Y24: Bachelor of Science (Honors) Agriculture

Category: Professional Core Courses (PCC)

24AECO241 - PRINCIPLES OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AECO241	PRINCIPLES OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT	PAEFM	R	2	0	0	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro- and macro-economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior.	2	PO1, PO5, PO11
CO2	To impart knowledge on judicious use of resources for optimum production	2	PO1, PO5, PO11
CO3	To apply the concepts of farm management, production economics, types and systems of farming, production functions, factor-product relationship.	2	PO1, PO5, PO11
CO4	To apply the concepts of cost, farm inventory, farm planning and budgeting and linear programming	2	PO1, PO5, PO11

Syllabus

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

Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.

Demand meaning law of demand demand schedule and demand curve determinants utility theory law of diminishing marginal utility, equi-marginal utility principle Consumers equilibrium and derivation of demand curve concept of consumer surplus

Elasticity of demand concept and measurement of price elasticity income elasticity and cross elasticity Production process creation of utility, factors of production input output relationship

Laws of returns Law of variable proportions and law of returns to scale Cost Cost concepts short run and long run cost curves Supply Stock vs supply law of supply supply schedule supply curve determinants of supply elasticity of supply

Distribution theory meaning factor market and pricing of factors of production Concepts of rent wage interest and profit National income Meaning and importance circular flow concepts of national income accounting and approaches to measurement difficulties in measurement Population Importance Malthusian and Optimum population theories natural and socio economic determinants current policies and programs on population control

Money Barter system of exchange and its problems evolution meaning and functions of money classification of money money supply general price index inflation and deflation Economic systems Concepts of economy and its functions important features of capitalistic socialistic and mixed economies elements of economic planning. Forms of business organizations international trade and balance of payments. GST and its implication on Indian economy

Forms of business organizations international trade and balance of payments. GST and its implication on Indian economy

Reference Books

1 Fundamentals of Farm Business Management, Johl S S and T R Kapur 2009, 1, Kalyani Publishers .

2 Agricultural Economics, S Subha Reddy P Raghu Ram T V Neelakanta and I Bhvani Devi , 2, Oxford & IBH publishing Co Pvt Ltd.

3 Principles of Agricultural Economics, Andrew Barkley and Paul W. Barkley, 2, : Routledge Textbooks in Environmental and Agricultural Economics.

4 Textbook of Agri-Economics and Farm Management , Trilochan Acharya, 1, Heritage Publishers & Distributors Pvt. Ltd..

24AECO342 - AGRICULTURAL FINANCE AND COOPERATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AECO342	AGRICULTURAL FINANCE AND COOPERATION	AFC	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	PRINCIPLES OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT	PAEFM	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the importance of credit in agriculture and the criteria to avail credit	2	PO2, PO4, PO7
CO2	Apply the source of credit crop loan system and financial inclusion	3	PO2, PO4, PO7
CO3	Application of different schemes for financing weaker sections also the higher financing agencies present in India and world along with crop insurance schemes	3	PO2, PO4, PO7
CO4	Application of agricultural project, cycle, cooperation, and history along with cooperative institutions in India	4	PO2, PO4, PO7
CO5	Analyze the progress of priority sector lending working out different repayment plans and prepare balance sheet along with income statement	4	PO2, PO4, PO7

Syllabus

Theory Agricultural Finance meaning scope and significance capital and credit needs and their role in Indian agriculture credit meaning definition need classification Credit analysis 3 Rs and 5Cs and 7 Ps of credit analysis Sources of agricultural finance institutional and noninstitutional sources social control and nationalization of commercial banks RRBs Lead bank scheme

Crop loan scheme Scale of finance and unit cost Cost of credit KCC Financial inclusion Micro financing and schemes for financing weaker sections Crop insurance AICI PMFBY Introduction to higher financing institutions RBI NABARD World bank group institutions Recent developments in agricultural credit.Agril Projects project meaning importance Project cycle and phases

Basic guidelines for preparation of project reports Agricultural Cooperation Meaning objectives principles of cooperation brief history of cooperative development in India significance of cooperatives in Indian agriculture Agricultural Cooperative institutions in India credit marketing consumer and multipurpose cooperatives farmers service cooperative societies processing cooperatives cooperative warehousing Role of ICA NCUI NCDC

Practical Determination of most profitable level of capital use Optimum allocation of limited amount of capital among different enterprises Analysis of progress and performance of cooperatives using published data Analysis of progress and performance of commercial banks and RRBs using published data Visit to a commercial bank cooperative bank and cooperative society to acquire firsthand knowledge of their management schemes and procedures of lending and sanction of loans

Estimation of credit requirement of farm business A case study Preparation and analysis of balance sheet A case studyPreparation and analysis of income statement A case study Appraisal of a loan proposal A case study Technoeconomic parameters for preparation of projects Preparation of Bankable projects for various agricultural products and value added products Seminar on selected topics

Reference Books

1 Agricultural Finance and Management, Subba Reddy S and P Raghuram, 1,2018, Oxford & Publishing Company Private Ltd., New Delhi..

2 Agricultural Economics, Raghu Ram P Sastry T V N and Bhavani Devi, 2,2019, Oxford IBH Publishing Company Private Ltd New Delhi.

3 Agricultural Finance, William G Murray and Nelson Aarsonn G, 1,1960, Iowa state University press Ames IOWA.

4 Financial Decision Making Concepts Problems and Cases, John J Hamptron, 2,2010, India publications New Delh.

5 A TEXT BOOK OF AGRICULTURAL FINANCE AND COOPRATION, Vishnu Shankar Meena, Shirish Sharma, Sweta Singh, 1,2022, S.R.Scientific Publication.

24AENG251 - FARM MACHINERY AND POWER (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AENG251	FARM MACHINERY AND POWER	FMP	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the concepts of Sources of farm power - I.C. engines - Working principles of I C engines - Comparison of two stroke and four stroke cycle engines - Study of different components of I.C. engine - I.C. engine terminology and solved problems - Familiarization with different systems of I.C. engines	2	PO6, PO11
CO2	Understand about Fuel supply and hydraulic control system of a tractor - Familiarization with power transmission system	2	PO6, PO11
CO3	Understand the concept of plant protection equipment - Familiarization with harvesting and threshing equipment Practical- Study of different components of I.C. engine	2	PO7, PO10
CO4	Apply knowledge in different types of primary and secondary tillage implements	3	PO6, PO11
CO5	Analyse the practical knowledge in harvesting and threshing machinery.	4	PO6, PO11

Syllabus

Status of farm power in India - Sources of farm power - I.C. engines - Working principles of I C engines - Comparison of two stroke and four stroke cycle engines - Study of different components of I.C. engine - I.C. engine terminology and solved problems - Familiarization with different systems of I.C. engines

Fuel supply and hydraulic control system of a tractor - Familiarization with power transmission system. Tillage - Primary and secondary tillage - M.B. plough, Functions, constructional features, operational adjustments and maintenance, Study of different components of I.C. engine

Familiarization with plant protection equipment - Familiarization with harvesting and threshing equipment, Practical- Harrows -Types, functions, operation of disc harrows - Cultivators-Rigid and spring loaded tynes - Puddlers, cage wheel, rotovators - Intercultural implements like Hoes and weeders for dry and wetland cultivation.

Familiarization with different types of primary and secondary tillage implements. Tractor mounted equipments for land development and soil conservation -Functions of bund former, ridger, and leveling blade.Threshing equipment and principles of combine harvester

Showing the difference between EC engine and constructional details of IC engine. Familiarizing with clutch -Gearbox - Differential and final drive along with brake stearing hydraulic control of tractor, Familiarization with inter-cultural equipment and different types available in the market

Reference Books

1 Elements of Agricultural Engineering, Jagadishwar Sahay, 7 (2020), Standard publishers .

2 Farm Machinery - Principles and Applications, Surendra Singh, 2020, ICAR Publishers.

3 Principles of Agricultural Engineering, Ojha, T. P. and Michael, A.M, 15 (2023), Jain Brothers.

4 Farm power and machinery, Surendra singh, 2019, Brillion.

24AENG351 - RENEWABLE ENERGY IN AGRICULTURE AND ALLIED SECTOR (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AENG351	RENEWABLE ENERGY IN AGRICULTURE AND ALLIED SECTOR	REAA	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the classification of various energy sources and importance of renewable energy sources like solar energy, wind energy and biomass energy	2	PO1, PO6, PO10
CO2	Understand the concepts of gasifiers, briquettes, briquetting machinery, shredders and solar appliances	2	PO1, PO7, PO10
CO3	understand the concepts of heating and cooling systems for effective functioning of various solar gadgets like solar cookers, solar water heating systems etc.	2	PO6, PO7, PO10
CO4	apply the performance of wind mills and understanding the concept of biofuels production from various feedstocks	3	PO1, PO7, PO10
CO5	Analyze the working of biogas plants, gasifiers, solar appliances and performance evaluation of solar photovoltaic system	4	PO6, PO7, PO10

Syllabus

Introduction to renewable energy sources, classification, advantages and disadvantages. Biomass, Importance of biomass, classification of energy production. Principles of combustion, pyrolysis and gasification. Principles of biogas production, advantages, disadvantages, utilization. Classification, types of biogas plants, constructional details of biogas plants

Types of gasifiers, producer gas and its utilization. Briquettes, briquetting machinery, types and uses of briquettes, shredders. Application of solar energy, methods of heat transfer. Solar appliances, flat plate collectors, focusing type collectors, solar air heater

Solar space heating and cooling, Solar energy gadgets, solar cookers, solar water heating systems. Solar grain dryers, solar refrigeration system, solar ponds, solar photovoltaic system, solar lantern, solar street lights, solar fencing, solar water pumping system. Wind energy, advantages, disadvantages, wind mills and types

Constructional details of wind mills, applications of wind mills. Characteristics of various biofuels, different parameters and calorific values. Applications of biodiesel, extraction from jatropha. Ethanol from Sugarcane and corn

Familiarization with renewable energy gadgets, biogas plants, the production process of biodiesel, briquetting machine, production process of bio-fuels - Familiarization with different solar energy gadgets, solar photovoltaic system, Solar light - Solar pumping - Solar fencing, solar distillation and solar pond

Reference Books

1 Non-conventional Energy Sources, Rai, G. D., 1 (1988), Khanna Publishers, New Delhi..

2 Non-Conventional Energy Sources, Rajput, R. K., 1 (2014), S. Chand Publishers..

3 Principles of Agricultural Engineering. Vol.I, Ojha, T.P. and Michael,A.M., 14 (2021), Jain Brothers, New Delhi..

4 Alternate Sources of Energy, Rathore, N.S., Mathur,A.N. and Kothari, S., 1 (2007), ICAR Publication.

5 Biotechnology and other alternative technologies for utilization of biomass - Agricultural Wastes. , Chakravarty, A. and Amalendu Chakraverty, 1 (1989), Oxford and IBH. Publishers, New Delhi..

24AEXT191 - RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AEXT191	RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY	RSEP	R	2	0	0	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand every village in India maintained a social and economic existence that was essentially independent. That was the distinctive aspect of India\	2	PO1, PO3, PO4
CO2	Understand culture transforms a man into a human being, governs his behaviour, and gets him ready for social interaction.	2	PO1, PO2, PO3
CO3	Apply at one time during the history of psychology, scholars felt that the main business of psychology was to study our conscious experience.	3	PO1, PO3, PO4
CO4	Analyze the personality is the total quality of an individual	4	PO1, PO2, PO3
CO5	Analyze the Rural sociology and educational psychology for practical purpose	4	PO1, PO2, PO3

Syllabus

Sociology and Rural Sociology - Meaning, definition, scope, its significance inAgricultural Extension - Importance of Rural Sociology in Agricultural Extension and their interrelationship.Different. cultural concepts - Culture, tradition, customs, folkways, mores, taboos, ritual -Definition, meaning, concept and examples and their role in Agricultural Extension.Indian rural society -Characteristics, differences and relationship between rural and urban society

Intelligence - Meaning, types, and factors affecting intelligence Intelligence - importance in Agricultural Extension. Perception - Meaning, types, factors influencing perception Importance of perception in Agricultural Extension. Emotions and frustration- Meaning, types, factors affecting it Emotions and frustration - importance in Agricultural Extension.

Different cultural concepts - Culture, tradition, customs, folkways, mores, taboos, ritual - Definition, meaning, concept and examples and their role in Agricultural Extensionocial values, Social control , Attitudes-Meaning, definition and types; need of social control and means of social control Social values, social control , Attitudes -role in Agricultural Extension

Personality - Meaning, definition, types, factors influencing personality, Social values, social control , Attitudes - role in Agricultural Extension.Motivation - Meaning, types of motives, theories of motivation Motivation - importance of motivation in Agricultural Extension teaching, learning, learning experience, learning situation -Meaning and definition, elements of learning situation and its characteristics

Visit the village to study the characteristics of rural society rural stratification, social groups, social institutions, in the rural areas. To know the social organizations in the rural areas. To implement a technology in rural areas under practical purpose To analyze their social values and their psychological development with respect to emotions, personality and their behaviour under motivation.

Reference Books

1 Extension Education, Adivi Reddy, A, 4, 1987, Sree Lakshmi Press, Bapatla.

2 Introductory Rural Sociology, chitambar jb , 4, 2020, New Age International Private Limited.

3 Educational Psychology in Agriculture, Daivadeenam, P., 2, 2019, Agrotech Publishing Academy, Udaipur.

4 Extension Communication and Management, Ray, G. L, 8, 2023, Prokash/ Kalyani Publishers, Ludhiana.

5 Essentials of Educational Psychology, J C Aggarwal & Sandeep Kumar, 4, 2020, Prakash Brothers, Ludhiana..

24AEXT291 - FUNDAMENTALS OF EXTENSION EDUCATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AEXT291	FUNDAMENTALS OF EXTENSION EDUCATION	FAE	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Fundamentals of extension education and agricultural extension.	2	PO1, PO9, PO10
CO2	Apply the Agricultural developmental programs and community development	3	PO1, PO7, PO9
CO3	Apply the Panchayat Raj system and women development programs.	3	PO1, PO9, PO10
CO4	Analyze about transfer of technology, Training of farmers, farmwomen and farm youth, and Extension teaching methods	4	PO1, PO7, PO10
CO5	Analyze practical study on various types of audio-visual aids, and Group discussion	4	PO1, PO7, PO9

Syllabus

Education: Meaning, definition & Types - Formal, Non - Formal and Informal Education; Extension Education - meaning, definition, Concepts, Characteristics scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development. Community Development - meaning, definition, concept & principles, Philology of C.D. Rural Development: meaning, Definitions, concept, Characteristics, Objectives, Importance and Problems in Rural Development

Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Sevagram, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, T & V System, KVK, IVLP, ORP, ND, NATP, ATMA, SREP,ATIC, NAIP, NFSM, RKVY etc.). New trends in agriculture extension: privatization extension, cyber extension/ eextension, market-led extension, farmer-led extension, expert systems, etc.

Community Development - meaning, definition, concept & principles, Philology of C.D. Rural Development: meaning, Definitions, concept, Characteristics, Objectives, Importance and Problems in Rural Development: various rural development programmes launched by Govt. of India - National Extension Service (NES). Monitoring and evaluation - Meaning, definition, concept, Objectives, Types and Importance. and monitoring and evaluation of extension programmes; transfer of technology.

Training Meaning , definition, Types of Training - Pre Service Training, In - Service, Orientation, Induction Training, Refresher Training and Training for Professional Qualification. Functions of Communication, models - Aristotle, Shannon Weaver, Berlo, Schramm, Rogers and Shoemaker, Litterer, Westley barriers to communication. Attributes of Innovation - Relative Advantage, Compatibility, Complexity, Trialability - Observability and Predictability,Innovation - Decision Process - Meaning - Stages (Knowledge, Persuasion, Decision, Implementation and Confirmation).

To study and familiarize university extension system. Community Development - meaning, definition, concept & principles, Philology of C.D. Rural Development: meaning, Definitions, concept, Characteristics, Objectives, Importance and Problems in Rural Development. Rural Leadership: Meaning, Definition and concept, types of leaders in rural context, Roles of Leaders, different Methods in Selection of a Leader. Training of Leaders - Lay and Professional Leaders, Advantages and Limitations in using Local Leaders in Agricultural Extension.

Reference Books

1 Extension Education, Adivi Reddy, 5 (1998), Sree Lakshmi Press, Bapatla..

2 Extension and Communication for Development, Dahama, O.P., 8 (2005), Oxford & IBH Private Limited, New Delhi.

3 Fundamentals of Extension Education, Jalihal, K.A, 4 (2000), Concept Publishing House.

4 Communication, Rayudu, C.S, 3 (2008), Himalaya Publishing.

5 Diffusion of Innovation, Rogers, E.M, 6 (2010), Free Press.

24AGRO101 - FUNDAMENTALS OF AGRONOMY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO101	FUNDAMENTALS OF AGRONOMY	FA	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand principles of agronomy with interdisciplinary approach invovling Botany, Soil Science, Irrigation, plant protection, Plant Genetics and Breeding, Agrometeorology etc	2	PO2, PO3, PO8
CO2	Describe the classification of various nutrients and their effects on plant health and plan irrigation measures for plant growth and development	2	PO2, PO3, PO8
CO3	Demonstrate on sustainable agricultural production, and apply scientific methods and tools in field preparation and for designing cropping systems	3	PO2, PO3, PO8
CO4	Apply the impact of the professional agricultural solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development	3	PO2, PO3, PO8
CO5	Interpret proper crop management practices with practical knowledge to produce food for humans.	3	PO2, PO3, PO8

Syllabus

Introduction to Agriculture, Agronomy, Tillage and Types with modern concepts of tillage, Seed and sowing, methods and crop geometry, Plant population, soil fertility, Crop nutrition and their symptoms, manures and fertilizers and Irrigation and methods and importance with crop growth and development

Plant population, soil fertility, Crop nutrition and their symptoms, manures and fertilizers and Irrigation and methods and importance with crop growth and development, Dry land farming, Soil moisture conservation methods, Weed Introduction and Classification and methods of weed control and Weed biology and crop weed competition

Herbicides, classification, selectivity, resistance , allelopathy; Growth and development of crops, factors affecting growth and development, plant ideotypes; Crop rotation and its principles

Crop adaptation and distribution in India and Andhra Pradesh - Factors influencing crop adaptation and distribution. Common problems in crop production related to climate, soil, pest and disease incidence - Crop management technologies to overcome the problems identified

Land preparation, layout, sowings in students plots, identification of crops and recording biometric observations in students plots, juice quality of sugarcane, hey and silage making and visit to research stations, farmers fields.

Reference Books

1 Agronomy of field crops, Reddy, S.R. and Reddi Ramu, 5th edition, 2016, Kalyani publishers.

2 Text book of field crops production., Rajendra Prasad., 3rd edition, 2006, echnical Editor, ICAR, New Delhi.

3 Fundamentals of Agronomy, Gopal Chandra de., 3rd , 1989, Oxford & IBH Publishing Co. Pvt. Ltd. , New Delhi.

4 Fundamentals Of Agronomy As per ICAR new SYLLABUS , SR Reddy, 4 th,2016, Kalyani publishers.

24AGRO201 - CROP PRODUCTION TECHNOLOGY - I (KHARIF CROPS) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO201	CROP PRODUCTION TECHNOLOGY - I (KHARIF CROPS)	CPT-1	R	1	0	4	0	3

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF AGRONOMY	FA	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand origin, geographical distribution, economic importance, area, production and productivity of field crops	2	PO4, PO6, PO8
CO2	Interpret the different management practices in wheat and maize crops	3	PO4, PO6, PO8
CO3	Identify economic importance, Adaptations, soil and climatic requirements, growth Stages and harvesting of all millets.	3	PO4, PO6, PO8
CO4	Estimate Nutrient management, water management, weed management, yield attributes and yield of Bengal gram, lentil and peas.	4	PO4, PO6, PO8
CO5	Record and estimate the sowing depth on germination of cereal and pulse crops, identification of weeds in cereal and pulse crops.	4	PO4, PO6, PO8

Syllabus

Origin, geographical distribution, economic importance, area, production and productivity; Soil and climatic requirements, climate resilience;Varieties, cultural practices and yield of cereal, millet and pulse crops;

Cereals, rice, wheat, barley, maize, sorghum, pearl millet, finger millet, proso millet, little millet, kodo millet, foxtail millet and barnyard millet; Pulses, pigeonpea, greengram, blackgram, bengalgram, lentil, peas, horsegram and cowpea.

Practical Rice nursery preparation, transplanting of rice, sowing of pigeonpea , greengram and maize, effect of seed size on germination and seedling vigour of cereal and pulse crops,

Effect of sowing depth on germination of cereal and pulse crops, identification of weeds in cereal and pulse crops, top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of cereal and pulse crops,

Study crop varieties and conduct important agronomic experiments at an experimental farm, provide morphological descriptions of cereal and pulse crops, and visit research centers related to these crops to gain comprehensive knowledge and practical insights into crop management and breeding techniques.

Reference Books

1 Principles of Agronomy , G.H. Shankara Reddy T. Yallamanda, 1. 2014, ISA New Delhi.

2 Crop Production Technology, R. K. Sharma, 2012, Daya Publishing House.

3 Principles of Agronomy and Crop Production, T. Yellamanda Reddy and G.H. Sankara Reddy, 2. 2000, Kalyani Publishers.

4 Crop Production and Field Crops, Rajendra Prasad, 2006, ICAR.

24AGRO202 - PRINCIPLES AND PRACTICES OF NATURAL FARMING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO202	PRINCIPLES AND PRACTICES OF NATURAL FARMING	PPNF	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand history and importance of natural farming	2	PO2, PO6, PO11
CO2	Demonstrate methods of natural farming	3	PO2, PO6, PO11
CO3	Explore concepts of natural farming	3	PO2, PO6, PO11
CO4	Apply certification and labelling of natural products	3	PO2, PO6, PO11
CO5	Analyse various methods of natural farming	4	PO2, PO6, PO11

Syllabus

Indian Heritage of Ancient Agriculture, History of Natural Farming, Importance of natural farming in view of climate change, soil health, water use carbon sequestration, biodiversity conservation, food security and nutritional security, and sustainable development goals (SDGs), Concept of natural farming; Definition of natural farming; Objective of natural farming, Essential characteristics and Principles of natural farming; Scope and importance of natural farming.

Main Pillars of natural farming; Methods/ types/schools of natural farming. Characteristics and design of a natural farm, Concept of ecological balance, ecological engineering and community responsibility in natural versus other farming systems, Introduction to concept of ecological, water, carbon and nitrogen foot prints, Concept and evaluation of ecosystem services, integration of crops, trees and animals, cropping system approaches

Biodiversity, indigenous seed production, farm waste recycling, water conservation and renewable energy use approaches on a natural farm, Rearing practices for animals under natural farming, Nutrient management in natural farming and their sources, Insect, pest, disease and weed management under natural farming; Mechanization in natural farming

Processing, labelling, economic considerations and viability, certification and standards in natural farming, marketing and export potential of natural farming produce and products. Initiatives taken by Government (central/state), NGOs and other organizations for promotion of natural farming and chemical free agriculture, Case studies and success stories in natural farming and chemical free traditional farming, Entrepreneurship opportunities in natural farming.

Visit of natural farm and chemical free traditional farms to study the various components and operations of natural farming principles at the farm; Indigenous technical knowledge (ITK) for seed, tillage, water, nutrient, insect-pest, disease and weed management; On-farm inputs preparation methods and protocols, Studies in green manuring in-situ and green leaf manuring, Studies on different types of botanicals and animal urine and dung based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management; Weed management practices in natural farming; Techniques of Indigenous seed production- storage and marketing, Partial and complete nutrient and financial budgeting in natural farming; farming; Evaluation of ecosystem services in natural farming (Crop, Field and System).

Reference Books

1 The Natural Way of Farming: The Theory and Practice of Green Philosophy, Fukuoka, M, 1985, Japan Publications, Tokyo.

2 The One-Straw Revolution: An Introduction to Natural Farming. , Fukuoka, M, 1978, Rodale Press, Emmaus.

3 State of Organic and Natural Farming: Challenges and Possibilities, Khurana, A. and Kumar, V. , 2020, Centre for Science and Environment, New Delhi..

4 Ecological Farming- The seven principles of a food system that has people at its heart., Reyes Tirado, 2015, University of Exeter, Ottho Heldringstraat.

24AGRO203 - CROP PRODUCTION TECHNOLOGY - II (RABI CROPS) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO203	CROP PRODUCTION TECHNOLOGY - II (RABI CROPS)	CPT-II	R	1	0	4	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand origin, geographical distribution, nutritional value, economic importance of groundnut crop	2	PO3, PO4, PO6
CO2	Execute the package of practices of safflower and castor crops	3	PO3, PO4, PO6
CO3	Demonstrate importance, climatic requirements of jute and mesta crops	3	PO3, PO4, PO6
CO4	Analyse curing of Virginia tobacco and quality of fodder crops	4	PO3, PO4, PO6
CO5	Demonstrate land preparation, layout, sowings in students plots, identification of crops and recording biometric observations of crops	4	PO3, PO4, PO6

Syllabus

Origin, geographical distribution, area, production, economic importance- soil and climatic requirement, Land preparation - seeds and sowing, varieties, nutrient, water, weed management and harvesting of soybean and sunflower crops

Complete knowledge on origin, geographical distribution, economic importance, soil and climatic Requirements, important varieties, pest, and diseases resistance varieties, cultural practices, and yield of Rabi crops

Origin- geographical distribution - economic importance- classification, soil and climatic requirements , varieties, cultural practices and Harvesting of jute and mesta crops. land preparation - seeds and sowing- seed treatment-seed ratespacing- season-time and method of sowing

Illustrate with proper knowledge about irrigation scheduling in Rabi season crops, the additional area can Increase of low water required crops. Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements-Land preparation - seeds and sowing- seed treatment-seed ratespacing- season-time and method of sowing- varieties

Field management practices and also identification of growth stages critical stages, pest and disease management etc. Which can be solved at field level. Also, complete awareness on crop cultivation practices of Rabi crops. Origin - geographical distribution - area, production and productivity in India and Andhra Pradesh - economic importance- soil and climatic requirements- Land preparation - seeds and sowing- seed treatment-seed rate-spacing-seasontime and method of sowing- varieties

Reference Books

1 Rajendra Prasad., text book of field crops production., 3rd ediition, 2004, Technical Editor, ICAR, New Delhi..

2 .Agronomy of fodder and forage crops,, Panda S.C, 5th edition, 2014, Kalyani publishers,.

