Simulation Methodologies:
Study various simulation methodologies, including Monte Carlo simulations, discrete event simulation, agent-based modeling, and system dynamics, along with their appropriate applications.

CO-6 Model Validation and Verification:
Understand the processes of model verification (ensuring the model is implemented correctly) and validation (ensuring the model accurately represents the real system), and their importance in achieving reliable results.

CO-7 **Ethical and Practical Considerations**:
Discuss the ethical implications of using models and simulations in decision-making, along with the challenges involved in modeling real-world systems accurately, such as uncertainty and computational limits.

Course Contents

Unit I
Introduction: System, environment, input and output variables, State variables; Static and Dynamic systems; Hierarchy of knowledge about a system and Modeling Strategy, Physical Modeling: Dimensions analysis, Dimensionless grouping of input and output variables of find empirical relations, similarity criteria and their application to physical models.

Unit II
Modeling of System with Known Structure: Review of conservation laws and the governing equation for heat, mass and momentum transfer, Deterministic model-(a) distributed parameter models in terms of partial identification and their solutions and (b) lumped parameter models in terms of differential and difference equations, state space model, transfer functions block diagram and sub systems, stability of transfer functions, modeling for control.

Unit III
Optimizations and Design of Systems: Summary of gradient based techniques: Nontraditional Optimizations techniques (1) genetic Algorithm (GA) - coding, GA operations elitism, Application using MATLAB :(ii) Simulated Annealing.

Unit IV
Neural Network Modeling of Systems only with Input-output Database: Neurons, architecture of neural networks, knowledge representation, learning algorithm. Multilayer feed forward network and its back propagation learning algorithm, Application to complex engineering systems and strategy for optimum output.

Unit V
Modeling Based on Expert Knowledge: Fuzzy sets, Membership functions, Fuzzy Inference systems, Expert Knowledge and Fuzzy Models, Design of Fuzzy Controllers, Simulation of Engineering Systems: Monte-Carlo simulation, Simulation of continuous and discrete processes with suitable examples from engineering problems.

BAG-215CAlgebraic Techniques and Semi definite Optimization

CO: COURSE OBJECTIVES

CO -1 Fundamentals of Algebraic Techniques: Learn the basics of linear algebra, including matrix theory, eigenvalues, and eigenvectors, which are essential tools in optimization. Understand the concept of positive semi definite (psd) matrices and their relevance in optimization problems.

CO-2 Introduction to Optimization: Gain a foundational understanding of optimization theory, especially convex optimization. Learn about different types of optimization problems, including linear and nonlinear programming.

CO-3 Semi definite Programming (SDP): Understand what semi definite programming is and how it generalizes linear programming to matrix variables. Explore the key properties of SDPs and how they can be formulated and solved.

CO-4Duality Theory: Study the duality of optimization problems, focusing on how primal and dual problems are related in semi definite programming. Learn about the duality gap and its significance in solving SDPs.

CO-5 Applications of Semi definite Optimization: Examine real-world applications of SDP in areas like control theory, machine learning, structural optimization, and quantum mechanics. Explore how semi definite optimization is used in approximation algorithms and to solve problems in combinatorial optimization.

CO-6Numerical Methods for Solving SDPs: Understand the computational methods used to solve semi definite programs, including interior-point methods and other algorithms. Learn how to implement these methods using software tools such as MATLAB, Python, or specialized optimization solvers.

CO -7 Algebraic Structure in Optimization: Explore how algebraic structures, such as matrix factorizations and linear algebraic properties, can simplify and improve the efficiency of solving SDPs. Investigate how algebraic techniques contribute to understanding the geometry of optimization problems.

Course Contents

Unit I

Semi definite programming (I), Semi definite programming (II), Algebra review, Univariate polynomials, Resultants and discriminants, Hyperbolic polynomials, SDP representability,

Unit II

Newton polytopes/BKK bound, Sums of squares (I), Sums of squares (II), SOS Applications, Varieties, Ideals, Groebner bases, Nullstellensatz, Complexity analysis of interior point methods

Unit III

Zero dimensional systems (I), Zero dimensional systems (II), Quantifier elimination, Real Nullstellensatz, Representation theorems, Practical implementations of semi definite programs

Unit IV

Symmetry reduction methods, Apps: polynomial solving, Markov chains, Graph theoretic apps, Applications in control theory, machine learning, and combinatorial optimization

BAG-217Livestock andPoultryManagement

CO: COURSE OBJECTIVES

CO-1Understanding Livestock and Poultry Types: Identify and classify various types of livestock and poultry breeds, including their characteristics, uses, and the role they play in agriculture and the economy.

CO -2 Animal Health Management: Learn the basic principles of animal health, including preventive measures, common diseases in livestock and poultry, and their treatment and control methods.

CO-3Animal Nutrition and Feeding: Understand the nutritional needs of livestock and poultry, including the types of feed and their role in growth, reproduction, and overall health.

CO-4Housing and Environmental Management: Explore the importance of proper housing, space requirements, and environmental conditions for livestock and poultry to ensure their well-being and productivity.

CO-5Reproductive Management: Learn the principles of reproduction in livestock and poultry, including breeding techniques, estrous cycles, and the management of breeding programs.

CO-6Production Systems and Productivity: Investigate the different livestock and poultry production systems (e.g., free-range, intensive, organic) and the factors that influence productivity, such as genetics, environment, and management practices.

CO-7 Economic Aspects of Livestock and Poultry Farming: Examine the economic considerations in livestock and poultry management, including cost analysis, market trends, and financial planning for sustainable farm operations.

Course Contents

Unit- I:

- Role of livestock in the national economy. Reproduction in farm animals and poultry.Housing principles, space requirements for different species of livestock and poultry.Managementofcalves,growingheifersand milchanimals.

Unit- II:

- Managementofsheep,goatandswine.Incubation,hatchingandbrooding.Managem ent of growers and layers. Important Indian and exotic breeds of cattle,buffalo,sheep,goat,swineandpoultry.Improvementoffarmanimalsandpoult ry.

Unit- III:

- Digestioninlivestockandpoultry.Classificationoffeedstuffs.Proximateprincipleso f feed. Nutrients and their functions. Feed ingredients for ration for livestock andpoultry.Feedsupplementsand feedadditives.Feedingoflivestockandpoultry.

Unit- IV:

- Introductionoflivestockandpoultrydiseases.Prevention(includingvaccinationsch edule)and control of importantdiseases oflivestockand poultry.

Practical:

Externalbodypartsofcattle,buffalo,sheep,goat,swineandpoultry.Handlingandrestraining of livestock. Identification methods of farm animals and poultry. Visit to IDF andIPF to study breeds of livestock and poultry and daily routine farm operations and farmrecords. Judging of cattle, buffalo and poultry. Culling of livestock and poultry. Planning andlayoutofhousingfordifferenttypesof livestock.Computationof rationsfor livestock.Formulation of concentrate mixtures. Clean milk production, milking methods. Hatcheryoperations, incubation and hatching equipments. Management of chicks, growers and layers.Debeaking, dusting and vaccination. Economics of cattle, buffalo, sheep, goat, swine andpoultryproduction.

BAG-202:Crop ProductionTechnology–II(Rabi Crops)

CO: COURSE OBJECTIVES

CO-1 Familiarize students with rabi crops: Teach the types, characteristics, and importance of various rabi crops, such as wheat, barley, mustard, gram, peas, and others.

CO-2Develop technical knowledge: Impart knowledge on the appropriate agronomic practices for rabi crop cultivation, including sowing techniques, irrigation, nutrient management, weed control, pest and disease management, and harvesting.

CO-3Understand climatic and soil conditions: Enable students to understand the climatic conditions and soil types best suited for rabi crops and how to optimize environmental factors for successful crop production.

CO-4Explore modern technologies: Introduce modern agricultural technologies and innovations that enhance productivity, such as mechanization, precision farming, and the use of improved crop varieties.

CO-5Promote sustainable practices: Educate students on sustainable farming practices, efficient water usage, soil health management, and integrated pest management (IPM) for rabi crop production.

CO-6Increase crop productivity and quality: Equip students with skills to improve both the yield and quality of rabi crops through scientific management and adoption of best agricultural practices.

CO-7Problem-solving and decision-making: Develop problem-solving and decision-making abilities in the context of crop management for different rabi crops under diverse field conditions.

Course Contents

Unit- I:

- Origin,geographicaldistribution,economicimportance

Unit- II:

- Soiland climatic requirements, varieties,culturalpractices andyield ofRabi crops;cereals–wheat and barley,pulses-chickpea,lentil,peas,

Unit- III:

- Oilseeds-rapeseed,mustardandsunflower;sugarcrops-sugarcane;

Unit- IV:

- Medicinalandaromaticcrops-mentha,lemongrassand citronella,

Unit- V:

- Foragecrops-berseem,lucerneandoat.

Practical:

Sowingmethodsofwheatandsugarcane,identificationofweedsinrabiseasoncrops,studyofmorphologicalcharacteristicsofrabicrops,studyofyieldcontributingcharactersofrabiseason crops, yield and juice quality analysis of sugarcane, study of important agronomicexperimentsofrabicropsatexperimentalfarms.Studyofrabiforageexperiments,oilextractionofmedicinal crops, visitto research stations of relatedcrops.

BAG-204:Production TechnologyforOrnamentalCrops,MAP andLandscaping

CO: COURSE OBJECTIVES

CO-1 Understanding the Importance of Ornamental Crops and Landscaping: To familiarize students with the role of ornamental plants in enhancing aesthetics and improving the quality of human environments, including urban, suburban, and rural landscapes.

CO-2Knowledge of Medicinal and Aromatic Plants (MAP): To introduce the cultivation practices, uses, and economic importance of medicinal and aromatic plants in healthcare, pharmaceuticals, and the fragrance industry.

CO-3Cultivation Practices: To study the best practices in the propagation, cultivation, and maintenance of ornamental plants and MAPs.

CO-4 Landscape Design and Management: To develop skills in the planning and design of landscapes using a variety of ornamental plants, including lawn management, flower beds, and shrubber.

CO-5Environmental Impact and Sustainability: To explore the environmental benefits of ornamental and medicinal plants, such as improving air quality, conserving biodiversity, and mitigating the effects of climate change.

CO-6 Encourage Circular Economy in Agriculture: To promote waste-to-energy processes (e.g., using agricultural by-products for bioenergy production) to create a circular economy model in agriculture.

CO-7Support Rural Development: To contribute to the socio-economic development of rural areas by providing renewable energy access, creating green jobs, and improving agricultural resilience.

Course Contents

Unit- I:

- Importanceandscopeofornamentalcrops,medicinalandaromaticplantsandlandscaping.Principlesoflandscaping.Landscape uses oftrees,shrubsandclimbers.

Unit- II:

- Production technology of important cut flowers like rose, gerbera, carnation, liliumand orchids under protected conditions and gladiolus, tuberose, chrysanthemum underopen conditions.

Unit- III:

- Packageofpracticesforlooseflowerslikemarigoldandjasmineunderopenconditions.

Unit- IV:

- Production technology of important medicinal plants like ashwagandha, asparagus,aloe,costus,Cinnamomum,periwinkle,isabgolandaromaticplants likemint,lemongrass,citronella, palmarosa,ocimum,rose,geranium, vetiver.

Unit- V:

- Processingandvalueadditioninornamentalcrops andMAPsproduce.

Practical:

Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nurserybed preparation and seed sowing. Training and pruning of Ornamental plants. Planning andlayout of garden. Bed preparation and planting of MAP. Protected structures – care andmaintenance.InterculturaloperationsinflowersandMAP.Harvestingandpost-harvesthandlingofcutandloose flowers.ProcessingofMAP.Visittocommercialflower/MAPuni

BAG-206 Renewable Energy and Green Technology

CO: COURSE OBJECTIVES

CO -1 Understand the Principles of Renewable Energy: Develop a solid understanding of the basic principles and technologies behind renewable energy sources, such as solar, wind, geothermal, hydro, and biomass.

CO-2 Evaluate the Environmental Impact of Energy Systems: Analyze and compare the environmental impacts of conventional and renewable energy sources, focusing on sustainability, carbon footprints, and ecological consequences.

CO -3 Assess the Technological Advancements in Green Technology: Study the latest technological innovations in green technology, including energy-efficient appliances, smart grids, and carbon capture technologies.

CO-4 Explore the Economics of Renewable Energy: Understand the economic challenges and opportunities in renewable energy, including cost analysis, financing, and government incentives that promote clean energy solutions.

CO-5Analyze Policy and Regulatory Frameworks: Investigate the global and local policies, regulations, and international agreements that shape the development and deployment of renewable energy and green technologies.

CO-6 Design and Implement Renewable Energy Projects: Learn how to design, plan, and implement renewable energy projects, including feasibility studies, site assessments, and integration with existing energy infrastructures.

CO7 Promote Sustainable Practices and Energy Efficiency: Encourage the adoption of energy-efficient practices and sustainable energy solutions across industries and communities, emphasizing the role of green technology in mitigating climate change.

Course Contents

Unit- I:

- Classificationofenergysources,contributionoftheseofsourcesinagriculturalsector,Familiarizationwithbiomassutilizationforbiofuelproductionandtheirapplication,

Unit- II:

- Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodieselandbiooil production and their utilization asbioenergyresource,

Unit- III:

- Introduction of solar energy, collection and their application, Familiarization withsolar energy gadgets: solar cooker, solar water heater, application of solar energy:solar drying, solarpond,solardistillation,

Unit- IV:

- Solar photovoltaic system and their application, introduction of wind energy and theirapplication.

Practical:

Familiarization with renewable energy gadgets. To study biogas plants, To study gasifiers, Tostudytheproductionprocessofbiodiesel,Tostudybriquettingmachine,Tostudytheproduction process of bio-fuels. Familiarization with different solar energy gadgets. To studysolar photovoltaic system: solar light, solar pumping, solar fencing. To study solar cooker, Tostudysolardryingsystem. To studysolar distillationand solar pond.

BAG-208: Problematic Soils and their Management

CO: COURSE OBJECTIVES

CO-1 Identify Problematic Soils: Enable students to recognize and classify various types of problematic soils, such as saline, sodic, acidic, expansive, and compacted soils.

CO-2Understand Soil Genesis and Characteristics: Provide insights into the formation processes, physical, chemical, and biological properties that make soils problematic.

CO-3Assess Soil Degradation: Develop the ability to evaluate the extent and causes of soil degradation through laboratory and field studies.

CO-4Explore Soil-Plant Relationships: Examine the impact of problematic soils on plant growth and productivity, focusing on nutrient availability and water retention.

CO-5 Management Strategies: Equip students with techniques and practices for the reclamation, amendment, and sustainable management of problematic soils.

CO-6Mitigate Environmental Impacts: Foster awareness of how problematic soils influence environmental systems and learn strategies to minimize adverse effects, such as erosion, pollution, or loss of biodiversity.

CO-7Promote Sustainable Land Use: Advocate for integrated land management approaches that balance soil restoration with agricultural productivity and ecosystem health.

Course Contents

Unit- I:

- Soil quality and health, Distribution of Waste land and problem soils in India. Theircategorizationbased on properties.

Unit- II:

- Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphatesoils, Eroded and Compacted soils, Floodedsoils, Pollutedsoils.

Unit- III:

- Irrigation water – quality and standards, utilization of saline water in agriculture.RemotesensingandGISin diagnosisand management of problem soils.

Unit- IV:

- Multipurpose tree species, bio remediation through MPTs of soils, land capability andclassification, land suitability classification. Problematic soils under different Agro-ecosystems.

BAG-210: Production Technology for Fruit and Plantation Crops

CO: COURSE OBJECTIVES

CO-1Understanding Crop Requirements: Develop a comprehensive understanding of the climatic, soil, and nutritional requirements of major fruit and plantation crops.

CO-2Knowledge of Cultivation Practices: Learn scientific cultivation practices, including planting, spacing, irrigation, and fertilization methods, to enhance productivity and sustainability.

CO-3Pest and Disease Management: Equip students with skills to identify, prevent, and manage pests and diseases affecting fruit and plantation crops using integrated pest management (IPM) techniques.

CO-4Post-Harvest Technology: Understand the principles of harvesting, grading, packaging, and storage of fruit and plantation crops to maintain quality and reduce losses.

CO-5Improving Yield and Quality: Gain knowledge about modern technologies, including high-yielding varieties, grafting techniques, and precision farming, to improve the yield and quality of crops.

CO-6Sustainability and Environmental Concerns: Explore sustainable farming practices that balance production needs with environmental conservation, such as organic farming and agroforestry.

CO-7Market and Economic Analysis: Analyze the market trends, value chains, and economic considerations related to the production and marketing of fruit and plantation crops.

Course Content

Unit- I:

- Importanceandscopeoffruit andplantationcropindustryinIndia;

Unit- II:

- Importance of rootstocks; Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, litchi, papaya, sapota, apple, pear, peach, walnut,almond

Unit- III:

- Minorfruits-date,ber,pineapple,pomegranate,jackfruit,strawberry,

Unit- IV:

- Plantationcrops-coconut,arecanut,cashew,tea,coffee&rubber.

Practical:

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit andplantation crops. Description and identificationof fruit. Preparation of plant bio regulatorsandtheiruses,importantpests,diseasesandphysiologicaldisordersofabov efruitandplantationcrops, Visit to commercial orchards.

BAG-212: Principles of Seed Technology

CO: COURSE OBJECTIVES

CO-1 Understand the Basics of Seed Science: Develop foundational knowledge of seed biology, including seed structure, development, and physiology.

CO-2Learn Seed Production Techniques: Gain insights into modern methods and best practices for seed production in various crops to ensure high quality and yield.

CO-3Explore Seed Quality Parameters: Study the factors affecting seed quality, including genetic purity, viability, vigor, and health.