3 Scientific field crop production, Gururaj hunsigi and Krishna, K.R., 2nd, 2007, Oxford &IBH Publishing

4 Principles and practices of rice Production, De Datta, S.K., 4, 1981, John Wiley and Sons, New York.

24AGRO204 - WATER MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO204	WATER MANAGEMENT	WM	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF AGRONOMY	FA	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the knowledge of irrigation water management to maximize crop yield	2	PO2, PO6, PO8
CO2	Understand the ways to improve crop performance by evaluating the different types of irrigation methods	2	PO4, PO6, PO8
CO3	Understand the knowledge of various irrigation methods which are more efficient to minimize the water loss and improve the water use efficiency of crop	2	PO2, PO4, PO6
CO4	Understand the knowledge on water requirements of crops, soil-plant- relationship, irrigation requirements, duty and delta, irrigation efficiencies	2	PO2, PO4, PO8
CO5	Analyze the need for efficient and effective irrigation to maximize crop yield and quality whilst making best use of the water available.	4	PO2, PO4, PO8

Syllabus

Irrigation : Definition and objectives; Water resources, Irrigation projects (major, medium & minor) in India and Andhra Pradesh; Soil - plant - water relationships: Importance - Soil a three phase disperse system- Physical properties of soil viz., Depth, Soil texture, Soil structure, Particle density, Bulk density & Porosity influencing water retention, movement & availability.; Methods of soil moisture estimation and Water retention in soil

Kinds of water in soil- Gravitational water- Capillary water- Hygroscopic water - Their importance in crop production. Soil moisture constants- Saturation capacity- Field capacity- Permanent wilting point- Available soil moisture - Hygroscopic coefficient- Theories of soil water availability. Plant-water relationships and Root characteristics. Evapotranspiration- Soil evaporation & Plant transpiration and water requirement of crops

Scheduling of irrigation- Different criteria- Soil water regime approach- Feel & appearance method, Soil moisture tension & Depletion of available soil moisture method. Climatological approach- Lysimeters & IW/CPE ratio method. Plant indices approach- Visual plant symptoms, Soil-cum-sand mini plot technique, Growth rate, Relative water content, Plant water potential, Canopy temperature, Indicator plants & Critical growth stages. Methods of irrigation - Surface, Subsurface, Sprinkler and Drip irrigation

Irrigation efficiency and Water use efficiency- Crop water use & Field water use efficiency- Factors influencing WUE ; Quality of irrigation water- Salinity hazard, Sodium hazard, Residual sodium carbonate & Boron toxicity- Criteria & threshold limits- Management practices for using poor quality water. Water logging- causes for waterlogging- Agricultural drainage- Surface & Subsurface drainage systems- Relative merits.

Practical Measurement of bulk density, study of soil moisture measuring devices, determination of field capacity and permanent wilting point, measurement of infiltration rate, irrigation water, scheduling of irrigation by IW/CPE ratio method, calculations on soil moisture, irrigation water needs, duty of water and irrigation efficiencies, layout of surface methods of irrigation, demonstration of drip and sprinkler irrigation, visit to micro irrigation systems in farmers fields ,water management practices in different crops.

Reference Books

1 Irrigation, Theory and Practice, Michael, A.M, 2nd, 2008, Vikas Publishing House Pvt. Ltd., New Delhi.

2 Irrigation Agronomy , Reddy, S.R and Reddy G.K, 5th, 2019, Kalyani Publishers, Ludhiana.

3 Efficient use of irrigation water, G.H.Reddy and Yellamanda reddy, 1st, 2005, Kalyani Publishers.

4 Irrigation water management- Pricinples and practices, Dilip Kumar Majumdar, 2st, 2013, Prentice Hall India Learning Private Limited.

24AGRO301 - INTRODUCTION TO AGRO-METEOROLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO301	INTRODUCTION TO AGRO-METEOROLOGY	IAM	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Estimate the behaviour of the atmosphere and agroclimatic zones.	2	PO2, PO4, PO6
CO2	Understand agrometeorology in agriculture and the changes of individual weather elements and their relation to crop production.	2	PO2, PO4, PO6
CO3	Understand the management of weather hazards for improving crop productivity.	2	PO2, PO4, PO6
CO4	Demonstrate the weather forecasting and impact of climate change on agriculture	3	PO2, PO4, PO6
CO5	Record and estimate the observation from the agro meteorological observatory and also about the measurement.	3	PO2, PO4, PO6

Syllabus

Earth atmosphere, composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo;

Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, energy balance of earth; Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification

Artificial rainmaking; Monsoon,mechanism and importance in Indian agriculture; Weather hazards, drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and coldwave; Agriculture and weather relations, modifications of crop microclimate, climatic normals for crop and livestock production

Weather forecasting, types of weather forecast and their uses; Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture. Practical Visit of Agrometeorological observatory, site selection of observatory, exposure of instruments and weather data recording;

Measuring the pressure of the atmosphere and analyzing atmospheric conditions, assessing wind speed and direction, and creating visualizations of wind patterns, meteorologists gain valuable insights into weather phenomena

Reference Books

1 Principles and practices of agricultural disaster management. , Radha Krishna Murthy,V., 2016. , B.S Publications, Koti,Hyderabad. .

2 Introduction to Agriculture and Agrometeorology. , Reddy, S.R, 1. 2014., B.S Publications, Koti, Hyderabad.

3 Agrometeorology: Principles and Applications of Climate Studies in Agriculture, H.D. Singh, 9. 1994, CRC Press.

4 Agrometeorology: A Modern Synthesis, S. Nagarajan and S.S. Dhingra, 2002, Kluwer Academic Publishers.

24AGRO302 - WEED MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO302	WEED MANAGEMENT	WM	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF AGRONOMY	FA	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Familiarize the students about the weeds, herbicides and methods of weed control	2	PO4, PO8, PO11
CO2	Learn different herbicide formulation and different methods of weed control	2	PO4, PO8, PO11
CO3	Illustrate about the Herbicide compatibility with nutrients and their application	3	PO4, PO8, PO11
CO4	Demonstrate about the Bio-herbicides and their application in agriculture concept of herbicide mixture and utility in agriculture	3	PO4, PO8, PO11
CO5	Distinguish and select the proper crop management in weed control practices with practical knowledge	4	PO4, PO8, PO11

Syllabus

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds. Herbicide classification, concept of adjuvant, surfactant, herbicide formulations and their use, Crop-weed-competition - Critical period of crop weed competition

Introduction to mode of action of herbicides and selectivity. Allelopathy and its application in weed management. Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with nutrients and their application. Integration of herbicides with non chemical methods of weed management.

Herbicide resistance and its management. Practical Techniques of weed preservation. Weed identification and the losses due to weeds study. Biology of important weeds. Study of herbicide formulations and mixture of herbicide ,Adjuvants and their use in herbicide application Types of adjuvants with examples

Herbicide and nutrient compatibility study. Shift of weed flora study in long term experiments. Study of methods of herbicide application, spraying equipments, Mode of action of herbicides - Important biochemical modes of action of herbicides

Calculations of herbicide doses, weed control efficiency and weed index,Selectivity and resistance- Selectivity of herbicides - Fundamental principles of selectivity- Differences in morphology and growth habit of plants - Differential absorption and translocation of herbicides.

Reference Books

1 Modern Weed Management (4th edition), Gupta, O.P. , 4th 2012, Agrobios (India) Ltd, Jodhpur.

2 Principles of Weed Science , Rao,V.S. , 2nd edition 1992., Oxford& IBH Publishing Co.Pvt Ltd, New Delhi..

3 Applied Weed Science., Ross, M.A and Lembi, C.A. 1999, 2nd 1999, Prentice Hall of India Pvt Ltd, New Delh.

4 Weed Management: Principles and Practices, Gupta (Author), O. P., 3rd 2011, Agrobios (india).

24AGRO303 - INTRODUCTORY AGRO FORESTRY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO303	INTRODUCTORY AGRO FORESTRY	IAF	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the basic information about various harvesting, transportation and processing systems used in the management of forest resources	3	PO2, PO6, PO8
CO2	Apply various regeneration techniques and tending operations	3	PO4, PO6, PO8
CO3	Apply different silviculture prescriptions appropriate to the management objectives	3	PO2, PO4, PO6
CO4	Apply the forest inventory information and future forest stand and tree conditions	3	PO2, PO4, PO8
CO5	Analyze laboratory equipment and procedures for the study about the tree species description and their management	4	PO2, PO4, PO8

Syllabus

Introduction. Definitions of basic terms related to forestry, Indian forest, target area, productivity. Influence of forest on climate, soil, floods, erosion, human health and recreation.Objectives of silviculture, forest classification, salient features of Indian forest policies. Forest regeneration, Naturals regeneration, natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers.

Artificial regeneration, objectives, choice between natural and artificial regeneration, planting methods, essential preliminary considerations. Crown Classification. Tending operations, weeding, cleaning, thinning, mechanical, ordinary, crown and advance thinning. Principles and practices of social forestry nurseries types of nurseries, success in nursery production. Afforestation in different sites shifting sand dunes, saline soils, ravine lands, wet lands, lateritic soils, dry rocky soils, canal banks, road sides and watershed areas.

Village wood lots, selection of species, measures for shortage of fuel wood Properties of fuel wood, management and advantages of energy plantations Suitable tree species, Forest mensuration and objectives, diameter measurement, instruments used in diameter measurement, Non instrumental methods of height measurement, shadow and single pole method, Instrumental methods of height measurement, geometric and trigonometric principles, instruments used in height measurement, Tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.

Major and minor forest products, 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 of Subabul, Eucalyptus and Casuarina tree species. Agroforestry-definitions, importance, criteria of selection of trees in agroforestry

Identification of tree species, diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees, Height measurement of standing trees by shadow method, single pole method and hypsometer, Volume measurement of logs using various formulae, Nursery lay out, seed sowing, vegetative propagation techniques, Forest plantations and their management, visits to nearby forest based industries

Reference Books

1 Tree farming, Singh, S.P., 2nd, 2009, Agrotech Publishing academy.

2 Favourite Agroforestry trees, Singh, S.P., 1st, 2010, Agrotech Publishing academy, Udaipur..

3 Silviculture of Indian trees, Troup, T.S, 1st, 1986, International book distributor, Dehradun .

4 Forestry in India, Dwivedi, A.P, 1st, 1980, Jugal Kishore and Company, Dehradun .

5 Agroforestry hand book, Negi, S.S, 1st, 1999, International book distributor, Dehradun.

24AGRO304 - DRYLAND AGRICULTURE/ RAINFED AGRICULTURE AND WATERSHED MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO304	DRYLAND AGRICULTURE/ RAINFED AGRICULTURE AND WATERSHED MANAGEMENT	DARAWM	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand rainfed agriculture problems and prospects of rainfed agriculture in India	2	PO6, PO7, PO8
CO2	Discuss about tillage for rainfed crops, modern concepts of tillage, soil erosion and factors affecting erosion and universal soil loss equation	2	PO6, PO7, PO8
CO3	Describe harvesting, water harvesting structures, In-situ moisture conservation measures	2	PO6, PO7, PO8
CO4	Apply contingent crop planning for aberrant weather conditions in red and black soils, Evapotranspiration, measures to reduce evapotranspiration	3	PO6, PO7, PO8
CO5	Interpret climate classification, rainfall analysis, onset and withdrawal of monsoons	3	PO6, PO7, PO8

Syllabus

Soil characteristics, soil fertility status, heavy weed infestation, soils and its management, Drought, types of drought, effect of water deficits on physio morphological characteristics of the plants and management strategies for drought management of crops in rainfed areas

Agronomic measures of soil and water conservation, choice of crops, cropping systems Watershed concept, objectives and principles of water shed management, Water harvesting, importance, its techniques, Water harvesting structures arid region runoff farming water spreading

Fertilizer use in rainfed areas, use of organic manures, bio-fertilizer use in rainfed agriculture, cropping systems in rainfed areas, efficient inter cropping systems in different rainfed regions of Andhra Pradesh.

Contingent crop planning for aberrant weather conditions in red and black soils, Evapotranspiration, measures to reduce evapotranspiration Efficient utilization of water through soil and crop management practices gully control, bench terraces, contour terracing and graded bund

Interpretation of meteorological data for rainfall variability, Scheduling of supplemental irrigation based on crop ET demand. Calculation of effective rainfall and Determination of moisture availability index cultural practices for mitigating moisture stress, Field demonstration on soil moisture conservation measures, Field demonstration of water harvesting structures.

Reference Books

1. Dryland Agriculture. Kalyani Publishers., Reddy, S. R. and Prabhakar Reddy, G, 4th edition, 2015, Kalyani Publishers. .
2. Watershed Management in India. , Dhruva Narayana, V.V., Sastry, G.S. and Patnaiak, V.S, 3RD EDITION,1999, B S publications.
3. Watershed Management in India, Dhruva Narayana, V.V., Sastry, G.S. and Patnaiak, V.S., 2, 1990, ICAR, New Delhi.
4. Dryland Agriculture in India: An agro-climatological and agro-meteorological perspective, Jeevananda Reddy,S., 3, 2002, B S publications.

24BICM301 - ESSENTIALS OF PLANT BIOCHEMISTRY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24BICM301	ESSENTIALS OF PLANT BIOCHEMISTRY	EPB	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the knowledge on Carbohydrates, Lipids and Proteins P	2	PO1, PO7, PO8
CO2	Understand the enzymes and nucleic acids functions	3	PO1, PO7, PO8
CO3	Apply the metabolic pathways to plants	3	PO1, PO7, PO8
CO4	Apply the plant biotechnology in crop improvement	4	PO1, PO7, PO8
CO5	Assess the qualitative tests for Carbohydrates, aminoacids and Nucleic acids	4	PO1, PO7, PO8

Syllabus

Recognise the information on proteins, lipids, and carbohydrates. thorough explanation of computers, covering their functions, architecture, input/output devices, memory principles, and advantages and disadvantages. Windows as the operating system and Office.

Recognise the roles of nucleic acids and enzymes. Acknowledge the functions of enzymes and nucleic acids. The way enzymes work on substrate with the help of cofactors. The knowledge about nucleic acid working principles.

Utilize the plant metabolic processes. Make use of the metabolic activities of plants. Plant metabolic processes are crucial for their growth, development, and overall functioning. Understanding these processes helps in comprehending how plants obtain energy, manage nutrients, and interact with their environment. Each process is finely tuned to ensure plants can thrive in diverse ecological niches.

Utilise plant biotechnology to enhance crop quality. Plant biotechnology offers several strategies to enhance crop quality through genetic modification and other techniques.By harnessing plant biotechnology, scientists and farmers can work towards developing crops that not only yield better but also contribute to improved nutrition, sustainability, and resilience in the face of environmental challenges.

Evaluate the qualitative tests for nucleic acids, amino acids, and carbohydrates.Overall, qualitative tests for nucleic acids, amino acids, and carbohydrates are essential tools in biochemical analysis, providing valuable information about the presence and sometimes the identity of these biomolecules in samples.

Reference Books

1 Introduction to Plant Biotechnology, H. S. Chawla, 3rd, 2020, Oxford & IBH Publishing Co. Pvt Ltd., New Delhi..

2 Biochemistry, S. N. Gupta, 2019, Rastogi Publications.

3 Plant Biotechnology, Adrian Slater, 2nd, 2008 , Oxford.

4 Lehninger Principles of Biochemistry, David Nelson, 7th, 2021, WH Freeman.

5 Plant Biochemistry, Hans-Walter Heldt, 4th, 2021, Academic Press Inc; 4th edition.

24CPHY361 - FUNDAMENTALS OF CROP PHYSIOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24CPHY361	FUNDAMENTALS OF CROP PHYSIOLOGY	FCP	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basic knowledge and history of crop physiology its important in agriculture, cell overview, seed germination and metabolic changes during seed development and plant Growth and its Development. Impart an insight into the various plant water relations.	2	PO3, PO5, PO8
CO2	Apply the students to higher levels of learning about the Rate of transpiration and Water use efficiency in C3, C4 and CAM plants. Assimilation of mineral nutrients in crop plant and also about photosynthesis and its reaction centre in crop plant	3	PO3, PO5, PO8
CO3	Apply the mechanism of various metabolic processes in crop. The factor affecting photosynthesis, Respiration, Biosynthesis of fatty acids in plastids, Physiology of flowering, vernalizationin, Occurrence of auxin, transport of auxin, biosynthesis of auxin and its mode of action.	3	PO3, PO5, PO8
CO4	Apply the Acquire basic knowledge about growth and development in plants like Auxin, Gibberellins, Cytokinins, Abscisic acid and Ethylene. They learn about senescence, abscission and post-harvest physiology	4	PO3, PO5, PO8
CO5	Analyze thel study of Seed vigour and viability tests, seed germination, leaf area measurement, Growth analysis, measurement of water status in plants, leaf anatomy of C3 and C4 plants and the students has developed their skills and techniques related to crop physiology. So that they can design their own experiments.	4	PO3, PO5, PO8

Syllabus

Crop physiology is pivotal in agriculture, encompassing plant cell intricacies like the endomembrane system (plasma membrane, endoplasmic reticulum, nuclear envelope, Golgi apparatus, vacuole, and endosomes), along with plastids, mitochondria, and metabolic processes. Understanding metabolic changes during seed development and germination, as well as growth parameters and water absorption mechanisms, elucidates the essence of crop physiology for optimizing agricultural outcomes.

Water uptake mechanisms including active and passive processes, alongside the stomatal complex regulating transpiration, highlight water use efficiency (WUE) crucial for C3, C4, and CAM plants, influenced by various factors. Mineral nutrition elucidates essential elements, nutrient uptake mechanisms, and the roles of macro and micronutrients, manifesting in distinctive deficiency symptoms. Understanding nitrogen assimilation, biological fixation, and photosynthesis reactions, including light absorption principles and photophosphorylation pathways, underscores the fundamental processes driving plant growth and development.

CO2 fixation via C3, C4, and CAM pathways elucidate photosynthetic efficiencies and the significance of each pathway, alongside factors influencing photosynthesis like light, CO2, temperature, and water stress, impacting crop productivity. Respiration\'s energy balance, including growth and maintenance respiration, alongside lipid metabolism in plastids, underscores the significance of lipids in plant physiology. Understanding flowering physiology, including photoperiodism, phytochrome, and vernalization, along with plant growth regulators like auxins, illuminates key mechanisms governing plant development and agricultural practices.

Gibberellins, cytokinins, ABA, and ethylene, covering their occurrence, transport, biosynthesis, mode of action, and commercial uses, are pivotal in regulating plant growth and development. Understanding senescence, abscission, and post-harvest physiology, including dormancy types, fruit ripening mechanisms, and hormonal regulation, provides insights into enhancing crop quality and shelf life through strategic interventions. Integrating knowledge of plant hormones and physiological processes facilitates effective management practices in agriculture and horticulture for improved yield and product quality.

Methods such as chlorophyll content estimation, seed vigor testing, and germination optimization are vital for assessing plant health and productivity. Techniques including growth analysis, water status measurement, and photosynthesis quantification aid in understanding plant physiological processes and response to environmental stimuli. Additionally, diagnosing nutrient deficiencies and analyzing yield provide valuable insights for effective crop management and maximizing agricultural output.

Reference Books

1 Plant Physiology and Development, Taiz, L. and Zeiger, E., 6 (2014), Sinauer Associates, Sunderland, MA, USA..

2 Physiology of Crop Plants., Gardner, F.P., Pearce, R.B., and Mitchell, R.L., 1 (2013), Scientific Publishers, Jodhpur..

3 Introduction to Plant Physiology, William G. HopkinsWilliam G. Hopkins, 4(2008), Prentice Hall Publishers, New Jersey, USA..

4 Crop Physiology Applications for Genetic Improvement and Agronomy, Victor O. Sadras and Daniel Calderini, 2(2019), Academic Press..

24ENTO131 - FUNDAMENTALS OF ENTOMOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ENTO131	FUNDAMENTALS OF ENTOMOLOGY	FE-I	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	understand the history of entomology in India and contributory factors for abundance of insects and to uo Classes, Structure and functions of body wall and moulting, Body segmentation of the insects, Abdomen, Antenna and mouth parts along with their modifications	2	PO2, PO3, PO4
CO2	Understand insect legs, wings, types of larva and pupa, metamorphosis, digestive, circulatory, excretory and respiratory systems	2	PO1, PO2, PO3
CO3	understand the nervous, reproductory, endocrine systems and sensory organs in insects and classification of Orders viz., Orthoptera, Dictyoptera and Isoptera	2	PO2, PO3, PO4
CO4	Apply systematic arrangement of Hemiptera, Lepidopteta, Coleoptera, hymenoptera and Diptera	3	PO1, PO2, PO4
CO5	analyse various collection and preservation methods of insects, to observe external features of insects, study the mouthparts, antenna, legs, wing venation, wings, digestive system and reproductive system of insects by dissection and observation and identification of different insect orders	4	PO1, PO2, PO4

Syllabus

History, abundance, classification, body segmentation, Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes.Relationship of class Insecta with other classes of Arthropoda,bodywall, antennae and types of antennae, mouthparts in insects and types- biting and chewing, piercing and sucking, chewing and lapping

legs, wings, metamorphosis, diapause in insects. Types of larvae and pupae.Structure and functions of digestive, circulatory, excretory, respiratory systems in insects, a. Morphology: Structure and functions of insect cuticle and moulting. Body segmentation.Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, wing venation, modifications and wing coupling apparatus

nervous, secretory (Endocrine) and reproductive systems in insects Metamorphosis and diapause in insects.Types of larvae and pupae.Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive systems in insects.Types of reproduction in insects. Major sensory organs like simple and compound eyes and chemoreceptors.Types of reproduction in insects. Major sensory organs like simple and compound eyes and chemoreceptors. Systematics: Taxonomy, orthoptera, dictyoptera, odonata

order characters of Isoptera, Thysanoptera, Hemiptera,Neuroptera, Lepidoptera, Coleoptera, Hymenoptera, Diptera, Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Miridae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Lymantridae, Saturniidae, Bombycidae

Methods of collection and preservation of insects including immature stages, External features of Grasshopper, Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus. Types of insect larvae and pupae, Dissection of digestive system in insects, Dissection of male and female reproductive systems in insects , Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.

Reference Books

1 Insects: Structure and Function, Chapman, R. F, 5th, 2012, Cambridge Univ. Press, UK.

2 Imms general textbook of Entomology, Richards and Davis, 10th, 1977, Chapman and Hall, London.

3 Insect Physiology and Anatomy, Pant, N.C. and Ghai, S., 1998, ICAR, New Delhi.

4 Insect Physiology., Wigglesworth, V.B, 2013, springer.

5 Modern Entomology, Timbhare, D.B., 2015, Himalaya Publishing House.

24ENTO231 - FUNDAMENTALS OF NEMATOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ENTO231	FUNDAMENTALS OF NEMATOLOGY	FN	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand history, economic importance of plant parasitic nematodes, morphology, biology, host parasitic relationship of nematodes	2	PO2, PO5, PO7
CO2	To understand Symptomatology, role of nematodes in disease development.	2	PO2, PO5, PO7
CO3	To understand nematode pests of different crops of national and local importance and their management	2	PO2, PO5, PO7
CO4	To apply Different methods of nematode management	3	PO2, PO5, PO7
CO5	To analyse various sampling methods for collection of soil and plant samples	4	PO2, PO5, PO7

Syllabus

Introduction: History of phytonematology, habitat and diversity, economic importance of nematodes. General characteristics of plant parasitic nematodes. Nematode: definition, general morphology and biology. Classification of nematodes up to family level with emphasis on groups containing economically important genera. Classification of nematodes on the basis of feeding/ parasitic habit.

Symptomatology, role of nematodes in disease development, Interaction between plant parasitic nematodes and disease-causing fungi, bacteria and viruses. Nematode pests of crops: Rice, wheat, vegetables, pulses,

Nematode pests of crops: oilseed, groundnut, castor, sunflower and fiber crops, cotton, jute, mesta, citrus and banana, tea, coffee and coconut.

Different methods of nematode management: Cultural methods, physical; methods, Biological methods, Chemical methods, Plant Quarantine, Plant resistance and INM.

Sampling methods, collection of soil and plant samples; Extraction of nematodes from soil and plant tissues following Cobbs sieving and decanting technique, Baermann funnel technique, Picking and counting of plant parasitic nematode. Identification of economically important plant nematodes up to generic level with the help of keys and description, Meloidogyne, Pratylenchus, Heterodera, Tylenchulus, Xiphinema, and Helicotylenchus etc. Study of symptoms caused by important nematode pests of cereals, vegetables, pulses, plantation crops etc. Methods of application of nematicides and organic amendments.

Reference Books

1 Text book on Introductory Plant Nematology, R.K. Walia and H.K. Bajaj., 2, ICAR.

2 Plant Parasitic Nematodes of India: Problems and Progress , Gopal Swarup, D. R. Dasgupta, P. K. Koshy. , 1, IARI, NewDelhi.

24ENTO331 - PESTS MANAGEMENT IN CROPS AND STORED GRAINS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ENTO331	PESTS MANAGEMENT IN CROPS AND STORED GRAINS	PMC&SG	R	2	0	2	0	3

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF ENTOMOLOGY	FE-I	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the major or minor crop pests, symptoms of damage and management of cereal crops	2	PO5, PO7, PO8
CO2	Apply the knowledge of the pests symptoms of damage and management in fiber crops	3	PO5, PO7, PO8
CO3	Apply the knowledge of pests symptoms of damage and management of oil seeds and pulse crops	3	PO5, PO7, PO8
CO4	Analyze the nature of damage and symptoms of stored grain pests and non insect pests	4	PO5, PO7, PO8
CO5	Analyze the recommended management practices of field crop pests and stored grain pests	4	PO5, PO7, PO8

Syllabus

General account on nature and type of damage by different arthropod pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practices for other important arthropod pests of various field crops

Mites, birds, nematodes and rodent pests of field crops and their management. Locust management, Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.

Pulses- Gram caterpillar, plume moth, pod fly, stem fly, spotted pod borer, cowpea aphid, cowbug, pod bug, leafhopper, stink bug, green pod boring caterpillar, blue butterflies, leaf webber/borer and redgram mite. Soyabean- Stem fly, stem girdler, ragi cutworm, leaf miner and whitefly- IPM Practices. Pea- pea leaf miner and pea stem fly

Sunflower- Helicoverpa and Spodoptera, leafhopper, Bihar hairy caterpillar and thrips - IPM Practices, Non insect Pests- Mites, rodents, birds and microorganisms associated with stored grain - Storage structures and methods of grain storage and fundamental principles of grain store management

Major and minor pests, non insect pests of field crops and their management and stored grain pests and their management practices. Storage structures and methods of grain storage and fundamental principles of grain store management.

Reference Books

1 Elements of Economic Entomology, Vasantharaj David, B. and Rama Murthy V.V. , 8 : 2016, Brillion Publishing.

2 General and Applied Entomology., Vasantharaj David, B and Aanathakrishnan, T.N. , 2 : 2006, Tata McGraw-Hill Publishing House, New Delhi..

3 Insects and Mites of crops in India., Nair MRGK. , 2 :1986, Indian Council of Agricultural Research New Delhi..

4 Stored Grain Pests and their Management, Khare, S.P. , 1993, Kalyani Publishers, Ludhiana..

24GPBR211 - PRINCIPLES OF GENETICS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24GPBR211	PRINCIPLES OF GENETICS	FG	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To Understand the pre-mendelian and mendelian genetics, Study of model organisms	2	PO2, PO4, PO6
CO2	To understand the different genetic interactions and their significance in the plant breeding.	2	PO2, PO4, PO6
CO3	To understand the sex determination techniques to study sex linkage traits, Types of DNA and RNA	2	PO2, PO4, PO6
CO4	To apply the chromosomal aberrations and mutations their role in plant breeding.	3	PO2, PO4, PO6
CO5	To Analyse the mitotic and meiotic cell division and Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross	4	PO2, PO4, PO6

Syllabus

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes. Chromosomal theory of inheritance- cell cycle and cell division- mitosis and meiosis. Probability and Chi-square. Dominance relationships, Epistatic interactions with example

Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications

Use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance.

Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Study of microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross and back cross, Experiments on epistatic interactions including test cross and back cross, Practice on mitotic and meiotic cell division, Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis. Study of models on DNA and RNA structures.

Reference Books

1 Genetics, Phundhan singh, Latest, 2020, Kalyani Publishers, Ludhiana.

2 Fundamentals of Genetics., B.D, singh, 6, 2022, Kalyani Publishers, Ludhiana.

3 Genetics Numerical Problems, Khanna VK, 3, 2015, Kalyani Publishers, Ludhiana.

4 Cell biology, genetics, molecular biology, evolution and ecology, Verma, P.S.and Agarwal, P.K, 1, 2013, Chand & Company Pvt. Ltd., Kolkata.

24GPBR212 - BASICS OF PLANT BREEDING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24GPBR212	BASICS OF PLANT BREEDING	BPB	R	2	0	2	0	3

Prerequisite

S#	Course Title	Acronym	Rule
1	PRINCIPLES OF GENETICS	FG	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the definition of plant breeding.	2	PO2, PO4, PO6
CO2	Apply different breeding methods for self-pollinated and cross-pollinated crops.	3	PO2, PO4, PO6
CO3	Apply genetic basis of heterosis, inbreeding depression to solve the agricultural problems.	3	PO2, PO4, PO6
CO4	Analyse polyploidy and mutation breeding methods on field level.	4	PO2, PO4, PO6
CO5	Analyze the germplasm maintenance and varietal development in various crops	4	PO2, PO4, PO6

Syllabus

Definition of plant breeding, modes of reproduction, self and cross pollination, self-incompatibility, and male sterility in crops. Study about the plant introduction agencies in India and their role.

Different breeding methods for self-pollinated and cross-pollinated crops and concept of population genetics and manage the crops on field level and statistical analysis.

The genetic basis of heterosis, inbreeding depression to solve the agricultural problems and development of inbred lines, hybrids, composite and synthetic varieties. To be well versed with different methodologies for asexually propagated crops and wide hybridization area.

The polyploidy and mutation breeding concepts on the field level. To be able to help in Agricultural Research Systems in the areas of crop improvement through breeding for important biotic and abiotic stresses involving both conventional and biotechnological approaches and its adaptation both on field and lab level.

Germplasm maintenance in various crops, emasculation, and hybridization techniques in self and cross-pollinated crops. Study of male sterility systems, analyzing statistical parameters, design, heterosis, heritability estimation and prediction of hybrid performance on field level and work out the extent of natural out crossing in crops.

Reference Books

1 Essentials of Plant Breeding, Phundan Singh, 1, 2018, Kalyani Publishers, New Delhi.

2 Plant Breeding: Principles and Methods, Singh, B.D, 12, 2022, MedTech Science Press.

3 Plant Breeding Theory and Techniques, Gupta, S.K., 1, 2010, Wiley India Pvt. Ltd. New Delhi..

4 Molecular Plant Breeding, B.D. Singh and N.S. Shekhawat, 1, 2017, Scientific Publishers.

24GPBR311 - CROP IMPROVEMENT (KHARIF CROPS) - I (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24GPBR311	CROP IMPROVEMENT (KHARIF CROPS) - I	CI-1	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	BASICS OF PLANT BREEDING	BPB	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand about origin, distribution, breeding objectives, breeding methods and hybrid seed production of Cereal crops	2	PO1, PO3, PO8
CO2	Understand breeding objectives, breeding methods and hybrid seed production of millets and pulses	2	PO3, PO8, PO10
CO3	understand breeding objectives, breeding methods in hybrid seed production of oil seeds	2	PO1, PO8, PO10
CO4	Apply breeding objectives, breeding methods in hybrid seed production of oil seeds	3	PO1, PO3, PO8
CO5	Analyze floral biology, Anthesis, Emasculation, Pollination, and hybridization techniques in Cereals, Millets, Pulses and Oil seed crops	4	PO3, PO8, PO10

Syllabus

Plant genetic resources, its utilization and conservation; Floral biology; study of genetics of qualitative and quantitative characters; Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops;Centers of origin, distribution of species, wild relatives in different cereals crops like Rice, maize, wheat and barley, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability,

Centers of origin, distribution of species, wild relatives in millets like pearl millet, finger millet, kodo millet, proso millet and kodo millet and pulses like black gram, green gram, pigeon pea, chick pea,,Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Ideotype concept and climate resilient crop varieties for future

Centers of origin, distribution of species, wild relatives in pulses like lentil, horse gram, field pea and oil seeds like ground nut, castor, sunflower and safflower, ,Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Ideotype concept and climate resilient crop varieties for future

Centers of origin, distribution of species, wild relatives in oil seeds like rapeseed mustard, niger, coconut and oil pam, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional); Ideotype concept and climate resilient crop varieties for future

Emasculation and hybridization techniques in different crop species; cereals, millets, pulses and oilseeds. Maintenance breeding of different crops. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods; Study of quality characters, donor parents for different characters

Reference Books

1 Principles of Plant Breeding, Allard, R.W, 2, 1999, John Wiley and Sons, New York.

2 Essentials of Plant Breeding, Pundhan singh, 12, 2014, Kalyani Publishers, New Delhi.

3 Plant Breeding: Principles and Methods, Singh, B.D, 12, 2015, Kalyani Publishers, New Delhi.

4 Breeding of Horticultural Crops-Principles and Practices, Kumar,N, 1, 2006, New India Publishing Agency, New Delhi.

5 Breeding of Asian Field Crops, Poehlman, J.M. and Borthakur, D., 1, 1995, Oxford and IBH Publishing Co., New Delhi.

6 Plant Breeding Theory and Techniques, Gupta, S.K., 2021, Agrobios.

24GPBR312 - FUNDAMENTALS OF AGRI BIOTECHNOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24GPBR312	FUNDAMENTALS OF AGRI BIOTECHNOLOGY	FSST	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Introduction to Plant Tissue Culture	2	PO1, PO7, PO8
CO2	Micropropagation technique for the generation of quality planting material	3	PO1, PO7, PO8
CO3	Introduction to Molecular Biology	3	PO1, PO7, PO8
CO4	Introduction to recombinant DNA technology	4	PO1, PO7, PO8
CO5	Introduction to Plant Tissue Culture and molecular biology laboratory experiments	4	PO1, PO7, PO8

Syllabus

Cellular tot potency and cytodifferentiation; Callus culture, Single-cell/suspension culture and their applications; Organogenesis and somatic embryogenesis; Somaclonal variation and its use in crop improvement; Embryo rescue technique and its significance in hybrid development; In vitro fertilization, ovule culture and its significance in hybrid development; Protoplast isolation, culture and regeneration; Somatic hybridization (somatic hybrids and cybrids) and its application in crop improvement; Anther and pollen culture for haploid production;

Development of disease-free (virus free) plants through apical meristem culture; Micropropagation technique for the generation of quality planting material; Synthetic seeds and its applications; National certification and Quality management of TC plants-secondary metabolite production- in vitro germplasm conservation.

DNA structure, function; Central dogma of life- DNA replication, transcription, translation; RNA, types and function. Structure of prokaryotic and eukaryotic gene; Genetic codes and Lac Operon concept; Nucleic acid hybridization, Polymerase chain reaction and its applications, DNA sequencing (Sanger method)

DNA modifying enzymes and vectors; Plant genetic transformation (physical-Gene gun method, chemical-PEG mediated and Agrobacterium-mediated); Transgenic and its importance in crop improvement with successful stories and Biosafety; Introduction to various molecular markers: RFLP, RAPD, SSR, SNP etc.; Marker-assisted breeding

Introduction to Plant Tissue Culture Laboratory, Good Laboratory Practices; Media Preparation and Glassware sterilization; Micropropagation; Callus induction and culture; Anther culture; Apical meristem culture; Preparation of synthetic seeds; Isolation of plasmid DNA; Quantification of DNA; Agarose Gel Electrophoresis and visualization of plasmid DNA; Restriction digestion of plasmid DNA and agarose gel electrophoresis; Isolation of Plant genomic DNA and PCR amplification and Gel electrophoresis; Visit to tissue culture units /biotech labs

Reference Books

1 Plant Tissue Culture: Theory and Practice, Bhojwani SS, 1 (1983), Elsevier..

2 Biotechnology: Expanding Horiozon. , Singh BD, 1 (2007), Kalyani.

3 Handbook of Plant Biotechnology, Christou P and Klee H., 1 (2004), John Wiley & Sons..

4 Gene IX. , Lewin B, 1 (2008), Peterson Publications/ Panima. W.H. Freeman & Co..

24GPBR313 - CROP IMPROVEMENT (RABI CROPS)-II (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24GPBR313	CROP IMPROVEMENT (RABI CROPS)-II	CI-II	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	BASICS OF PLANT BREEDING	BPB	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Acquaintain knowledge on centers of origin, distribution of species, wild relatives in different fibres, sugars, starches, narcotics, vegetables, fruits and flower crops	2	PO6, PO8, PO11
CO2	Understand about plant genetic resources, its utilization and conservation	2	PO6, PO7, PO11
CO3	Implement Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties	3	PO8, PO11
CO4	Execute the methods of adaptability, stability, abiotic and biotic stress tolerance and quality .	3	PO6, PO7, PO8
CO5	Analyze the emasculation and hybridization techniques in fibres, sugars, starches, narcotics, vegetables, fruits and flower crops	4	PO6, PO7, PO11

Syllabus

Introduction Origin Distribution of species Wild relatives and forms Breeding objectives Major breeding procedures conventional and modern innovative approaches for development of hybrids varieties Seed production technology of varieties and hybrids Accomplishments in cotton, jute, sugarcane, tobacco and potato sweet potato

Introduction Origin Distribution of species Wild relatives and forms Breeding objectives Major breeding procedures conventional and modern innovative approaches for development of hybrids varieties Seed production technology of varieties and hybrids Accomplishments in tomato brinjal chilli okra cabbage cucumber and cauliflower

Introduction Origin Distribution of species Wild relatives and forms Breeding objectives Major breeding procedures conventional and modern innovative approaches for development of hybrids varieties Seed production technology of varieties and hybrids Accomplishments in onion garlic melons and gourds Banana and Guava Mango and Papaya

Introduction Origin Distribution of species Wild relatives and forms Breeding objectives Major breeding procedures conventional and modern innovative approaches for development of hybrids varieties Seed production technology of varieties and hybrids Accomplishments in lime lemon apple pomegrante sapota

Emasculation and hybridization techniques in fibres sugars starchesnarcoticsvegetables fruits and flower crops maintenance breeding of different crops Handling of germplasm and segregating populations by different methods Study of quality characters study of donor parents for different characters

Reference Books

1 Principles of Plant Breeding, Allard, R.W., 1,1960, John Wiley & Sons, New York..

2 Essential of Plant Breeding, Phundan Singh. , 2,2006, Kalyani Publishers, Ludhiana..

3 Vegetable Breeding, Kalloo, G.1, 2,1994, Panima Educational Book Agency, New Delhi.

4 Breeding of Horticultural Crops - Principles and Practices, Kumar, N. , 2,2006, New India Publishing Agency, New Delhi..

24GPBR314 - FUNDAMENTALS OF SEED SCIENCE AND TECHNOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24GPBR314	FUNDAMENTALS OF SEED SCIENCE AND TECHNOLOGY	FSST	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	BASICS OF PLANT BREEDING	BPB	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand seed technology & foundation and certified seed production in rice and maize.	2	PO1, PO7, PO11
CO2	Understand foundation and certified seed production in cereals, millets, pulses, oilseeds & grow out test.	2	PO1, PO7, PO9
CO3	Understand seed processing steps like seed drying, cleaning, upgrading & treatment.	2	PO7, PO9, PO11
CO4	Apply seed coating, packaging, storage, marketing, testing, seed act, central seed committee.	3	PO1, PO9, PO11
CO5	Analyze seed production in cereals, pulses, oilseeds, seed certification, sampling, physical purity, germination, moisture, viability, dormancy, vigour.	4	PO1, PO7, PO11

Syllabus

Understand seed technology, seed certification procedure & foundation and certified seed production in rice and maize, seed quality, definition, characters of good quality seed, different classes of seed, seed generation systems, seed multiplication ratios, seed replacement rate, maintenance of genetic purity during seed production in self pollinated and cross pollinated crops.

Foundation and certified seed production of varieties and hybrids in sorghum, pearl millet, groundnut, sesamum, sunflower, castor, pulses, cotton, mesta and sunhemp, organic seed production, importance, problems and perspectives for production of quality seeds, varietal identification through Grow Out Test, electrophoresis, molecular and biochemical tests.

Planning, layout and establishment of seed processing plant, types of layout, seed processing and its steps such as seed drying, methods of seed drying, drying zones in seed bin drying, types of air distribution systems and seed drying, cleaning, pre cleaning and conditioning equipment, parts of air screen cleaner upgrading the quality of cleaned seeds, seed treatment, types and equipment.

Seed processing steps such as seed coating, packaging, equipments and types of packaging material used, storage, categories of seeds, general principles, stages and factors affecting seed longevity during storage, measures for pest and disease control during storage, marketing, structure, organization, factors affecting, seed act, central seed committee, seed testing for quality assessment

Seed production in cereals, pulses, oilseeds, seed certification, seed sampling- principles & procedures, physical purity analysis, germination analysis, seed moisture test, seed viability test, seed dormancy, types & methods to break dormancy, seed vigour test, seed health test, Grow out test (GOT) and electrophoresis for varietal identification, visit to seed testing laboratories (STLs), seed processing plant, seed production farm.

Reference Books

1 Principles of Seed technology., Agarwal, P.K., 23, 1994., ICAR, New Delhi..

2 Techniques in Seed Science and Technology., Agarwal, P.K. and Dadlani, M., 3, 2018, Brillion publishers.

3 Seed Technology., Agarwal, R.L., 2, 1995., Oxford and IBH Publication Co., New Delhi..

4 Seed Technology. , Dhirendra Khare and Mohan S. Bhale., 1, 2007., Scientific Publishers (India), Jodhpur..

5 An introduction of Seed Technology. , Thomson, J.R., 1, 1979., Leonard Hill, London..

24HORT181 - FUNDAMENTALS OF HORTICULTURE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24HORT181	FUNDAMENTALS OF HORTICULTURE	FH	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the scope and importance of horticulture, divisions of horticulture, classification of horticultural crops, climate and soil requirements	3	PO2, PO3, PO5
CO2	Apply propagation methods and orchard establishment	3	PO1, PO2, PO3, PO5
CO3	Apply knowledge of aspects of orchard management viz., training, pruning, management of juvenility, flower bud differentiation and unfruitfulness problems in addition to vegetable and ornamental gardens	3	PO2, PO5
CO4	Apply knowledge of fertilizer and irrigation management schedules in addition to lawn making and use of growth regulators	3	PO1, PO2, PO3
CO5	Analyze uses of garden tools, Identification of horticultural crops, Preparation of seed bed/nursery bed, Practice of sexual and asexual methods of propagation, Layout and planting of orchard plants	4	PO2, PO3, PO5

Syllabus

Horticulture-Its definition and branches, Importance and scope of horticulture, Horticultural and botanical classification, Climate and soil for horticultural crops, Practice of sexual and asexual methods of propagation, Layout and planting of orchard plants, Training and pruning of fruit trees, Transplanting and care of vegetable seedlings, Making of herbaceous and shrubbery borders, Preparation of potting mixture, potting and repotting, Fertilizer application in different crops, Visits to commercial nurseries/orchard.

Plant propagation-methods (sexual & asexual), propagating structures; separation, division, grafting, budding, layering), High density planting; Use of rootstocks; Orchard establishment; (Principles & Layout) Practice of sexual and asexual methods of propagation, Layout and planting of orchard plants, Training and pruning of fruit trees, Transplanting and care of vegetable seedlings, Making of herbaceous and shrubbery borders, Preparation of potting mixture, potting and repotting, Fertilizer application in different crops, Visits to commercial nurseries/orchard.

Principles and methods of training and pruning, Juvenility and flower bud differentiation; Unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; Practice of sexual and asexual methods of propagation, Layout and planting of orchard plants, Training and pruning of fruit trees, Transplanting and care of vegetable seedlings, Making of herbaceous and shrubbery borders, Preparation of potting mixture, potting and repotting, Fertilizer application in different crops, Visits to commercial nurseries/orchard.

Vegetable gardens & ornamental garden types and parts; Lawn making, Use of plant bio-regulators in horticulture, Irrigation methods in horticulture crops, Fertilizers application-methods, Practice of sexual and asexual methods of propagation, Layout and planting of orchard plants, Training and pruning of fruit trees, Transplanting and care of vegetable seedlings, Making of herbaceous and shrubbery borders, Preparation of potting mixture, potting and repotting, Fertilizer application in different crops, Visits to commercial nurseries/orchard.

Identification of garden tools, Identification of horticultural crops, Preparation of seed bed/nursery bed, Practice of sexual and asexual methods of propagation, Layout and planting of orchard plants, Training and pruning of fruit trees, Transplanting and care of vegetable seedlings, Making of herbaceous and shrubbery borders, Preparation of potting mixture, potting and repotting, Fertilizer application in different crops, Visits to commercial nurseries/orchard.

Reference Books

1 Handbook of Horticulture, Chadha, K.L, 1. 2004, ICAR.

2 Basic Horticulture , Jitendra Singh, 3. 2008, Kalyani Publishers.

3 Floriculture in India , Randhawa, G.S. and Mukhopadhyaya, A., 2. 2005, Allied Publishers Pvt. Ltd., New Delhi.

4 Introduction to Horticulture., Kumar, N. , 8. 2017, Rajyalakshmi Publications, Nagorcoil, Tamilnadu. .

5 Glaustas Horticulture , Muthukumar and Selvakumar New , 2. 2019, Vishal Publications.

24HORT281 - PRODUCTION TECHNOLOGY OF FRUITS AND PLANTATION CROPS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24HORT281	PRODUCTION TECHNOLOGY OF FRUITS AND PLANTATION CROPS	PTFPC	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF HORTICULTURE	FH	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basics of the fruit and plantation crop industry	2	PO1, PO2, PO10
CO2	Apply principles of crop production of major fruit crops	3	PO1, PO2, PO10
CO3	Apply principles of crop production of minor fruit crops and plantation crops	3	PO1, PO2, PO10
CO4	Apply principles of crop production of cashew, tea, coffee and rubber	4	PO1, PO2, PO10
CO5	Analyse crop varieties, pests and diseases in fruit crops	4	PO1, PO2, PO10

Syllabus

Importance and scope of fruit and plantation crop industry in India and Production technologies for the cultivation of major fruits and their Botanical name, Family, Origin, Introduction, Varieties, Climate, Soil, Propagation, Planting, Manuring, Irrigation, Inter Cultivation, Harvesting, Yield

Production technologies for the cultivation of major fruits-Mango, Banana, Citrus, Grape, Guava & Litchi, Papaya, Apple, Pear, Peach Botanical name, Family, Origin, Introduction, Varieties, Climate, Soil, Propagation, Planting, Manuring, Irrigation, Inter Cultivation, Harvesting, Yield

Production technology for the cultivation of Minor fruits- Pineapple, Pomegranate, Jackfruit, Strawberry, Nut crops (Almond & Walnut Botanical name, Family, Origin, Introduction, Varieties, Climate, Soil, Propagation, Planting, Manuring, Irrigation, Inter Cultivation, Harvesting, Yield

Production technology for the cultivation of Plantation crops-Coconut, Areca nut, Cashew, Tea, Coffee & Rubber Botanical name, Family, Origin, Introduction, Varieties, Climate, Soil, Propagation, Planting, Manuring, Irrigation, Inter Cultivation, Harvesting, Yield

Seed propagation, Scarification and stratification of seeds, Propagation methods for fruit and plantation crops including Micro-propagation, DescriptionIdentification of fruit, Preparation of plant bio regulators and their uses, Pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchard.

Reference Books

2 Text Book on Pomology (Fundamentals of Fruit Growing).., Chattopadhya, P. K. , 2 (1995), I Kalyani Publishers, Ludhiana..

3 Horticulture at a Glance. , Bijendra Singh., 2 (2012), Kalyani Publishers, Ludhiana.

4 Plantation Crops. Vol I and II. ., Parthasarathy, V. A., P.K.Chattopadhyay and Bose, T.K. , 1 (2006), Parthasankar basu Naya Udyog, Kolkata.

5 Introduction to Spices, Plantation crops, Medicinal and Aromatic Crops, Kumar, N., Abdul Khader, J.B.M, Rangaswamy, P. and Irulappan, I. ., 2&3 (2004), Oxford and IBH publishing Co, New Delhi.

24HORT282 - PRODUCTION TECHNOLOGY FOR VEGETABLES AND SPICES (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24HORT282	PRODUCTION TECHNOLOGY FOR VEGETABLES AND SPICES	PTVS	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF HORTICULTURE	FH	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the production practices of Tomato, Brinjal & Chilli, Okra & Leafy vegetables	3	PO5, PO6, PO8
CO2	Apply the production practices and their management of melons,cucurbits, cole crops and beans	3	PO5, PO6, PO8
CO3	Apply the productions aspects of root and bulb crops	3	PO5, PO6, PO8
CO4	Apply the production practices of spices	3	PO5, PO6, PO8
CO5	Demonstrating the seed extraction, nursery raising, direct seed sowing and transplanting, Harvesting & preparation for market, of vegetables and spices cultivation	4	PO5, PO6, PO8

Syllabus

Importance of vegetables & spices in human nutrition and national economy, Tomato- origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation,

production practices and their management of melons,cucurbits, cole crops and beansBotanical name, Family, Origin, Introduction, Varieties, Climate, Soil, Propagation, Planting, Manuring, Irrigation, Inter Cultivation, Harvesting, Yield

productions aspects of root and bulb crops Botanical name, Family, Origin, Introduction, Varieties, Climate, Soil, Propagation, Planting, Manuring, Irrigation, Inter Cultivation, Harvesting, Yield

production practices of spices crops like Ginger, Black pepper, Turmeric, fenugreek, methi, coriander etc Botanical name, Family, Origin, Introduction, Varieties, Climate, Soil, Propagation, Planting, Manuring, Irrigation, Inter Cultivation, Harvesting, Yield

Demonstrating the seed extraction, nursery raising, direct seed sowing and transplanting, Harvesting & preparation for market, of vegetables and spices cultivation

Reference Books

1 Vegetables Growing in India, Prem Singh Arya and S. Prakash, 2 (2002), Kalyani publishers, New Delhi.

2 Vegetable Crops , Bose, T. K, Kabir, J., Maity T. K., Parthasarathy V. A., and Som M. G., 2002, Vol. II & III (2002), Naya Prokash, Kolkata..

3 Production Technology of Spices and Plantation Crops, Shanmugavelu, K.G., N. Kumar and K.V. Peter 2005., 4 (2005), Agrobios (India), Jodhpur.

4 Text book of vegetables and spices, Tamburaj, 1 (2003), Kalyani publishers, New Delhi.

5 Production technology of vegetable and spice crops, shanmugavelu, 2 (2005), Agrobios (India), Jodhpur.

24HORT381 - ORNAMENTAL CROPS, MAPS & LANDSCAPING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24HORT381	ORNAMENTAL CROPS, MAPS & LANDSCAPING	OCMAPL	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF HORTICULTURE	FH	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply the importance and scope of ornamental crops and landscaping	3	PO3, PO7, PO11
CO2	Apply the production practices of commercial flowers in protected cultivation.	3	PO3, PO7, PO11
CO3	Apply the scope, importance and future prospectus in cultivation of medicinal and aromatic plants.	3	PO3, PO7, PO11
CO4	Apply the techniques of processing and value addition in ornamental crops and MAPs produce	3	PO3, PO7, PO11
CO5	Analyzing the nursery techniques viz. bed preparation, seed sowing, training and pruning, harvesting and post- harvest handling of cutand loose flowers	4	PO3, PO7, PO11

Syllabus

Importance and scope of ornamental crops and landscaping landscape uses of trees shrubs and climbers production technology of cut flowers under protected conditions principles of landscaping Rose Introduction origin and distribution Classification Species and varieties Climate and soil requirements- Propagation Rootstocks Stock scion compatibility

Carnation Liliumand Orchids Gladiolus and Tuberose Introduction Origin and distribution Classification Species and varieties Climate and soil requirements Propagation Land preparation Planting Manures and fertilizers Cultural operations Pinching and disbudding use of growth regulators Physiological disorders- Harvesting- Post harvest management and yield

Loose flowers Marigold and Jasmine under open condition Introduction Origin and distribution Species and varieties F1 hybrids Cimate and soil requirements Propagation Land preparation Planting Manures and fertilizers Cultural operations Pinching and disbudding Use of growth regulators Harvesting Post harvest management and yield

Aromatic plants Importance Essential oil industry in India Properties of essential oils Production technology of Mint and Ocimum Botanical name Family Origin Economic part Introduction Climate Soil Varieties Propagation Planting Manuring Irrigation Intercultural operations Harvesting Yield

Identification of ornamental medicinal and aromatic plants preparation and flower seed sowing protected structures Care and maintenance processing of Medicinal and Aromatic Plants Extraction of essential oils

Reference Books

1 Handbook of Horticulture (Vol 1&2), K L Chadha, 2 nd 2019, ICAR.

2 Basic Horticulture, Jitendra Singh, 5 th 2019, Kalyani .

3 Introduction to Horticulture, N Kumar, 9 th edition, Medtech Science Press.

4 Floriculture In India, GS Randhawa, 1 st 2021, Kalyani.

24LSPM101 - LIVE-STOCK AND POULTRY MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24LSPM101	LIVE-STOCK AND POULTRY MANAGEMENT	LSPM	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand Demographic distribution of live-stock population, Reproduction and Housing of live-stock and poultry.	2	PO2, PO9, PO10
CO2	To apply Indian breeds and Management of cattle, buffalo, sheep, goat, swine and poultry, exotic breeds of cattle, buffalo, sheep, goat, swine and poultry.	3	PO2, PO9, PO10
CO3	To apply Feeding and computation of ration of Livestock and Poultry	3	PO2, PO9, PO10
CO4	To analyze Diseases of cattle and buffaloes,sheep, goat,Poultry and Prevention of infectious diseases.	4	PO2, PO9, PO10
CO5	To analyze Familiarizing with body points/parts, Handling and Restraint and management of different domesticated animals and poultry.	4	PO2, PO9, PO10

Syllabus

Demographic distribution of live-stock population, Population dynamics of live-stock and role in Indian economy, Reproduction in live-stock and poultry, Housing systems live-stock and poultry, Design and construction of live-stock and poultry buildings, Selection of site and General principles affecting the design, Arrangements of building, Building materials

Indian breeds of cattle, buffalo, sheep, goat, swine and poultry, exotic breeds of cattle, buffalo, sheep, goat, swine and poultry, Management of calves, growing heifers and milch animals, Management of sheep, goat and swine, Incubation, hatching and brooding, Improvement of live-stock and poultry, Digestion and metabolism live-stock and poultry, Classification of feedstuffs for live-stock and poultry.