CO-4Master Seed Processing and Handling: Acquire practical knowledge of seed cleaning, grading, treatment, and storage methods to maintain seed quality.

CO-5Examine Seed Certification Standards: Understand the principles and procedures of seed certification to comply with national and international standards.

CO-6Study Seed Testing and Analysis: Learn techniques for seed testing, including germination tests, moisture determination, and seed health assessments.

CO-7Understand the Role of Seed Technology in Agriculture: Analyze the economic and ecological importance of high-quality seeds in sustainable agriculture and food security.

Course Contents

Unit- I:

- Seedandseedtechnology:introduction,definitionandimportance.Deteriorationcauses of crop varieties and their control; Maintenance of genetic purity during seedproduction, seed quality; Definition, Characters of good quality seed, different classesofseed.Foundationandcertifiedseedproductionofimportantcereals,pulses, oilseeds,fodder and vegetables.

Unit- II:

- Seedcertification,phasesofcertification,procedureforseedcertification,fieldinspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector,offences and penalties. Seeds Control Order 1983, Varietal Identification throughGrowOut Test and Electrophoresis,MolecularandBiochemicaltest.

Unit- III:

- Detection of genetically modified crops, Transgene contamination in non-GM crops,GM crops and organic seed production. Seed drying, processing and their steps, seedtesting for quality assessment, seed treatment, its importance, method of applicationandseed packing.

Unit- IV:

- Seed storage: general principles, stages and factors affecting seed longevity duringstorage.Measures for pestand diseasecontrol duringstorage.

Unit- V:

- Seed marketing: structure and organization, sales generation activities, promotionalmedia. Factors affecting seed marketing, Role of WTO and OECD in seed marketing.Privateand publicsectors and theirproduction and marketingstrategies.

Practical:

Seedproductioninmajorcereals:Wheat,Rice,Maize, Sorghum,Bajra andRagi.Seedproduction in major pulses: Urd, Mung, Pigeonpea, Lentil, Gram, Field bean, pea. Seedproduction in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seedproductioninimportantvegetablecrops.Seedsamplingandtesting:Physicalpurity,germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out testandelectrophoresis.Seedcertification:Procedure,Fieldinspection,Preparationoffieldinspectionreport.Visittoseedproductionfarms,seedtestinglaboratoriesandseedprocessing plant.

BAG-214: Farming System & Sustainable Agriculture

CO: COURSE OBJECTIVES

CO-1Understand Farming Systems: To provide students with a comprehensive understanding of various farming systems, including traditional, organic, and modern approaches, and their role in agricultural sustainability.

CO-2 Analyze Agricultural Ecosystems: To explore the interactions between crops, livestock, soil, water, and climate in farming systems, emphasizing the ecological principles underlying sustainable agriculture.

CO-3 Promote Sustainable Practices: To identify and evaluate sustainable agricultural practices that enhance productivity while conserving natural resources and maintaining ecological balance.

CO-4Address Environmental Challenges: To analyze the environmental challenges associated with agriculture, such as soil degradation, water scarcity, and climate change, and develop strategies for mitigation and adaptation.

CO-5Foster Socioeconomic Sustainability: To understand the socioeconomic dimensions of sustainable agriculture, including farmer livelihoods, market dynamics, and the role of policy in promoting sustainability.

CO-6Apply Technological Innovations: To explore and apply innovative technologies, such as precision farming, agroecology, and climate-smart agriculture, to enhance sustainability and productivity in farming systems.

CO-7Encourage Critical Thinking and Problem-Solving: To develop critical thinking and problem-solving skills for designing and implementing sustainable agricultural solutions tailored to specific regional and global challenges.

Course Contents

Unit- I:

- FarmingSystem-scope,importance,andconcept,Typesandsystemsoffarmingsystem and factors affecting types of farming, Farming system components and theirmaintenance,Croppingsystemandpattern,multiplecroppingsystem,Efficientcropping system and their evaluation, Allied enterprises and their importance, Toolsfordeterminingproduction and efficiencies in croppingandfarmingsystem

Unit- II:

- Sustainableagriculture-problemsanditsimpactonagriculture,indicatorsofsustainability,adaptationandmitigation,conservationagriculturestrategiesinagriculture,HEIA,LEIAandLEISA and itstechniquesfor sustainability

Unit- III:

- Integratedfarmingsystem-historicalbackground,objectivesandcharacteristics,components of IFS and its advantages, Site specific development of IFS model fordifferentagro-climaticzones, resourceuseefficiencyand optimizationtechniques

Unit- IV:

- Resource cycling and flow of energy in different farming system, farming system andenvironment, Visit of IFS model in different agro-climatic zones of nearby statesUniversity/institutes andfarmersfield

BAG-216: Agricultural Marketing Trade & Prices

CO: COURSE OBJECTIVES

CO-1Understand the Basics of Agricultural Marketing: To provide students with foundational knowledge of agricultural marketing principles, including product flow, market channels, and the role of intermediaries.

CO-2Analyze Agricultural Market Structures: To examine different agricultural market structures, such as perfect competition, monopolistic competition, and oligopoly, and their implications for pricing and trade.

CO-3Explore the Role of Agricultural Prices: To help students understand how agricultural prices are determined, including factors like supply and demand, government policies, and market speculation.

CO-4 Study International Agricultural Trade: To introduce students to the global trade of agricultural products, including trade policies, international trade agreements, and how global market trends affect local farmers and markets.

CO-5Evaluate the Impact of Government Policies on Agriculture: To analyze the effect of government interventions, such as subsidies, tariffs, and price supports, on agricultural markets and prices.

CO-6Assess the Role of Technology in Agricultural Marketing: To investigate how advancements in technology, such as digital platforms, supply chain innovations, and data analytics, are transforming agricultural marketing and pricing.

CO-7 Develop Practical Skills for Marketing Agricultural Products: To equip students with the skills necessary for effective marketing strategies, including market research, pricing techniques, and communication strategies tailored to the agricultural sector.

Course Contents

Unit- I:

- Agricultural Marketing: Concepts and definitions of market, marketing, agriculturalmarketing, market structure, marketing mix and market segmentation, classificationand characteristics of agricultural markets; demand, supply and producer's surplus ofagri-commodities: nature and determinants of demand and supply of farm products,producer's surplus – meaning and its types, marketable and marketed surplus, factorsaffectingmarketablesurplusofagri-commodities;productlifecycle(PLC)andcompetitivestrategies:

Unit- II:

- Meaning and stages in PLC; characteristics of PLC; strategies in different stages ofPLC; pricing and promotion strategies: pricing considerations and approaches – costbasedandcompetitionbasedpricing;marketpromotion– advertising,personalselling,salespromotionandpublicity– theirmeaningandmerits&demerits;marketing process andfunctions: Marketing process-concentration, dispersion andequalization; exchange functions – buying and selling; physical functions – storage,transport and processing; facilitating functions – packaging, branding, grading, qualitycontrol and labeling(Agmark);Marketfunctionaries and marketingchannels:

Unit- III:

- Types and importance of agencies involved in agricultural marketing; meaning anddefinition of marketing channel; number of channel levels; marketing channels fordifferentfarmproducts;Integration,efficiency,costsandpricespread:Meaning,definitio n and types of market integration; marketing efficiency; marketing costs,margins and price spread; factors affecting costof marketing; reasons for highermarketing costs of farmcommodities; ways of reducingmarketingcosts;

Unit- IV:

- Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI,CACP & DMI – their objectives and functions; cooperative marketing inIndia; Riskin marketing: Types of risk in marketing; speculation & hedging; an overview offuturestrading;Agriculturalpricesandpolicy:Meaningandfunctionsofprice;administer edprices;needforagricultural pricepolicy; Trade:

Unit- V:

- Concept of International Trade and its need, theories of absolute and comparativeadvantage. Present status and prospects of international trade in agri-commodities;GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indianagriculture;IPR.

Practical:

Plotting and study of demand and supply curves and calculation of elasticities; Study ofrelationship between market arrivals and prices of some selected commodities; Computationof marketable and marketed surplus of important commodities; Study of price behaviour overtimeforsomeselectedcommodities;Constructionofindexnumbers;Visittoalocalmarkettostu dyvariousmarketingfunctionsperformedbydifferentagencies,identificationofmarketing channels for selected commodity, collection of data regarding marketing costs,margins and price spread and presentation of report in the class; Visit to market institutions –NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization andfunctioning;Applicationofprinciplesof comparative advantage ofinternational trade.

BAG-218: Introductory Agro-meteorology & Climate Change

CO: COURSE OBJECTIVES

CO-1Understand Basic Agro-meteorology Concepts: Introduce students to fundamental concepts in agro-meteorology, including the role of weather and climate in agriculture and how meteorological phenomena affect crop growth and farming practices.

CO-2Analyze Weather Systems and Agricultural Impacts: Develop skills to analyze various weather systems (such as precipitation, temperature, humidity, and wind) and understand their direct and indirect impacts on agricultural productivity and farming techniques.

CO-3 **Examine Climate Change and Its Effect on Agriculture**: Explore the causes, evidence, and impacts of climate change, with a particular focus on how shifting climatic patterns affect agriculture, including crop yield variations, water availability, and pest/disease outbreaks.

CO-4Learn Agro-meteorological Tools and Techniques: Familiarize students with the tools, technologies, and data sources used in agro-meteorological research and applications, such as weather forecasting, climate models, and remote sensing.

CO-5 Evaluate Climate Adaptation Strategies in Agriculture: Teach students strategies to mitigate and adapt to climate change in agriculture, including the use of climate-resilient crops, water conservation techniques, and sustainable farming practices.

CO-6 Assess the Role of Agro-meteorology in Agricultural Decision-Making: Understand how agro-meteorological data is used by farmers, policymakers, and agricultural professionals in decision-making, from planting and irrigation scheduling to pest and disease management.

CO-7Promote Awareness of Climate Change Mitigation: Encourage students to think critically about how to reduce the carbon footprint of agriculture and promote sustainable farming practices that contribute to global efforts in mitigating climate change.

Course Contents

Unit- I:

- Meaning and scope of agricultural meteorology; Earth atmosphere- its composition,extentandstructure;Atmosphericweathervariables;Atmosphericpressure,itsvariation withheight;Wind, types of wind, daily and seasonal variation of windspeed,cyclone, anticyclone, land breezeand seabreeze;

Unit- II:

- Nature and properties of solar radiation, solar constant, depletion of solar radiation,shortwave,long-waveandthermalradiation,netradiation,albedo;Atmosphericctemperature,temperatureinversion,lapserate,dailyandseasonalvariationsoftemperature,vertical profileof temperature,Energybalance ofearth;

Unit- III:

- Atmospherichumidity,conceptofsaturation,vaporpressure,processofcondensation,formationofdew,fog,mist,frost,cloud;Precipitation,processofprecipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formationand classification; Artificial rainmaking. Monsoon- mechanism and importance inIndian agriculture, Weather hazards - drought, floods, frost, tropical cyclones andextremeweatherconditionssuchasheat-waveandcold-wave.Agricultureandweatherrelations;

Unit- IV:

- Modificationsofcropmicroclimate,climaticnormalsforcropandlivestockproduction. Weather forecasting- types of weather forecast and their uses. Climatechange, climatic variability, global warming, causes of climate change and its impactonregional and nationalAgriculture.

Practical:

VisitofAgro-meteorologicalObservatory,siteselectionofobservatory,exposureofinstruments and weather data recording. Measurement of total, shortwave and long-waveradiation,anditsestimationusingPlanck'sintensitylaw.Measurementofalbedoandsunshine duration, computation of Radiation Intensity using BSS. Measurement of maximumand minimum air temperatures, its tabulation, trend and variation analysis. Measurement ofsoil temperature and computation of soil heat flux. Determination of vapor pressure andrelative humidity. Determination of dew point temperature. Measurement of atmosphericpressureandanalysisofatmosphericconditions.Measurementofwindspeedanddwinddirection,preparationofwindrose.Measurement,tabulationandanalysisofrain.Measurement of open pan evaporation and evapo-transpiration. Computation of PET andAET.

BAG-2020:ElectiveCourse

BAG-301:PrinciplesofIntegratedPestandDiseaseManagement

CO: COURSE OBJECTIVES

CO-1 Understanding Pest and Disease Dynamics: To familiarize students with the basic concepts of pest and disease biology, including their lifecycle, behavior, and factors influencing their populations.

CO-2 Introduction to Integrated Pest Management (IPM): To introduce the concept of Integrated Pest Management (IPM) as a sustainable approach that combines multiple pest control methods.

CO-3 Identification and Diagnosis of Pests and Diseases: To develop skills in identifying common pests, diseases, and symptoms affecting crops, and understanding their impact on yield and quality.

CO-4 Pest and Disease Control Methods: To provide knowledge of various pest control strategies, including cultural, biological, chemical, and mechanical methods.

CO-5Principles of Disease Management: To study the principles and practices of plant disease control, including sanitation, crop rotation, and the use of fungicides and other disease management tools.

CO-6 Pesticide Management and Safety: To educate students on the safe and effective use of chemical control methods, including the proper application techniques and safety protocols.

CO-7 Sustainable Practices in Pest and Disease Management: To highlight the importance of sustainable practices in pest and disease management to ensure long-term agricultural productivity.

CO-8 Economic and Social Aspects of Pest and Disease Management: To understand the economic importance of pest and disease management in agriculture, including cost-benefit analysis of various control measures.

CourseContents

Unit- I:

- Categoriesofinsectpestsanddiseases,IPM:Introduction,history,importance,concepts, principles and tools of IPM. Economic importance of insect pests, diseasesandpest risk analysis.

Unit- II:

- Methodsofdetectionanddiagnosisofinsectpestanddiseases.Calculationanddynamicsofeconomicinjury levelandimportanceofEconomicthresholdlevel.Methods of control: Host plant resistance, cultural, mechanical, physical, legislative,biologicalandchemical control.

Unit- III:

- Ecological management of crop environment. Introduction to conventional pesticidesfor the insect pests and disease management. Survey surveillance and forecasting ofInsectpest and diseases.Development and validation ofIPMmodule.

Unit- IV:

- Implementation and impact of IPM (IPM module for Insect pest and disease. Safetyissuesinpesticideuses.Political,socialandlegalimplicationofIPM.CasehistoriesofimportantIPM programmes.CasehistoriesofimportantIPMprogrammes.

Practical:

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods ofinsect pests and plant disease measurement, Assessment of crop yield losses, calculationsbased oneconomicsofIPM,Identificationof biocontrolagents,differentpredatorsandnaturalenemies.MassmultiplicationofTrichoderma,Pseudomonas,Trichogramma,NPVetc. Identification and nature of damage of important insect pests and diseases and theirmanagement. Crop (agro- ecosystem) dynamics of a selected insect pest and diseases. Plan &assess preventive strategies (IPM module) and decision making. crop monitoring attacked byinsect,pestand diseases. Awareness campaign atfarmers fields.

BAG-303:Manures,Fertilizers andSoil FertilityManagement

CO: COURSE OBJECTIVES

CO-1 Understanding Soil Fertility and Nutrient Dynamics: To comprehend the concepts of soil fertility, productivity, and factors influencing them.To study the physical, chemical, and biological properties of soil that affect nutrient availability.

CO-2Nutrient Functions and Deficiency Symptoms: To understand the role of essential plant nutrients in crop growth and development.To identify nutrient deficiencies and toxicities and their impact on crops.

CO-3Manures and Organic Amendment: To learn about the types, composition, and importance of organic manures like farmyard manure, compost, green manures, and biofertilizers.To explore methods of preparation, application, and benefits of organic amendments in sustainable agriculture.

CO-4Fertilizers: Types, Properties, and Application: To study various chemical fertilizers, their composition, and nutrient content.To understand fertilizer application methods, including their timing and efficiency enhancement techniques.

CO-5Soil Fertility Evaluation and Management: To gain proficiency in soil testing and plant analysis as tools for assessing soil fertility.To formulate site-specific nutrient management plans for sustainable crop production.

CO-6Environmental Implications and Best Practices: To understand the environmental impacts of excessive or improper fertilizer use.To promote integrated nutrient management (INM) for sustainable and eco-friendly agriculture.

CO-7 Practical Applications and Field Studies: To provide hands-on experience in preparing organic manures, soil sampling, and fertilizer application.To familiarize students with fertilizer recommendations based on soil and crop requirements.

CourseContents

Unit- I:

- Introductionandimportanceoforganicmanures,propertiesandmethodsofpreparationofbulkyandconcentratedmanures.Green/leafmanuring.Fertilizerrecommendationapproaches.Integratednutrientmanagement.

Unit- II:

- Chemical fertilizers: classification, composition and properties of major nitrogenous,phosphatic,potassicfertilizers,secondary&micronutrientfertilizers,Complexfertilizers,nanofertilizersSoilamendments,FertilizerStorage,FertilizerControlOrder.

Unit- III:

- History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency andtoxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport toplants, factorsaffectingnutrient availabilityto plants.

Unit- IV:

- Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur andmicronutrients.Soilfertilityevaluation,Soiltesting.Criticallevelsofdifferentnutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests.Indicator plants. Methods of fertilizer recommendations to crops. Factor influencingnutrient use efficiency (NUE), methods of application under rainfed and irrigatedconditions.

Practical:

Introductionofanalyticalinstrumentsandtheirprinciples,calibrationandapplications,Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkalinehydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeableK;CaandMg insoils.Estimationof
soilextractableSinsoils..EstimationofDTPAextractableZninsoils.EstimationofNinplants.EstimationofPinplants.EstimationofKin plants. Estimation ofSinplants.

BAG-305:PestsofCropsandStoredGrainand their Management

CO: COURSE OBJECTIVES

CO-1 Understanding Pest Dynamics

- To familiarize students with the biology, ecology, and classification of major pests affecting field crops and stored grains.
- To understand the life cycles and damage caused by these pests to identify them effectively.