Proximate principles of feed, Nutrients and their functions, Feed ingredients for ration- Balanced ration, General principles of computation of ration, Formulation of rations and feeding dairy cattle and buffaloes, Formulation of rations sheep, goat and swine and poultry, Feed supplements Feed additives in the rations of live-stock and poultry, Feeding of live-stock and poultry

Diseases of cattle and buffaloes, Diseases of sheep, goat and swine, Diseases of Poultry, Sanitation, Sanitation of live-stock and poultry houses, Prevention of infectious diseases in live-stock and poultry, Vaccination schedule for cattle and buffaloes sheep, goat, Vaccination schedule for swine and poultry, Control of infectious diseases in live-stock and poultry

Familiarizing with body points/parts of different domesticated animals and poultry, Approaching, handling methods of restraining, Casting of live-stock, Identification methods of farm animals and poultry (branding, tattooing, notching & tagging), A visit to the live-stock and poultry farms, Identification of various breeds and familiarizing with various farm routines and farm records, Judging of cattle, buffalo and poultry, Culling of live-stock and poultry, Layout plans for different

Reference Books

1 LivestockProduction andManagement , N.S.R. Sastri, C.K.Thomas, R.A.Singh, 4, 2021, -.

2 A Handbook ofAnimalHusbandry, ICAR, 8, 2019, ICAR.

3 The Merck Veterinary Manual:, Merck & Co., , 11, Merck & Co., .

4 Small Animal Clinical Medicine, Nelson Richard W. DVM, 6, 2019, Elsevier Health Sciences.

5 Livestock Production Management by Nilotpal Ghosh, Nilotpal Ghosh, 5, 2019, PHI LEARNING PVT. LTD..

24PATH171 - FUNDAMENTALS OF PLANT PATHOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24PATH171	FUNDAMENTALS OF PLANT PATHOLOGY	FPP-I	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basic knowledge on the introduction of plant pathology, objective of plant pathology, history of plant diseases, plant pathogens, plant diseases, symptoms and disorders. Important plant diseases caused by fungi, bacteria, virus, spiroplasm etc. general characteristic features of plant parasitic organisms its physiological and morphological traits, its taxonomical classification.	2	PO2, PO3, PO5
CO2	Understand the major characteristic features of the Kingdom Fungi, Phylum Chytridiomycota, Phylum Zygomycota, Phylum Ascomycota, Phylum Basidiomycota, Kingdom Chromista, Protozoa.	2	PO2, PO3, PO5
CO3	Apply classification, and different characteristic features of the Phylum Basidiomycota, Subphylum, Kingdom Chromista	3	PO2, PO3, PO5
CO4	Apply knowledge about characteristic features of Kingdom Protozoa, Characteristics features of (prokaryotes) plant pathogenic bacteria, classifications, and identification. Phylum Firmicutes, Virus and viroid, its important characteristic plant virus and viroid, classification, and taxonomy. To know about the Nematodes, importance in agriculture, general characteristics and diseases caused by plant parasitic nematodes.	3	PO2, PO3, PO5
CO5	Analyse study on Microscopy, morphological identification of different fungi, disease symptoms caused by a pathogen. Phytopathogenic bacteria isolation and its characteristics, the transmission of plant virus and plant-parasitic nematodes.	4	PO2, PO3, PO5

Syllabus

Understand the basic knowledge on the introduction of plant pathology, objective of plant pathology, history of plant diseases, plant pathogens, plant diseases, symptoms and disorders. Important plant diseases caused by fungi, bacteria, virus, spiroplasm etc. general characteristic features of plant parasitic organisms its physiological and morphological traits, its taxonomical classification.

Understand the major characteristic features of the Kingdom Fungi, Phylum Chytridiomycota, Phylum Zygomycota, Phylum Ascomycota, Phylum Basidiomycota, Kingdom Chromista, Protozoa.

Develop and understand the Phylum Basidiomycota, Subphylum, Kingdom Chromista, their classification, and different characteristic features

Gain knowledge about characteristic features of Kingdom Protozoa, Characteristics features of (prokaryotes) plant pathogenic bacteria, classifications, and identification. Phylum Firmicutes, Virus and viroid, its important characteristic plant virus and viroid, classification, and taxonomy. To know about the Nematodes, importance in agriculture, general characteristics and diseases caused by plant parasitic nematodes.

Practical study on Microscopy, morphological identification of different fungi, disease symptoms caused by a pathogen. Phytopathogenic bacteria isolation and its characteristics, the transmission of plant virus and plant-parasitic

Reference Books

1 An Introduction to Fungi., Dube, H. C,, 4th (Edition), 2013, Scientific Publishers, Jodhpur, India.

2 Plant Pathology, G.N.Agrios, 5th,2004 , Elsevier.

3 Fundamentals of Plant Pathology, R S Mehrotra, 1, 2017, Mc Graw Hill Education.

4 Introduction To Principles Of Plant Pathology, R S Singh, 5,2017, MedTech Science Press.

24PATH371 - DISEASES OF FIELD & HORTICULTURAL CROPS & THEIR MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24PATH371	DISEASES OF FIELD & HORTICULTURAL CROPS & THEIR MANAGEMENT	DFHCM	R	2	0	2	0	3

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF PLANT PATHOLOGY	FPP-I	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand management practices for rice, wheat and sorghum diseases	2	PO3, PO5, PO8
CO2	Apply management practices for Sorghum, Maize, Bajra, Ragi, Cotton and Sugarcane diseases	3	PO3, PO5, PO8
CO3	Apply management practices for Sugarcane, Tobacco, Groundnut, Sesamum, Castor and Sunflower diseases in field	3	PO3, PO5, PO8
CO4	Analyse management practices of Safflower, Mustard, Red gram, Bengal gram, Black gram, Green gram, Soybean and Cowpea diseases in field conditions	4	PO3, PO5, PO8
CO5	Identify and analyze the diseases of field crops	4	PO3, PO5, PO8

Syllabus

Management practices for rice (Blast, sheath blight, bacterial leaf blight, false smut), wheat (Types of Rusts, Smuts) and sorghum diseases (Ergots, Smuts)

Management practices for Sorghum, Maize (Wilts, Rots, Smuts adn Downy Mildews), Bajra, Ragi, Cotton (Bacterial Leaf spot, Rust,Leaf Spots) and Sugarcane diseases (Red Rot, Smut,Pineapple Disease,Mosaic)

Management practices for Sugarcane, Tobacco(leaf Spots, Mosaic, Damping off), Groundnut (Mosaic,Peanut Bud Necrosis,Tikka Leaf Spots), Sesamum (Leaf Spot and Wilt), Castor(Grey Blight, leaf spots) and Sunflower (leaf spots) diseases in field

Management practices of Safflower, Mustard(White Rust,Leaf spot and Downy Mildew) Red gram(Sterility Mosaic, Fusarium Wilt), Bengal gram (Wilt, Ascochyta Blight), Black gram, Green gram, Soybean and Cowpea diseases in field conditions

To identify and analyze the diseases of field crops

Reference Books

1 Diseases of crop plants in India, Rangaswami and Mahadevan, 4th,1998, PHI Learning.

2 Plant Pathology, G.N.Agrios, 5th,2006, Elsevier.

3 Diseases of field crops and their management, Parthasarathy, S., Thiribhuvanamala, G. and Prabakar, K. , 5th,2020., CRC press.

4 Diseases of Field Crops and their Management, S.C. Dubey, 1st, 2016, Today and tomorrow.

24PATH372 - AGRICULTURAL MICROBIOLOGY AND PHYTO-REMEDIATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24PATH372	AGRICULTURAL MICROBIOLOGY AND PHYTO-REMEDIATION	AMPM	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the hidden world of microbiology, classification of microbes- Microorganisms and principles, History of microbiology, Pasteur- Robert Koch - Pure Culture Methods- Applied aspects of Microbiology- Agricultural microbiology, Bacteria, etc.	2	PO2, PO8, PO11
CO2	Apply the impact Microbial Nutrition , Autotrophy Chemoautotrophy Photoautotrophy Heterotrophy Metabolic pathways Glycolysis HMP ED TCA cycle	3	PO2, PO8, PO11
CO3	Apply the Role of microbes in fertility of soils and plant growth Rhizosphere Rhizoplane, Phyllosphere. ..... Nitrogen fixation In Azolla Blue green algae, etc	3	PO2, PO8, PO11
CO4	Apply on fermentations, Bio-fertilizers, Bio-pesticides, Bio-fuel production, Biodegradation, Bio-gas, Bio-manures and Composting Technologies.	3	PO2, PO8, PO11
CO5	Analysis on various laboratory microbiological laboratory and its equipments, Microscope, Micrometry, Sterilization, Bacterial staining, Nutritional media, isolation, purification and maintenance of microbial cultures, etc.	4	PO2, PO8, PO11

Syllabus

INTRODUCTION TO MICROBIOLOGY,Brief History of microbiology - Spontaneous generation theory- Contributions of Antony Van Leeuwenhoek Francesco Redi- Lazzaro Spallanzani- Franz Schulze- Schroder and Von Dusch- Louis Pasteur- John Tyndall., 2. Role of microbes in fermentation-Contributions of Cagnaird Latour,3. Protection against infection- Contributions of Edward Jenner- F. Loeffler- BehirngKitasasto- Louis Pasteur, , 4. Morphological types of Bacteria, Bacteria cell Structure- External and internal cell structures- Differences between Prokaryotes and Eukaryotes.

Microbial Nutrition Autotrophy Chemoautotrophy Photoautotrophy Heterotrophy Metabolic pathways Glycolysis HMP ED TCA cycle. Growth of Microorganisms Cell Division , Growth cycle of bacteria , Lag phase, Log phase, Stationary and Death phase Generation time, Growth rate Growth yield Synchronous Diauxic growth, Bacterial genetics Genetic recombination Transformation Conjugation Transduction Plasmids Transposon.

Role of microbes in fertility of soils and plant growth Rhizosphere, Rhizoplane Phyllosphere, Phylloplane,Microflora, Nitrogen cycle, Mineralisation, Immobilisation, Nitrification, Denitrification Nitrogen Fixation Phosphorus cycle, phosphorus solubilisation Oxidation Reduction Sulphur cycle Oxidation and reduction. Biological nitrogen fixation Symbiotic Associative Asymbiotic Nitrogen fixation In Azolla Blue green algae Actinorhizal symbiosis Frankia, Phosphate solubilizing microorganisms Bacillus Pseudomonas Mycorrhiza for Phosphorous uptake. PGPR Organisms Bacillus Pseudomonas Azotobacter Azospirillum Rhizobium Microbes in human welfare.

Types of fermentations Batch Batch fed Continuous Solid State Fermentations, Common microbial fermentations Alcohol Lactic acid Butyric acid Formic acid Butanediol Propionic Acid, Mixed Acid, Fermentation technology, Alcoholic beverages production, Biofertilizers (Bacterial Cyanobacterial Fungal) production technology Silage Production Technology. Biopesticides Viruses (Nucleo polyhedrosis virus Granular viruses) Bacteria (Bacillus thuringiensis, Bacillus papilliae) fungi (Beauveria Verticillium) Protozoa (Malameba locustae Mattesia Spp) Mode of action. Biofuel Production Biodegradation Biogas, Biomanures and Composting Technologies.

Reference Books

1 Microbiology , Michael J. Pelczar, Jr., E.C.S. Chan, Noel R Krieg, 5th edition 2020, Mc Graw-Hill Global Education.

2 Experiments in Microbiology Plant Pathology Tissue Culture and Microbial Biotechnology, K R Aneja , 5th edition 2007, New Age International Publishers.

3 Microbiology, Prescott, L.M., Harley, J.P. and Klein, D.A, 9th edition 2014, McGraw Hill Publishers, New York. .

4 Soil Microbiology, Subba Rao, N.S. , 4th Ed. 2014. , Oxford and IBH Publishing Company Pvt. Ltd., New Delhi. .

5 Brock Biology of Microorganisms. , Madigan, M., Martinko, J.M and Parker, J., 14Ed. 2015. , Prentice hall of India Pvt Ltd., New Delhi. .

24SMCA301 - BASIC AND APPLIED AGRIL STATISTICS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24SMCA301	BASIC AND APPLIED AGRIL STATISTICS	BAS	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Acquaint the knowledge on basic concepts of statistics and various methods of descriptive datacollection and analysis	3	PO1
CO2	Apply the probability distribution of a discrete and continuous random variables based on a real-world problems	3	PO2, PO6
CO3	Apply statistical tests for large and small samples to test the hypothesis	3	PO2, PO8
CO4	Apply the Generation of random numbers for the selections of samples in data analysis	3	PO6, PO8
CO5	Apply the data using various descriptive and inferential statistics using R/Excel	3	

Syllabus

Introduction to Statistics and its Applications in Agriculture - Graphical Representation of Data. Measures of Central Tendency- Dispersion -Skewness and Kurtosis. Definition of Probability - Addition and Multiplication Theorem - Simple Problems Based on Probability Theory.

Corelation-Karl Pearson coefficient of co relation,Rank correlation and Regression-Linear regression,Scatter diagram,To estimate the value of future using least square method,,Distributions-Binomial distribution, Poission distribution, Normal Distributions along with real agricultural applications.

Introduction to Test of Significance - One sample -Two Sample Test for Means. Chi-Square Test of Goodness of fit - Chi-Square Test of Independence of Attributes in 2 x 2 contingency table.Testing of Hypothesis,Null hypothesis,Alternative Hypothesis, Level of significance,test statistics

Introduction to Analysis of Variance - Analysis of One Way and Two Way Classification. Introduction to Sampling Methods - Sampling versus Complete Enumeration - Simple Random Sampling with and without replacement - Use of Random Number Tables for selection of Simple Random Sample

Reference Books

1 Programmed Statistics, Agrawal, B .L, 5th,2012, New Age International Publishers, Hyderabad.

2 Hand Book of Agricultural Statistics., Chandel SRS, 9th,2013, Achal Prakashan Mandirpublications, New Delhi..

3 Statistics for Agricultural Sciences, Nageswara Rao, G 2007, 5th,2008, B S Publications, Hyderabad.

4 A Text Book ofAgricultural Statistics, Rangaswamy, R, 7th,2007, New Age International (P) Limited, Hyderabad..

24SSAC121 - FUNDAMENTALS OF SOIL SCIENCE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24SSAC121	FUNDAMENTALS OF SOIL SCIENCE	FSS	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the soil as a natural body by Pedological and edaphological concepts of soil,	2	PO3, PO4, PO7
CO2	Understand Comprehend the Soil Profile concept and Soil physical properties.	2	PO3, PO4, PO7
CO3	Apply Acquiring the concepts of soil water retention, soil air, composition, gaseous exchange	3	PO3, PO4, PO7
CO4	Apply Distinguish different soil colloids and their sources of charge ion exchange, cation exchange capacity, base saturation	3	PO3, PO4, PO7
CO5	Analyse of soil colour and organic matter content of soil.	4	PO3, PO4, PO7

Syllabus

Soil as a natural body, "Pedological and edaphological concepts of soil"; Soil genesis: soil forming-- rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: Soil-texture, structure, density and porosity, Soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy classification and soils of India;

Soil water retention, movement and availability; soil air, composition, gaseous exchange, problem and plant growth; source, amount and flow of heat in soil; soil temperature and plant growth; Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; Soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge ion exchange, cation exchange capacity,

Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects; Soil pollution - behavior of pesticides and inorganic contaminants,

Study of soil profile in field. Study of soil sampling tools, collection of representative soil sample, its processing and storage. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos Methods. Studies of capillary rise phenomenon of water in soil column and water movement in soil, Infiltration rate. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Study of soil map. Determination of soil colour.

Demonstration of heat transfer in soil and Estimation of organic matter content of soil. bulk density and particle density of soil and porosity, soil colour & study of soil map, Determination of heat transfer in soils

Reference Books

1 Fundamentals of Soil Science, , S K Ray, Tapas Bhattacharyya, P Chandran, D C Nayak, 12TH, 2012. , Indian Society of Soil Science. .

2 . Introductory Soil Science, , Das, D. K ., 4th Edition, 2015, Kalyani Publishers, New Delhi..

3 A Text Book of Pedology, Sehgal J. , 2nd, 2015, Kalyani Publishers, New Delhi.

4 The Nature and Properties of Soils, N. C bray, 2nd edition, 2013, Indian Society of Soil Science. .

5 Principles of Soil Science, P. D. Sharma: , 5TH, 2013, Indian Society of Soil Science. .

24SSAC122 - SOIL FERTILITY MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24SSAC122	SOIL FERTILITY MANAGEMENT	MFSFM	R	2	0	2	0	3

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF SOIL SCIENCE	FSS	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the essential nutrients and their deficiency symptoms	2	PO2, PO3, PO4
CO2	Understand Comprehending the importance of essential nutrient for plant growth and soil fertility.	2	PO2, PO3, PO4
CO3	Understand Acquiring soil fertility assessment and efficient use of nutrients in rainfed and irrigated environments	2	PO2, PO3, PO4
CO4	Understand Distinguish manures and fertilizers for soil fertility and nutrient management.	2	PO2, PO3, PO4
CO5	Analyse laboratory equipment and procedures for soil and plant nutrient estimation	4	PO2, PO3, PO4

Syllabus

Introduction, traditional concepts and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Integrated nutrient management.

Criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients. Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.

Chemical fertilizers, classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, Nano fertilizers, Soil amendments, Fertilizer Storage, Fertilizer Control Order. History of soil fertility and plant nutrition. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil.

Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rain fed and irrigated conditions.

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of available N in soils. Estimation of available P in soils. Estimation of available K in soils. Estimation of available S in soils. Estimation of available Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants. Determination of N, P and K in fertilizers, Identification of fertilizer radicals, Nitrogen estimation inorganic manure.

Reference Books

1 Soil Fertility and Fertilizers, An Introduction to Nutrient Management, samuel Tisdale, Nelson Werner L, Beaton James D and Havlin John L, 2 nd. 2012, Macmillian Publishing Co.,New York..

2 Introductory Soil Science, D.K. Das, 1 st. 2015, Kalyani Publishers, New Delhi.

3 Manures and Fertilisers, YawalkarK.S, Agarwal, T.P and Bokde, S, 2 nd, 2012, Agril. Publishing House, Nagpur.

4 FUNDAMENTALS OF SOIL SCIENCE , Dr. N.N. Goswami (Chairman), R.K. Rattan, G. Dev, G. Narayanasamy, D.K. Das, S.K. Sanyal, D.K. Pal, D.L.N. Rao, 2 nd. 2012, Indian Society of Soil Science.

5 TEXT BOOK OF SOIL SCIENCE , T D BISWAS and SK MUKHERJEE, 2 nd,.2012, MC Grawhill..

24SSAC221 - PROBLEMATIC SOILS AND THEIR MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24SSAC221	PROBLEMATIC SOILS AND THEIR MANAGEMENT	PSM	R	1	0	2	0	2

Prerequisite

S#	Course Title	Acronym	Rule
1	FUNDAMENTALS OF SOIL SCIENCE	FSS	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Comprehend the concepts of problematic soils, their distribution, symptoms, effects on plants, and reclamation and management practices.	2	PO3, PO4, PO11
CO2	Understand the concepts of acid and acid sulfate soils, their distribution and the problems of land degradation and polluted soil sources.	2	PO3, PO4, PO11
CO3	Understand and implement soil pollution management practices, address bio-remediation challenges, and classify land capability and suitability.	2	PO3, PO4, PO11
CO4	Utilize Remote Sensing and GIS techniques, assess soil health and quality, adhere to irrigation water quality standards, and apply guidelines for evaluating water quality.	3	PO3, PO4, PO11
CO5	Evaluate the identification of problematic soils, analyze the determination of infiltration rate, pH, EC, ESP, GR, LR, CaCO3, Ca and Mg, CO3 and HCO3, Na and K, RSC, and SAR.	4	PO3, PO4, PO11

Syllabus

Problem soils, Definition, Different types of problematic soils, Extent and distribution of problematic and wastelands soils in different agro-eco systems and in Andhra Pradesh. Salt affected soils, Origin and formation. Distribution of salt affected soils in India and Andhra Pradesh. Characteristic features of saline, sodic and saline-sodic soils. Diagnostic criteria based on properties. Saline soils, Visual symptoms for identification of saline soils, Build up of salinity, Effect of salinity on plant growth and nutrient availability, Reclamation and management. Sodic soils, Visual symptoms for identification of sodic soils, Effect of sodicity on plant growth and nutrient availability, Reclamation and management.

Acid soils, Extent of area in India and Andhra Pradesh, Formation, Characteristics of acid soils, Sources of soil acidity, nutrient limitations and toxicity, Reclamation of acid soils, Different liming materials used for reclamation, Benefits of liming, Harmful effects of over liming. Acid sulphate soils, Origin, Types, Characterization, Constraints and management. Land degradation, Eroded, compacted, flooded and water logged soils, Biologically sick soils, Effects on plant growth, Management. Polluted soils, Definition, Sources of pollution, Bio solid wastes, Industrial effluents (distillery, paper mill, tannery, textiles industrial effluents), Mechanism of interaction of wastes with soil.

Soil pollution, Potentially toxic elements, Excessive use of fertilizers, pesticides and weedicides, Heavy metal contamination, Management. Bio-remediation of problem soils through Multi Purpose Tree Species. Taxonomic classification of soils, Land Capability Classification. Land suitability classification, Index, Criteria, Different approaches, Land suitability for different crops.

Remote Sensing and GIS techniques in diagnosis, mapping and management of degraded and problematic soils. Soil health and quality, Definition, Concepts, Soil resilience, Factors affecting soil quality (Physical, chemical and biological), Assessment of soil quality, Management and improvement of soil quality. Irrigation water, Quality and standard parameters, Classification based on ICAR, CSSRI and USDA criteria. Guidelines for judging quality of water, Utilzation of saline water in agriculture.

Field identification of problematic soils and visit to degraded lands. Determination of infiltration rates of light soils and heavy soils. Determination of aggregate stability of sodic soils. Determination of pH, ECe of acid, saline and sodic soils, ESP of sodic soils, GR of sodic soils, LR of acid soils, lime content ($CaCO_3$) of cacarious soil. Determination of pH and EC of saline, sodic and good quality irrigation water. Determination of CO_3 , and HCO_3 in irrigation water, chlorides in irrigation water, Ca and Mg content in irrigation water, Na and K content in irrigation water. Computation of quality class, RSC and SAR of irrigation water. Evaluation and interpretation of analytical data of problematic soils and suggesting ameliorating practices.

Reference Books

1 Fundamentals of Soil Science, Indian Society of Soil Science, 2nd Edition, 2012, IARI, New Delhi.

2 Introductory Soil Science. , Das, D. K. , 4th Edition, 2015, Kalyani publishers, New Delhi..

3 Soils of Andhra Pradesh, Monograph of I.V. Subbarao, 1st Edition, 2012, Monograph of I.V. Subbarao.

4 Soil Test Based Fertilizer Application, AICRP on STCR, ANGRAU, Hyderabad, 1st Edition, 2007, AICRP on STCR, ANGRAU, Hyderabad.

Y24: Bachelor of Science (Honors) Agriculture

Category: Professional Elective Courses (PEC)

24ELCT400 - FOOD SCIENCE AND NUTRITION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT400	FOOD SCIENCE AND NUTRITION	FSN	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the basic concepts of food science including physical properties, chemical composition such as water, carbohydrates, proteins, fats & oils, vitamins and minerals	2	PO1, PO2, PO6
CO2	Understand the basic concepts of natural emulsifiers, organic acids, oxidants, antioxidants; concepts of enzymes and basic concepts of food microbiology including yeast, algae, protozoa, viruses, microbial spoilage of food and production of fermented foods such as beer using good bacteria.	2	PO2, PO6, PO10
CO3	Understand the basic principles of preservation of food using heat treatment and heat treatment methods, principles of preserving food sing low temperature and low temperature methods, preservation using chemicals, irradiation, fermentation and drying, and history of diet around the world especially European diet	2	PO1, PO6, PO10
CO4	Apply knowledge on the basic concepts of malnutrition, nutritional disorders, energy metabolism and disorders of carbohydrates, fat and proteins, and concepts of balanced or modified diet, menu planning and new trends in food science and nutrition.	3	PO1, PO2, PO10
CO5	Anazyle Proximate analysis of foods; calorific value of foods; Estimation of vitamins, phenols and flavonoids, carotenoids, antinutrients like Phytate/ Oxallate, Trypsin and Chymotrypsin inhibitor activities, limiting amino acids in food stuff.	4	PO2, PO6, PO10

Syllabus

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.); Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions

Food microbiology - Morphology and fine structure of bacteria - Cultivation of bacteria, nutritional requirements - Nutritional classification of bacteria, Introduction to yeast, algae and protozoa and virus, general characteristics, Microbial spoilage of foods - Factors affecting kinds, numbers, growth and survival of microorganisms in foods, Production of fermented foods - Production, purification and estimation of beer/ ethanol.

Preservation by heat treatment - Principle and equipment for blanching, Preservation by heat treatment - Canning, pasteurization, sterilization, Preservation by use of low temperature - Principle, methods, equipment, Preservation by chemicals - Antioxidants, mould inhibitors, antibodies, acidulants, etc.,Preservation by irradiation - Principle, methods, equipment, Preservation by fermentation - Principles, methods, equipment, Preservation by drying, dehydration and concentration - Principle, methods, equipment, Food and nutrition - History of diet around the world - European diet.

Malnutrition (over and under nutrition), body cell, digestion and absorption, energy and calories, obesity and weight control, Nutritional disorders that can compromise health, Energy metabolism - Carbohydrates, individual sugars, sugars and diabetes mellitus, glycemic response, dietary carbohydrates, Energy metabolism - Fat, synthesis, control, biosynthesis, cellular degradation, peroxidation, Energy metabolism - Proteins, synthesis, catabolism, ammonia and urea., Balanced/modified diets, diet selection, Menu planning, New trends in food science and nutrition

Proximate analysis of foods; calorific value of foods; Estimation of vitamins, phenols and flavonoids, carotenoids, antinutrients like Phytate/ Oxallate, Trypsin and Chymotrypsin inhibitor activities, limiting amino acids in food stuff.

Reference Books

1 Food Science, B.Srilakshmi, 8, 2023, New Age.

2 Nutrition Science, B.Srilakshmi, 8, 2023, New Age.

3 Food Biochemistry, JK Dickson, 1, 2020, CBS publishers.

4 Textbook of Human Nutrition, Mahtab S. Bamji, Kamala Krishnaswamy, 4, 2019, CBS publishers.

5 Handbook of Therapeutic diets, Yusuf Jamal, 2, 2017, CBS publishers.

24ELCT401 - FOOD SAFETY ISSUES (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT401	FOOD SAFETY ISSUES	FSI	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the concepts of Food Safety - Definition, Importance, Scope and Factors affecting Food Safety.	2	PO1, PO5, PO7
CO2	Understand the concepts of Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts.	2	PO1, PO2, PO7
CO3	Understand the concepts of Risk Analysis. Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene.	2	PO1, PO2, PO7
CO4	Apply the concepts of Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling.	3	PO1, PO5, PO7
CO5	Analyze the concepts of Preparation of different types of media. Microbiological examination of different food samples.	4	PO1, PO5, PO7

Syllabus

Food safety and food quality, Factors affecting food safety, Hazards and risks, food sanitation, Food preservation and food processing, food preservation technologies. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards. Management of hazards - Need. Control of parameters. Temperature control. Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal - Pest and Rodent Control.

Product design, Innovation, Food storage, Hygiene and sanitation in food Service establishments, Hazard Analysis Critical Control Point, International Organization of Standardization. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series. TQM - concept and need for quality, components of TQM, Kaizen.

Food surveillance, food sampling, Water analysis, Food regulatory enforcement and compliance through inspection, Model Accreditation Standards. Food laws and Standards- Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food.

Food safety standards of packaging and labelling regulations. Food Laws and Standards in India. International Food Control Systems, genetically modified foods, Organic foods, Genetically modified foods\ transgenics. Organic foods, Newer approaches to food safety. Recent Outbreaks. Practical Water quality analysis physico-chemical and microbiological.

Water quality analysis of Physicochemical, Minerals, Chemical and Microbiological analyses. Microbiological examination and detection of different food samples, Assessment of surface sanitation by swab/rinse method. Assessment of personal hygiene. Biochemical tests for identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000.

Reference Books

1 Food Quality Assurance: Principles and Practices, nteaz Alli. , 4, 2004, CRC Press.

2 Food Safety Handbook, Gloyega, 3, 2015, AGRI HORTI PRESs.

3 Food Quality and safety, Prem Kumar Jaiswal, 1, 2009, CBS Publishers.

4 Food safety Handbook , Ronald H. Schmidt, Gary E. Rodrick, 1,2003, Wiley.

24ELCT402 - CLIMATE RESILIENT AGRICULTURE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT402	CLIMATE RESILIENT AGRICULTURE	CRA	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand climate change and impacts of climate change on agriculture and food security	2	PO2, PO4, PO8
CO2	Demonstrate climate resilient agronomic practices for sustainbale agriculture	3	PO2, PO4, PO8
CO3	Explore climate resilient agronomic practices for water and nutrient management	3	PO2, PO4, PO8
CO4	Apply breeding techniques for climate resilient varieties	3	PO2, PO4, PO8
CO5	Analyze climate resilient practices to overcome climate change	4	PO2, PO4, PO8

Syllabus

Climate change and impacts of climate change on agriculture and food security; crop productivity under different climate change scenarios including extreme events such as drought, flood, pest and disease outbreak etc. Basics of adaption and mitigation in the agricultural sectors; analyzing and assessing climate vulnerability to identify vulnerable sectors and possible adaptation options in agriculture

Assessing biophysical and socio-economic impacts on agricultural sector; risk assessment strategies, preparedness for weather and climate risks in agriculture; application of geospatial tools and techniques for sustainable agriculture. Climate resilient agriculture (CRA) concept, scope and importance with special reference to India, climate resilient technologies for enhancing crop productivity and sustainability role of weather and climatic information, agro advisories, ICTs and simulation models; climate resilient agronomic practices crop/cultivar selection, crop diversification/ crop mixtures;

Water management practices rain water harvesting, micro-irrigation, deficit irrigation and drainage management, organic/natural farming, integrated farming systems (IFS); site specific nutrient management (SSNM), conservation agriculture technologies to build soil organic carbon, harnessing microbial biodiversity, biomass recycling; use of renewable sources of energy; climate resilient pest-disease management strategies.

Breeding strategies for development of climate change resilient crops and varieties, development of biotic and abiotic stress tolerant/resistant cultivars under changed climatic scenarios including extreme weather events.

Acquaintance with meteorological instruments including AWS, Statistical techniques to study trend of climatic parameters, Analysis of extreme weather events using non-parametric tests, Building climate change scenarios under different futuristic emission of GHGs, Designing strategies to mitigate the effect of climate change using climate resilient crops/cultivars, Climate resilient technologies and manipulation of cropping patterns, Acquaintance with ICTs for effective dissemination of local weather information and agro-advisories, Analysing carbon sequestration potential of different agro-ecosystems; Designing climate smart village model considering the availability of resources. Awareness programme on climate change and climate resilient agriculture among farming community

Reference Books

1 Climate Change and Agriculture Over India , Prasad Rao, 2010, PHI Learning.

2 Climate-Smart Agriculture Sourcebook, FAO, 2013, FAO.

3 Climate Resilient Agriculture Adaptation and Mitigation Strategies , Bhan Manish, 2018, New India Publishing Agency.

4 Climate Resilient Animal Agriculture , GSLHV Prasada Rao, 2020, New India Publishing Agency.

24ELCT403 - SYSTEM SIMULATION AND AGROADVISORY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT403	SYSTEM SIMULATION AND AGROADVISORY	SSAD	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand Crop models, concepts and techniques, types of crop models, data requirements, relational diagrams. Evaluation of crop responses to weather elements	2	PO2, PO6, PO10
CO2	To understand the Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance	2	PO2, PO6, PO10
CO3	To understand the Weather forecasting, types methods, tools and techniques, forecast verification; Value added weather forecast	2	PO2, PO6, PO10
CO4	To apply the Use of crop simulation model for preparation of Agro- advisory and its effective dissemination	3	PO2, PO6, PO10
CO5	To analyse the Sensitivity analysis of varying weather and crop management practices and use of statistical approaches in data analysis	4	PO2, PO6, PO10

Syllabus

System approach for representing soil-plant-atmospheric continuum, system boundaries. Crop models, concepts and techniques, types of crop models, data requirements, relational diagrams.

Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modelling, techniques for their estimation.

Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance. Weather forecasting, types methods, tools and techniques, forecast verification; 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 effective dissemination

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential and achievable production; yield forecasting, insect and disease forecasting models. Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices

Reference Books

1 Introduction to Agrometeorology, H. S. Mavi, 2, Kalyani publishers, Delhi.

2 Text Book of Agricultural Meteorology, M.C. Varshneya and P.B. Pillai., 3, ICAR.

3 Advances in Plant Atmospheric Interactions, Eds. Rao, V.U.M., Rao, A.V.M.S., Rao, G.G.S.N., Ramana Rao, B.V., Vijaya Kumar, P. and Venkateswarlu, B, 2, Central Research Institute for Dryland Agriculture (CRIDA), Santoshnagar, Hyderabad.

4 Principles of Agricultural Meteorology, OP Bishnoi, 1, Scientific publishers, Jodhpur.

24ELCT404 - GEO INFORMATICS AND REMOTE SENSING, PRECISION FARMING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT404	GEO INFORMATICS AND REMOTE SENSING, PRECISION FARMING	GRPF	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	This CO provides the information about the concept of precision farming and techniques involved in precision farming. This course detailly explains about the issues and concerns in precision farming and also the techniques involved in precision farming. Students also learn about the tools and techniques involves in geoinformatics and how it is used for crop discrimination and estimating the yield.	2	PO2
CO2	This CO informs the students regarding geodesy principles how the global positioning system helps in agriculture. This course helps the student to understand the applications of nanotechnology in tillage operation, seed sowing, fertilizer application, plat protection management. This course detailed the nanoparticles properties, occurrence importance of nanoparticles and synthesis of nano particles.	2	PO2
CO3	This CO enables the students to understand cartography techniques and units, scale, symbols used in various maps. This course helps to understand the techniques involve in soil mapping. It allows the student to learn about remote sending practical application in the field of agriculture and allied fields including drones. We are identifying the spatial variability in soil fertility and recommendation based on geospatial technologies.	2	PO2
CO4	This CO about the using image processing and interpretating the data in this course. Geo referencing those data and classify the supervised and unsupervised data of RS images. Site specific Nutrient Management approach for precision farming helps to use the fertilizers efficiently. This course explains about nanotechnology definition, concepts and techniques and structural characterization of nanoparticles and nano sensors. This course helps to understand the importance	2	PO2
CO5	This CO will learn about the GIS software, spatial data creation and editing, various processing software to deal with visual and digital interpretation of remote sensing images. Students gets practical knowledge about generation of spectral profiles of different objects and soil mapping using remote sensing technologies. This course also helps to understand about fertilizer recommendation based on Variable rate technology and soil test-based crop response techniques.	3	PO2

Syllabus

Precision agriculture uses advanced technologies like GIS and remote sensing to optimize farm productivity while addressing challenges like fragmented landholdings in India. Geo-informatics supports crop monitoring, yield prediction, and spatial data analysis for informed decisions.

Soil mapping and geospatial technologies enable site-specific nutrient management to enhance soil health and productivity. GIS and geodesy ensure accurate spatial data management for improved farming practices.

Remote sensing and GPS aid in monitoring crops, guiding machinery, and optimizing farm operations with precise data. System simulation and crop models help predict outcomes and improve agricultural input efficiency. Module 4: STCR Approach and Nanotechnology in Agriculture The STCR approach ensures precise fertilizer application based on soil and crop response. Nanotechnology introduces advanced tools like nano-fertilizers and nano-pesticides for efficient resource use and productivity. Module 5: Applications of Nanotechnology and Future Perspectives Nanotechnology offers solutions like nano-sensors and controlled-release fertilizers to improve farming practices. Integration of precision tools will drive sustainable agriculture and address challenges like climate change and food security.

The STCR approach ensures precise fertilizer application based on soil and crop response. Nanotechnology introduces advanced tools like nano-fertilizers and nano-pesticides for efficient resource use and productivity.

Nanotechnology offers solutions like nano-sensors and controlled-release fertilizers to improve farming practices. Integration of precision tools will drive sustainable agriculture and address challenges like climate change and food security.

Reference Books

1 Remote sensing and image interpretation. (3rd edition),, Lillesand, T.M. and Kiefer, R. W. , 1994, John Wiley and Sons.

2 Text book of Remote sensing and Geographical Information Systems, , Anji Reddy, M., 2006, B.S. Publications, Hyderabad.

3 NANO: The Essentials: Understanding Nanoscience and Nanotechnolgy, Pradeep. T, 2007, Hill Publishing Company Limited, New Delhi.

24ELCT405 - PRINCIPLES AND PRACTICES OF ORGANIC FARMING/CONSERVATION AGRICULTURE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT405	PRINCIPLES AND PRACTICES OF ORGANIC FARMING/CONSERVATION AGRICULTURE	PP/CA	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Discuss the concept and principles of organic production technology and Role of organic farming in National economy.	2	PO3, PO5, PO6
CO2	Analyse compost methods and nutrient management in organic farming	3	PO3, PO5, PO6
CO3	Demonstrate the various botanicals used for pest management	3	PO3, PO5, PO6
CO4	Evaluate quality analysis of organic inputs and products	3	PO3, PO5, PO6
CO5	Demonstrate Indigenous technology knowledge (ITK), Vermicompost and other organic manures production methodology and their application	4	PO3, PO5, PO6

Syllabus

Organic farming definition need scope principles characteristics relevance to modern agriculture. Different eco friendly farming systems- biological farming, natural farming, regenerative agriculture permaculture biodynamic farming. Relevance of organic farming to A.P, India, and global agriculture and future prospects advantages barriers. Initiatives taken by the central and state governments, NGOs and other organizations for promotion of organic agriculture in India.

Organic nutrient sources and their fortification, organic manures, methods of Composting, Green manures, bio fertilisers types, methods of application, benefits and limitations. Nutrient use in organic farming-scope and limitations. Nutrient management in organic farming.

Organic ecosystem and their concepts. Choice of crops and varieties in organic farming crop rotations, need and benefits multiple cropping. Fundamentals of insect, disease and weed management under organic mode of production, cultural, biological methods non chemical pest and disease management. Botanicals pyrethrum, neem seed kernel extract, neem seed powder, soluble neem formulations, neem oil.

Operational structure of NPOP other agencies for organic production. Inspection certification labelling and accreditation procedures for organic products. Processing, economic consideration and viability. Marketing and export potential of organic products national economy.

Visit to organic farm to study the various components, identification and utilization of organic products. Compost making aerobic and anaerobic methods Vermicompost preparation Preparation of enriched farm yard manure Visit to organic clusters and bio control lab to study the maintenance of biofertilizers/bio-inoculant cultures Biological nitrogen fixers

Reference Books

1 A Hand book of organic farming., Arun K. Sharma, 2002, Agrobios, India.

2 Organic farming-Theory and Practice., Palaniappan, S.P and Annadurai, K, 1999, Scientific publishers, Jodhpur,India.

3 Sustainability through organic farming, Mukund Joshi and Prabhakarasetty, T.K, 2006, Kalyani publishers, New Delhi..

4 Principles and practices of organic farming, Balasubramanian, R., Balakishnan, K and Siva Subramanian, K, 2013, Satish Serial Publishing House.

24ELCT411 - COMMERCIAL PLANT BREEDING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT411	COMMERCIAL PLANT BREEDING	CPB	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To Understand modes of reproduction & pollination for development of parental lines and testing of genetic purity in parents and hybrids	2	PO1, PO2, PO8
CO2	To Understand hybrid seed production of rice, maize, sorghum, pearl millet, castor	2	PO1, PO2, PO8
CO3	To understand hybrid seed production in sunflower, cotton, pigeon pea, Brassica sps and speed breeding, Breeding Management systems, High-throughput phenotyping and genotyping platforms,quality seed production of vegetables under open and protected environment	2	PO2, PO3, PO8
CO4	To Apply alternative strategies for line development, testing and registration of crop varieties & types of seed and quality testing	3	PO1, PO3, PO8
CO5	To Analyze floral biology, hybrid seed production techniques in cereals, pulses, oilseeds, vegetable crops, seed drying, storage and seed processing	4	PO1, PO3, PO8

Syllabus

Types of crops, Modes of plant reproduction, line development maintenance breeding in self and cross pollinated crops (A/B/R and two line system) for development of hybrids and seed production, grow out test

Development of hybrids and advances in hybrid seed production using male sterile lines (A/B/R and two line system)along with field and seed standards of cereal crops, Millets and Oil seed crops - rice, maize, sorghum, pearl millet, castor

Development of hybrids and advances in hybrid seed production using male sterile lines (A/B/R and two line system)along with field and seed standards of Sunflower, cotton and pigeon pea, Brassica species, Speed breeding, Breeding Management systems, High-throughput phenotyping and genotyping platforms, quality seed production of vegetables under open and protected environment

Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools, IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act and Variety testing, release and notification systems in India.Principles and techniques of seed production in self and cross pollinated crops

Floral biology and techniques of seed production in self and cross pollinated crops using A/B/R and two line system of field and Horticultural crops, drying, Seed storage structure in quality seed management and seed processing techniques

Reference Books

1 Essentials of Plant Breeding, Phundan Singh, 12, 2014, Kalyani publishers.

2 Plant Breeding: Principles and Methods, B D Singh, 12, 2015, Kalyani Publishers, New Delhi..

3 Seed Technology, Agarwal, R.L, 2, 2015, Oxford and IBH Publication Co., New Delhi.

4 Seed Technology second revised edition, Khare, Dhirendra and Bhala, M.S., 2, 2014, Scientific Publishers. Jodhpur.

5 Principles and Practice of Plant Breeding, Sharma, J.R., 1, 1994, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

24ELCT412 - BIOTECHNOLOGY OF CROP IMPROVEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT412	BIOTECHNOLOGY OF CROP IMPROVEMENT	BTCI	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the biotechnological tools of crop improvement	2	PO6, PO8, PO11
CO2	Apply the direct and indirect gene transfer methods in crop improvement	3	PO6, PO7, PO11
CO3	Apply the Gene editing and transgenic tools in plant breeding	3	PO8, PO11
CO4	Analyse the recombinants using marker assisted selection for improvement of crops.	4	PO6, PO7, PO8
CO5	Execute the biotechnological methods for enhancing of plant breeding strategies in developing of crop varieties	4	PO6, PO7, PO11

Syllabus

Impact of Biotechnology on crop improvement and the perspective of society and various biotechnological techniques available for crop improvement

Techniques of Plant Tissue Culture and Direct and Indirect methods of gene transfer in plants

Principles and applications of gene silencing, gene editing and transgenic technology

Applications of CRISPR/cas9 technology, Marker Assisted Breeding and Genomic Selection in crop improvement.

Exploit the genetic potential of crop plants through tissue culture, Gene transfer methods, genome editing tools and Marker assisted selection

Reference Books

1 Genomes, Brown, T. A., 3, Garland Science Pub, New York.

2 Principles of Gene Manipulation and Genomics, Old, R. W., Primrose, S. B. and Twyman, R. M, 7, Oxford: Blackwell Scientific Publications.

3 CRISPR-Cas systems for Editing, Regulating and Targeting Genomes, Sander, J.D. and Joung, J.K., 1, Nat Biotechnol.

4 Crop Breeding and Biotechnology, Ram, Hari Har, 1, Kalyani Publications.

5 Molecular Cloning: a Laboratory Manual, Green, M. R. and Sambrook, 1, Cold Spring Harbor Laboratory Press.

24ELCT413 - COMMERCIAL SEED PRODUCTION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT413	COMMERCIAL SEED PRODUCTION	CSP	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To Understand the General Principles of Seed Production, Introduction, class of improved seeds, monitoring or certification agency, isolation distance, rouging, HSP in field crops, concepts of apomixes, MS, SI and its application in HSP and FPSP.	2	PO1, PO7, PO8
CO2	To understand the Principles and objectives of Seed Processing, Drying, WVE, cleaning and grading, Separators, seed treatments, Bagging and Labelling, principles of seed testing, procedures, seed viability and vigour, physiological quality test and Principles of seed Germination, types of germination, biochemical and genetic basis.	2	PO1, PO7, PO8
CO3	To understand the concepts of seed certification, staff requirement Indian Minimum Seed Certification Standards (I.M.S.C.S.) - general and specific crop standards including GM varieties, field and seed standards. Seed Industry and Seed Marketing	2	PO1, PO8, PO11
CO4	To apply the biotechnological tools in seed technology, plant tissue culture - Micro-propagation, advantages and disadvantages, synthetic seed types, production, development, storage, Advantages and limitations of synthetic seed production	3	PO2, PO7, PO11
CO5	To analyze Seed Production, land, isolation, Planting ratio of male and female lines, supplementary pollination, pollen storage, hand emasculation and pollination of Tomato, Maize. Seed storage, seed testing, biotechnological tools in seed technology and visit to seed processing plant	4	PO2, PO10, PO11

Syllabus

General Principles of Seed Production, Introduction, class of improved seeds, monitoring or certification agency, isolation distance, rouging, Hybrid Seed Production in field crops, concepts of apomixes, Male Sterility, SI and its application in HSP and FPSP.

Principles and objectives of Seed Processing, Drying, WVE, cleaning and grading, Separators, seed treatments, Bagging and Labelling, principles of seed testing, procedures, seed viability and vigour, physiological quality test and Principles of seed Germination, types of germination, biochemical and genetic basis.

concepts of seed certification, staff requirement Indian Minimum Seed Certification Standards (I.M.S.C.S.) - general and specific crop standards including GM varieties, field and seed standards. Seed Industry and Seed Marketing

biotechnological tools in seed technology, plant tissue culture - Micro-propagation, advantages and disadvantages, synthetic seed types, production, development, storage, Advantages and limitations of synthetic seed production

Seed Production, land, isolation, Planting ratio of male and female lines, supplementary pollination, pollen storage, hand emasculation and pollination of Tomato, Maize. Seed storage, seed testing, biotechnological tools in seed technology and visit to seed processing plant

Reference Books

1 Seed Technology, Agarwal, R.L. , 2, 1997, Oxford & IBH.

2 Introduction to Plant Biotechnology, Chawla, H.S, 2, 2008, Oxford &IBH publishing Co. Ltd. 113-B Shahpur Jat, New Delhi-110049..

3 Indian Minimum Seed Certification Standards, Tunwar, N.S. and Singh S.N, 1, 1988, CSCB, Ministry of Agriculture, New Delhi.

4 Principles and Practices of Seed Storage, Justice, O.L. and Bass, L.N, 1, 1978, Castle House Publ. Ltd..

5 Seed Production: Principles and Practices, 2. McDonald, M.B. Jr and Copeland, L.O, 1, 1997, Chapman & Hall.

6 An Introduction to Seed Technology, Thompson, J.R. , 1, 1979, Leonard Hill.

24ELCT416 - MICRO PROPAGATION TECHNOLOGIES (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT416	MICRO PROPAGATION TECHNOLOGIES	MPT	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Principles of Micropropagation	2	PO1, PO5, PO9
CO2	Demonstrate Techniques in Plant Tissue Culture	3	PO1, PO5, PO9
CO3	Apply and Troubleshoot Micropropagation Protocols	3	PO1, PO5, PO9
CO4	Analyze Micropropagation in Agricultural Practices	4	PO1, PO5, PO9
CO5	Analyze Economic and Environmental Impacts of Micropropagation	4	PO1, PO5, PO9

Syllabus

Introduction, History, Advantages and limitations. Types of cultures (seed, embryo, organ, callus, cell).

Stages of micro propagation; Axillary bud proliferation (Shoot tip and meristem culture, bud culture).

Organogenesis (calluys and direct organ formation); Somatic embryogenesis

Cell suspension cultures; production of secondary metabolites; Somaclonal variation; Cryopreservation.

Identification and use of equipment in tissue culture Laboratory; Nutrition media composition; Sterilization techniques for media, containers and small instruments; Sterilization techniques for explants; Preparation of stocks and working solution; Preparation of working medium; Culturing of explants: Seeds, shoot tip and single node; Callus induction; Induction of somatic embryos regeneration of whole plants from different explants; Hardening procedures.

Reference Books

1. Plant Tissue Culture : Techniques and Experiments. , Smith, R.H , 3(2012) , Academic Press, San Diego, CA, USA..
2. .Pant Tissue Culture: An Introductory Text., Bhojwani, S.S. and Dantu, P.K, 1st 2013. , Springer, India, New Delhi..
3. Pant Biotechnology: Methods in Tissue Culture and Gene Transfer. , Keshavachandran, R. and Peter, K.V., 1(2008) , Universities Press, Hyderabad..
4. Plant Cell Tissue Organ Culture : Fundamental Methods. , Gamborg, O.L. and Phillips, G.C., 1(1995), Springer, Berlin..

24ELCT421 - AGROCHEMICALS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT421	AGROCHEMICALS	AC	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand introduction to agrochemicals, Effect of agro chemicals, Herbicides, Fungicides, Inorganic fungicides, Organic sulphur fungicides	2	PO5, PO8
CO2	Understand Systemic fungicides, Introduction and classification of insecticides, Organochlorines, Organo phosphates, Carbamates, Synthetic pyrethroids, Insecticides of other groups, Biorationals	2	PO5, PO8
CO3	Apply IGRs, Biopesticides, Insecticide Act and rules, Recent advances in pest control, Fertilizers and their importance, Manufacturing process, Phosphatic fertilizers, Potassic Fertilizers	3	PO5, PO8
CO4	Apply mixed and complex fertilizers, Manufacturing process, Secondary and multinutrient fertilizers, Fertilizer Storage, Physical and chemical properties of fertilizers, Fertilizer Control Order (FCO)-Importance and regulations, Fertilizer logistics and marketing	3	PO5, PO8
CO5	Analyze sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticides appliances. Quick tests for identification of commonfertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used.	4	PO5, PO8

Syllabus

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides - Fate of herbicides. Inorganic fungicides- Characteristics, preparation and use of sulphur and copper fungicides, Mode of action-Bordeaux mixture, copper oxychlorid and sulphur fungicides. Organic sulphur fungicides- Mode of action-Dithio carbamatescharacteristics, preparation and use of Zineb and Maneb.

Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides - Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant.

Fertilizers and their importance. Nitrogenous fertilizers- Feedstocks and Manufacturing of ammoniumsulphate, ammonium nitrate, ammonium chloride, urea. Slow release N-fertilizers. Phosphatic fertilizers-feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate.

Mixed and complex fertilizers. Sources and compatibility,preparation of major, secondary and micro nutrient mixtures. Complex fertilizers- Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Fertilizers and their importance -Classification with examples- Nitrogenous fertilizers- Feed stocks-Manufacturing process and properties of Ammonium sulphate, ammonium nitrate. Manufacturing process and properties of ammonium chloride and urea- Slow release nitrogenous fertilizers Phosphatic fertilizers-Uses-Types and properties - Manufacturing process and properties of SSP, TSP, bone meal and basic slag

Sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticides appliances. Quick tests for identification of commonfertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used. To study and identify various formulations of insecticide available kin market. Estimation of nitrogen in Urea. Estimation of water soluble P2O5 and citrate soluble P2O5 in single super phosphate. Estimation of potassium in Muriate of Potash/ Sulphate of Potash by flame photometer. Determination of copper content in copper oxychloride. Determination of sulphur content in sulphur fungicide. Determination of thiram. Determination of ziram content.

Reference Books

1 Elements of Economic Entomology, Vasantharaj David, B and Ramamurthy V V., eighth , 2017, Np Namuratha Publications.

2 General and Applied Entomology., Vasantharaj David, B and Aanathakrishnan, T.N.., second, 2003, Tata McGraw-Hill Publishing House.

3 A text book of Insect toxicology, Srivastava R P and Saxena R C, third, 2020, Himanshu Publications.

4 Methods of Pesticide analysis, S Sriramulu, second, 2020, Oxford IBH,.

24ELCT431 - BIOPESTICIDES AND BIOFERTILIZERS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT431	BIOPESTICIDES AND BIOFERTILIZERS	BB	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the History and concept, Importance, scope and potential and classification of biopesticides and their advantages and limitations.	2	PO3, PO4, PO5
CO2	Understand Comprehend the Biorationals and to Mass produce Entomopathogenic bacteria, virus, fungi, protozoa and EPN.	2	PO3, PO4, PO5
CO3	Apply Acquiring information on Structure and characteristic features of bacterial biofertilizers and to apply Rhizobium, Azotobacter, Azospirillum,	3	PO3, PO4, PO5
CO4	Apply the Production and application technology of biofertilizers, FCO specifications and quality control,	3	PO3, PO4, PO5
CO5	Analyze mass production technology of bacteria, Entomopathogenic virus, Entomopathogenic fungi, EPN and Isolation of Rhizobium, Azospirillum and Azotobacter, P and K solubilizers.	4	PO3, PO4, PO5

Syllabus

History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses. Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogens.

Methods of quality control and techniques of biopesticide evaluation. Impediments and limitation in production and use of biopesticide. Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cynobacterial biofertilizers- Anabaena, Nostoc, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza. Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization,

Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers and setts. Biofertilizers - storage, shelf life, quality control and marketing.

Study about mass production technology of important biopesticides. Identification of important botanicals. Visit to biopesticide lab. Working in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition.

Quality control of biopesticides. Isolation and purification of Azospirillum , Azotobacter, Rhizobium, P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.

Reference Books

1 Botanical and Bio pesticides, BS Parmar and C. Deva Kumar , 5th, 1993, West Will Publishing House, New Delhi.

2 Applied Entomology. Vol I & II ,, Srivastava, K. P. and Dhaliwal, G.S., 5th 2015, Kalyani Publishers, New Delhi .

3 Biofertilizers Technology (Scientific Pub., Jodhpur)., Kannaiyan, S., K. Kumar and K. Govindarajan, 8th, 2013, Scientific Pub., Jodhpur.