CO-2Pest-Management Strategies

- To introduce various integrated pest management (IPM) approaches, including cultural, mechanical, biological, and chemical methods.
- To emphasize the safe and effective use of pesticides, focusing on resistance management and environmental sustainability.

CO-3Storage Pest Management

- To highlight the factors affecting pest infestations in storage environments and methods for preventing losses in stored grains.

CO-4Economic Threshold Levels and Decision-Making

- To develop the ability to assess economic thresholds and make informed pest management decisions based on cost-benefit analysis.

CO-5Sustainable Agriculture and Food Security

- To encourage the adoption of sustainable pest control measures that align with environmental conservation and global food security goals.

CO-6Practical Skills Development

- To provide hands-on experience in pest identification, monitoring, and implementing management techniques through field visits and lab exercises.

CourseContents

Unit- I:

- Generalaccount on natureand type ofdamage bydifferentarthropods pests.

Unit- II:

- Scientific name, order, family, host range, distribution, biology and bionomics, natureof damage, and management of major pests and scientific name, order, family, hostrange, distribution, nature of damage and control practice other important arthropodpests of various field crop, vegetable crop, fruit crop, plantation crops, ornamentalcrops,spicesandcondiments.

Unit- III:

- Factorsaffecting losses of storedgrainandroleof physical, biological, mechanicaland chemical factors in deterioration of grain. Insect pests, mites, rodents, birds andmicroorganismsassociatedwithstored grainand their management.

Unit- IV:

- Storage structure and methods of grain storage and fundamental principles of grainstoremanagement.

Practical:

Identification of different types of damage. Identification and study of life cycle and seasonalhistoryofvariousinsectpestsattackingcropsandtheirproduce:(a)FieldCrops;(b)Vegetable Crops; (c) Fruit Crops; (d) Plantation, gardens, Narcotics, spices & condiments.Identification of insect pests and Mites associated with stored grain. Determination of insectinfestation by different methods. Assessment of losses due to insects. Calculations on thedosesofinsecticidesapplicationtechnique.Fumigationofgrainstore/godown.Identification of rodents and rodent control operations in godowns. Identification of birds andbird control operations in godowns. Determination of moisture content of grain. Methods ofgrain sampling under storage condition. Visit to Indian Storage Management and ResearchInstitute, Hapur and Quality Laboratory, Department of Food., Delhi. Visit to nearest FCIgodowns.

BAG-307:DiseasesofField and HorticulturalCrops and their ManagementI

CO: COURSE OBJECTIVES

CO-1Understanding Plant Diseases: To familiarize students with the various diseases affecting field and horticultural crops, including their symptoms, etiology, and epidemiology.

CO-2Diagnosis and Identification: To develop the ability to identify and diagnose crop diseases based on visible symptoms, causal agents, and environmental factors.

CO-3Pathogen Biology: To understand the biology, life cycle, and interaction of pathogens with host plants, contributing to the development of diseases.

CO-4Disease Management Practices: To study and analyze various disease management strategies, including cultural, chemical, biological, and integrated pest management (IPM) approaches.

CO-5Economic Impact Assessment: To assess the economic impact of diseases on crop production and explore cost-effective and sustainable management practices.

CO-6Latest Technologies and Research: To introduce students to modern tools and techniques such as disease forecasting models, molecular diagnostics, and biotechnological approaches in disease management.

CO-7Practical Applications: To provide hands-on training in field diagnosis, sample collection, pathogen isolation, and identification techniques for effective disease management.

CourseContents

Unit- I:

- Symptoms, etiology, disease cycle and management of major diseases of followingcrops: Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut,khairaandtungro;Maize:stalkrots,downy mildew,leaf spots;Sorghum:smuts,grain mold and anthracnose,Bajra :downy mildew and ergot;Groundnut: early andlateleaf spots,wilt

Unit- II:

- Soybean:Rhizoctoniablight,bacterialspot,seedandseedlingrotandmosaic;Pigeonpea: Phytophthora blight, wilt and sterility mosaic;Fingermillet: Blast and leafspot;Black&greengram:Cercosporaleafspotandanthracnose,webblightandyellow mosaic;Castor: Phytophthora blight; Tobacco: black shank, black root rot andmosaic.

Unit- III:

- Horticultural Crops:Guava: wilt and anthracnose;Banana: Panama wilt, bacterialwilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic,Pomegranate:bacterialblight;Cruciferous vegetables: Alternarialeafspot andblackrot;

Unit- IV:

- Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight;Tomato: damping off,wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow VeinMosaic;Beans: anthracnose and bacterial blight;Ginger: soft rot;Colocasia:Phytophthorablight;Coconut: wiltand bud rot;Tea:blisterblight; Coffee:rust

Practical:

Identificationandhistopathological studiesof selected diseasesoffieldandhorticulturalcropscoveredintheory.Fieldvisitforthediagnosisoffieldproblems .Collectionandpreservation of plant diseased specimens for Herbarium; Note: Students should submit 50pressedandwell-mountedspecimens.

BAG-309:Crop Improvement-I(KharifCrops)

CO: COURSE OBJECTIVES

CO-1 Understanding Crop Breeding Principles:

- To provide fundamental knowledge of plant breeding concepts, methods, and techniques applied to kharif crops.

CO-2 Familiarity with Kharif Crop Varieties:

- To study the major kharif crops such as rice, maize, sorghum, pearl millet, groundnut, cotton, and pulses.
- To understand the characteristics of existing high-yielding, disease-resistant, and region-specific varieties.

CO-3 Knowledge of Crop Improvement Strategies:

- To explore various breeding approaches like hybridization, mutation breeding, and molecular techniques for developing improved kharif crop varieties.

CO-4 Genetic Resource Management:

- To familiarize students with the conservation, evaluation, and utilization of plant genetic resources for crop improvement.

CO-5 Problem-Solving Skills:

- To identify the challenges related to kharif crop production, such as pests, diseases, and abiotic stresses, and develop strategies for improvement.

CO-6 Practical Exposure:

- To provide hands-on training in breeding techniques, hybridization, and evaluation of breeding material for kharif crop.

CourseContents

Unit- I:

- Centers of origin, distribution of species, wild relatives in different cereals; pulses;oilseeds;fibres; foddersandcash crops; vegetableandhorticultural crops;

Unit- II:

- Plantgeneticresources,itsutilizationandconservation,studyofgeneticsofqualitative and quantitative characters; Important concepts of breeding self pollinated,crosspollinatedand vegetativelypropagatedcrops;

Unit- III:

- Majorbreedingobjectivesandproceduresincludingconventionalandmoderninnovative approaches for development of hybrids and varieties for yield, adaptability,stability,abioticandbioticstresstoleranceandquality(physical,chemical,nutritional);

Unit- IV:

- HybridseedproductiontechnologyinMaize,Rice,Sorghum,PearlmilletandPigeonpea,etc. Ideotypeconcept andclimateresilientcropvarietiesforfuture.

Practical:

Floral biology,emasculation and hybridization techniques indifferentcrop species; viz.,Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urdbean, Mungbean, Soybean,Groundnut, Seasame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceouscrops.Maintenancebreedingofdifferentkharifcrops.Handlingofgermplasmandsegregating populationsby different methods like pedigree, bulkandsingle seed decentmethods; Study of field techniques for seed production and hybrid seeds production in Kharifcrops;Estimationofheterosis,inbreedingdepressionandheritability;Layoutoffieldexperiments; Study of quality characters, donor parents for different characters; Visit to seedproductionplots; VisittoAICRPplots ofdifferentfield crops.

BAG-311:EntrepreneurshipDevelopmentandBusiness

CO: COURSE OBJECTIVES

CO-1 Understanding the Basics of Entrepreneurship:

- To introduce students to the fundamental concepts of entrepreneurship, including the role of entrepreneurs in economic development.
- To explore entrepreneurial traits, skills, and competencies relevant to the agricultural sector.

CO-2 Promoting an Entrepreneurial Mindset:

- To instill a proactive approach to identifying opportunities and solving challenges within the agri-business and allied sectors.
- To encourage creativity, innovation, and risk-taking among students.

CO-3 Development of Managerial and Business Skills:

- To equip students with essential knowledge of business planning, financial management, and marketing strategies specific to agriculture.
- To familiarize students with legal, regulatory, and procedural aspects of starting and running a business.

CO-4 Exposure to Agripreneurship:

- To develop an understanding of agribusiness models, value chain development, and opportunities in modern agriculture, including organic farming, precision farming, and agro-processing.
- To explore rural entrepreneurship and cooperatives as pathways for sustainable development.
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CO-5 Practical Application and Skill Development:

- To provide hands-on experience in creating business plans and feasibility reports tailored for agricultural ventures.
- To enhance leadership, decision-making, and problem-solving skills through case studies, field visits, and projects.

CO-6 Leveraging Technology and Innovation:

- To emphasize the role of digital technologies, e-commerce, and ICT tools in modern agricultural business development.
- To understand how technological advancements can drive profitability and efficiency in agriculture-related enterprises.

CourseContents

Unit- I:

- ConceptofEntrepreneur,EntrepreneurshipDevelopment,Characteristicsofentrepreneurs ;SWOTAnalysis&achievement motivation,

Unit- II:

- Government policy and programs and institutions for entrepreneurship development,Impactof economicreformson Agribusiness/Agrienterprises,

Unit- III:

- EntrepreneurialDevelopmentProcess;BusinessLeadershipSkills;Developingorganizati onalskill(controlling,supervising,problemsolving,monitoring&evaluation),Developing Managerial skills,

Unit- IV:

- BusinessLeadershipSkills(Communication,directionandmotivationSkills),Problemsolv ingskill,Supply chainmanagementandTotalqualitymanagement,ProjectPlanningFormulationandreportp reparation;Financingofenterprise,Opportunitiesfor agri-entrepreneurshipand ruralenterprise.

Practical:

Assessing entrepreneurial traits, problem solving skills, managerial skills and achievementmotivation, exercise in creativity, time audit through planning, monitoring and supervision,identificationandselectionofbusinessidea,preparationofbusinessplanandproposalw riting,visit toentrepreneurshipdevelopment institute andentrepreneurs.

BAG-311A: Communication & English Grammar-III

CO: COURSE OBJECTIVES

CO-1 Develop Advanced Communication Skills
Enhance students' ability to communicate effectively in academic, professional, and social settings, with a focus on oral and written English.

CO-2 Strengthen Grammatical Proficiency
Provide in-depth knowledge of advanced English grammar, including complex sentence structures, clauses, voice, and reported speech.

CO-3 Promote Critical Thinking and Expression
Foster critical thinking and the ability to express ideas clearly and concisely in English.

CO-4 Enhance Professional Writing Skills
Equip students with skills for writing formal letters, emails, reports, and proposals relevant to agricultural and allied sectors.

CO-5 Improve Presentation and Public Speaking Skills
Train students in delivering effective presentations and participating in group discussions and debates.

CO-6 Cultural and Contextual Understanding
Enable students to use language effectively in diverse cultural and professional contexts, especially in the agricultural field.

CO-7 Prepare for Competitive Exams
Provide a foundation for language proficiency in competitive exams and professional applications, such as research papers and project reports.

CourseContents

Unit 1: Grammar and Composition

1. **Advanced Grammar:** Subject-Verb Agreement, Tenses and Voice (Active and Passive), Direct and Indirect Speech, Sentence Transformation (Simple, Complex, Compound), Phrasal Verbs and Idiomatic Expressions, Use of Articles and Prepositions, Correction of Common Errors in English
2. **Essay Writing:**Structure of an Essay (Introduction, Body, Conclusion)Descriptive, Narrative, Persuasive, and Expository Essays
3. **Comprehension:**Reading Skills, Understanding ContextSummarization and Paraphrasing
4. **Letter Writing:**Formal and Informal Letters, Applications and Complaint Letters, Cover Letters and Resume

Unit 2: Communication Skills

1. **Basics of Communication:**Definition and Process of Communication, Verbal and Non-Verbal Communication, Barriers to Communication and Overcoming Them
2. **Speaking Skills:**Extempore Speaking, Group Discussions, Presentations and Public Speaking
3. **Listening Skills:**Techniques for Active Listening, Understanding Tone and Context in Conversations
4. **Writing for Communication:**Business Writing (Memos, Notices, Emails), Report Writing

Unit 3: Functional English

1. **Vocabulary Building:**Synonyms and Antonyms, One-Word Substitutes, Collocations and Word Formation
2. **Technical English:**Agriculture-Specific Terminology, Writing Research Proposals and Abstracts
3. **Reading and Interpretation:**Understanding Scientific Texts, Critical Analysis of Articles

Unit 4: Personality Development

1. **Soft Skills:**Confidence Building, Time Management, Leadership and Teamwork Skills
2. **Interview Preparation:**Resume Writing, Mock Interviews and Question Patterns
3. **Interpersonal Communication:**Building Relationships, Networking and Professional Etiquette.

BAG-311B: Soft Skills-III

CO: COURSE OBJECTIVES

CO-1 Effective Communication: Develop advanced verbal and written communication skills tailored for professional and social contexts.

CO-2Teamwork and Collaboration: Foster teamwork abilities, emphasizing the importance of collaboration in agricultural and multidisciplinary settings.

CO-3 Problem-Solving and Critical Thinking: Cultivate the ability to analyze problems, think critically, and develop innovative solutions in agriculture-related fields.

CO-4 Leadership and Interpersonal Skills: Build leadership qualities and interpersonal skills essential for managing teams and working effectively in diverse groups.

CO-5 Time and Stress Management: Equip students with strategies for effective time management and coping with stress to enhance productivity.

CO-6 Adaptability and Emotional Intelligence: Develop the ability to adapt to changing environments and improve emotional intelligence for better personal and professional relationships.

CO-7 Ethics and Professionalism: Instill a sense of ethics, integrity, and professionalism in communication and decision-making.

CourseContents

Unit I

Personality Enrichment, Positive attitude, SWOT Analysis, Self-confidence and motivation, Inter-personal skills, projecting a positive social image.

Unit II

Time Management, Goal setting and prioritization, ABC Analysis—preparing a personal schedule, Short term and long term goals, Implementing goals.

Unit III

Leadership Skills, Planning, organizing, setting objectives and taking initiatives, Task list organization.

Unit IV

Persuading and negotiating, Team work, maintaining morale, Visualizing, inspiring others.

BAG-311C: Life Management-III

CO: COURSE OBJECTIVES

CO-1 Holistic Development: To enable students to develop a balanced approach toward personal and professional life, fostering physical, mental, emotional, and spiritual well-being.

CO-2 Stress Management: To introduce students to practical techniques and strategies for managing stress and maintaining a positive outlook amidst challenges in academic and agricultural careers.

CO-3 Interpersonal Skills: To improve communication, teamwork, and leadership skills, ensuring effective collaboration in diverse environments.

CO-4 Time Management: To equip students with methods to prioritize tasks, manage time effectively, and increase productivity in their studies and work.

CO-5 Ethics and Values: To instill a strong foundation of ethical principles and values that guide responsible behavior in both personal and professional spheres.

CO-6 Decision-Making Skills: To develop analytical and critical thinking abilities to make informed and impactful decisions in various life situations.

CO-7 Resilience Building: To foster resilience and adaptability, enabling students to overcome challenges and excel in a dynamic agricultural industry.

CO-8 Goal Setting and Motivation: To assist students in setting realistic goals, maintaining focus, and staying motivated to achieve success in their academic and personal endeavors.

CourseContents

Unit I

Basics of Life Style, Daily Routine, View of Life, Goal and Ideal your life, Self-Evaluation

Unit II

Process of life Style Management, Spiritual practice-(Upasana/japa/meditation), Creative potentials & positive use of negativity,

Unit III

Personality Skills, Creative Reading and Writing Skills, Communication Skills-Self-Management Skills

Unit IV

Art of Positive Thinking, Environmental Ethics, Behavior skills and relationship, Stress (causes, effects & management)

BAG-313:Geo-informatics,Nano-technologyandPrecision Farming

CO: COURSE OBJECTIVES

CO-1 Introduction to Geo-Informatics:

- To develop an understanding of the principles and applications of Geographic Information Systems (GIS) and Remote Sensing in agriculture.
- To enable students to analyze spatial data and apply mapping techniques for agricultural planning and resource management.

CO-2Fundamentals of Nano-Technology in Agriculture:

- To introduce the concepts of nanotechnology and its potential applications in improving agricultural productivity and sustainability.
- To familiarize students with nano-based tools, devices, and materials for soil and water management, pest control, and crop improvement.

CO-3Precision Farming Concepts:

- To provide insights into the principles and practices of precision farming for efficient resource utilization.
- To train students in the use of modern tools such as sensors, drones, and automated systems for real-time monitoring and decision-making in agriculture.

CO-4Integration of Technologies:

- To explore the combined use of geo-informatics, nanotechnology, and precision farming to address challenges in modern agriculture.
- To enhance skills in data-driven decision-making and sustainable agricultural practices.

CO-5Sustainability and Innovation:

- To promote the adoption of innovative and sustainable technologies to improve agricultural productivity while minimizing environmental impacts.
- To encourage critical thinking and research-oriented approaches in leveraging emerging technologies for rural and agricultural development.

CO-6Hands-on Experience:

- To provide practical exposure to GIS software, remote sensing tools, nano-materials, and precision agriculture equipment.

CourseContents

Unit- I:

- Precision agriculture: concepts and techniques; their issues and concerns for Indianagriculture; Geo-informatics- definition, concepts, tool and techniques; their use inPrecisionAgriculture.