4 Biofertilizers in Agriculture and Forestry , Subbarao, N.S. , 4th , 2012, vishal publication .

5 Biofertilizer Technology and biofertilizers , santhosh et al, 4 th, 2013, dehli publishing house .

24ELCT432 - BIOFORMULATION AND NANOFORMULATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT432	BIOFORMULATION AND NANOFORMULATION	BFNF	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand importance of biopesticides and biofertilizers	2	PO3, PO5, PO10
CO2	To apply various techniques involved in biofertilizers and biopesticides production	3	PO3, PO5, PO10
CO3	To apply and get knowledge on essential oils, botanicals, predators, parasitoids, pheromones, and parapheromone and their application in insect pest management	3	PO3, PO5, PO10
CO4	To analyze students to acquire expertise and skill to develop bioformulation and Nanoformulation	4	PO3, PO8, PO10
CO5	To analyze concepts on agrochemical formulations with nanoparticles and acquaint them with nanotechnology.	4	PO3, PO5, PO8, PO10

Syllabus

Introduction and history of biological control of pests and diseases; Microbial biopesticides: the global and Indian market scenario; biopesticides for organic agriculture; Different phytopathogenic biocontrol agents

Different phytopathogenic biocontrol agents: Mode of action; Different entomopathogenic biocontrol agents: Mode of action; Microbial inoculants as biofertilizer candidates, Production, quality assessment

Methods of application of biopesticides and biofertilizers; Regulatory system of biopesticides in India; Formulations of plant essential oils, botanicals, pheromone, and parapheromone and their application in insect pest management

Use of predators and parasitoids for insect pest management; Nanotechnology: its applications in pest and disease diagnosis and management; Nano biopesticides: Concept and importance, different techniques of producing nano biopesticides; Nano Fertilizers: Concept and importance

Types of nano fertilizers; Different techniques of producing nano fertilizers; Green synthesis of nano fertilizers; green slow-release fertilizer composition based on urea-modified hydroxyapatite nanoparticles

Reference Books

1. Current Status of Biological Control of Plant Disease using Antagonistic Organisms in India. , Ramanujam, B. and Rabindra, R.J., 2006, Precision Fototype Services, Bengaluru..
2. Biological Suppression of Plant Disease, Phytoparasitic Nematodes and Weeds, Singh, S.P. and Hussanini, S.S., 1998, Precision Fototype Services, Bengaluru..
3. Nano-biopesticides Today and Future Perspectives, Koul, Opender Ed, 2019, Nanobiotechnology in Bioformulations, Kindle Edition.
4. Nanotechnology and Society, Allhoff, Fritz and Lin, Patrick (Eds), 2009, Springer Publications, UK.
5. Current Status of Biological Control of Plant Disease using Antagonistic Organisms in India, Cincholkar, S.B. and Mukherji, K.G., 2006, Precision Fototype Services, Bengaluru.

24ELCT441 - AGRI-BUSINESS MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT441	AGRI-BUSINESS MANAGEMENT	ABM	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Learning and Understanding the basics of various fundamental concepts in Agribusiness management. These basic concepts are needed for further proper understanding of the course and subject.	2	PO2, PO6, PO8
CO2	Understanding the concept of how to enter a market or industry. The requirements to build a factory/plant/company for goods production or service production. The marketing techniques that can be used will be understood.	2	PO2, PO6, PO8
CO3	Understanding the next steps after planning and setting up of a factory/plant/company. To decide on the product mix, the packaging decisions, selling strategy. Capital management, financial awareness for establishing a business with strong foundation will be understood.	2	PO2, PO6, PO8
CO4	Understanding various techniques of appraisal of the business in terms of finance, product, market share etc. Understanding the product and project cycle to know what kind of decisions to be made at what time.	3	PO2, PO6, PO8
CO5	Balance sheet analysis, profit & Loss analysis, Break even analysis, Financial ratio analysis for a business, planning of a hypothetical business to understand the real world situations and problems that one has to face during setting up of a business.	4	PO2, PO6, PO8

Syllabus

Theory Management- concepts and functions, Agribusiness Management-Scope, Structure, importance and its role in the Indian economy

SWOT analysis concept and its application in agribusiness enterprises Agro based industries and their linkages contribution of agro industries to the economy

Agribusiness Projects Evaluation concepts project cycle, appraisal and evaluation techniques, sensitivity analysis Basic guidelines for preparation of project reports.

Practical Balance sheet analysis and Analysis of Profit and Loss statement, Break Even Analysis/ Cost Volume and Profit analysis Financial Ratio Analysis

Development of Business performance tracking system Compounding and Discounting Techniques Project Appraisal Techniques

Preparing Business plans , SWOT Analysis, Visit & Study of Profile of Agro-based industries

Formulation of project feasibility report of agribusiness enterprise,

Marketing management of agribusiness enterprise

Reference Books

1. 1. Production and Operations Management , 1. Aswathappa, K and Sridhar K. Production and Operations Management . 2. David Downey, a nd John Ericson.Agribusiness Management, 1, DELHI.
2. Agribusiness Management, David Downey a nd John Ericson, 2, NE DELH PUBLICATION.
3. Gitteger Price, J.1989. Economic Analysis of Agricultural Projects. John Hopkins University Press, London., Gitteger Price, J , 1,1989., John Hopkins University Press, London.

4	Management of the Farm Business. Prentice Hall Inc, 4. Harsh, S.B. Conner, U.J. and Schwab G.D. , 1, 4. Harsh, S.B. Conner, U.J. and Schwab G.D. 1981. Management of the Farm Business. Prentice Hall Inc., New Jersey, USA.New Jersey, USA..
5	Introduction to Agribusiness . Prentice Hall of India Pvt. Ltd., New Delhi , . Omri Rawlins, N. , 1, Prentice Hall of India Pvt. Ltd., New Delhi .

24ELCT451 - MANAGEMENT OF NATURAL RESOURCES (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT451	MANAGEMENT OF NATURAL RESOURCES	MNR	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand about Natural Resource Bases: Concept of resource, classification of natural resources.	2	PO4, PO6, PO10
CO2	To understand about Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.	2	PO4, PO6, PO10
CO3	To understand about Introduction to soil and water conservation and causes of soil erosion., Definition and agents of soil erosion, water erosion	2	PO2, PO4, PO6, PO10
CO4	To apply knowledge on Wind erosion - Mechanics of wind erosion, types of soil movement - Principles of wind erosion control and its control measures.	3	PO4, PO6, PO10
CO5	To analyze and Identify natural resources and their utility. Practicing survey	4	PO4, PO6, PO10

Syllabus

Introduction to Natural Resource Bases: Concept of resource, classification of natural resources. Factors influencing resource availability, distribution and uses. Interrelationships among different types of natural resources. Concern on Productivity issues. Ecological, social and economic dimension of resource management. Land resources: Land as a resource. Dry land, land use classification, land degradation, man induced landslides, soil erosion and desertification. Landscape impact analysis, wetland ecology and management

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Water ecology and management. Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Resource Management Paradigms: Resource management the evolution and history of resource management paradigms. Resource conflicts: Resource extraction, access and control system. Approaches in Resource Management: Ecological approach; economic approach; ethnological approach; implications of the approaches; integrated resource management strategies.

Introduction to soil and water conservation and causes of soil erosion., Definition and agents of soil erosion, water erosion - Forms of water erosion, Gully classification and control measures. Soil loss estimation by universal soil loss equation - Soil loss measurement techniques. Principles of erosion control - Introduction to contouring, strip cropping. Contour bund - Graded bund and bench terracing.

Wind erosion - Mechanics of wind erosion, types of soil movement - Principles of wind erosion control and its control measures, Water harvesting techniques - Lining of ponds, tanks and canal systems.

Identify natural resources and their utility. Practicing survey - Principles and educating to use pacing technique for measurement. Area calculations through chain survey - GPS demo for tracking and area measurement. Estimation of soil loss and calculation of erosion index. Leveling concepts and practical utility in agriculture. Preparation of contour maps. Concept of vegetative water ways and design of grassed water ways. Wind erosion and estimation process. Different irrigation pumps and their constructional differences. Farm pond construction and its design aspects. Visit to nearby farm pond. Visit to an erosion site. Exposure to strip cropping/contour bunding.

Reference Books

1 Sustainable Natural Resource Management, Danill R. Lynch, 1, Cambridge University Press.

2 Management of Natural Resource for Sustainable Development , Vijay Singh Rathor and B S Rathor, 1, Daya Publishing House..

3 Managing Natural Resources: Focus on Land and Water., Ed. Harikesh N. Mishra., 1, PHI Learning.

4 Management of Resources for Sustainable Development: , Sushma Goel., 1, The Orient Blackswan .

5 Natural Resources: Their Conservation and Management , Arvindrai Upadhyay. , 1, Aspiration Academy.

6 Natural Resource Management for Growth Development and Sustainability , Vasudeva Srishti Pal., 1, Today & Tomorrows Printers and Publishers.

24ELCT481 - HI-TECH. HORTICULTURE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT481	HI-TECH. HORTICULTURE	HTH	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Introduction & importance; Nursery management and mechanization; Micro propagation of horticultural crops	2	PO1, PO4, PO9
CO2	Apply the Modern field preparation and planting methods, Protected cultivation	3	PO1, PO4, PO9
CO3	Apply the Micro irrigation systems and its components	3	PO1, PO4, PO9
CO4	Analyze canopy management, high density orcharding, Components of precision farming	4	PO1, PO4, PO9
CO5	Analyze different Types of Polyhouses and shade net houses, intercultural operations, tools and equipments identification and application	4	PO1, PO4, PO9

Syllabus

Hi-tech horticulture Introduction Scope and importance Perspectives of Hitech horticulture in India. Nursery management Quality control of planting material Plastics in nursery management Advantages of plant propagation under green houses

Modern field preparation methods Raised bed preparation Plastic mulching Types of protected structures Glass house, poly house, rain shelters, poly tunnels, hotbeds and cold flames, shade nets etc.

Micro irrigation systems and its components Methods of micro irrigartion genetically dwarf scion cultivars, dwarf rootstocks, pruning and training, use of growth retardants, induction of viral infection, use of incompatible rootstocks etc. Advantages and Constraints in HDP

High Density orcharding Concept HDP systems Components of HDP Green food production Approaches Biodynamic farming. preparations Cosmic integration Biodynamic calendar Strategies for green food production

preparations Cosmic integration Biodynamic calendar Strategies for green food production. Applications of precision farming in horticultural crops. Strategic approaches of precision technology for improvement of fruit production

Reference Books

1. Greenhouse Management of Horticultural Crops. , Prasad, S. And Kumar, U., 2nd edition, 2005, Agribios publishers, New Delhi..
2. Precision Farming in Horticulture, Singh, H.P., Singh, G., Samuel, J.C., and Pathak, R.K, 2nd edition, 2001, NCPAH, MOA, PFDC, CISH, Lucknow.
3. Canopy Management of Fruit Crops, Srivasthava, K.K., 2nd edition, 2005, International book distributing co., Lucknow.
4. Basics of Remote Sensing and Geographical Information Systems., Sahu, K.C, 1st edition, 2001, Atlantic publishers & Distributors.

24ELCT481 - LAND SCAPING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT481	LAND SCAPING	LS	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the concept of Importance and scope of landscaping	2	PO4, PO6, PO11
CO2	Apply and study about the different garden components or featurs	3	PO4, PO6, PO11
CO3	Apply and study about the different Trees used in landscaping	3	PO4, PO6, PO11
CO4	Apply and study about the different Succulents used in landscaping	3	PO4, PO6, PO11
CO5	Analyze Identification of avenue trees	4	PO4, PO6, PO11

Syllabus

Importance and scope of landscaping Goals of landscaping Categories of landscaping Residential public commercial specialty landscaping Garden types Formal Informal Wild Garden Styles of garden in the world Mughal Garden Site and design Walls and gates Terrace Running water Baradari Trees and flower.

Lawn making Selection of Grass Bermuda grass Korean grass Poa grass Fescue grass Kentucky blue grass Grasses for shady areas Site Selection Soil Preparation of soil Drainage Digging Manuring and grading Methods of planting Sowing of Seeds Dibbling.

To apply the knowledge regarding Ferns Palms Definition Introduction Utility aesthetic values Classification with examples Feather leaved Palm Fan leaved Palm Propagation Pot culture Potting Re-potting Potting media Manuring After care

Landscaping of schools public places like bus station railway station townships river banks hospitals play grounds airports industries institutions Importance Need Planting materials for different areas of institutions

Identification avenue trees shrubs annuals care and maintenance of plants planning designing and layout of formal gardens and informal gardens conservatory and lath house tools and implements used in landscape design visit to important gardens parks institutes

Reference Books

1 Landscape Gardening and Design with plants. , Bhattacharjee, S. K., 1 st. 2012, Aavishkar Publishers.

2 Floriculture and Landscaping, Bose, T.K, 1st. 1999, Naya Prakash.

3 Ornamental Horticulture in India, Chadha K.L and Choudhary,, 1 st 2011, ICAR.

4 Tropical garden plants in colour , B. Chowdhury and S.P. Sharma , 4 th. 1992, South Asia Books.

24ELCT482 - PROTECTED CULTIVATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT482	PROTECTED CULTIVATION	PC	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Protected cultivation its importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate.	3	PO3, PO6, PO10
CO2	Apply Cladding material involved in greenhouse/ poly house. Greenhouse design, environment control, artificial lights, Automation.	3	PO3, PO6, PO10
CO3	Apply Soil preparation and management, Substrate management. Types of benches and containers. Irrigation and fertigation management. Propagation and production of quality planting material of horticultural crops.	3	PO3, PO6, PO10
CO4	Analyze the Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management	4	PO3, PO6, PO10
CO5	Analyze raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production, I	4	PO3, PO6, PO10

Syllabus

Protected cultivation its Importance and scope Status of protected cultivation in India. World types of protected structure based on site and climate Glass house, poly house, rain shelters, poly tunnels, hotbeds and cold flames, shade nets

Types of green houses based on shape, utility, construction and cladding materialSoil preparation and management Soil sterilization methods Soil and soilless media like cocopeat, vermicompost, perlite, vermiculite, charcoal, pumice, rockwool etc. Substrate management

Cladding material involved in greenhouse/ poly house and common production practices followed under protected cultivation for commercial flowers.Fertilizer requirement Fertigation Training and pruning Special intercultural operations Defoliation, De-shooting, Bending, Disbudding etc. Use of growth regulators Physiological disorders Harvesting Grading & packing Yield.

Propagation and production of quality planting material of horticultural crops Asexual and sexual methods of propgation. Cultivation of economically important medicinal plants, vegtables

Raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production

Reference Books

1. Greenhouse Technology and Applications, Vilas M. Salone and Ajay K. Sharma, 2 (2012), Agrotech Publishers. New Delhi.
2. Greenhouse Management of Horticultural Crops, S. Prasad and U. Kumar., 2 (2012), Agrobios. New Delhi.
3. Green houses: Advanced Technology for Protected Horticulture, Joe.J.Hanan, 1 (1998), CRC Press, LLC. Florida..
4. Greenhouse Technology and Management , K.Radha Manohar and C. Igathinathane, 1 (2013), BS Publications.
5. Green House Operation and Management., Paul V. Nelson, 1 (1991), Ball publishing.

24ELCT483 - POST-HARVEST TECHNOLOGY AND VALUE ADDITION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT483	POST-HARVEST TECHNOLOGY AND VALUE ADDITION	PHT&VA	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the scope and importance of post-harvest technology of fruits and vegetables	2	PO3, PO5, PO6
CO2	Apply about the important disease, disorders and factors responsible for post-harvest losses in fruits and vegetables.	3	PO3, PO5, PO6
CO3	Apply skills such as post-harvest handling, different methods storage, principles and methods of preservation.	3	PO3, PO4, PO5
CO4	Apply the different methods of processing and packaging of fruits and vegetables	3	PO4, PO5, PO6
CO5	Analyse the different types of packaging containers for shelf life extension of pulps, juices, jam, Jelly, RTS, Nectar, Squash, Osmotically dried products.	4	PO3, PO4, PO5

Syllabus

Importance of fruits and vegetables, extent and possible causes of post harvest losses; Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; Respiration and factors affecting respiration rate, Role of ethylene, Applications of different types of packaging containers for shelf life extension, Effect of temperature on shelf life and quality of produce

Post harvest disease and disorders; Heat, chilling and freezing injury; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept; Principles and methods of preservation; Intermediate moisture, Demonstration of chilling and freezing injury in vegetables and fruits, Extraction and preservation of pulps and juices,

Effect of temperature on shelf life and quality of produce, ost harvest disease and disorders; Heat, chilling and freezing injury; Harvesting and field handling; Post harvest disease and disorders; Heat, chilling and freezing injury; Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric)

Preparation of jam, Preparation of Jelly, Preparation of RTS, Preparation of Nectar, Preparation of Squash, Osmotically dried products, mportance of fruits and vegetables, extent and possible causes of post-harvest losses; Pre-harvest factors affecting postharvest quality, maturity, Preparation of Jelly, Preparation of RTS, Preparation of Nectar, Preparation of Squash, Osmotically dried products

Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables Concept and methods, osmotic drying. Canning -Concepts and Standards, Packaging of products. Canned products, Quality evaluation of products physico-chemical and sensory, Visit to processing unit/ industry

Reference Books

1 Post-harvest Management and Processing of Fruits and Vegetables , Rathore, N.S., Mathur, G.K., Chasta, S.S., 1. 2014, ICAR.

2 Fruit and Vegetable Preservation: Principles and Practices. , Srivastava, R.P. and Sanjeev Kumar. , 2. 2012, International Book Distribution Company,.

3 Preservation of Fruits and Vegetables. , Giridharilal, G.S., Siddappa and Tondon, G.L. , 2. 2017, ICAR.

4 Post Harvest Physiology and Storage of Tropical and Subtropical Fruits. , Mitra, S.K. , 1.2015, CABI Publishers, Kolkatta..

24ELCT491 - AGRICULTURAL JOURNALISM (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELCT491	AGRICULTURAL JOURNALISM	AJ	R	3	0	2	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand every village in India maintained a social and economic existence that was essentially independent.	2	PO1, PO3, PO4
CO2	Understand culture transforms a man into a human being, governs his behaviour, and gets him ready for social interaction.	2	PO1, PO2, PO3
CO3	Apply at one time during the history of psychology, scholars felt that the main business of psychology was to study our conscious experience.	2	PO1, PO3, PO4
CO4	Analyze the personality is the total quality of an individual	3	PO1, PO2, PO3
CO5	Analyze the Rural sociology and educational psychology for practical purpose	4	PO1, PO2, PO3

Syllabus

Journalism, Meaning, nature, importance, and types of journalism

Agricultural Journalism , Meaning, definition, principle, objectives, types, and scope

Newspaper and magazines as communication media

Use of photograph in agricultural journalism, Basic principles of photography, composition, exposure, lens, light

Practice in writing an agricultural news story

Reference Books

1 News Reporting and Editing, K. M. Shrivastava, 5, New Age International Private Limited.

2 Professional Journalism , M.V. Kamath, 9, Agrotech Publishing Academy, Udaipur.

3 Farm Journalism and Media Management, Bhaskaran , 2, Prakash Brothers, Ludhiana..

4 Agricultural Extension and farm Journalism, A K Singh. , 2, Prokash/ Kalyani Publishers, Ludhiana.

5 Farm Journalism, Jana and Mitra, 1, Sree Lakshmi Press, .

Y24: Bachelor of Science (Honors) Agriculture

Category: Project Research And Internship (PRI)

24COCA300 - STUDY TOUR (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24COCA300	STUDY TOUR	ST	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Visit to nearest farmer fields	1	PO1, PO5, PO10
CO2	visit to nearest markets to know about exports imports quality maintaince profit margings	2	PO1, PO5, PO10
CO3	visit to nearest seed ,fertilizer,food processing unit and know about process and compailation of report	3	PO1, PO5, PO10
CO4	visit to plant production protection and RBK centers	3	PO1, PO5, PO10
CO5	Impart research experience to the students and expose them to the research activities in KVK and research stations	4	PO1, PO2, PO10

Syllabus

To impart research experience to the students.

all agriculture institutes regarding production IIOR IIRI

ICRISAT NAPHM NARM MANGE

CRIDA

PJTSAU

Reference Books

1 practial visit to all research stations , ., 1, all research stations .

2 Students will file report after completion of tour about all the institues they visited , students , 1, all research stations, farms, industriies .

3 seed,fertilizer and food processing industry report , students , 1, students and faculty incharges will publish in magazines .

4 survey of markets banaks all government offices women empowerment and list out facilities provided by givernment and usage and merits and demerits , students , 2, kl magazine paranoma .

24ELP1 - EXPERIENTIAL LEARNING PROGRAMME (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELP1	EXPERIENTIAL LEARNING PROGRAMME	ELP	R	0	0	20	0	10

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply our initiatives are crafted to enhance entrepreneurial skills, equipping participants with the essential tools for success in business ventures. In the realm of agricultural and allied sciences, we blend fundamental knowledge with advanced conceptual frameworks, ensuring a thorough grasp of the industry.	3	PO3, PO5, PO7
CO2	Apply the ability to work in project mode, we provide a structured environment where individuals can engage in real-world projects. This hands-on approach helps them develop critical thinking and problem-solving skills.	3	PO3, PO5, PO7
CO3	Apply the intricacies of product development, market analysis, and strategic planning. This prepares them to navigate the complexities of the commercial landscape and successfully launch innovative products. In addition, we emphasize the importance of earning through value addition technologies that are locally available.	3	PO3, PO5, PO7
CO4	Analyze the integration of different agricultural on-farm practices and devices for income generation, we provide comprehensive training and resources. Participants learn to combine various farming techniques and innovative devices, enhancing productivity and profitability.	4	PO3, PO5, PO7
CO5	Analyze the students will have adequate experience in planning and managing an enterprise in totality starting from procurement of raw material to processing, production, packaging and storage of products, organizing resources and utilities.	4	PO3, PO5, PO7

Syllabus

Our programs are designed to cultivate entrepreneurship development skills, providing the tools necessary for success in business ventures. In the field of agricultural and allied sciences, we integrate basic knowledge with advanced conceptual aspects, ensuring a comprehensive understanding of the industry. This integration helps individuals stay current with the latest advancements and trends. Our aim is to create a dynamic learning environment that supports innovation and growth.

we provide a structured environment where individuals can engage in real-world projects. This hands-on approach helps them develop critical thinking and problem-solving skills, essential for managing complex tasks and collaborating effectively in team settings. By working on diverse projects, participants gain practical experience that boosts their confidence and prepares them for future professional challenges. Additionally, our programs are dedicated to generating trained and skilled manpower specifically for self-employment and entrepreneurship development. We offer comprehensive training that covers various aspects of running a business, from planning and execution to marketing and financial management. This ensures that our participants are not only skilled in their chosen fields but also equipped with the entrepreneurial mindset needed to create and sustain their own ventures.

Participants learn how to effectively bring new technologies to market, understanding the intricacies of product development, market analysis, and strategic planning. This prepares them to navigate the complexities of the commercial landscape and successfully launch innovative products. In addition, we emphasize the importance of earning through value addition technologies that are locally available. By integrating integrated farming practices, food safety protocols, agriculture marketing strategies, and good agricultural practices, we equip individuals with the skills necessary to enhance the value of agricultural products. This approach not only boosts their earning potential but also promotes sustainable and efficient farming methods.

Explore wider opportunities in the integration of different agricultural on-farm practices and devices for income generation, we provide comprehensive training and resources. Participants learn to combine various farming techniques and innovative devices, enhancing productivity and profitability. By adopting practices such as precision farming, sustainable agriculture, and the use of smart farming technologies, individuals can significantly increase their income streams and optimize resource use. Moreover, we strive to integrate education with entrepreneurship for employment generation. Our programs are designed to equip agriculture students with the knowledge and skills necessary to transform their academic learning into practical entrepreneurial ventures. By fostering an entrepreneurial mindset, we encourage students to develop business plans, identify market opportunities, and create value-added products and services.

Twenty credits are recommended for EL programme of 180 days duration. The students will have adequate experience in planning and managing an enterprise in totality starting from procurement of raw material to processing, production, packaging and storage of products, organizing resources and utilities, sale of products, maintain accounts and analyze profits. Finally, students will present their work along with a report of their performance.

Reference Books

1. Organic farming for sustainable Horticulture, Parvatha Reddy P., 2012, Organic farming for sustainable Horticulture.
2. Organic Farming: Theory and Practice, Tarafdar J.C., K. Tripathi and M. Kumar. , 2 (2022), Scientific Publishers (India).
3. Microbial control of pests and plant diseases,, Burges, H.D. 1981. , 1998, Academic Press, New York..
4. Allelochemicals: Biological Control of Plant Pathogens and Diseases: 2 (Disease Management of Fruits and Vegetables), Inderjit K.G. Mukerji , 6(2006), Springer-Verlag New York Inc..
5. Precision Agriculture: Technology and Economic Perspectives., Pedersen S.M. and K.M. Lind, , 3(2009), Springer Publishers, UK..

24ELP2 - EXPERIENTIAL LEARNING PROGRAMME (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24ELP2	EXPERIENTIAL LEARNING PROGRAMME	ELP	R	0	0	20	0	10

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply on fostering self-employment opportunities, encouraging individuals to create their own paths in the professional world. Our programs are designed to cultivate entrepreneurship development skills, providing the tools necessary for success in business ventures.	3	PO2, PO5, PO9
CO2	Apply to build confidence and the ability to work in project mode, we provide a structured environment where individuals can engage in real-world projects. This hands-on approach helps them develop critical thinking and problem-solving skills.	3	PO2, PO5, PO9
CO3	Apply to participants learn how to effectively bring new technologies to market, understanding the intricacies of product development, market analysis, and strategic planning. This prepares them to navigate the complexities of the commercial landscape and successfully launch innovative products.	3	PO2, PO5, PO9
CO4	Analyze to explore wider opportunities in the integration of different agricultural on-farm practices and devices for income generation, we provide comprehensive training and resources.	4	PO2, PO5, PO9
CO5	Analyze the twenty credits are recommended for EL programme of 180 days duration. The students will have adequate experience in planning and managing an enterprise in totality starting from procurement of raw material to processing.	4	PO2, PO5, PO9

Syllabus

Promote professional skills and knowledge through hands on experience. To promote self-employment opportunities and entrepreneurship developmental skills in the field of agricultural and allied sciences through integration of basic knowledge and conceptual aspect

Build confidence and ability to work in project mode. To generate trained and skilled manpower for self-employment and entrepreneurship development.

Acquire enterprise management capabilities in commercialization of technologies. To earn through value addition technologies available locally through integration of integrated farming, food safety, agriculture market and good agriculture practices.

Explore wider opportunities in integration of different agricultural on-farm practices and devices for income generation. To integrate education with entrepreneurship for employment generation, so that agriculture students may become job providers rather than job seekers.

Twenty credits are recommended for the 180-day EL programme, during which students will gain comprehensive experience in planning and managing an enterprise, including procurement, processing, production, packaging, storage, resource organization, product sales, account maintenance, profit analysis, and presenting their work along with a performance report.