Unit- II:

- Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendationusing geospatial technologies; Spatial data and their management in GIS;
  Remotesensingconceptsandapplicationinagriculture;Imageprocessingandinterpretation ;

Unit- III:

- Global positioning system (GPS), components and its functions; Introduction to cropSimulationModelsandtheirusesforoptimizationofAgriculturalInputs;STCRapproac hfor precision agriculture;

Unit- IV:

- Nanotechnology,definition,conceptsandtechniques,briefintroductionaboutnanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Useofnanotechnologyinseed,water,fertilizer,plantprotectionforscaling-upfarmproductivity.

Practical:

IntroductiontoGISsoftware,spatialdatacreationandediting.Introductiontoimageprocessingsoft ware.Visualanddigitalinterpretationofremotesensingimages.Generationofspectral

BAG-315 PracticalCrop Production –I(Kharif crops)

CO: COURSE OBJECTIVES

CO-1 Understanding the Kharif Cropping System

- To provide students with in-depth knowledge of the climatic, soil, and water requirements of major Kharif crops.
- To familiarize students with the cropping patterns and production constraints of Kharif season crops.

CO-2 Practical Crop Management

- To develop skills in the preparation of field operations, including land preparation, sowing, irrigation, and weed management.
- To impart knowledge about integrated nutrient, pest, and disease management practices for Kharif crops.

CO-3 Seed and Input Management

- To train students in the selection, storage, and treatment of quality seeds.
- To enhance understanding of fertilizer application methods, organic manures, and bio-fertilizers for sustainable crop production.

CO-4 Crop Monitoring and Evaluation

- To enable students to monitor crop growth, identify stress conditions, and take corrective measures.
- To train students in yield estimation, harvesting techniques, and post-harvest handling.

CO-5 Economic and Sustainable Practices

- To teach cost-effective and sustainable agricultural practices for optimizing the productivity of Kharif crops.
- To create awareness of climate-smart agriculture and water-efficient practices.

CO-6 Hands-On Experience

- To provide hands-on experience in the cultivation of major Kharif crops like paddy, maize, sorghum, pearl millet, groundnut, soybean, cotton, etc.
- To involve students in fieldwork, covering all aspects of crop production from sowing to harvesting.

CO-7 Practical Record Maintenance

- To ensure students can maintain detailed field records, analyze data, and prepare reports on crop performance.

CourseContents

Practical:

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed,treatment, nursery raising, sowing, nutrient, water and weed management and management ofinsect-pestsdiseasesofcrops,harvesting,threshing,dryingwinnowing,storageandmarketingofproduce.Theemphasiswillbegiventoseedproduction,mechanization,resourceconservationandintegratednutrient,insect-pestanddiseasemanagementtechnologies.Preparationofbalancesheetincludingcostofcultivation,netreturnsperstudent as well as perteam of 8-10 students.

BAG-317 IntellectualPropertyRights

CO: COURSE OBJECTIVES

CO-1 To Understand the Fundamentals of IPR

- To introduce students to the basic concepts, types, and significance of Intellectual Property Rights (IPR) in agriculture and related fields.

CO-2 To Explore Legal and Policy Frameworks

- To familiarize students with national and international legal frameworks governing intellectual property, such as patents, trademarks, copyrights, and plant breeders' rights, with specific relevance to agriculture.

CO-3 To Encourage Innovation and Entrepreneurship

- To promote awareness of the role of IPR in fostering innovation, research, and development, encouraging students to explore entrepreneurial opportunities in agriculture.

CO-4 To Address Ethical and Social Issues

- To develop an understanding of the ethical, social, and environmental implications of IPR in agriculture, including issues of biopiracy, traditional knowledge, and biodiversity conservation.

CO-5 To Equip Students with Practical Knowledge

- To provide students with knowledge of procedures for patent filing, geographical indications, copyrights, and plant variety protection, equipping them with skills to apply IPR concepts in agricultural practice.

CO-6To Prepare for Future Challenges

- To prepare students to address future challenges related to technology transfer, Commercialization, and the global competitiveness of agricultural products.

CourseContents

Unit- I:

- Introduction and meaning of intellectual property, brief introduction to GATT, WTO,TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention,Budapesttreaty, etc.

Unit- II:

- TypesofIntellectualPropertyandlegislationscoveringIPRinIndia:- Patents,Copyrights,Trademark,Industrialdesign,Geographicalindications,Integratedcircuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability,process and product patent, filing of patent, patent specification, patent claims, Patentopposition and revocation, infringement, Compulsory licensing, Patent CooperationTreaty,Patentsearchandpatent database.

Unit- III:

- Origin and history including a brief introduction to UPOV for protection of plantvarieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plantbreeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders,researcherandfarmersrights.Traditionalknowledge-meaningandrightsofTKholders.

Unit- IV:

- Convention on Biological Diversity, International treaty on plant genetic resources forfood and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salientfeatures,accessand benefitsharing.

BAG-317A: Research Methodology

CO: COURSE OBJECTIVES

CO-1 Understanding Research Fundamentals:

- To develop a clear understanding of the principles, concepts, and importance of research in agriculture.
- To familiarize students with the types, objectives, and methodologies of agricultural research.

CO-2 Problem Identification and Formulation:

- To enable students to identify, define, and articulate research problems specific to agricultural sciences.
- To guide students in framing research hypotheses and objectives.

CO-3 Research Design and Methodology:

- To introduce students to various research designs, sampling techniques, and data collection methods suited to agricultural studies.
- To train students in the preparation and execution of research plans.

CO-4 Data Analysis and Interpretation:

- To teach students basic statistical tools and techniques for data analysis in agricultural research.
- To guide students in interpreting research results and deriving meaningful conclusions.

CO-5Scientific Writing and Reporting:

- To develop skills for writing research proposals, reports, and scientific papers in the field of agriculture.
- To train students in effective communication and presentation of research findings.

CO-6 Application of Research Tools:

- To familiarize students with modern tools and software used in agricultural research.
- To emphasize ethical practices in conducting research and handling data.

CO-7 Problem-Solving and Decision-Making:

- To cultivate critical thinking and analytical skills necessary for addressing real-world agricultural challenges through research.

CourseContents

Unit I

Introduction to Research: The concept of research, characteristics of good research, Application of Research, Meaning and sources of Research problem, characteristics of good Research problem, Research process, outcomes, application of Research, Meaning and types of Research hypothesis, Importance of Review of Literature, Organizing the Review of Literature.

Unit II

Types of Research: Types of research, pure (basic, fundamental) and applied research, qualitative and quantitative. Research Design: Meaning, need, types of research design – Exploratory, Descriptive, Casual research Design, Components of research design, and Features of good Research design. Experiments, surveys and case study Research design

Unit III

Sampling, Data Collection and analysis: Types and sources of data – Primary and secondary, Methods of collecting data, Concept of sampling and sampling methods – sampling frame, sample, characteristics of good sample, simple random sampling, purposive sampling, convenience sampling, snowball sampling, classification and tabulation of data, graphical representation of data, graphs and charts – Histograms, frequency polygon and frequency curves, bell shaped curve and its properties. Statistical Methods for Data Analysis: Applications of Statistics in Research, measures of central tendency and dispersion

Unit IV

Research Report: Research report and its structure, journal articles – Components of journal article. Explanation of various components. Structure of an abstract and keywords. Thesis and dissertations. Components of thesis and dissertations. Referencing styles and bibliography. Ethics in Research - Plagiarism - Definition, different forms, consequences, unintentional plagiarism, copyright infringement, collaborative work. Qualities of good Researcher

Unit V

ICT Tools for Research : Role of computers in research, maintenance of data using software such as Mendeley, Endnote, Tabulation and graphical presentation of research data and software tools. Web search: Introduction to Internet, use of Internet and WWW, using search engines and advanced search tools.

BAG-317B: Publication Ethics and Emerging trends in Research

CO: COURSE OBJECTIVES

CO-1 Understanding Research Fundamentals:

- To develop a clear understanding of the principles, concepts, and importance of research in agriculture.
- To familiarize students with the types, objectives, and methodologies of agricultural research.

CO-2 Problem Identification and Formulation:

- To enable students to identify, define, and articulate research problems specific to agricultural sciences.
- To guide students in framing research hypotheses and objectives.

CO-3 Research Design and Methodology:

- To introduce students to various research designs, sampling techniques, and data collection methods suited to agricultural studies.
- To train students in the preparation and execution of research plans.

CO-4 Data Analysis and Interpretation:

- To teach students basic statistical tools and techniques for data analysis in agricultural research.
- To guide students in interpreting research results and deriving meaningful conclusions.

CO-5Scientific Writing and Reporting:

- To develop skills for writing research proposals, reports, and scientific papers in the field of agriculture.
- To train students in effective communication and presentation of research findings.

CO-6 Application of Research Tools:

- To familiarize students with modern tools and software used in agricultural research.
- To emphasize ethical practices in conducting research and handling data.

CO-7 Problem-Solving and Decision-Making:

- To cultivate critical thinking and analytical skills necessary for addressing real-world agricultural challenges through research.

CourseContents

Unit I
Introduction to Research Philosophy: Concept; Definitions; Nature & Scope, General Characteristics of a value-based Research, Axiological approach, Research Ethics; Definition; Moral Philosophy; Nature of Moral Judgments, Political Issues in Research, Ethical Norms & Responses, Enhancing research interests, Research Collaboration & Research Recognition, Ethical guidelines in field research, Concealed Information & Extent of Respondents' rights.

Unit II
Elements of Research Ethics & Types of Research, Mixed Methods in Applied & Action Research, Internet search, deep web search, Authenticated v. Fake information, Research Integrity & Academic Honesty in Interdisciplinary Research, Redundant Publications; Duplicate & Overlapping Publications; Salami Slicing, Selective Reporting and Misrepresentation of Data.

Unit III
Publication Ethics: Introduction, Definition, & Importance, Scientific Research Misconduct; Falsification, Fabrication & Plagiarism/Self-plagiarism, Kinds & Remedies, Intellectual Property; Reasonable & Fair Use; Copyright and related IPR Issues, Violation of Publication Ethics; Authorship/Co-authorship, Joint research/ Contributorship& Patentable Inventions- Extent of Rights & Claims, Best Practices/Standards Setting Initiatives and guidelines; COPE, WAME, UGC-CARE list etc. Publication Misconduct; Concept; Definition & Kinds of Problems & Unethical Behaviour, Identification of Publication Misconduct, Complaints & Appeal Provisions.

Unit IV
Open Access Publications and Initiatives, Creative Common License, Predatory Publishers & Journals, Reference Management & Referencing Standards in Open Access Publishing iv. SHERPA/RoMEO; Online Resources for Publisher Copyright & Self-archiving Policies, Data Management, Data Sharing Techniques, Data Reuse & Data Citation, Software Tool to identify Predatory Publications developed by SPPU, Journal Finder/ Journal suggestions tools viz., JANE, Elsevier Journal Finder, Springer Journal Suggester etc.

Unit V
Subject specific Ethical Issues, FFP, Authorship, Conflict of Interests; Copyright/Plagiarism Issues, Sharing of data collected for a research (confidentiality, reuse, dissemination or republishing), Consent in publishing/ using different kinds of data and Simultaneous Submission, Complaints & Appeals: Case Studies/Examples of Publication Frauds from India & abroad, Research Literacy & Advocacy; Digital Humanities, Use of Plagiarism Software like Turnitin, Urkund& other Open Source Software Tools.

BAG-302 RainfedAgriculture & Watershed Management

CO: COURSE OBJECTIVES

CO-01 Understanding Rainfed Agriculture Systems: To comprehend the characteristics, challenges, and potential of agricultural systems in rainfed areas and their role in sustainable food production.

CO-02 Enhancing Water Use Efficiency: To study techniques for optimizing water use in rainfed agriculture through soil moisture conservation, efficient irrigation methods, and crop selection.

CO-03 Soil and Water Conservation: To develop knowledge of soil erosion control, water harvesting techniques, and strategies for enhancing soil fertility in rainfed regions.

CO- 04 Climate Resilience in Rainfed Areas: To learn about the impacts of climate change on rainfed agriculture and strategies to build resilience through adaptive cropping systems and agroforestry.

CO- 05 Integrated Watershed Development: To study the integration of agricultural productivity, water resource development, and ecological balance in watershed management projects.

CO- 06 Policy and Socioeconomic Aspects: To analyze policies, community participation, and economic strategies for the sustainable development of rainfed and watershed-based agriculture.

CourseContents

Unit- I:

- Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershedinIndia;

Unit- II:

- Problems and prospects of rainfed agriculture in India ; Soil and climatic conditionsprevalent in rainfed areas; Soil and water conservation techniques, Drought: types,effectofwater deficitonphysio-morphologicalcharacteristicsof theplants,

Unit- III:

- Cropadaptationandmitigationtodrought;Waterharvesting:importance,itstechniques,Efficientutilizationofwaterthroughsoilandcropmanagementpractices,

Unit- IV:

- Management of crops in rainfed areas, Contingent crop planning for aberrant weatherconditions, Concept, objective, principles and components of watershed management,factorsaffecting watershedmanagement.

Practical:

Studies on climate classification, studies on rainfall pattern in rainfed areas of the country andpattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfedareas in the country and demarcation of rainfed area on map of India. Interpretation ofmeteorologicaldataandschedulingofsupplementalirrigationonthebasisofevapo-transpiration demand of crops.Critical analysis of rainfall and possible drought period in thecountry, effective rainfall and its calculation. Studies on cultural practices for mitigatingmoisture stress. Characterization and delineation of model watershed. Field demonstration onsoil&moistureconservationmeasures.Fielddemonstrationonconstructionofwaterharvestingstructures.Visitto rainfedresearch station/watershed.

BAG-304 Protected Cultivation and Secondary Agriculture

CO:COURSE OBJECTIVES

CO- 1 Understand the Principles of Protected Cultivation: Equip students with knowledge about the fundamentals of protected cultivation, including greenhouse design, climate control systems, and production technologies.

CO- 2 Learn Modern Cultivation Practices: Introduce advanced cultivation techniques like hydroponics, aeroponics, and vertical farming to optimize crop yields and resource efficiency.

CO- 3 Develop Skills in Environmental Control: Teach methods for managing temperature, humidity, light, and ventilation in controlled environments to enhance crop quality and productivity.

CO- 4 Promote Resource Efficiency: Emphasize sustainable practices, including water-use efficiency, integrated pest management, and energy conservation in protected farming systems.

CO- 5 Understand the Role of Secondary Agriculture: Highlight the importance of post-harvest processing, value addition, and storage techniques in reducing agricultural losses and increasing farmer income.

CourseContents

Unit- I:

- Green house technology: Introduction, Types of Green Houses; Plant response toGreenhouse environment,Planningand design ofgreenhouses,

Unit- II:

- Designcriteriaofgreenhouseforcoolingandheatingpurposes.Greenhouseequipments,materialsofconstructionfortraditionalandlowcostgreenhouses.Irrigationsystemsusedingreenhouses,typicalapplications,passivesolargreenhouse, hot air green house heating systems, green house drying. Cost estimation andeconomic analysis.

Unit- III:

- Important Engineering properties such as physical, thermal and aero & hydrodynamicproperties of cereals, pulses and oilseed, their application in PHT equipment designand operation. Drying and dehydration; moisture measurement, EMC, drying theory,various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, traydryer, fluidizedbed dryer, recirculatorydryer andsolardryer).

Unit- IV:

- Material handling equipment; conveyer and elevators, their principle, working andselection.

Practical:

Study of different type of green houses based on shape. Determine the rate of air exchange inanactivesummerwintercoolingsystem.Determinationofdryingrateofagriculturalproducts inside green house. Study of green houseequipments. Visit to various Post HarvestLaboratories. Determination of Moisture content of various grains by oven drying & infraredmoisture methods. Determination of engineering properties (shape and size, bulk density andporosity of biomaterials).Determination of Moisture content of various grains by moisturemeter.Field visitto seedprocessingplant.

BAG-306 Diseases of Field and Horticultural Crops and their Management-II

CO: COURSE OBJECTIVES

CO- 1 Understand Major Crop Diseases: To provide an in-depth understanding of the major diseases affecting field and horticultural crops, including their etiology, symptoms, and epidemiology.

CO- 2 Identify Disease Symptoms: To equip students with the skills to accurately identify diseases in crops through field observations and laboratory diagnostics.

CO- 3 Analyze Disease Dynamics: To study the factors influencing disease development and spread, including climatic, biological, and cultural conditions.

CO- 4 Apply Management Strategies: To introduce integrated disease management strategies, including cultural, biological, chemical, and genetic approaches.

CO- 5 Evaluate Disease Resistance: To understand the role of plant resistance and breeding for disease-resistant crop varieties.

CO- 6 Implement Disease Monitoring Tools: To teach techniques for monitoring disease outbreaks and predicting potential epidemics using modern tools and technologies.

CO- 7 Promote Sustainable Practices: To emphasize the importance of eco-friendly and sustainable disease management practices to minimize environmental impact and ensure long-term crop health.

CourseContents

Unit- I:

- Symptoms,etiology,diseasecycleandmanagementoffollowingdiseases:FieldCrops: Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, andearcockle;Sugarcane:redrot,smut,wilt,grassyshoot,ratoonstuntingandPokkahBoeng ;Sunflower: Sclerotiniastem rot and Alternaria blight;

Unit- II:

- Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot;Gram:wilt, grey mould and Ascochyta blight;Lentil: rust and wilt; Cotton: anthracnose,vascularwilt,and black arm;Pea:downymildew,powderymildew andrust.

Unit- III:

- Horticultural Crops: Mango: anthracnose, malformation, bacterial blight and powderymildew;Citrus: canker and gummosis;Grape vine: downy mildew, Powdery mildewand anthracnose;Apple: scab, powdery mildew, fire blight and crown gall;Peach:leafcurl.

Unit- IV:

- Strawberry: leaf spot , Potato: early and late blight, black scurf, leaf roll, and mosaic;Cucurbits: downy mildew, powdery mildew, wilt;Onion and garlic: purple blotch,andStemphyliumblight;Chillies:anthracnoseandfruitrot,wiltandleafcurl;Turmeri c: leaf spotCoriander: stem gall,Marigold: Botrytis blight; Rose: dieback,powderymildewand black leafspot.

Practical:

Identificationandhistopathological studiesof selected diseasesoffieldandhorticulturalcropscoveredintheory.Fieldvisitforthediagnosisoffieldproblems .Collectionandpreservationof plant diseased specimensfor herbarium.

Note:Studentsshouldsubmit50 pressedandwell-mounted specimens.

BAG-308 Post-harvest Management and Value Addition of Fruits and Vegetables

CO: COURSE OBJECTIVES

CO- 1 Understand Post-Harvest Physiology: To explain the physiological and biochemical changes occurring in fruits and vegetables after harvest, including ripening, senescence, and spoilage.

CO- 2 Minimize Post-Harvest Losses: To identify factors contributing to post-harvest losses and develop strategies to minimize these losses during handling, storage, and transportation.

CO- 3 Learn Preservation Techniques: To study various preservation methods, such as refrigeration, canning, drying, and freezing, to extend the shelf life of fruits and vegetables.

CO- 4 Enhance Value Addition Skills: To explore processes for transforming fresh produce into value-added products such as juices, jams, pickles, and dried snacks.

CO- 5 Understand Quality Standards: To examine quality assessment techniques and standards for fruits and vegetables to ensure food safety and market acceptability.

CO- 6 Develop Packaging and Storage Solutions: To design appropriate packaging and storage systems that maintain the quality and nutritional value of fruits and vegetables.

CourseContents

Unit- I:

- Importance of post-harvest processing of fruits and vegetables, extent and possiblecausesof post-harvestlosses;

Unit- II:

- Pre-harvestfactorsaffectingpostharvestquality,maturity,ripeningandchangesoccurringduringripening;Respirationandfactorsaffectingrespirationrate;Harvestingandfieldhandling;Storage(ZECC,coldstorage,CA,MA,andhypobaric);

Unit- III:

- Valueadditionconcept;Principlesandmethodsofpreservation;Intermediatemoisturefood - Jam, jelly, marmalade, preserve, candy– Concepts and Standards;

Unit- IV:

- Fermented and non-fermented beverages. Tomato products- Concepts and Standards;Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying.Canning-– Concepts andStandards,packagingofproducts.

Practical:

Applications of different types of packaging, containers for shelf life extension. Effect oftemperatureonshelflifeandqualityofproduce.Demonstrationofchillingandfreezinginjury in vegetables and fruits. Extraction and preservation of pulps and juices. Preparation ofjam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomatoproducts, canned products. Quality evaluation of products -- physico-chemical and sensory.Visitto processingunit/industry.

BAG-310 Management of Beneficial Insects

CO: COURSE OBJECTIVES

CO-1 Identify Beneficial Insects: Develop the ability to recognize and classify key beneficial insect species, including pollinators, predators, and parasitoids, based on their roles in ecosystems and agriculture.

CO-2 Understand Ecological Roles: Gain comprehensive knowledge about the ecological functions of beneficial insects, including their contributions to pollination, pest control, and biodiversity.

CO-3 Explore Habitat Requirements: Learn to assess the habitat needs of beneficial insects and understand how to create or manage environments that support their survival and effectiveness.

CO-4 Implement Conservation Strategies: Develop strategies for conserving and enhancing populations of beneficial insects through sustainable practices such as integrated pest management (IPM) and agroecological approaches.

CO-5 Evaluate Environmental Impact: Analyze the effects of agricultural practices, pesticide use, and climate change on beneficial insect populations and their ecological functions.

CO-6 Promote Sustainable Agriculture: Understand the integration of beneficial insects into sustainable agricultural systems to improve crop yields, reduce chemical inputs, and foster environmental health.

CO-7 Develop Management Plans: Design and implement practical management plans for promoting beneficial insects in agricultural and natural ecosystems, tailored to specific regions or crop systems.

CourseContents

Unit- I:

- ImportanceofbeneficialInsects,Beekeepingandpollinators,beebiology,commercial methods of rearing, equipment used, seasonal management, bee enemiesanddisease.Beepasturage,beeforagingandcommunication.Insectpestsanddiseasesof honeybee.Role of pollinators in crosspollinatedplants.

Unit- II:

- Typesofsilkworm,voltinismandbiologyofsilkworm.Mulberrycultivation,mulberry varieties and methods of harvesting and preservation of leaves. Rearing,mounting and harvesting of cocoons. Pest and diseases of silkworm, management,rearing appliancesof mulberrysilkworm and methods of disinfection.

Unit- III:

- Species of lac insect, morphology, biology, host plant, lac production – seed lac,button lac, shellac, lac- products. Identification of major parasitoids and predatorscommonlybeingused inbiological control.

Unit- IV:

- Insect orders bearing predators and parasitoids used in pest control and their massmultiplicationtechniques.Importantspeciesofpollinator,weedkillersandscavengers withtheirimportance.

Practical:

Honey bee species, castes of bees. Beekeeping appliances and seasonal management, beeenemies and disease. Bee pasturage, bee foraging and communication. Types of silkworm,voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods ofharvestingandpreservationofleaves.Speciesoflacinsect,hostplantidentification.Identification of other importantpollinators, weed killers and scavengers. Visitto researchand training institutions devoted to beekeeping, sericulture, lac culture and natural enemies.Identificationand techniques for mass multiplication ofnatural enemies.

BAG-312 Crop Improvement-II (Rabi crops)

CO: COURSE OBJECTIVES

CO-1 Understanding the Importance of Rabi Crops: Explain the economic and nutritional significance of major Rabi crops in agriculture and their role in ensuring food security.

CO-2 Exploring Crop Breeding Techniques: Study advanced breeding methods, including hybridization, mutation breeding, and biotechnological approaches, for the genetic improvement of Rabi crops.

CO-3 Enhancing Stress Tolerance: Develop strategies to improve Rabi crops' tolerance to abiotic stresses like drought, frost, and nutrient deficiencies, as well as biotic stresses such as pests and diseases.

CO-4 Focusing on Yield and Quality Traits: Improve the productivity, nutritional quality, and marketability of Rabi crops through targeted breeding and selection techniques.

CO-5 Integrating Genomics and Biotechnology: Apply molecular biology tools, such as marker-assisted selection (MAS) and genetic engineering, for faster and more precise crop improvement.

CourseContents

Unit- I:

- Centersoforigin,distributionofspecies,wildrelativesindifferentcereals;pulses;oilseeds;fodder crops and cashcrops; vegetableand horticulturalcrops;

Unit- II:

- Plantgeneticresources,itsutilizationandconservation;studyofgeneticsofqualitativeand quantitative characters;

Unit- III:

- Majorbreedingobjectivesandproceduresincludingconventionalandmoderninnovative approaches for development of hybrids and varieties for yield, adaptability,stability,abioticandbioticstresstoleranceandquality(physical,chemical,nutritional);

Unit- IV:

- Hybridseedproductiontechnologyofrabicrops.Ideotypeconceptandclimateresilientcrop varieties forfuture.

CourseContents

Practical:

Floral biology, emasculation and hybridization techniques in different crop species namelyWheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard,Sunflower,Safflower,Potato,Berseem.Sugarcane,Tomato,Chilli,Onion;Handlingofgermplasm and segregating populations by different methods like pedigree, bulk and singleseeddecentmethods;Studyoffieldtechniquesforseedproductionandhybridseedsproduction in Rabi crops; Estimation of heterosis, inbreeding depression and heritability;Layout of field experiments; Study of quality characters, study of donor parents for differentcharacters;Visittoseedproduction plots;VisittoAICRPplots ofdifferentfieldcrops

BAG-314 Practical Crop Production –II (Rabi crops)

CO: COURSE OBJECTIVES

CO-1 Understand Rabi Crop Management: Develop a comprehensive understanding of the principles and practices involved in the cultivation of major Rabi crops, including wheat, barley, mustard, chickpea, and lentils.

CO-2 Learn Soil Preparation Techniques: Gain practical knowledge of soil preparation, nutrient management, and seedbed preparation techniques suitable for Rabi crop cultivation.

CO-3 Master Sowing Practices: Acquire skills in selecting, treating, and sowing seeds at appropriate times and methods to ensure optimal germination and yield.

CO-4 Implement Irrigation Strategies: Learn the principles of water management and irrigation scheduling specific to the requirements of Rabi crops.

CO-5 Apply Pest and Weed Management: Develop proficiency in identifying and managing pests, diseases, and weeds that affect Rabi crops using integrated pest management (IPM) strategies.

CO-6 Practice Harvesting and Post-Harvest Techniques: Understand the methods of harvesting, threshing, storage, and quality preservation of Rabi crops to minimize losses and maintain market standards.

CourseContents

Practical:

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed,treatment, nursery raising, sowing, nutrient, water and weed management and management ofinsect-pestsdiseasesofcrops,harvesting,threshing,dryingwinnowing,storageandmarketingofproduce.Theemphasiswillbegiventoseedproduction,mechanization,resourceconservationandintegratednutrient,insect-pestanddiseasemanagementtechnologies.Preparationofbalancesheetincludingcostofcultivation,netreturnsperstudent as well as perteam of 8-10 students.

BAG-316 Principles of Organic Farming

CO: COURSE OBJECTIVES

CO-1 Understand the Fundamentals of Organic Farming: Learn the basic principles, philosophy, and historical development of organic agriculture.

CO-2 Recognize the Importance of Soil Health: Study the role of soil fertility and health in organic farming, including practices like composting, crop rotation, and cover cropping.

CO-3 Explore Organic Farming Practices: Examine the techniques used in organic farming, such as natural pest management, weed control, and water conservation methods.

CO-4 Analyze Certification Standards: Understand the rules, regulations, and certification processes for organic farming at national and international levels.

CO-5 Promote Environmental Sustainability: Assess how organic farming contributes to environmental sustainability by reducing chemical inputs and promoting biodiversity.

CourseContents

Unit- I:

- Organic farming, principles and its scope in India; Initiatives taken by Government(central/ state), NGOs and other organizations for promotion of organic agriculture;Organic ecosystem and their concepts;

Unit- II:

- Organic nutrient resources and its fortification; Restrictions to nutrient use in organicfarming;Choiceof cropsand varieties in organicfarming;

Unit- III:

- Fundamentals of insect, pest, disease and weed management under organic mode ofproduction;Operational structureof NPOP;

Unit- IV:

- Certificationprocessandstandardsoforganicfarming;Processing,leveling,economicconsiderationsandviability,marketingandexportpotentialoforganicproducts.

Practical:

Visit of organic farms to study the various components and their utilization; Preparation ofenrichcompost,vermin-compost,bio-fertilizers/bio-inoculantsandtheirqualityanalysis;Indigenoustechnologyknowledge(ITK)fornutrient,insect,pestdiseaseandweedmanagement; Cost of organic production system; Post harvest management; Quality aspect,grading,packaging and handling.

BAG-318 Farm Management, Production & Resource Economics

CO: COURSE OBJECTIVES

CO-1 Understand the Principles of Farm Management: Equip students with knowledge of the core principles of managing a farm, including planning, organizing, directing, and controlling agricultural operations.

CO-2 Analyze Agricultural Production Systems: Develop the ability to assess and optimize production systems to improve efficiency and productivity in farm enterprises.

CO-3 Apply Economic Principles to Resource Allocation: Train students to apply economic concepts to allocate resources effectively, ensuring sustainability and profitability in agriculture.

CO-4 Evaluate Financial Performance of Farms: Enable students to use financial tools and techniques to evaluate the profitability, liquidity, and solvency of farm businesses.

CO-5 Understand Risk and Uncertainty in Agriculture: Teach strategies to manage risks and uncertainties in farming caused by market fluctuations, climate variability, and policy changes.

CO-6 Optimize Resource Use for Sustainable Farming: Instill knowledge about sustainable use of land, labor, capital, and technology to achieve long-term agricultural viability.

CourseContents

Unit- I:

- Meaning and concept of farm management, objectives and relationship with othersciences.Meaninganddefinitionoffarms,itstypesandcharacteristics,factordetermining types and size of farms. Principles of farm management: conceptofproduction function and its type, use of production function in decision-making on afarm, factor-product, factor-factor and product- product relationship, law of equi-marginal/orprinciples ofopportunitycost and lawof comparative advantage.

Unit- II:

- Meaning and concept of cost, types of costs and their interrelationship, importance ofcostinmanagingfarmbusinessandestimationofgrossfarmincome,netfarmincome, family labour income and farm business income. Farm business analysis:meaningandconceptoffarmincomeandprofitability,technicalandeconomicefficiencymeasuresincrop and livestock enterprises.

Unit- III:

- Importance of farm records and accounts in managing a farm, various types of farmrecords needed to maintain on farm, farm inventory, balance sheet, profit and lossaccounts.Meaningandimportanceoffarmplanningandbudgeting,partialandcomplete budgeting,stepsinfarmplanningandbudgeting-linearprogramming,appraisal of farm resources, selection of crops and livestock's enterprises. Concept ofrisk and uncertainty occurs in agriculture production, nature and sources of risks anditsmanagement strategies, Crop/livestock/machineryinsurance

Unit- IV:

- Weather based crop insurance, features, determinants of compensation. Concepts ofresource economics, differences between NRE and agricultural economics, uniquepropertiesofnaturalresources.Positiveandnegativeexternalitiesinagriculture,Inefficiencyandwelfareloss,solutions,Importantissuesineconomicsandmanagementofcommonpropertyresourcesofland,water,pastureandforestresourcesetc.

Practical:

Preparation of farm layout. Determination of cost of fencing of a farm. Computation ofdepreciationcostoffarmassets.Applicationofequi-marginalreturns/opportunitycostprinciple in allocation of farm resources. Determination of most profitable level of inputs usein a farm production process. Determination of least cost combination of inputs. Selection ofmostprofitableenterprisecombination.ApplicationofcostprinciplesincludingCACPconcepts in the estimation of cost of crop and livestock enterprises. Preparation of farm planand budget, farm records and accounts and profit & loss accounts. Collection and analysis ofdataon various resourcesinIndia.

BAG-320 Principles of Food Science and Nutrition

CO: COURSE OBJECTIVES

CO-1 Understand the Fundamentals of Food Science: Explain the physical, chemical, and biological principles underlying food systems and their application in food production and processing.

CO-2 Explore Nutritional Requirements: Analyze the role of essential nutrients in human health and their impact on growth, development, and disease prevention.

CO-3 Evaluate Food Quality and Safety: Assess factors that affect food quality, safety, and shelf life, including food preservation techniques and contamination risks.

CO-4 Investigate Food Processing Methods: Identify and describe common food processing methods and their influence on nutritional value, sensory properties, and food functionality.

CO-5 Examine the Role of Food in Society: Discuss the cultural, social, and economic factors that influence food choices and dietary habits globally.

CO-6 Apply Principles of Nutrition: Design balanced diets and recommend nutritional interventions based on scientific evidence to address specific health conditions or goals.

CourseContents

Unit- I:

- Concepts of Food Science (definitions, measurements, density, phase change, pH,osmosis,surfacetension,colloidalsystems etc.);

Unit- II:

- Foodcompositionandchemistry(water,carbohydrates,proteins,fats,vitamins,minerals,flavours, colours, miscellaneousbioactives, important reactions);

Unit- III:

- Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods,Productionof fermentedfoods);

Unit- IV:

- Principlesandmethodsoffoodprocessingandpreservation(useofheat,lowtemperature, chemicals, radiation, drying etc.); Food and nutrition, Malnutrition (overand undernutrition),nutritional disorders;

Unit- V:

- Energy metabolism(carbohydrate,fat,proteins);Balanced/modifieddiets,Menuplanning,Newtrends infood scienceand nutrition.

BAG-321:ElectiveCourse

B.Sc. (Ag.) VII Semester

BAG-401 General orientation & on campus training by differentFaculties

CO: COURSE OBJECTIVES

CO-1 Familiarization with the Institution: Introduce students to the institution's culture, values, and infrastructure.Provide an overview of various academic and co-curricular resources available on campus.

CO-2Interdisciplinary Exposure: Facilitate interaction with faculty members from different disciplines to broaden students' academic perspectives.Encourage understanding of multidisciplinary approaches to problem-solving and learning.

CO-3Skill Development: Enhance communication, teamwork, and interpersonal skills through interactive sessions. Introduce students to tools and techniques relevant to academic and professional success.

CO-4Guidance on Academic Pathways: Offer insights into academic programs, research opportunities, and career trajectories.Provide orientation on the curriculum, evaluation systems, and academic expectations.

CO-5Motivation and Goal Setting: Inspire students through lectures and interactions with experienced faculty.Help students set personal and academic goals for their educational journey.

CO-6 Community Building: Create a sense of belonging and engagement among students by fostering peer and faculty interactions.Encourage participation in campus life, clubs, and other student activities.

BAG-403 Village attachment

CO: COURSE OBJECTIVES

CO-1 **UnderstandingRural Life:** To familiarize students with the day-to-day lifestyle, culture, traditions, and challenges faced by rural communities.

CO-2 **Knowledge of Agricultural Practices:** To observe and analyze the farming systems, cropping patterns, and the use of modern and traditional agricultural techniques.

CO-3 **Socio-Economic Awareness:** To assess the socio-economic structure of rural areas, including income sources, living standards, education, healthcare, and social organization.

CO-4 **Community Engagement:** To encourage students to interact with farmers, laborers, and village authorities to understand their perspectives and aspirations.

CO-5 **Identification of Problems:** To identify key issues in rural development, such as water scarcity, soil degradation, lack of education, or health facilities, and suggest possible solutions.

CO-6 **Application of Knowledge:** To apply classroom knowledge in real-life rural scenarios, enhancing problem-solving skills and practical learning.