Reference Books

1 Seed Technology, Agrawal,R.L, 1(2004), Oxford & IBH Publishing Co., New Delhi..

2 Indian Minimum Seed Certification Standards, Trivedi.R.K. and M.Gunasekaran. , 2 (2013), Central Seed Certification Board, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India, New Delhi..

3 A guide to seed legislation. , Ramalingam, C., K. Sivasubramaniam and A. Vijayakumar., 1(2006), Rasi Computers, Madurai..

4 Soil Fertility and Fertilizers: An Introduction to Nutrient Management, Havlin, John L., Tisdale, Samuel L., Nelson, Werner L., and Beaton James D. , 2009, Pearlson Education Inc., USA..

24RAWEP01 - CROP PRODUCTION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24RAWEP01	CROP PRODUCTION	CP	R	0	0	8	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO4	Analyse package of practices, yield and economics of different crops	4	PO3, PO8, PO11
CO5	Analyse hands-on experience in all aspects of crop production from land preparation to harvesting and marketing	4	PO3, PO8, PO11

Syllabus

land preparation, layout, sowings in farmer\'s field, identification of crops and nutrient and weed management in farmer\'s field.

management of pests and diseases, scheduling of irrigation, biometric observations and mechanization, harvesting in different crops.

Reference Books

1 Text book of field crops production., Rajendra Prasad., 5th edition, 2004 , Kalyani publishers, .

2 Agronomy of fodder and forage crops, Panda S.C, 2nd edition, 2014, Kalyani publishers.

3 Agronomy of field crops, Reddy, S.R. and Reddi Ramu, 3 edition, 2016, Kalyani publishers, Ludhiana..

4 Modern techniques of raising field crops, Chidda Singh, Singh, P and Singh, R., 4 th edition, 2003, Oxford & IBH Publishing house, New Delhi.

24RAWEP02 - CROP PROTECTION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24RAWEP02	CROP PROTECTION	CPT	R	0	0	6	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	understand rural life and different situations prevailing in villages with special reference to agriculture among the students.	2	PO2, PO3, PO5
CO2	apply knowledge and experience on the operational aspects of agricultural technology being used / adopted by the farmers.	3	PO1, PO2, PO5
CO3	analyse and provide an opportunity for practical training in Crop Production and Plant Protection through work experience	4	PO1, PO3, PO5
CO4	analyse and acquire enterprise management capabilities	4	PO1, PO2, PO5
CO5	analyse socio-economic conditions of farmers and several agencies	4	PO1, PO3, PO5

Syllabus

Identification of insect and non-insect pests, diseases, nutritional disorders, weeds and other physiological disorders in standing crops, Non-insect pests like rodents, birds, wild boars, etc.

Maintenance of record of plant protection work undertaken in the prescribed proforma for a minimum of two crops, Make critical observations on adoption of recommended plant protection measures for the control of diseases and insect and non-insect pests of the crops

Record the observations on plant protection separately for insect and non-insect pests and diseases Collection of information on nematode problems, i Recommendation of the use and methods / techniques of applying pesticides for the control of crop pests and diseases

Demonstration of preparation of fungicidal/insecticidal spray fluids for important plant protection measures, Submission of 10 herbarium specimens each of insect damage, plant disease symptoms, nutritional disorders, weeds and physiological disorders of any of the crops grown in the village.

Collection of information on insecticides, fungicides and herbicides available in market from local input dealers, Collection of information about the procedure for obtaining licence from government to market pesticides

Reference Books

1 Vyavasaya Panchangam, ANGRAU, 10th, 2024, ANGRAU.

2 Elements of Economic Entomology, Vasantharaj David, B. and Rama Murthy V.V, 4th, 2016, Popular Book Depot, Coimbatore.

3 Insects and Mites of crops in India, Nair MRGK., 1st, 1986, Insects and Mites of crops in India.

4 Handbook of Economic Entomology for South India, Handbook of Economic Entomology for South India, 2nd, 1963, Government Press, Madras.

5 Agricultural Pests of India and South East Asia. K, Atwal, A.S., 2nd, 1976, Kalyani Publishers, Ludhiana.

24RAWEP03 - RURAL ECONOMICS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24RAWEP03	RURAL ECONOMICS	RE	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the solutions and the problem solving ability	2	PO1, PO5, PO9
CO2	Apply the Environment, sustainability and society at thought and thoughts of economics to Individual and Team work	3	PO1, PO5, PO9
CO3	Analyse Project formulation and sourcing of finance and Life long learning and upgradation	4	PO1, PO5, PO9
CO4	Orientation of Rural economics	4	PO1, PO5, PO9
CO5	Practical	4	PO1, PO5, PO9

Syllabus

Agroeconomic survey Demographic particulars of the village Occupational distribution of the village Identify the solutions and the problem solving ability: To identify various pests and disease of crops both field and Horticultural and suggest management strategies which are location specific environmentally safe, and economically sound

Land utilization, Irrigation and Cropping Pattern of the village Supply of resources in the village Particulars of Agricultural Credit Modern tools equipment software s usage To be able to effectively use software tools, statistical applications, mathematical packages/models expertise in techniques of Extension and modern tools of ICTs to analyse, interpret and by effectively handling the data and to draw valid conclusions thereon and to transfer Agriculture technologiesfor modernize Agriculture use

Village Industries in the village Marketing of Agricultural Produce in the village Agricultural Product prices in the village Individual and Team work:To develop individual competence, critical and complex problem solving skills to solve the practical problems in the field of Agriculture and to demonstrate the abilities to work in a team.

Processing facilities in the village Market finance facilities in the village Major Sources of market information to farmers Details of family and farm labour of the host farmer Land holding particulars of the farmer Environment, Sustainability and Society at thought and deed: Ability to demonstrate the agricultural solutions to contemporary issues by understanding their impact on societal and environmental contexts, towards sustainable development

Details of family and farm labour of the host farmer Land holding particulars of the farmer Season wise crops cultivated by the farmer Agricultural loans availed by the farmer Crop Insurance particulars of the village Project formulation and sourcing of finance: To come out as a good Agro-entrepreneur, Farm Manager/Agribusiness Person with sound knowledge in rural credit flow, banking systems, farm/enterprise budgeting, project management, marketing, supply chain management, Agricultural Policies for Governments.

Reference Books

1 Introduction to Agricultural Economic Analysis, Bishop CEand WD Tousaint, 1,1958, John Wiley and Sons London.

2 Fundamentals of Farm Business Management. , SS Johl JR Kapur , 2,2006, New delhi publication.

3 Economics of Farm Production and Management, Raju V T and DVS Rao , 1, 2006, Oxford & IBH Publishing Co Pvt Limited New Delhi.

4 Rural Economics, Chaudhary CM, 1,2009, Sublime Publications.

5 Economics For Rural Development , Shashi Bhushan Rakesh Pushap, 1, 2019, VK Global Publications Pvt. Ltd.

24RAWEP04 - EXTENSION PROGRAMME (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24RAWEP04	EXTENSION PROGRAMME	EP	R	0	0	8	0	4

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the identification of major agricultural problems of the village through Participatory Rural Appraisal (PRA) techniques	2	PO1
CO2	Apply the gap analysis and preparation of action plan for participatory extension teaching methods.	3	PO5
CO3	Apply to study the public and private agricultural extension information sources and their critical analysis	3	PO7
CO4	Apply the Training Need Assessment of the farmers and conduct of training programme	3	PO9
CO5	Analyze to develop an understanding of rural life and different situations prevailing in villages with special reference to agriculture among the students.	4	

Syllabus

Identify the solutions and the problem solving ability

Life long learning and upgradation

Project formulation and sourcing of finance

Documentation of Indigenous Technical Knowledge

. Identification of major agricultural problems of the village through Participatory Rural Appraisal(PRA)techniques 2. Gap analysis and preparation of action plan for participatory extension teaching methods 3. Organization of participatory extension teaching methods such as method demonstrations, group discussions, Rythu Sadassu and exhibition 4. Maintenance of Agricultural Information Corner in the village 5. Study of Public and Private Agricultural Extension Information sources and their critical analysis 6. Study of on-going Central/State sponsored rural development/ extension programmes/ schemes 7. Training Need Assessment of the farmers and conduct of training programme 8. Documentation of Indigenous Technical Knowledge (ITK) and Farmer Innovations 9. Study of Farmers groups (RMGs, CIGs, Farmers Associations, FPOs) and Self Help Groups (SHGs) in the village 10. Documentation of success stories of farmers in the village

Reference Books

1 Extension Communication and Management, Ray, G.L., 3rd edition, Kalyani Publishers, Kalkatta/Ludhiana.

2 Communication, Rayudu, C.S., 2nd edition, Himalaya Publishing House, New Delhi.

3 Fundamentals of Extension Education and Management in Extension, Jalihal, K.A., 2nd edition, Publishing House, New Delhi.

4 Diffusion of Innovation, Rogers, E.M., 4th edition, Free Press, New Delhi.

5 Text book of Rural Development, Sagar Mondal , 4th edition, Kalyani Publishers, Kolkata/Ludhiana..

24RAWEP05 - RESEARCH STATION / KVK /DAATT CENTRE ACTIVITIES (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24RAWEP05	RESEARCH STATION / KVK /DAATT CENTRE ACTIVITIES	RAS	R	0	0	2	0	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the Orientation on KVK	2	PO8, PO9, PO11
CO2	Apply the Orientation on services of research stations	3	PO5, PO8, PO9, PO11
CO3	Apply the Orientation On programmes of research stations	3	PO5, PO9, PO11
CO4	Analyse the Orientation on technology tranfer	4	PO5, PO9, PO11
CO5	Analyse the Research station activities	4	PO7, PO8

Syllabus

Research Station activities

Services of Research stations

Programes conducted by Research stations

Role and data management analysis of research stations in the technology transfer

Reference Books

1 Vyavasaya Panchangam, ANGRAU, 2020, Angrau publishers.

2 Handbook of Agriculture, ICAR, 2, ICAR Publishers.

3 Handbook of Agricultural Extension, ICAR, 1, ICAR PUBLISHERS.

4 A Textbook of Agricultural Statistics, Rangaswami R, 2, New Age international Publishers.

24RAWEP06 - INTERNSHIP (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24RAWEP06	INTERNSHIP	ITS	R	0	0	12	0	6

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Application of subject studied in the companies	3	PO6, PO9, PO10
CO2	Apply the knowledge of marketing the company products	3	PO6, PO9, PO10
CO3	Determine the functionaries invovled the private companies	3	PO6, PO9, PO10
CO4	Apply management and operational aspects of the agriculture based companies	3	PO6, PO9, PO10
CO5	Analyze the products in the companies on various crops	4	PO6, PO9, PO10

Syllabus

Crop planning, raising field crops in multiple cropping systems, field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying, winnowing, storage and marketing of produce.

Marketing of various produce, dealers in the marketing channel and farmers interest towards the purchase of produc

Study various functionaries invovled in private companies and their working at various levels

Management and operational aspects of the agriculture based companies

Learning experience by practical application of the knowledge gained and theory learned in the classroom environment in a professional environment with a hand holding support for overall skill development. To gain valuable applied experience and make connections in professional fields they are considering for career paths and give employers the opportunity to guide and evaluate talent.

Reference Books

1 Principles of Agronomy, S R Reddy, 2009, Kalyani publishers.

2 Principles of crop production, SR Reddy, 2014, Kalyani Publishers.

3 Irrigation Water Management: Principles and Practice, Majumdar D.K , 2014, Prentice Hall India Learning Private Limited.

4 Fundamentals of Crop production , Rajendra Prasad , 2016, Kalyani publishers .

Y24: Bachelor of Science (Honors) Agriculture

Category: Ability Enhancement Courses (AEC)

24AEXT192 - COMMUNICATION SKILLS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AEXT192	COMMUNICATION SKILLS	CS&PD	R	1	0	2	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand communication, skills, voice modulation, and their impact: listening, note-taking, writing, oral presentations.	2	PO1, PO2, PO9
CO2	Understand field diary, lab record, presentations, public speaking, group discussions, seminars, human behavior components.	2	PO1, PO2, PO9
CO3	Apply personality development theories to analyze wants, needs, motives, and goals using transactional analysis.	3	PO1, PO2, PO9
CO4	Apply negotiation skills, stress management, conflict management emotional intelligence, creativity, team work, factors affecting and role of team work.	3	PO1, PO2, PO9
CO5	Analyze communication skills, writing records, public speaking, organizing events, teamwork, and time management practices.	4	PO1, PO2, PO9

Syllabus

Communication - Meaning and process of communication, verbal and nonverbal communication,Functions of communication, barriers in communication, Communication skills - Structural and functional grammar, Listening, Types of listening, note taking, Phases of note taking, Methods of note taking, writing skills, oral presentation skills. Voice modulation basics and their usage for meaningful impact on people.

Field diary, Step of field diary, Advantages of keeping field diary, Procedure of keeping field diary, Part of field diary, Lab record, Basic parts of lab record, Purpose of keeping Lab record, Indexing, Importance of indexing, Types of indexing, Footnote, Types of Footnote, Purpose of footnote, Bibliographic procedures, Types of Bibliography, Kinds of Bibliograph, Bibliographic procedure, Reading and comprehension of general and technical articles, Precise writing, summarizing, Abstracting Individual and group presentations, Extempore, Impromptu, Prepared presentations, Public speaking, Group discussion, Organizing seminars and Conferences, Human Behaviour - Domains and Components of Behaviourr

Personality, Types of Personality, Dimensions of Personality, Characteristics of Personality, Factors Influencing Personality, Significance or importance of personality development, Types of Personality, Personality Theories, Importance of wants, desires, needs, drives, motives, aspirations, interests, objectives and goals in personality development, Transactional Analysis, Transactional Analysis segments

Negotiation Skills, Features of negotiation,Types of Negotiation, Important Stages involved in a Negotiation Process, Stress Management,Types of stress,Stress management strategie, Conflict Management, Conflict Management Styles, Emotional Intelligence, Characteristics of Emotional Intelligence, Significance of Emotional Intelligence, creativity, Meaning and concept of team work

Communication - Meaning and process of communication, Overview of non-verbal communication skills, signs of body language, Simulated Exercises on Communication, Overview of verbal communication skills, Practicing listening and note taking and writing skills, Practicing oral presentation skills, Practicing writing of field diary and lab record - Indexing, footnote and bibliographic procedures, Practicing reading and comprehension of general and technical articles, Practical exposure on organizing seminars and conferences, Evaluative exercise on recorded video programme to build the confidence levels of students, Practical exercise on importance of team work,Practical exercise on importance of time management.

Reference Books

1 A Text Book of Communication Skills., Dangi K.L., S.S. Sisoda, Pravesh Singh Chauhan and Yogita Ranavat., 1, 2019, Agrotech Publications.

2 Essentials of Educational Psychology. PHI Learning Private Ltd., Mangal S.K, 2, 2019, PHI Learning Private Ltd., New Delhi,.

3 A Genesis of Behavioural Science., Nirajkumar, 2, 2015, Gyan Publishing House, New Delhi..

4 Personality Development and Communication Skills , Dr. Anubhuti Dubey, Prof. Aradhna Shukla , 1, 2020, Laxmi Publications Pvt. Ltd..

24AEXT193 - PERSONALITY DEVELOPMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AEXT193	PERSONALITY DEVELOPMENT	PD	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the fundamental concepts of personality, its nature, types, theories, and the humanistic approach to personality development	2	PO1
CO2	Apply personality theories, including Maslows self actualization and Myers Briggs Typology, to assess individual behavior in organizational settings	3	PO5
CO3	Apply models of individual behavior, perception, and attribution theory to enhance understanding of organizational dynamics and decision making	3	PO7
CO4	Apply learning theories, motivation principles, and emotional intelligence to improve teamwork, training, and overall organizational performance	3	PO9
CO5	Analyze the influence of personality traits, learning styles, motivational needs, and leadership styles on organizational behavior and team dynamics	4	PO5

Syllabus

Personality Theories (including Maslows self actualization and MBTI), determinants, and their impact on organizational behavior

Individual behavior, perception, attribution theory, and the factors influencing perception and decision making in organizational contexts

Learning theories, principles, and their application to organizational behavior, training, and feedback processes.

Intelligence types, emotional intelligence, motivation theories, teamwork dynamics, and their role in enhancing organizational performance

Analyzing MBTI, learning styles, motivation, communication, teamwork, and leadership to improve organizational behavior

Reference Books

1 Social and Personality Development, Shaffer, D, 6, Belmont, CA.

2 All about Self- Motivation, Pravesh Kumar., 7, Goodwill Publishing House..

3 Body Language, Smith, B, 6, Rohan Book Company.

4 Reducing Stress, Hindle, Tim, 4, Dk Publishing.

24COCA100 - NATIONAL SERVICE SCHEME (NSS-1) / NATIONAL CADET CORPS (NCC-1) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24COCA100	NATIONAL SERVICE SCHEME (NSS-1) / NATIONAL CADET CORPS (NCC-1)	COCA	R	0	0	2	0	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand Basic Concepts of NSS Activities and shramadan	2	PO1, PO5, PO9
CO2	Apply basic Indian constitution and Human rights , Family and Society	3	PO1, PO5, PO9
CO3	Apply health Hygiene and importance of fitness programs	3	PO1, PO5, PO9
CO4	Analyze Environmental Issues and Disaster Management	4	PO1, PO5, PO9
CO5	Analyze Disaster management, Entrepreneurship development	4	PO1, PO5, PO9

Syllabus

To impart the knowledge of agricultural science with respect to agronomical and horticultural crops and to develop skills to solve complex problems crop growth monitoring, soil analysis methods, plant protection analysis,production and processing of seed.Orientation - History, objectives, principles, symbol, badge; regular programmes under NSS, organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers awareness about health

To be well versed with different methodologies of crop growth monitoring, soil analysis methods, plant protection analysis,production and processing of seed Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary

To identify various pests and disease of crops both field and Horticultural and suggest management strategies, which are location specific, environmentally safe, Understanding youth - Definition, profile, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change Community mobilization -Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilisation involving youth-adult partnership

Weed Management and crop improvement programs involving both conventional and biotechnological approaches.Social harmony and national integration - Indian history and culture, role of youth in nation building, conflict resolution and peace-building Volunteerism and shramdan - Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism

Environment, Sustainability and Society at thought and deed: Ability to demonstrate the agricultural solutions to contemporary issues by understanding their impact on societal and environmental contexts, Citizenship, constitution and human rights - Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information Family and society - Concept of family, community (PRIs and other community based organisations) and society

Reference Books

1 Health, Physical Education and Yoga, Dr Neeraj pratap, 1,2019, Sports Publication.

2 Physical Education UGC , Dr. A. K. Uppal and Prof. V. Satyanarayana , 1,2019, Publisher Sports Publication.

3 Physical Education and Sports Science , Umesh K.Ahlwat, 1,2023, KHEL SAHITYA KENDRA.

4 Complete Physical Education, jds parwar, 1,2022, Sports Publication.

24COCA101 - NATIONAL SERVICE SCHEME (NSS-2) / NATIONAL CADET CORPS (NCC-2) (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24COCA101	NATIONAL SERVICE SCHEME (NSS-2) / NATIONAL CADET CORPS (NCC-2)	NCC	R	0	0	2	0	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO

24COCA200 - PHYSICAL EDUCATION, FIRST AID, YOGA PRACTICES AND MEDITATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24COCA200	PHYSICAL EDUCATION, FIRST AID, YOGA PRACTICES AND MEDITATION	PE,FA,YPM	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO

Y24: Bachelor of Science (Honors) Agriculture

Category: Multi-Disciplinary Courses (MDC)

24AECO242 - ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AECO242	ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION	EDBC	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understanding the scope and importance of entrepreneurship, its different types and concept, and management levels.	2	PO1, PO4, PO9
CO2	Application of new ideas, research, and innovative ideas for commercialization	3	PO1, PO4, PO9
CO3	Apply the knowledge of venture capitals ,MSME industry , farm and some projects for entrepreneur	3	PO1, PO4, PO5
CO4	Analysing and management of new Govt. policies, supply chain management and system marketing management	4	PO1, PO5, PO9
CO5	Analysing the concept of entrepreneur, entrepreneurship	4	PO4, PO5, PO9

Syllabus

Concept of Entrepreneur, Entrepreneurship, Distinction between an Entrepreneur and a Manager. Factors Affecting Entrepreneurship Development; Generation, Incubation and Commercialization of Business Ideas. Environment scanning and opportunity identification. Globalization and the emerging business entrepreneurial environment; Role of ED in economic development of a country- Overview of Indian social, political systems and their implications for decision making by individual entrepreneurs SWOT Analysis.

Entrepreneurship Development Programmes (EDPs). Government Policies, Incentives, Programmes and Schemes for Entrepreneurship Development; Export and Import Policies relevant to Indian Agriculture Sector. Institutional Support - Financial Institutions and other agencies in entrepreneurship development. Venture capital (VC), contract farming (CF) and joint ventures (JV), Public-private partnerships (PPP). Steps in establishment of MSME Enterprise - Planning of an enterprise, Project identification, Selection of the product / services, selection of form of ownership; registration, selection of site.

SWOT Analysis - Concept, Meaning and Advantages. Project Planning, Formulation and Project Report - Meaning - Importance - Components and Preparation; Supply Chain Management - Meaning, Advantages, Stages and Process and Total quality Management. Definition of business; Stakeholders in business; Stages of Indian business; Importance of agribusiness in Indian economy; Business Communication for Public Relation , Advertisement and crisis communication. Social responsibility of business.

Formulation and Project Report. Morals and ethics in enterprise management Assessment of Entrepreneurship skills, Business Leadership Skills; Communication Skills for entrepreneurship development, Developing organizational skill, Managerial skills, Problem solving skill and Time management skills. Food Processing Industry; Steps in establishment of MSME Enterprise - Planning of an enterprise, Project identification, Selection of the product / services, selection of form of ownership; registration, selection of site, capital sources, acquisition of manufacturing know how, packaging and distribution.

Field Visits to study Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. Objectives, Phases, Problems of EDPs, Entrepreneurial behavior and Role of Achievement Motivation, Factors Affecting Entrepreneurship Development; Generation, Incubation and Commercialization of Business Ideas. Environment scanning and opportunity identification. Researching / Managing Competition - Ways to define possible Competitors; Globalization and the emerging business entrepreneurial environment; Role of ED in economic development of a country.

Reference Books

1 Entrepreneurship Development & Management., Bhaskaran, S, 5 (2000), Aman Publishing House, Meerut.

2 Theory and Practice., Gupta, C.B, 3 (2005), Sultan Chand and Sons, New Delhi..

3 Reaching the Unreached, Ganesh, R, 4 (2010), Associate Publishing Company.

4 Entrepreneurship Development , Bhaskaran, 6 (2007), Aman Publishing House.

5 Dynamics of Entrepreneurial Development and Management, Vasanta Desai, 4 (1999), Himalaya Publishing House, New Delhi.

24AECO341 - AGRICULTURAL MARKETING AND TRADE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AECO341	AGRICULTURAL MARKETING AND TRADE	AMT	R	2	0	2	0	3

Prerequisite

S#	Course Title	Acronym	Rule
1	PRINCIPLES OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT	PAEFM	1

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understand the concept of market and its types, demand supply of farm products, exchange functions, facilitating functions and market functionaries	2	PO4, PO6, PO10
CO2	Understand the marketing channels, supply chain, marketing mix, product life cycle, pricing, market promotion, segmentation, and integration	2	PO4, PO6, PO10
CO3	Understand the marketing costs, margins, and price spread, regulated markets, APMC, cooperative marketing, types of risk in marketing, future trading	2	PO4, PO6, PO10
CO4	Apply the concepts, agricultural product price, CACP, MSP, international trade, WTO and its agreements, TRIPS and IPR in Indian agriculture	3	PO4, PO6, PO10
CO5	Analyze elasticities and plot demand supply curve for agricultural commodities, study market arrival, prices, and comparative advantage	4	PO4, PO6, PO10

Syllabus

Agricultural Marketing concepts and definitions of market, marketing, agricultural marketing, market structure, classification and characteristics of agricultural markets demand, supply and producers surplus of agri commodities in India. Meaning of marketable surplus and marketed surplus, importance and their measurement. marketable surplus and marketed surplus of agri-commodities in India, factors affecting them.

Marketing process and functions Marketing process concentration, dispersion and equalization exchange functions buying and selling physical functions storage, transportation and processing, facilitating functions packaging, branding, grading, quality control and labeling- AGMARK, HACCP, FSSAI, CODEX - Need for codex certification and relevance. Market functionaries - Types and importance of agencies involved in agricultural marketing and their role - Producers middlemen (merchant middlemen, agent middlemen, speculative middlemen, processors, facilitative middlemen). Meaning and definition of marketing channels and supply chain management and their importance.

Marketing mix and Market segmentation. Product life cycle (PLC) and competitive strategies Meaning and stages in PLC, characteristics of PLC, strategies in different stages of PLC, pricing and promotion strategies Pricing considerations and approaches Cost based and competition-based pricing. Market promotion Advertising, personal selling, sales promotionand publicity. Their meaning and merits and demerits. Market segmentation Meaning and its importance, types of market segmentation and benefits. Market Integration Meaning, definition. Marketing efficiency Meaning, definition, measurement of marketing efficiency

Trade Concept of International Trade and its importance in globalised world economies, theories of absolute and comparative advantage. Present status and prospects of Indian agri commodities trade in international trade. WTO Genesis, objectives, functions and principles of multilateraltrade. WTO agreements -Agreement on Agriculture (AoA) Market access, Aggregate Measures of Support (AMS), export subsidies, sanitary and phyto santitary measures (SPS) and their implications and impact on Indian agriculture.

Plotting and study of demand and supply curves and calculation of elasticities Study of relationship between market arrivals and prices of some selected commodities Computation of marketable and marketed surplus of important commodities Study of price behaviour over time for some selected commodities. Construction of index numbers moving averages. General PI, WPI, CPI. Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodities, collection of data regarding marketing costs. Estimation and calculation of marketing costs, margins and price spread and presentation of report in the class

Reference Books

1 Agricultural Marketing in India., S S Acharya and N L Agarwal., 4, 1987, Oxford & IBH Publications Co. Pvt. Ltd.

2 Agricultural Price: Analysis and Policy. , S S Acharya and N L Agarwal. , 6, 1994, Oxford & IBH Publications Co. Pvt Ltd.

3 Agricultural Economics. , Subba Reddy, S., P.Raghu Ram., Sastry, T.V.N and Bhavani Devi, I. , 2, 2019, Oxford & IBH Publishing Company Private Ltd.