CO-7 **Promoting Sustainable Practices:** To educate villagers about sustainable agricultural and livelihood practices, emphasizing the importance of environmental conservation.

BAG-405 Unit attachment in University/College/KVK / Research StationAttachment

CO: COURSE OBJECTIVES

CO-1 Skill Development: Equip students with practical knowledge and skills in agricultural practices, laboratory techniques, and modern research methodologies.
Develop competencies in handling scientific instruments and performing field trials.

CO-2 Practical Knowledge Application: Provide exposure to real-life applications of theoretical concepts learned in classrooms. Enable students to analyze and solve on-ground agricultural challenges.

CO-3 Research Familiarity: Introduce students to research station operations and research methodologies, including data collection, analysis, and reporting.
Foster a research-oriented mindset.

CO-4 Knowledge of Extension Services: Understand the role of KrishiVigyanKendras (KVKs) in technology dissemination and farmer training.Participate in outreach programs, on-farm demonstrations, and training sessions conducted for farmers.

CO-5 Collaborative Learning: Facilitate interaction with agricultural scientists, extension workers, and farmers to gain diverse perspectives on agriculture.Promote teamwork in multidisciplinary agricultural projects.

CO-6 Exposure to Advanced Techniques: Familiarize students with advanced agricultural techniques like precision farming, integrated pest management, and sustainable resource management.Gain insights into recent innovations in agriculture and their implementation.

CO-7 Career Readiness: Prepare students for future roles in academics, research, and extension services.Enhance employability through experience in professional agricultural setups.

BAG-407 Plant Clinic

CO: COURSE OBJECTIVES

CO-1 Diagnosis of Plant Problems: Develop the ability to identify symptoms of diseases, pests, nutrient deficiencies, and abiotic stresses in plants.

CO-2 Integrated Pest and Disease Management (IPDM): Understand and implement IPDM strategies to manage plant health issues sustainably.

CO-3 Understanding Plant-Pathogen Interactions: Learn the mechanisms of how pathogens, pests, and environmental factors affect plant growth and productivity.

CO-4 Use of Diagnostic Tools and Techniques: Train in the application of modern diagnostic tools, such as microscopy, molecular methods, and field-based techniques.

CO-5 Prescribing Solutions: Gain expertise in recommending suitable control measures, including chemical, biological, and cultural practices.

CO-6 Monitoring and Early Warning Systems: Learn to establish monitoring systems for early detection of plant health problems.

CO-7 Advisory Services: Prepare to provide guidance to farmers and stakeholders on plant health management.

BAG-409 Agro-Industrial Attachment

CO: COURSE OBJECTIVES

CO-1 Practical Exposure: Provide students with hands-on experience in agro-industrial operations, enabling them to understand the real-world functioning of agriculture-related industries.

CO-2 Skill Development: Develop technical and managerial skills through active participation in various industrial processes, including production, processing, and quality management.

CO-3 Industry-Academia Interface: Strengthen the connection between educational institutions and industries to align academic training with industrial requirements.

CO-4 Understanding Industrial Processes: Familiarize students with the working principles, technologies, and machinery used in agro-industrial units, such as food processing, agrochemicals, or farm machinery.

CO-5 Professional Networking: Build relationships with industry professionals, which can help students understand market trends, entrepreneurship opportunities, and career prospects.

CO-6 Problem-Solving Ability: Encourage students to identify and analyze real-time challenges in agro-industries and propose innovative solutions.

CO-7 Entrepreneurship Development: Inspire entrepreneurial mindset by exposing students to industrial strategies, supply chain mechanisms, and business models in agriculture.

CO-8 Value Addition Awareness: Help students understand the importance of value addition in agriculture and its role in enhancing income and sustainability.

BAG-411 Project Report Preparation, Presentation andEvaluationGeneral Orientation & On campus training by different Faculties

CO: COURSE OBJECTIVES

CO-1 Skill Development in Research Methodology: Equip students with the knowledge to design and implement research projects systematically.Teach proper techniques for data collection, analysis, and interpretation.

CO-2 Enhancing Report Writing Skills: Develop the ability to prepare well-structured, concise, and comprehensive project reports.Focus on correct formatting, citation, and documentation practices.

CO-3 Effective Presentation Techniques: Train students to present their research findings clearly and confidently using various tools (e.g., PowerPoint, charts, graphs). Improve communication skills for academic and professional contexts.

CO-4 Evaluation and Feedback Integration: Enable students to critically evaluate research work (their own and others'). Incorporate constructive feedback to refine their research and reporting skills.

CO-5 Team Collaboration and Interdisciplinary Exposure: Promote teamwork and exchange of ideas among peers. Foster an understanding of interdisciplinary approaches to problem-solving.

CO-6 Practical Exposure through Faculty Training: Gain insights into specialized topics through on-campus training sessions conducted by expert faculty members.Learn from real-world case studies, faculty experiences, and practical demonstrations.

CO-7 Career Readiness: Prepare students for professional roles requiring project planning, execution, and reporting skills.Build confidence in handling future academic or industrial projects.

CO-8 Critical Thinking and Problem Solving: Develop analytical skills to identify challenges and propose solutions within a project framework.

RuralAgriculturalWorkExperience(RAWE)andAgro-Industrial Attachment(AIA)

- This program will be undertaken by the studentsduring the seventh semester foratotal duration of 20 weeks with a weightage of 0+20 credit hours in two parts, namely,RAWEand AIA.
- It will consist of general orientation and on-campus training by different facultiesfollowedbyvillageattachment/unitattachmentinuniversity/college/KVKorarese archstation.
- The students would beattachedwiththeagro-industriestogetanexperienceoftheindustrial environmentand working.
- Due weightage in terms of credit hours will be given depending upon the duration ofstayof students in villages/agro-industries.
- At the end of RAWE/AIA, the students will be given one week for project reportpreparation,presentation and evaluation.

The Rural Agricultural Work Experience (RAWE) helps the students primarily to understandthe rural situations, status of agricultural technologies adopted by the farmers to prioritize
thefarmers'problemsandtodevelopskills&attitudeofworkingwithfarmfamiliesforoverall development in rural area. The timings for RAWE can be flexible for specific regionstocoincidewiththe main cropping season.

RAWEComponent-I:VillageAttachmentTrainingProgramme

S. No	Activity	Duration
1	Orientation andSurveyofVillage	1week
2	AgronomicalInterventions	1 week
3	PlantProtection Interventions	1 week
4	SoilImprovement Interventions(Soil samplingand testing)	1week
5	FruitandVegetableproductioninterventions	1 week
6	FoodProcessingand Storageinterventions	
7	AnimalProductionInterventions	1 week
8	Extension andTransferofTechnologyactivities	1 week

RAWE Component –II:AgroIndustrialAttachment

- StudentsshallbeplacedinAgro-andCottageindustriesandCommoditiesBoardsfor03weeks.
- IndustriesincludeSeed/Saplingproduction,Pesticides-insecticides,Post-harvest-processing-value addition, Agri-financeinstitutions, etc.

ActivitiesandTasksduringAgro-IndustrialAttachmentProgramme

- Acquaintancewithindustryandstaff
- Studyofstructure, functioning,objectiveandmandatesof theindustry
- Studyofvariousprocessingunitsandhands-ontrainingsundersupervisionofindustrystaff
- Ethics of industry
- Employmentgeneratedbytheindustry
- Contribution of the industrypromotingenvironment
- Learningbusinessnetwork includingoutlets of the industry
- Skilldevelopment inallcrucialtasks of the industry
- Documentation oftheactivities and task performed bythe students
- Performanceevaluation,appraisalandrankingofstudents

B.Sc. (Ag.) VIII Semester

BAG-402 Production Technology for Bioagents and Biofertilizer

CO: COURSE OBJECTIVES

CO-01 Understanding Bioagents and Biofertilizers: Familiarize students with the concept, types, and importance of bioagents (e.g., biocontrol agents like Trichoderma, Bacillus) and biofertilizers (e.g., Rhizobium, Azotobacter, Mycorrhiza).

CO-02 Production Technologies: Equip students with knowledge about the production processes, culture techniques, and maintenance of bioagents and biofertilizers under laboratory and industrial conditions.

CO-03 Formulation and Quality Control: Teach methods for the formulation, packaging, and quality assessment of bioagents and biofertilizers to ensure their efficacy and shelf life.

CO-04 Application Techniques: Train students in the effective application methods of bioagents and biofertilizers in agriculture for sustainable crop production.

CO-05 Environmental and Economic Benefits: Highlight the role of bioagents and biofertilizers in reducing chemical inputs, improving soil health, enhancing crop productivity, and promoting eco-friendly agricultural practices.

CO-06 Entrepreneurial Opportunities: Encourage students to explore entrepreneurship in the biofertilizer and bioagent production sector as a sustainable business model.

BAG-404 Seed Production and Technology

CO: COURSE OBJECTIVES

CO-01 Understanding Seed Science: To provide a thorough understanding of the principles of seed biology, including seed development, physiology, and germination.

CO-02 Seed Production Techniques: To learn the methodologies and technologies used in the production of quality seeds for various crops.

CO-03 Seed Certification and Quality Control: To understand the standards, procedures, and practices involved in seed certification, labeling, and maintaining quality standards.

CO-04 Seed Storage and Preservation: To study the principles and techniques of seed storage, maintaining seed viability, and longevity under various conditions.

CO-05 Hybrid Seed Production: To explore techniques for hybrid seed production, including pollination control mechanisms and genetic purity maintenance.

CO-06 Seed Health and Testing: To familiarize students with seed testing protocols for germination, vigor, purity, and health.

CO-07 Role in Crop Improvement: To highlight the role of quality seed production in improving crop yield, disease resistance, and overall agricultural productivity.

BAG-406 Mushroom Cultivation Technology

CO: COURSE OBJECTIVES

CO-01 Understanding Mushroom Biology: Learn about the taxonomy, morphology, and physiology of edible and medicinal mushrooms. Understand the ecological role and nutritional importance of mushrooms.

CO-02 Cultivation Techniques: Develop skills in the preparation of substrates for mushroom cultivation.Understand the methods of spawn production and management.Learn cultivation practices for different types of mushrooms (e.g., button, oyster, shiitake, and milky mushrooms).

CO-03 Post-Harvest Management: Gain knowledge about harvesting, processing, and packaging techniques. Explore value-added products and storage methods to enhance shelf life.

CO-04 Disease and Pest Management: Understand common diseases, pests, and environmental issues affecting mushroom production. Learn preventive and curative measures.

CO-05 Economic and Entrepreneurial Skills: Develop an understanding of the commercial potential of mushroom cultivation. Gain knowledge of cost-effective production, market trends, and business planning. Explore opportunities for small-scale and large-scale entrepreneurship.

CO-06 Sustainability and Waste Utilization: Learn about sustainable practices in mushroom cultivation. Explore the use of agricultural waste and by-products as substrates for cultivation.

CO-07 Practical Applications and Hands-on Training: Engage in hands-on training for setting up mushroom farms and spawn production units.

BAG-408 Soil, Plant, Water and Seed Testing

CO: COURSE OBJECTIVES

CO-01 Understand Soil Testing: Develop expertise in analyzing soil physical, chemical, and biological properties. Provide recommendations for sustainable soil fertility management based on test results.

CO-02 Plant Testing and Analysis: Learn to assess plant tissue for nutrient status to identify deficiencies, toxicities, or imbalances. Integrate plant analysis data with soil tests for efficient nutrient management.

CO-03 Water Testing: Evaluate water quality parameters like pH, electrical conductivity, salinity, and contaminant levels for agricultural use. Understand the suitability of water for irrigation and its impact on soil and crop health.

CO-04 Seed Testing: Develop skills in determining seed quality, including germination percentage, vigor, moisture content, and purity. Learn methods to ensure high-quality seed production for better crop yields.

CO-05 Promote Sustainable Agriculture: Integrate testing practices to make informed decisions for sustainable and environmentally friendly farming practices.

CO-06 Enhance Research and Analytical Skills: Train in the use of advanced instruments and methodologies for precise analysis. Foster critical thinking and problem-solving in agricultural resource management.

CO-07 Policy and Advisory Role: Equip participants to work as advisors or policymakers in agriculture, ensuring resource-efficient and sustainable practices are adopted at local and regional levels.

BAG-410 Commercial Beekeeping

CO: COURSE OBJECTIVES

CO-01 Introduction to Beekeeping: Understanding the fundamentals of beekeeping, including bee biology, behavior, and the role of bees in agriculture and biodiversity.

CO-02 Bee Management Practices: Learning how to manage bee colonies effectively for honey production, pollination, and other byproducts like beeswax, propolis, and royal jelly.

CO-03 Hive Management: Training on how to maintain and manage beehives, including setting up, inspecting, and maintaining healthy hives for maximum productivity.

CO-04 Disease and Pest Control: Understanding common diseases and pests that affect bees and how to manage them to ensure a thriving colony.

CO-05 Pollination Services: Exploring the commercial aspects of pollination services for crops, especially for fruit, vegetable, and seed production.

CO-06 Honey Harvesting and Processing: Learning the best practices for harvesting honey and other bee products, followed by methods of extraction, processing, and packaging for sale.

CO-07 Marketing and Business Skills: Developing the skills needed to run a successful commercial beekeeping operation, including market analysis, business planning, and product distribution.

BAG-412 Poultry Production Technology

CO: COURSE OBJECTIVES

CO-01 Understanding Poultry Husbandry: Teaching the basics of poultry farming, including the care, breeding, and management of poultry species such as chickens, ducks, turkeys, and geese.

CO-02 Poultry Nutrition: Understanding the nutritional requirements of poultry for different stages of growth (chicks, growers, and layers), including feed formulation and feeding techniques.

CO-03 Poultry Health Management: Learning about common diseases in poultry, their prevention, and control measures, along with vaccination schedules and biosecurity practices.

CO-04 Poultry Breeding: Gaining knowledge of selective breeding techniques for improving traits like egg production, meat quality, and disease resistance.

CO-05 Egg and Meat Production: Developing the skills required to manage egg-laying and meat-producing flocks, ensuring high productivity and quality.

CO-06 Poultry Farm Management: Acquiring skills in managing a poultry farm, including housing design, waste management, record-keeping, and financial management.

CO-07 Poultry Processing and Marketing: Understanding the steps involved in processing poultry products (eggs, meat) for market readiness, along with packaging, storage, and marketing strategies.

CO-08 Sustainable Practices: Promoting environmentally sustainable poultry farming practices, including waste management, resource optimization, and minimizing environmental impact.

BAG-414 Commercial Horticulture

CO: COURSE OBJECTIVES

CO-01 Understanding Horticultural Practices: Learn about the scientific principles and techniques involved in the cultivation of various horticultural crops, including soil preparation, irrigation, fertilization, and pest management.

CO-02 Business and Economic Aspects: Develop the ability to assess the economic viability of horticultural ventures, including cost analysis, market trends, and profitability. Understanding the economics of large-scale horticultural production is crucial for success in commercial farming.

CO-03 Sustainable Practices: Focus on the adoption of sustainable farming methods, such as organic farming, integrated pest management (IPM), and water conservation techniques, ensuring long-term productivity without compromising environmental health.

CO-04 Advanced Technologies: Explore the use of modern technologies in horticulture, including greenhouse production, hydroponics, precision agriculture, and the application of biotechnology in crop improvement.

CO-05 Post-Harvest Management: Understand the techniques for post-harvest handling, storage, and transportation to reduce losses and maintain product quality, which is key to the success of commercial horticultural enterprises.

CO-06 Market and Supply Chain Management: Gain insights into market demand, packaging, distribution, and logistics involved in the commercialization of horticultural products, including export opportunities.

CO-07 Entrepreneurial Skills: Equip students with entrepreneurial skills to start their own horticulture-based ventures, focusing on innovation, business planning, and financial management.

BAG-416 Floriculture and Landscaping

CO: COURSE OBJECTIVES

CO-01 Understanding of Floriculture: To provide students with knowledge about the production, cultivation, and management of flowers and ornamental plants. This includes learning about plant varieties, their growth requirements, and techniques for effective flower cultivation.

CO-02 Landscape Design Principles: To teach the principles of designing functional, aesthetically pleasing, and sustainable landscapes. This covers aspects such as site analysis, plant selection, design concepts, and landscaping elements (e.g., pathways, fountains, and sculptures).

CO-03 Techniques in Landscaping: To equip students with practical skills in landscape maintenance, soil preparation, irrigation, and pest management, which are essential for creating and maintaining beautiful gardens and landscapes.

CO-04 Environmental Sustainability: To highlight the role of floriculture and landscaping in promoting environmental sustainability, including water conservation, biodiversity, and reducing carbon footprints through green spaces.

CO-05 Economic Aspects of Floriculture and Landscaping: To explore the economic potential of floriculture as a business, including the marketing of flowers, plants, and landscaping services, as well as the role of landscaping in urban development.

CO-06 Horticultural Practices: To teach students the various horticultural practices specific to the cultivation of flowers and ornamental plants, such as propagation, pruning, and harvesting.

BAG-418 Food Processing

CO: COURSE OBJECTIVES

CO-01 Understanding Food Processing Principles: To introduce students to the fundamental principles of food processing, such as preservation, fermentation, freezing, drying, and packaging, and their role in enhancing shelf life, nutritional value, and sensory qualities of food.

CO-02Exploring Different Processing Techniques: To familiarize students with various processing techniques used in the food industry, including thermal processing, refrigeration, dehydration, canning, pasteurization, and extrusion.

CO-03Food Safety and Quality Control: To emphasize the importance of food safety, sanitation, and quality control measures during processing to prevent contamination and ensure that food products meet regulatory standards.

CO-04Impact on Nutritional Content: To examine how different processing methods affect the nutritional content, bioavailability of nutrients, and sensory attributes (taste, color, texture) of food products.

CO-05Technology and Innovation: To expose students to the latest advancements in food processing technology, including automation, use of enzymes, nanotechnology, and other innovative methods for improving efficiency and sustainability in food production.

CO-06 Understanding Food Product Development: To equip students with skills in food product formulation and development, enabling them to create new food products based on consumer demands, market trends, and nutritional needs.

CO-07 Economic and Environmental Aspects: To analyze the economic feasibility of food processing operations, including cost analysis, resource utilization, and the environmental impact of food processing techniques.

Practical Application: To provide hands-on experience through laboratory work or industry internships, where students can apply theoretical knowledge to real-world food processing challenges.

BAG-420 Agriculture Waste Management

CO: COURSE OBJECTIVES

CO-01 Understanding Agricultural Waste: Learn about the types of agricultural waste generated (e.g., crop residues, animal manure, and agro-industrial waste) and their environmental impact.

CO-02 Waste Disposal and Recycling: Explore methods for the safe disposal and recycling of agricultural waste to minimize environmental pollution.

CO-03 Waste-to-Energy Technologies: Study technologies that convert agricultural waste into energy (e.g., biogas production, biofuels).

CO-04 Composting and Soil Health: Understand how agricultural waste can be composted and used to improve soil health and fertility.

CO-05 Environmental Impact Assessment: Evaluate the environmental implications of poor waste management practices and the importance of sustainable waste management in agriculture.

CO-06 Policy and Regulation: Study national and international policies, regulations, and standards related to agricultural waste management.

BAG-422 Organic Production Technology

CO: COURSE OBJECTIVES

CO-01 Understanding Organic Farming Principles: Introduce students to the fundamental principles of organic farming, emphasizing the importance of sustainability, biodiversity, and soil health.

CO-02 Techniques of Organic Crop Production: Equip students with knowledge of various organic farming practices such as crop rotation, composting, green manure, mulching, and organic pest management.

CO-03 Soil Health Management: Teach students how organic production emphasizes soil fertility through the use of organic matter, bio-fertilizers, and soil-friendly techniques, avoiding chemical inputs.

CO-04 Organic Inputs and Fertilization: Focus on the sources and use of organic fertilizers, including compost, vermicompost, biofertilizers, and plant-based nutrient amendments.

CO-05 Certification and Standards: Provide knowledge on organic certification processes, standards, and regulations to ensure products meet the requirements for organic labeling.

CO-06 Pest and Disease Management in Organic Systems: Teach students how to manage pests and diseases through non-chemical means like biological control, physical methods, and plant resistance.

BAG-424 Commercial Sericulture

CO: COURSE OBJECTIVES

CO-1 Understanding Sericulture Basics: To introduce students to the history, principles, and biology of sericulture, focusing on silk-producing organisms, particularly silkworms (Bombyxmori).

CO-2 Silkworm Rearing Techniques: To train students in the various techniques involved in silkworm rearing, including the selection of appropriate breeds, feeding, and care of silkworms to enhance silk production.

CO-03 Silk Cocoon Production: To impart knowledge about cocoon harvesting, handling, and processing for commercial silk production.

CO-04 Sericulture Infrastructure: To educate students on setting up and managing a sericulture farm, including the design of rearing houses, mulberry cultivation for silkworm feed, and other necessary infrastructure.

CO-05 Economic Aspects: To explore the economic potential of sericulture, including cost analysis, profit margins, market trends, and the development of a business model.

CO-06 Post-harvest Processing: To provide hands-on training in processing cocoons into silk threads, including reeling, twisting, dyeing, and weaving.

CO-07 Sustainability in Sericulture: To discuss sustainable sericulture practices, pest management, and environmental concerns associated with silk farming.

ModulesforSkillDevelopmentandEntrepreneurship

A student has to register 20 credits opting for two modules of (0+10) credits each (total 20credits)from thefollowingpackage ofmodulesin theVIIIsemester.

NOTE:InadditiontoaboveELPmodulesotherimportantmodulesmaybegiventothestudents bySAUs.

S. No	Subject Code	Title	CreditHours			
			Cr	L	T	P
1.	BAG-402	ProductionTechnologyfor Bioagentsand Biofertilizer	1	0	0	2
2.	BAG-404	SeedProductionandTechnology	1	0	0	2
3.	BAG-406	Mushroom CultivationTechnology	1	0	0	2
4.	BAG-408	Soil, Plant,Water and SeedTesting	1	0	0	2
5.	BAG-410	CommercialBeekeeping	1	0	0	2
6.	BAG-412	PoultryProductionTechnology	1	0	0	2
7.	BAG-414	CommercialHorticulture	1	0	0	2
8.	BAG-416	Floriculture and Landscaping	1	0	0	2
9.	BAG-418	FoodProcessing	1	0	0	2
10.	BAG-420	AgricultureWaste Management	1	0	0	2
11.	BAG-422	OrganicProductionTechnology	1	0	0	2
12.	BAG-424	CommercialSericulture	1	0	0	2
	Total		**12**	**0**	**0**	**24**

EvaluationofExperientialLearningProgramme/Hands-onTraining(HOT)

S. No	Parameters	Max.Marks
11.	Project PlanningandWriting	10
12.	Presentation	10
13.	Regularity	10
14.	MonthlyAssessment	10
15.	Output delivery	10
16.	TechnicalSkill Development	10
17.	EntrepreneurshipSkills	10
18.	Business networkingskills	10
19.	Report WritingSkills	10
20.	FinalPresentation	10
	Total	**100**

ElectiveCourses

A student can select three elective courses out of the following and offer during 4th (BAG-220),5th(BAG-319)and6th(BAG-321) semesters.

Agribusiness Management

CO: COURSE OBJECTIVE

CO-1Maximize Profitability: Optimize the use of resources, including land, labor, capital, and technology, to ensure the profitability and financial sustainability of agribusiness operations.

CO-2Efficient Resource Utilization: Ensure the efficient use of inputs like seeds, fertilizers, water, and machinery to reduce waste and increase productivity.

CO-3Market Competitiveness: Develop strategies to compete effectively in local and global markets, including pricing, branding, and distribution.

CO-4Sustainability and Environmental Stewardship: Promote environmentally sustainable practices by reducing the ecological impact of agricultural operations, conserving natural resources, and supporting biodiversity.

CO-5Risk Management: Identify, analyze, and mitigate risks related to price volatility, climate change, pests, diseases, and market uncertainties.

CO-6Enhance Supply Chain Efficiency: Streamline processes from production to distribution, ensuring timely delivery of products while maintaining quality and minimizing costs.

CO-7Support Rural Development: Contribute to rural economic growth by creating employment opportunities, fostering community development, and improving the livelihood of farmers and workers.

CourseContents

Unit- I:

- Transformation of agriculture into agribusiness, various stakeholders and componentsof agribusiness systems. Importance of agribusiness in the Indian economy and NewAgricultural Policy. Distinctive features of Agribusiness Management:Importanceandneeds ofagro-based industries,

Unit- II:

- Classificationofindustriesandtypesofagrobasedindustries.Institutionalarrangement, procedures to set up agro based industries. Constraints in establishingagro-basedindustries.

Unit- III:

- Agri-value chain: Understanding primary and support activities and their linkages.Business environment: PEST & SWOT analysis. Management functions: Roles &activities, Organization culture. Planning, meaning, definition, types of plans. Purposeor mission, goals or objectives, Strategies, polices procedures, rules, programs andbudget.Components of abusiness plan, Steps inplanningand implementation.

Unit- IV:

- Organizationstaffing,directingandmotivation.Ordering,leading,supervision,communications,control.CapitalManagementandFinancialmanagementofAgribusiness.Financialstatementsandtheirimportance.MarketingManagement:Segmentation,targeting &positioning.

Unit- V:

- Marketing mix and marketing strategies. Consumer behaviour analysis, Product LifeCycle(PLC).Sales&DistributionManagement.Pricingpolicy,variouspricingmethods. Project Management definition, project cycle, identification, formulation,appraisal,implementation,monitoringandevaluation.ProjectAppraisalandevaluationtechniques.

Practical:

Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets: grains,fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, andvalueaddedproducts.Studyoffinancinginstitutions-Cooperative,Commercialbanks,RRBs, Agribusiness Finance Limited, NABARD. Preparations of projects and Feasibilityreports for agribusiness entrepreneur. Appraisal/evaluation techniques of identifying viableproject- Non-discounting techniques. Case study of agro-based industries. Trend and growthrate of prices of agricultural commodities. Net present worth technique for selection of viableproject.Internalrateof return.

Agrochemicals

CO: COURSE OBJECTIVE

CO-1Enhance Crop Yield: Increase agricultural productivity by providing essential nutrients, protecting crops from pests, and improving growth conditions.

CO-2 Pest and Disease Control: Protect crops from harmful pests, weeds, and diseases that can reduce yields and quality.

CO-3 Improve Crop Quality: Ensure better-quality produce by preventing nutrient deficiencies, diseases, and pest damage.

CO-4 Promote Efficient Resource Use: Maximize the effectiveness of water, nutrients, and soil resources through targeted applications.

CO-5 Support Sustainable Farming Practices: Help maintain soil fertility and health while minimizing land degradation when used responsibly.

CO-6 Facilitate Large-Scale Farming: Enable efficient management of large agricultural areas by reducing the labor required for pest control and fertilization.

CO-7 Adapt to Changing Climate Conditions: Provide tools to combat stress factors such as drought, high temperatures, or nutrient depletion caused by climate changes.

CourseContents

Unit- I:

- Anintroductiontoagrochemicals,theirtypeandroleinagriculture,effectonenvironment, soil, human and animal health, merits and demerits of their uses inagriculture,managementofagrochemicalsforsustainableagriculture.Herbicides-Major classes, properties and important herbicides. Fate of herbicides, Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfurandcopper, Modeofaction-Bordeauxmixtureand copper oxychloride.

Unit- II:

- Organicfungicides-Modeofaction-Dithiocarbamates-characteristics,preparationand use of Zineb and maneb, Systemic fungicides- Benomyl, carboxin, oxycarboxin,Metalaxyl, Carbendazim, characteristics and use. Introduction and classification ofinsecticides:inorganic and organic insecticides

Unit- III:

- Organochlorine,Organophosphates,Carbamates,SyntheticpyrethroidsNeonicotinoids,Biorationals,InsecticideActandrules,Insecticidesbanned,withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides,Reduced risk insecticides, Botanicals, plant and animal systemic insecticides theircharacteristicsanduses.

Unit- IV:

- Fertilizersandtheirimportance.Nitrogenousfertilizers:FeedstocksandManufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea.SlowreleaseN-fertilizers.Phosphaticfertilizers:feedstockandmanufacturingofsingle superphosphate. Preparationof bone meal and basic slag.Potassic fertilizers:Natural sources of potash, manufacturing of potassiumchloride, potassium sulphateandpotassium nitrate.

Unit- V:

- Mixedandcomplexfertilizers:Sourcesandcompatibility– preparationofmajor,secondaryandmicronutrientmixtures.Complexfertilizers:Manufacturingofammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order.Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insectrepellent.

Practical:

Samplingoffertilizersandpesticides.Pesticidesapplicationtechnologytostudyaboutvariouspesticidesappliances.Quicktestsforidentificationofcommonfertilizers.Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used.To study and identify various formulations of insecticide available kin market. Estimation ofnitrogen in Urea. Estimation of water soluble P_2O_5 and citrate soluble P_2O_5 in single superphosphate.EstimationofpotassiuminMuraiteofPotash/SulphateofPotashby flamephotometer.Determinationofcoppercontentincopperoxychloride.Determinationofsulphurcontentinsulphurfungicide.Determinationofthiram.Determinationofziramcontent.

Commercial Plant Breeding

CO: COURSE OBJECTIVE

CO-1 **Improved Yield**: To increase the productivity of crops per unit area, ensuring higher returns for farmers and food security for populations.

CO-2 **Disease and Pest Resistance**: To develop plant varieties resistant to specific diseases and pests, reducing crop losses and the need for chemical pesticides.

CO-3 **Abiotic Stress Tolerance**: To breed plants capable of withstanding adverse environmental conditions such as drought, salinity, extreme temperatures, and flooding.

CO-4 **Enhanced Quality**: To improve the nutritional value, taste, texture, shelf life, and appearance of crops, meeting consumer demands and market standards.

CO-5 **Adaptation to Mechanization**: To produce crop varieties that are suited to modern agricultural practices, including mechanical planting, harvesting, and processing.

CO-6 **Shorter Growing Cycles**: To develop varieties with reduced maturity periods, enabling multiple cropping in a year or better adaptation to specific growing seasons.

CO-7 **Market-Specific Traits**: To tailor crops for specific industrial uses (e.g., high oil content in oilseeds, gluten content in wheat, or sugar content in sugarcane) and regional consumer preferences.

CourseContents

Unit- I:

- Types of crops and modes of plant reproduction. Line development and maintenancebreedinginselfandcrosspollinatedcrops(A/B/Randtwolinesystem)fordevelopmentof hybrids and seedproduction.

Unit- II:

- Genetic purity test of commercial hybrids. Advances in hybrid seed production ofmaize,rice,sorghum,pearlmillet,castor,sunflower,cotton pigeonpea,Brassicaetc.

Unit- III:

- Quality seed production of vegetable crops under open and protected environment.Alternative strategies for the development of the line and cultivars: haploid inducer,tissueculturetechniques and biotechnologicaltools.

Unit- IV:

- IPR issues in commercial plant breeding: DUS testing and registration of varietiesunder PPV & FRAct.Variety testing,release and notification systemsinIndia.Principlesandtechniquesofseedproduction,typesofseeds,qualitytestinginselfandcross pollinated crops.

Practical:

Floralbiologyinselfandcrosspollinatedspecies,selfingandcrossingtechniques.Techniques of seed production in self and cross pollinated crops using A/B/R and two linesystem. Learning techniques in hybrid seed production using male-sterility in field crops.Understanding the difficulties in hybrid seed production, Tools and techniques for optimizinghybrid seed production. Concept of rouging in seed production plot. Concept of line itsmultiplication and purification in hybrid seed production. Role of pollinators in hybrid seedproduction.Hybridseedproductiontechniquesinsorghum,pearlmillet,maize,rice,rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops. Sampling andanalytical proceduresfor purity testing and detection of spurious seed.Seed drying andstorage structure in quality seed management. Screening techniques during seed processingviz.,gradingandpackaging. Visittopublicprivate seedproduction andprocessingplant.

Landscaping

CO: COURSE OBJECTIVE

CO-1 Aesthetic Enhancement: Create visually appealing spaces through the use of plants, structures, and other landscape elements.

CO-2 Functional Use: Optimize outdoor spaces for practical purposes, such as recreation, dining, walking paths, or seating areas.

CO-3 Environmental Sustainability: Promote ecological balance by incorporating native plants, conserving water, and providing habitats for wildlife.

CO-4 Climate Moderation: Use landscaping elements like trees and shrubs to regulate temperature, reduce heat, and provide shade or windbreaks.

CO-5 Erosion and Soil Protection: Prevent soil erosion and degradation by using ground covers, terraces, and retaining walls.

CO-6 Increase Property Value: Enhance the market value of a property through thoughtful and well-maintained landscaping.

CO-7 Improved Air and Noise Quality: Use plants to purify the air and act as natural sound barriers to reduce noise pollution.

CourseContents

Unit- I:

- Importance and scope of landscaping. Principles of landscaping, garden styles andtypes, terrace gardening, vertical gardening, garden components, adornments, lawnmaking, rockery, water garden, walk-paths, bridges, other constructed features etc.gardensfor special purposes.

Unit- II:

- Trees:selection,propagation,plantingschemes,canopy management,shrubsandherbaceousperennials:selection,propagation,plantingschemes,architecture.Climberand creepers: importance,selection, propagation, planting,

Unit- III:

- Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns,grassesandcactisucculents.Pot plants: selection,arrangement, management.

Unit- IV:

- Bio-aesthetic planning: definition, need, planning; landscaping of urban and ruralareas, Peri-urban landscaping, Landscaping of schools, public places like bus station,railway station, townships, river banks, hospitals, play grounds, airports, industries,institutions.Bonsai:principlesandmanagement,lawn:establishmentandmaintenance.CADapplication

Practical:

Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals,care and maintenance of plants, potting and repotting, identification of tools and implementsusedinlandscapedesign,trainingandpruningofplantsforspecialeffects,lawnestablishment and maintenance, layout of formal gardens, informal gardens, special type ofgardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathehouse.Use ofcomputersoftware, visit toimportant gardens/ parks/ institutes.

Food Safety and Standards

CO: COURSE OBJECTIVE

CO-1 Ensure Public Health: Protect consumers by ensuring that food is safe, nutritious, and free from contaminants, thereby reducing foodborne illnesses.

CO-2 Regulate Food Quality: Establish and enforce standards for food products to ensure consistent quality and safety throughout the food supply chain.

CO-3 Prevent Adulteration: Monitor and prevent the adulteration of food products to maintain their authenticity and protect consumer rights.

CO-4 Promote Hygiene in Food Handling: Encourage hygienic practices at every stage, from production and processing to storage, distribution, and consumption.

CO-5 Facilitate Fair Trade Practices: Ensure that food businesses adhere to ethical practices, avoiding misleading claims and labeling to protect consumer interests.

CO-6 Support Consumer Awareness: Educate consumers about food safety, labeling, and nutritional information to enable informed choices.

CO-7 Encourage Innovation and Research: Promote advancements in food technology, safety standards, and sustainable practices to improve the overall food ecosystem.

CourseContents

Unit- I:

- FoodSafety– Definition,Importance,ScopeandFactorsaffectingFoodSafety.HazardsandRisks,Typesofhazards-Biological,Chemical,Physicalhazards.Managementof hazards-Need.Control ofparameters. Temperaturecontrol.

Unit- II:

- Foodstorage.Productdesign.HygieneandSanitationinFoodServiceEstablishments-Introduction.Sourcesofcontaminationandtheircontrol.WasteDisposal.Pest and Rodent Control. Personnel Hygiene.FoodSafetyMeasures.

Unit- III:

- Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc.HACCP.ISOseries.TQMconceptandneedforquality,componentsofTQM,Kaizen.RiskAnalysis.AccreditationandAuditing,WaterAnalysis,SurfaceSanitationand PersonalHygiene.

Unit- IV:

- Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global ScenarioCAC. Other laws and standards related to food. Recent concerns- New and EmergingPathogens.Packaging, Productlabeling and Nutritional labeling.

Unit- V:

- Genetically modified foods\ transgenics. Organic foods. Newer approaches to foodsafety.Recent Outbreaks.IndianandInternationalStandardsforfoodproducts.

Practical:

Water quality analysis physico-chemical and microbiological.Preparationof different typesof media. Microbiological Examination of different food samples. Assessment of surfacesanitation by swab/rinse method. Assessment of personal hygiene.Biochemical testsforidentification of bacteria. Scheme for the detection of food borne pathogens. Preparation ofplansfor Implementationof FSMS-HACCP,ISO: 22000.

Biopesticides&Biofertilizers

CO: COURSE OBJECTIVE

CO-1Enhance Crop Productivity: Improve soil fertility and plant health to increase crop yields.

CO-2 Promote Sustainable Agriculture: Reduce reliance on chemical pesticides and fertilizers, fostering eco-friendly farming practices.

CO-3 Improve Soil Health: Restore and maintain soil microbial diversity and organic matter content.

CO-4 Reduce Environmental Impact: Minimize soil, water, and air pollution by avoiding harmful chemical inputs.

CO-5 Support Integrated Pest and Nutrient Management: Provide targeted pest control and nutrient supplementation without disrupting natural ecosystems.

CO-6 Enhance Crop Quality: Improve the nutritional value, flavor, and shelf life of agricultural produce.

CO-7 Promote Farmer and Consumer Safety: Reduce health risks associated with synthetic agrochemicals for farmers and consumers.

CourseContents

Unit- I:

- History and concept of biopesticides. Importance, scope and potential of biopesticide.Definitions,conceptsandclassificationofbiopesticidesviz.pathogen,botanicalpesticides, and biorationales. Botanicalsand their uses. Mass production technologyofbio-pesticides.Virulence,pathogenicityandsymptomsofentomopathogenicpathogensand nematodes.

Unit- II:

- Methodsofapplicationofbiopesticides.MethodsofqualitycontrolandTechniquesofbiopesticides.Impediments andlimitationinproductionanduse ofbiopesticide.

Unit- III:

- Biofertilizers - Introduction, status and scope. Structure and characteristic features ofbacterialbiofertilizers-Azospirillum,Azotobacter,Bacillus,Pseudomonas,RhizobiumandFrankia;Cynobacterialbiofertilizers-Anabaena,Nostoc,Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorhiza. Nitrogenfixation-Free living andsymbiotic nitrogenfixation.

Unit- IV:

- Mechanism of phosphate solubilization and phosphate mobilization, K solubilization.Productiontechnology: Strain selection, sterilization, growth and fermentation, massproductionofcarrier based and liquid biofertiizers.

Unit- V:

- FCO specifications and quality control of biofertilizers. Application technology forseeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control andmarketing.Factors influencingtheefficacyof biofertilizers.

Practical:

Isolation and purification of important biopesticides: Trichoderma Pseudomonas, Bacillus,Metarhyziumetc.anditsproduction.Identificationofimportantbotanicals.Visittobiopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers.Identification of entomopathogenic entities in field condition.Quality control of biopesticides.IsolationandpurificationofAzospirillum,Azotobacter,Rhizobium,P-solubilizersandcyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation ofAMfungi-Wetsievingmethodandsucrosegradientmethod.MassproductionofAMinoculants.

Protected Cultivation

CO: COURSE OBJECTIVE

CO-1Enhanced Crop Productivity: To increase the yield per unit area by optimizing environmental conditions like temperature, humidity, and light for plant growth.

CO-2 Quality Improvement: To produce high-quality crops with uniformity in size, shape, and color by minimizing environmental stress and pest damage.

CO-3 Extended Growing Seasons: To enable off-season production or extend the growing season of specific crops, ensuring a continuous supply to the market.

CO-4 Resource Efficiency: To conserve resources such as water and nutrients through efficient irrigation systems like drip irrigation and fertigation.

CO-5 Pest and Disease Management: To reduce crop loss by providing a physical barrier against pests and diseases, minimizing the need for chemical pesticides.

CO-6 Climate Resilience: To mitigate the adverse effects of extreme weather events such as frost, hail, excessive rain, or drought, ensuring stable crop production.

CO-7 Diversification and Innovation: To enable the cultivation of high-value crops, exotic vegetables, flowers, and fruits that might not thrive in open-field conditions due to climatic limitations.

CourseContents

Unit- I:

- Protected cultivation- importance and scope, Status of protected cultivation in Indiaand World types of protected structure based on site and climate. Cladding materialinvolved in greenhouse/ polyhouse.

Unit- II:

- Greenhousedesign,environmentcontrol,artificiallights,Automation.Soilpreparationand management,Substratemanagement.Typesofbenchesandcontainers.Irrigation andfertigation management.

Unit- III:

- Propagationandproductionofqualityplantingmaterialofhorticulturalcrops.Greenhousec ultivationofimportanthorticulturalcrops– rose,carnation,chrysanthemum,gerbera,orchid,anthurium,lilium,tulip,tomato,bellpeppe r,cucumber,strawberry, pot plants, etc.

Unit- IV:

- Cultivationofeconomicallyimportantmedicinalandaromaticplants.Off-seasonproductionofflowers andvegetables.Insectpestand diseasemanagement.

Practical:

Raising ofseedlingsandsaplingsunder protectedconditions,useofprotraysinqualityplanting material production,Bedpreparationandplanting of cropforproduction,Intercultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizersthroughdrip,fogging ad misting.

Micro propagation Technologies

CO: COURSE OBJECTIVE

CO-1Mass Production of Plants: To produce a large number of genetically identical plants in a relatively short time, ensuring consistent traits and uniform quality.

CO-2 Preservation of Genetic Traits: To maintain and propagate plants with specific desirable characteristics, such as disease resistance, high yield, or ornamental value.

CO-3 Propagation of Rare or Endangered Species: To conserve and multiply species that are rare, endangered, or difficult to propagate through conventional methods.

CO-4 Production of Disease-Free Plants: To obtain pathogen-free plants by using meristem or shoot-tip cultures, particularly in cases where diseases are transmitted through seeds or vegetative propagation.

CO-5 Year-Round Production: To enable plant propagation irrespective of seasonal or environmental limitations, ensuring a continuous supply of plants.

CO-6 Development of Genetically Engineered Plants: To propagate transgenic plants or plants developed through genetic engineering techniques that may have enhanced traits such as pest resistance or stress tolerance.

CO-7 Facilitation of International Trade: To produce plants in sterile, contamination-free conditions that comply with quarantine regulations, allowing for the export and import of plants without spreading diseases or pests.

CourseContents

Unit- I:

- Introduction,History,Advantagesandlimitations;Typesofcultures(seed,embryo,organ,callus, cell),

Unit- II:

- Stagesofmicro-propagation,Axillarybudproliferation(Shoottipandmeristemculture,bud culture),Organogenesis(callus anddirect organ formation),

Unit- III:

- Somaticembryogenesis,cell suspensioncultures,

Unit- IV:

- Productionof secondarymetabolites,Somaclonalvariation, Cryopreservation

Practical:

IdentificationanduseofequipmentintissueultureLaboratory,Nutritionmediacomposition,sterilizationtechniquesformedia,containersandsmallinstruments,sterilizationtechniquesforexplants,Preparationofstocksandworkingsolution,Preparationofworkingmedium,Culturingofexplants:Seeds,shoottipandsinglenode,Callusinduction,Inductionofsomaticembryosregenerationofwholeplantsfromdifferentexplants,Hardeningprocedures.

Hi-tech. Horticulture

CO: COURSE OBJECTIVE

CO-1Enhancing Productivity: To maximize the yield of high-value crops by using advanced cultivation techniques, optimized resource management, and superior plant genetics.

CO-2 Efficient Resource Utilization: To promote the efficient use of inputs such as water, nutrients, and energy through technologies like drip irrigation, fertigation, and protected cultivation.

CO-3 Improved Quality of Produce: To achieve higher quality standards in terms of size, color, taste, and shelf life by leveraging precision agriculture and controlled environment farming.

CO-4 Sustainability: To reduce the environmental footprint of horticultural practices by promoting eco-friendly techniques such as organic farming, integrated pest management (IPM), and renewable energy sources.

CO-5 Diversification of Crops: To introduce and promote the cultivation of high-value exotic and off-season crops, expanding the market and income opportunities for farmers.

CO-6 Reduction in Post-Harvest Losses: To minimize post-harvest losses by adopting modern storage, packaging, and transportation methods.

CO-7 Technology Dissemination and Farmer Empowerment: To transfer advanced technologies to farmers, enhancing their skills and enabling them to adopt profitable and sustainable horticultural practices.

CourseContents

Unit- I:

- Introduction&importance;Nurserymanagementandmechanization;micropropagationof horticultural crops;Modernfield preparation and planting methods,

Unit- II:

- Protectedcultivation:advantages,controlledconditions,methodandtechniques,Micro irrigation systems and its components; EC, pH based fertilizer scheduling,canopymanagement, high densityorcharding,

Unit- III:

- Components of precision farming: Remote sensing, Geographical Information System(GIS),DifferentialGeo-positioningSystem(DGPS),

Unit- IV:

- VariableRateapplicator(VRA),applicationofprecisionfarminginhorticulturalcrops(fruit s,vegetablesandornamental crops);mechanizedharvestingofproduce.

Practical:

Types of polyhouses and shade net houses, Intercultural operations, tools and equipmentsidentification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pHbasedfertilizerscheduling, canopymanagement,visitto hi-techorchard/nursery.

Weed Management

CO: COURSE OBJECTIVE

CO-1 **Understanding Weed Biology and Ecology**: Explain the life cycles, reproduction strategies, and ecological roles of weeds in agricultural and non-agricultural ecosystems.

CO-2 **Identification and Classification of Weeds**: Equip students with the skills to identify common weed species and classify them based on their morphology, lifecycle, and habitat.

CO-3 **Principles of Weed-Crop Competition**: Analyze the impact of weeds on crop growth and yield through competition for resources like light, water, and nutrients.

CO-4 **Weed Control Methods**: Compare and evaluate various weed management strategies, including cultural, mechanical, biological, and chemical control methods.

CO-5 **Integrated Weed Management (IWM)**: Design and implement integrated weed management plans that combine multiple control strategies to ensure long-term weed suppression and sustainable agriculture.

CO-6 **Herbicide Use and Resistance Management**: Examine the proper use of herbicides, their mode of action, environmental impact, and strategies to prevent or manage herbicide resistance.

CO-7 **Economic and Environmental Impacts of Weed Management**: Assess the cost-benefit analysis of weed control measures and their implications for environmental sustainability and agricultural productivity.

CourseContents

Unit- I:

- Introduction to weeds, characteristics of weeds their harmful and beneficial effects onecosystem.Classification, reproduction and dissemination ofweeds.

Unit- II:

- Herbicide classification, concept of adjuvant, surfactant, herbicide formulation andtheiruse. Introduction tomode ofaction ofherbicidesand selectivity.

Unit- III:

- Allelopathyanditsapplicationforweedmanagement.Bio-herbicidesandtheirapplicationinagriculture. Concept of herbicide mixtureand utilityinagriculture.

Unit- IV:

- Herbicidecompatibilitywithagro-chemicalsandtheirapplication.Integrationofherbicides withnonchemical methods of weed management. Herbicide Resistanceandits management.

Practical:

Techniques of weed preservation. Weed identification and their losses study. Biology ofimportant weeds. Study of herbicide formulations and mixture of herbicide. Herbicide andagro- chemicals study. Shift of weed flora study in long term experiments. Study of methodsof herbicide application, spraying equipments. Calculations of herbicide doses and weedcontrolefficiencyandweed index.

System Simulation and Agro-advisory

CO: COURSE OBJECTIVE

CO-1 **Understand System Simulation Basics**: To introduce the fundamentals of system simulation, including types of models (e.g., discrete-event, continuous, hybrid), simulation techniques, and their applications in agricultural systems.

CO-2 **Develop Simulation Models for Agricultural Systems**: To develop and implement simulation models to represent agricultural processes such as crop growth, irrigation, pest management, and climate change impacts.

CO-3 **Analyze and Interpret Simulation Data**: To train students on analyzing simulation results, understanding model outputs, and interpreting data in the context of agricultural decision-making.

CO-4 **Explore the Role of Agro-Advisory Systems**: To provide a deep understanding of agro-advisory systems, their importance, and how they provide actionable insights to farmers for crop management, pest control, irrigation, and fertilization.

CO-5 **Apply Simulation Techniques to Agro-Advisory Tools**: To explore how simulation models can be integrated with agro-advisory systems to provide personalized, data-driven recommendations for farmers.

CO-6 **Assess the Impact of Climate and Environmental Variables**: To understand how environmental variables like weather, climate change, and soil conditions affect agricultural systems, and how to simulate their impacts for better planning and advisories.

CO-7 **Evaluate and Design Decision Support Systems for Agriculture**: To help students evaluate existing decision support systems and design new ones that leverage simulation models to optimize agricultural practices and improve farm productivity and sustainability.

CourseContents

Unit- I:

- System Approach for representing soil-plant-atmospheric continuum, systemboundaries, Crop models, concepts & techniques, types of crop models, datarequirements,relationaldiagrams.

Unit- II:

- Evaluation of crop responses to weather elements; Elementary crop growth models;calibration, validation, verification and sensitivity analysis .Potential and achievablecropproduction-conceptand modellingtechniquesfortheir estimation.

Unit- III:

- Crop production in moisture and nutrients limited conditions; components of soilwater and nutrients balance. Weather forecasting, types, methods, tools & techniques,forecastverification;

Unit- IV:

- Value added weather forecast, ITK for weather forecast and its validity; Crop-Weather Calendars; Preparation of agro-advisory bulletin based on weather forecast.Use of crop simulation model for preparation of Agro-advisory and its effectivedissemination.

Practical:

Preparationofcropweathercalendars.Preparationofagro-advisoriesbasedonweatherforecastusingvariousapproachesandsynopticcharts.Workingwithstatisticalandsimulation models for crop growth. Potential & achievable production; yield forecasting,insect&diseaseforecastingmodels.Simulationwithlimitationsofwaterandnutrientmanagement options. Sensitivity analysis of varying weather and crop management practices.Use of statistical approaches in data analysis and preparation of historical, past and presentmeteorological data for medium range weather forecast. Feedback from farmers about theagro-advisory.

Agricultural Journalism

CO: COURSE OBJECTIVE

CO-1Understand Agricultural Issues and Trends: To familiarize students with the key issues, challenges, and trends in agriculture, including sustainability, food security, climate change, and technological advancements.

CO-2 Develop Writing and Reporting Skills: To teach students how to effectively research, write, and report on agricultural topics, ensuring clarity and accuracy while making complex subjects accessible to diverse audiences.

CO-3 Foster Multimedia Communication Abilities: To enable students to use various media formats—such as print, radio, television, and digital platforms—to communicate agricultural stories, including the use of social media for outreach.

CO-4 Critically Analyze Agricultural Policies and Practices: To provide students with the skills to critically assess agricultural policies, practices, and their impacts on rural communities, economies, and the environment.

CO-5 Enhance Ethical and Responsible Journalism: To instill a strong understanding of journalistic ethics, particularly in the context of reporting on agricultural issues, with a focus on balanced, fair, and transparent reporting.

CO-6 Cultivate Collaboration with Agricultural Stakeholders: To prepare students to work closely with farmers, agricultural businesses, government agencies, NGOs, and other stakeholders in the agricultural sector to gather information and enhance their stories.

CO-7 Promote Advocacy and Public Awareness: To empower students to use journalism as a tool for advocacy, raising awareness about critical agricultural issues and contributing to informed public discourse on topics such as food production, rural development, and environmental sustainability.

CourseContents

Unit- I:

- AgriculturalJournalism:Thenatureandscopeofagriculturaljournalismcharacteristics and training of the agriculturaljournalist,how agricultural journalismissimilartoand differentfromothertypes ofjournalism.

Unit- II:

- Newspapersandmagazinesascommunicationmedia:Characteristics;kindsandfunctions of newspapers and magazines, characteristics of newspaper and magazinereaders.Formandcontentofnewspapersandmagazines:Styleandlanguageofnew spapersand magazines, partsofnewspapersand magazines.

Unit- III:

- The agricultural story: Types of agricultural stories, subject matter of the agriculturalstory,structureoftheagriculturalstory.Gatheringagriculturalinformation:Sou rcesof agricultural information, interviews, coverage of events, abstracting from researchandscientific materials,wire services,otheragriculturalnews sources.

Unit- IV:

- Writing the story: Organizing the material, treatment of the story, writing the newsleadandthebody,readabilitymeasures.Illustratingagriculturalstories:Useofphotogr aphs,useofartwork(graphs,charts,maps,etc.),writingthecaptions.Editorialmechanics:Co pyreading,headlineandtitlewriting,proofreading,layouting.

Practical:

Practice in interviewing. Covering agricultural events. Abstracting stories from research andscientific materials and from wire services. Writing different types of agricultural stories.Selecting pictures and artwork for the agricultural story. Practice in editing, copy reading,headline and title writing, proofreading, layouting. Testing copy with a readability formula.Visitto apublishingoffice.