4 Agricultural Price Policy in India. , Kahlon, A.S and Tyagi.D S. , 1, 1983, Allied Publishers Pvt. Ltd..

5 Principles and Practices of Marketing in India. , Mamoria, C.B. and Joshi. R L, 2, 1968, Kitab Mahal.

24AGRO102 - FARMING BASED LIVELIHOOD SYSTEMS (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO102	FARMING BASED LIVELIHOOD SYSTEMS	FLS	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand the Status of agriculture in India and different states, Income of farmers and rural people in India, Livelihood-Definition, concept and livelihood pattern in urban and rural areas, Different indicators to study livelihood systems. Agricultural livelihood systems (ALS): Meaning, approach, approaches and framework,	2	PO2, PO6, PO10
CO2	o understand the Types of traditional and modern farming systems. Components of farming system/ farming-based Summerise the livelihood systems- Crops and cropping systems, Livestock, (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agro--forestry systems, Aqua culture Duck/Poultry cum Fish, Dairy cum Fish, Piggery cum Fish etc., small, medium and large enterprises including value chains and secondary enterprises as livelihood components for farmers	2	PO2, PO6, PO10
CO3	To understand the Factors affecting the integration of various enterprises of farming for livelihood. Feasibility of different farming systems for different agro-climatic zones, Commercial farming-based livelihood models by NABARD, ICAR and other organizations across the country, Case studies on different livelihood enterprises associated with farming. Risk and success factors in farming-based livelihood systems	2	PO2, PO6, PO10
CO4	To apply Categorise the Schemes and programs by Central and State Government, Public and Private organizations involved in promotion of farming-based livelihood opportunities. Role of farming-based livelihood enterprises in 21st Century in view of circular economy, green economy, climate change, digitalization and changing life style	3	PO2, PO6, PO10
CO5	To analyse the important farming-based livelihood models/ systems in different agro-climatic zones, Study of production and profitability of crop-based, livestock-based, processing-based and integrated farming-based livelihood models, Field visit of innovative farming system models. Visit of Agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors and Study of agri-enterprises involved in industry and service sectors (Value Ch	4	PO2, PO6, PO10

Syllabus

Status of agriculture in India and different states, Income of farmers and rural people in India, Livelihood-Definition, concept and livelihood pattern in urban and rural areas, Different indicators to study livelihood systems.

Definition of farming systems and farming based livelihood systems Prevalent Farming systems in India contributing to livelihood. Types of traditional and modern farming systems. Components of farming system/ farming-based livelihood systems

Livestock, (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agro--forestry systems, Aqua culture Duck/Poultry cum Fish, Dairy cum Fish, Piggery cum Fish etc., small, medium and large enterprises including value chains and secondary enterprises as livelihood components for farmers

Factors affecting the integration of various enterprises of farming for livelihood. Feasibility of different farming systems for different agro-climatic zones, Commercial farming-based livelihood models by NABARD, ICAR and other organizations across the country

Case studies on different livelihood enterprises associated with farming. Risk and success factors in farming-based livelihood systems, Schemes and programs by Central and State Government, Public and Private organizations involved in promotion of farming-based livelihood opportunities

Reference Books

1 Towards Green Villages: A strategy for Environmentally, Sound and Participatory Rural Development,, Agarwal, A. and Narain, S, 2nd edition, 1989, Center for Science and Environment, New Delhi, India.

2 Sustainable Livelihoods: Lessons from Early Experience; Department for International Development, Ashley, C. and Carney, D., 7th edition, 1999, London, UK;.

3 Farming System and Sustainable Agriculture, Walia, S. S. and Walia, U. S, 3rd edition, 2020, Scientific Publishers,Jodhpur, Rajasthan..

4 Farming System and Sustainable Agriculture, Reddy, S.R., 3rd edition, 2016, Kalyani Publishers, New Delhi.

Y24: Bachelor of Science (Honors) Agriculture

Category: Skill Enhanced Courses (SEC)

24AGSE001 - BIOFERTILIZER AND BIOPESTICIDE PRODUCTION (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGSE001	BIOFERTILIZER AND BIOPESTICIDE PRODUCTION	BF&BP	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	To understand Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers	2	PO2, PO3, PO5
CO2	To apply Production technology on Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers	3	PO1, PO2, PO5
CO3	To analyse Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogens. Methods of application of biopesticides.	4	PO1, PO3, PO5
CO4	To analyse Methods of quality control and techniques of biopesticide evaluation	4	PO1, PO2, PO5
CO5	To analyse about mass production technology of important biopesticides and biofertilizers	4	PO1, PO3, PO5

Syllabus

Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cynobacterial biofertilizers- Anabaena, Nostoc, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorrhiza. Nitrogen fixation -Free living and symbiotic nitrogen fixation.Mechanism of phosphate solubilization and phosphate mobilization, K solubilization.

Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCO specifications and quality control of biofertilizers. Application technology for seeds, seedlings, tubers and setts. Biofertilizers - storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses. Mass production technology of bio-pesticides.

Virulence, pathogenicity and symptoms of entomopathogens. Methods of application of biopesticides. Methods of quality control and techniques of biopesticide evaluation. Impediments and limitation in production and use of biopesticide.

mass production technology of important biopesticides. Identification of important botanicals. Visit to biopesticide lab. Working in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides. Isolation and purification of Azospirillum , Azotobacter, Rhizobium, P-solubilizers and cyanobacteria. Mass multiplication and inoculums production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AM inoculants.

Reference Books

1 Biofertilizers in Agriculture and Forestry, Subbarao, N.S., 1, Oxford and IBH Pub. Co..

2 Biofertilizers Technology, Kannaiyan, S., K. Kumar and K. Govindarajan (, 1, Scientific Pub..

24AGSE002 - MUSHROOM PRODUCTION TECHNOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGSE002	MUSHROOM PRODUCTION TECHNOLOGY	MPT	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analyse Nutritional and Medicinal Value of Mushrooms, Mushroom Cultivation Practices Around the World, Substrates for Mushroom Cultivation, Spawn and Spawn Production	4	PO1, PO7
CO2	Analyse Cultivation Methods of different mushrooms. Pest and Disease management in Mushroom Cultivation, Post Harvest, Processing and Preservation of Mushrooms,	4	PO1, PO7

Syllabus

Introduction to Mushroom Cultivation, Classification of Mushrooms, Nutritional and Medicinal Value of Mushrooms, Mushroom Cultivation Practices Around the World, Substrates for Mushroom Cultivation, Spawn and Spawn Production,

Mushroom Cultivation Methods of different mushrooms. Pest and Disease management in Mushroom Cultivation, Post Harvest, Processing and Preservation of Mushrooms, Value added Products, Mushroom Research and Development, Future Prospects of Mushroom Industry

Reference Books

1 textbook of Mushroom Cultivation, Tripathi D.P, 1, CBS PUBLISHERS AND DISTRIBUTORS PVT LTD.

2 :An introduction to Fungi by HC Dube The Mushroom Cultivator: A Practical Guide to Growing Mushrooms at Home, Paul Stamets and J.S. Chilton, 4, Scientific Publishers India.

24AGSE003 - SEED PRODUCTION TECHNOLOGY (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGSE003	SEED PRODUCTION TECHNOLOGY	SPT	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO5	Principles and practices of selection of area and agronomic requirement of seed production & hybrid seed production of field & horticultural crops, Importance of isolation distance and Rouging, General Principles of Seed Testing, Seed health testing, Seed sampling, Concept of seed viability and vigour, Dormancy, Physiological quality of seed, Principles of seed Germination.	4	PO1, PO8, PO10

Syllabus

General Principles of Seed Production, Reporting to Monitoring or certification Agency, Principles and practices of selection of area and agronomic requirement of seed production of field & horticultural crops, Importance of isolation distance and Rouging, Principles of hybrid seed production in field crops, Concept of apomixes, male sterility and self-incompatibility, General Principles of Seed Testing, Seed sampling, Concept of seed viability and vigour; dormancy, Physiological quality of seed, Principles of seed Germination.

Reference Books

1 Seed Technology , Agarwal, R.L.1995. , (2nd edition)., Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, India..

2 Seed Technology , Khare, D. and Bhale, M.S. 2019., (2nd revised & enlarged edn) , Scientific Publishers, ISBN: 978-81-72338-84-8, New Pali Road, P.O. Box 91, Jodhpur, India.

24AGSE004 - POST HARVEST PROCESSING TECHNOLOGIES (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGSE004	POST HARVEST PROCESSING TECHNOLOGIES	PHPT	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analyse thePost-harvest techniques and its applications. Harvesting, handling and grading of fruits, vegetables, and flowers. Proper maturity indices, and techniques like pre-cooling, cold storage, and controlled atmosphere storage to extend the shelf life of horticultural produce. different packaging methods, viz., modified atmosphere and vacuum packaging.	4	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11
CO2	Analyse the drying and dehydration techniques, including sun drying, mechanical drying, and osmotic dehydration for value-added products. Freezing, canning, and bottling of horticultural produce, enabling students to explore preservation methods that enhance product shelf life. Value addition of fruit juices, jams, jellies, pickles, and dried flowers.	4	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11

Syllabus

Post-harvest techniques and its applications. Harvesting, handling and grading of fruits, vegetables, and flowers. Proper maturity indices, and techniques like pre-cooling, cold storage, and controlled atmosphere storage to extend the shelf life of horticultural produce. different packaging methods, viz., modified atmosphere and vacuum packaging

Drying and dehydration techniques, including sun drying, mechanical drying, and osmotic dehydration for value-added products. Freezing, canning, and bottling of horticultural produce, enabling students to explore preservation methods that enhance product shelf life. Value addition of fruit juices, jams, jellies, pickles, and dried flowers.

Reference Books

1 Post-harvest technology of horticultural crops, K.P. Sudheer and V. Indira., 1, New India Publishing Agency..

2 Postharvest Management and Value Addition by , Aswini Kumar Goel, Rajender Kumar and Satwinder S. Mann, 1, Daya Publishing House.

24AGSE005 - BENEFICIAL INSECT FARMING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGSE005	BENEFICIAL INSECT FARMING	BIF	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analyse the types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties, methods of harvesting and preservation of leaves. Species of lac insect, morphology, biology, host plant and lac production. Identification of major parasitoids and predators commonly used in biological control	4	PO3, PO5, PO11
CO2	Analyse the Rearingof mulberry silkworm, rearing appliances, mounting and harvesting of cocoons. Pests and diseases of silkworm, management, and methods of disinfection. Importance of beneficial insects, bee keeping, pollinating plants and their cycle, bee biology, commercial methods of rearing, equipment used and seasonal management. Bee pasturage, bee foraging and communication.	4	PO3, PO5, PO11

Syllabus

Species of Silkworms, Characteristic features of Mulberry Silkworm, Tasar Silkworm, Eri Silkworm and Muga Silkworm and their hosts. Mulberry silkworm races. Grainage centres, brushing of silkworm larvae, young age and late age silkworm rearing.Effect of temperature, humidity, air current and photoperiod.Leaf quality and leaf maturity on larval growth and survival. Feeding of late instars, bed cleaning and bed spacing for IV and V instars. Silk worm diseases.Pebrine Symptoms, mode of transmission, stages of contamination and intensity, detection and control Viral diseases. Nucleo polyhedro Virus and Cytoplasmic Polyhedro Virus. Symptoms, prevention and control. Grasserie. Symptoms, source of contamination, prevention and control. Infectious Flacherie. Symptoms, prevention and control.Fungal Diseases. White muscardine. Source of infection, symptoms, prevention and control. Uzi fly. Biology, nature of damage and symptoms and management

Establishment of mulberry garden, Planting season and land preparation, preparation of planting material, Irrigation, spacing, varieties, planting inter cultivation, fertilization, irrigation, leaf harvest and leaf yield, Mulberry Planting under rainfed and irrigated conditions. Spacing and preparation of pits, planting, fertilization, inter-cultivation, maintenance, soil moisture conservation and leaf harvest. Pests and diseases of mulberry plants and their management. BeekeepingImportance and multiple source of income Species of Honey bees Rock bee, Little bee, Indian honey bee, European bee and Dammar bee Bee biology Life cycle Caste determination in honey bees Structural adaptations of honeybees.

Reference Books

1. Elements of Economic Entomology, Vasantharaj David, B. and V.V. Rama Murthy, 4, 2016, Popular Book Depot, Coimbatore.
2. Beekeeping: A Comprehensive Guide on Bees and Beekeeping, Abrol, D.P., 3, 2010, Scientific publishers, Jodhpur.
3. Honey Bees and Their Management in India, Mishra, R.C. , 1, 1995, Indian Council of Agricultural Research, New Delhi..
4. Principles of Sericulture, Hisao Aragu, 3, 1997, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi..

24AGSE006 - HORTICULTURE NURSERY MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGSE006	HORTICULTURE NURSERY MANAGEMENT	HNM	R	0	0	4	0	2

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Analyse the principles and practices of managing a horticultural nursery. Nursery site selection, infrastructure development. Propagation techniques: Seed propagation and vegetative methods (cuttings, grafting, layering). Propagation media and containers. Environmental control and plant Care: Temperature, light, humidity, and ventilation management, fertilization techniques and watering and irrigation systems (drip, sprinkler, and misting systems). Types of nurseries: commercial and home-based. Types of nursery beds and nursery bed preparation. Plant nutrition, pest and disease management.	4	PO2, PO6, PO10
CO2	Analyse the plant growth regulation: use of growth regulators (PGRs) in nursery management, hardening techniques and quality standards for seedlings. Production planning, nursery marketing, pricing and economic analysis of nursery businesses, quality control, and sustainable management practices. Automation and biotechnology in nursery management. Practical sessions, field visits and hands-on experience in running a commercial or home-based nursery operation.	4	PO2, PO6, PO10

Syllabus

Introduction to principles and practices of managing a horticultural nursery. Nursery site selection, infrastructure development. Propagation techniques: Seed propagation and vegetative methods (cuttings, grafting, layering). Propagation media and containers. Environmental control and plant Care: Temperature, light, humidity, and ventilation management, fertilization techniques and watering and irrigation systems (drip, sprinkler, and misting systems). Types of nurseries: commercial and home-based. Types of nursery beds and nursery bed preparation. Plant nutrition, pest and disease management.

plant growth regulation: use of growth regulators (PGRs) in nursery management, hardening techniques and quality standards for seedlings. Production planning, nursery marketing, pricing and economic analysis of nursery businesses, quality control, and sustainable management practices. Automation and biotechnology in nursery management. Practical sessions, field visits and hands-on experience in running a commercial or home-based nursery operation.

Reference Books

1 Floriculture in India, G. S. Randhawa and A.N. Mukhopadyay , 2004, Allied Publishers Private Limited.

2 Handbook of Horticulture , Chada KL, 1st Edition,2019, Indian Council of Agricultural Research.

Y24: Bachelor of Science (Honors) Agriculture

Category: Audit Courses (AUC)

CADCOML1V1 - CAREER ADVANCEMENT:COMPETITIVE EXAM TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADCOML1V1	CAREER ADVANCEMENT:COMPETITIVE EXAM TRAINING	CAD: COM	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Enhance critical thinking and problem-solving skills to analyze and solve complex problems effectively.	3	PO9
CO2	Apply strategic test-taking techniques to improve performance and manage exam-related stress.	3	PO9

Syllabus

Introduction to Critical Thinking: covering the definition, importance, and key components; Logical Reasoning: focusing on types of reasoning (deductive and inductive) and common logical fallacies; Data Interpretation: analyzing graphs, charts, and statistical information; and Problem-Solving Techniques: emphasizing creative problem-solving methods and structured frameworks.

Practice Sessions through case studies and group discussions. It also explores Understanding Exam Formats, providing an overview of common competitive exams such as GRE, GMAT, and UPSC, along with types of questions encountered. Students will learn Time Management Techniques for prioritizing questions and allocating time efficiently, alongside Effective Study Habits to create study schedules and utilize resources. The syllabus includes Stress Management Strategies, focusing on mindfulness and relaxation techniques, and concludes with Mock Exams and Feedback to assess performance and identify areas for improvement.

Reference Books

1 Critical Thinking: A Beginner's Guide, Gail McDonald, Springer, 2018.

2 The 7 Habits of Highly Effective People, Stephen R. Covey, Free Press, 2020.

CADCORL1V1 - CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADCORL1V1	CAREER ADVANCEMENT: TRAINING IN CORE DOMAIN	CAD: TICD	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply advanced domain-specific concepts and emerging trends to address industry challenges and innovations.	3	PO1, PO2
CO2	Apply advanced problem-solving and strategic decision-making techniques to manage complex projects within the core domain.	3	PO1, PO2

Syllabus

Core Concepts, theories, and frameworks of the specific domain (e.g., finance, IT, healthcare, engineering), Advanced Domain-Specific Tools, innovations and their impact on the core domain, Real-world examples of how new trends are being applied within the domain

Domain specific challenges, Practical exercises to resolve complex issues in the domain, best practices for managing projects within the domain, Case Studies and Simulations.

CADENTL1V1 - CAREER ADVANCEMENT:ENTREPRENEURIAL CAREER PATHWAY TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADENTL1V1	CAREER ADVANCEMENT:ENTREPRENEURIAL CAREER PATHWAY TRAINING	CAD: ECPT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply essential entrepreneurial qualities such as resilience, innovation, and risk-taking, enabling them to pursue entrepreneurial career paths in various contexts, including startups, corporate roles, and freelancing.	3	
CO2	Develop the skills to recognize potential business opportunities, conduct thorough market research, and validate ideas by addressing customer needs and evaluating feasibility, preparing them to create sustainable business solutions.	3	

Syllabus

Defining entrepreneurship: What it means to be an entrepreneur; The distinction between entrepreneurial and traditional career paths; The entrepreneurial mindset: resilience, risk-taking, innovation, and adaptability; Exploring entrepreneurial career pathways in startups, corporate environments, freelancing, and social ventures.

Spotting opportunities: How to find unmet needs and gaps in the market; Market research: Tools and techniques for understanding trends and customer needs; Idea validation: Testing the feasibility of your business idea; Problem-solving for innovation: Leveraging customer pain points and inefficiencies.

Reference Books

1 The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Eric Ries, 1st (2011), Crown Business.

2 The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company, Steve Blank, Bob Dorf, 2nd (2020), K&S Ranch Press.

3 Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Alexander Osterwalder, Yves Pigneur, 1st (2010), Wiley.

4 The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, Clayton M. Christensen, 1st (1997), Harvard Business Review.

CADUPSL1V1 - CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAM TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CADUPSL1V1	CAREER ADVANCEMENT: UPSC-CIVIL SERVICES EXAM TRAINING	CAD: UPSC	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Understanding the basics of Indian History and it\'s evolution	2	PO9, PO10
CO2	Understanding the basics of Indian Geography	2	PO9, PO10
CO3	Understanding the Evolution of Indian Constitution.	2	PO9, PO10
CO4	Understanding the evolution of Indian Economy	2	PO9, PO10

Syllabus

Ancient Indian History- IVC,Rig Vedic, Later Vedic, Buddhism, Jainism, Mahajanapadas, Mouryan Empire, Guptan Empire, Harshavardhana empire, Sangam Age.

Exploring The Physical and Social Geography of India: The Universe, Big Bang Theory, Solar system, Geological Time Scale, Earth\'s Interior, Earth\'s Magnetic Feild.

Indian Polity and Constitution: Sailent featuresof Indian constitution, Preamble, Fundamental RIghts, Directrive Principles of State Policy, Fundamental Duties , Indian Parliament.

Understanding India\'s Economy - Indian Economic Development, National Income, Public Finance, Indian Budget.

Reference Books

1 Indian Polity, M. Laxmikanth, 7, Tata Mc Graw Hill.

2 Indian Economy, Nitin Singhania, 5, Mc Graw Hill.

3 Ancient and Medieval India, Poonam Dalal Dahiya, 3, Mc Graw Hill.

4 Fundamentals of Physical Geography, Husain Majid, 5, Mc Graw Hill.

CRTCODL1V1 - CAMPUS RECRUITMENT: LOGIC BUILDING SKILLS TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTCODL1V1	CAMPUS RECRUITMENT: LOGIC BUILDING SKILLS TRAINING	CRT: LBST	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply logical principles and critical thinking skills to analyze and evaluate arguments, solve problems, and make informed decisions.	3	PO1
CO2	Identify various logical reasoning techniques to solve complex problems, identify patterns, and draw valid conclusions	3	PO1

Syllabus

Introduction to Logic and Critical Thinking: fundamentals of logic, including the concepts of statements, propositions, truth values, logical connectives (AND, OR, NOT, IF-THEN, IF-AND-ONLY-IF), truth tables, and logical equivalence. Students will learn to identify and analyze different types of arguments, including deductive and inductive reasoning. They will also develop critical thinking skills, such as evaluating evidence, identifying assumptions, and recognizing fallacies

Logical Reasoning and Problem-Solving: applying logical reasoning techniques to solve various types of problems. Students will learn about different problem-solving strategies, including problem decomposition, pattern recognition, working backward, and using analogies. They will practice solving logic puzzles, brain teasers, and real-world problems that require logical thinking. Additionally, students will explore the concepts of syllogisms, Venn diagrams, and conditional reasoning to enhance their problem-solving abilities

Reference Books

1 Introduction to Logic, Irving M. Copi, Carl Cohen, Victor Rodych, 2014, Routledge.

2 Critical Thinking, Richard Paul, Linda Elder, 2019, Pearson.

3 The Art of Logical Thinking; Or, The Laws of Reasoning, William Walker Atkinson, 2013, Public domain in the

4 Symbolic logic and The game of logic, Carroll, Lewis, 1958, Dover Publications.

CRTCSSL1V1 - CAMPUS RECRUITMENT: COMMUNICATION SKILLS TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTCSSL1V1	CAMPUS RECRUITMENT: COMMUNICATION SKILLS TRAINING	CRT: CST	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply knowledge of communication of different types and techniques while analyzing body language and tone to enhance overall communication effectiveness.	3	
CO2	apply active listening and feedback techniques, and analyzing effective participation in group discussions, while exploring roles in teamwork and strategies for managing conflicts, alongside professional communication practices such as writing emails and conducting meetings.	3	

Syllabus

Communication: Basics, significance, types, verbal & non-verbal communication techniques, effective speaking and presentation skills tone and pacing in verbal interactions

Interpersonal skills, listening skills, feedback techniques, group communication and dynamics, group discussion, conflict management in professional communication, E-mail writing, report writing, presentations, interview skills.

Reference Books

1 Business Communication: A Problem-Solving Approach, Louis E. Boone & David L. Kurtz, 3rd Edition, McGraw Hill Education.

2 The Complete Guide to Business School Presentations", Jennifer D. D. McDonald, 2nd Edition, Pearson.

3 Listening: The Forgotten Skill", Geoffrey M. Cohen, 1st Edition, University Press of America.

4 Business Communication: Process and Product", Mary Ellen Guffey & Dana Loewy, 8th Edition, Cengage Learning.

5 Effective Communication Skills" Author, John Adair, 2nd Edition, Pan Macmillan.

CRTCSSL2V2 - CAMPUS RECRUITMENT: SOFT SKILLS TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTCSSL2V2	CAMPUS RECRUITMENT: SOFT SKILLS TRAINING	CRT: SST	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	applyi and practice empathy, critical thinking, problem-solving, decision-making, effective communication, and interpersonal skills through real-life scenarios and interactive activities.	3	PO9
CO2	apply group discussion techniques, interview skills, and mock interviews through practical exercises, encouraging learners to practice and refine these skills in realistic settings.	3	PO9

Syllabus

Critical thinking, problem soving, decision making, communication skills, interpersonal skills

Grooming, group discussions, story narrations, interview skills, mock interviews

Reference Books

1 Personality Development and Soft Skills", Barun K. Mitra, 2nd Edition, Oxford University Press.

2 Communication Skills for Engineers", C. Muralikrishna & Sunita Mishra, 1st Edition, Pearson Education.

3 Developing Soft Skills", Robert L. Katz, 1st Edition, McGraw Hill Education.

CRTVQRL1V1 - CAMPUS RECRUITMENT: VERBAL APTITUDE TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTVQRL1V1	CAMPUS RECRUITMENT: VERBAL APTITUDE TRAINING	CRT: VAT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	apply and practice grammatical concepts like sentence formation, identifying odd words, using one-word substitutions, while enhancing understanding of idioms, phrases, spellings, and structures.	3	PO9
CO2	apply concepts like paragraph formation, sentence completion, reading comprehension, sentence correction, and correcting jumbled sentences, while enhancing word selection and sentence structure accuracy.	3	PO9

Syllabus

Synonyms, Antonyms, odd words, parts of speech, idioms and phrases, one word substitutions, odd words, formation of sentences

sentence completion, sentence correction, jumbled sentences, paragraph formation, reading comprehension, and sentence selection

Reference Books

1 The Pearson Guide to Verbal Ability and Logical Reasoning for the CAT", Nishit K. Sinha, 2nd Edition, Pearson.

2 Objective General English", S.P. Bakshi, 3rd Edition, Arihant Publications.

3 English Grammar in Use", Raymond Murphy, 5th Edition, Cambridge University Press.

CRTVQRL2V2 - CAMPUS RECRUITMENT: QUANTITATIVE APTITUDE TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTVQRL2V2	CAMPUS RECRUITMENT: QUANTITATIVE APTITUDE TRAINING	CRT: QAT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply principles of quantitative techniques to solve problems on Simple Equations, Simple & Compound Interest etc	3	PO7
CO2	Apply principles of quantitative techniques to solve problems on Divisibility, Functions, Surds & Indices etc	3	PO7

Syllabus

Simple Equations, Problem on Ages, Ratio & Proportion, Variation& Partnership, Percentages, Profit, Loss& Discounts, Simple & Compound Interest, Averages & Allegations or Mixtures

Numbers, Divisibility, Decimal Fractions, LCM & HCF, Simplification, Sequence, Series & Progressions, Linear Algebra, Quadratic Equations & Inequalities, Theory of Equations. Sets, Relations & Functions, Surds & Indices, Logarithms

Reference Books

1 Quantitative Aptitude by R.S. Agarwal, SCHAND Publications, R.S. Agarwal, 2021, SCHAND Publications.

2 A Modern Approach to Verbal Reasoning by R.S. Agarwal, SCHAND Publications, R.S. Agarwal, 2021, SCHAND Publications.

CRTVQRL3V3 - CAMPUS RECRUITMENT: REASONING APTITUDE TRAINING (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
CRTVQRL3V3	CAMPUS RECRUITMENT: REASONING APTITUDE TRAINING	CRT: RAT	R	0	0	0	8	0

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Apply principles of deductive logic to solve problems on syllogisms, Venn diagrams, etc	3	PO9
CO2	Apply principles of inductive logic to solve problems on assumptions and conclusions	3	PO9

Syllabus

Syllogism, Number& letter series, Number, letter & word Analogy, Odd man out, coding & decoding, Cubes & Dice, Logical Venn Diagrams

Statements & conclusions, statements & Arguments (Critical Reasoning), statements & Assumptions, logical connectives, Binary logic

Reference Books

1 A Modern Approach to Verbal Reasoning, R.S. Agarwal, 2022, SCHAND Publications.

2 Logical Reasoning for CAT, Arun Sharma, 2021, McGraw Hills.

Y24: Bachelor of Science (Honors) Agriculture

Category: Value Added Courses (VAC)

24AGRO103 - ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24AGRO103	ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT	ESDM	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	understand Renewable and nonrenewable resources, Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies.	2	PO5, PO8, PO11
CO2	Apply Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves,	3	PO5, PO8, PO11
CO3	Apply Environmental Pollution: definition, cause, effects and control measures of a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution	3	PO5, PO8, PO11
CO4	Analyse Disaster management: Natural Disasters and nature of natural disasters, their types and effects.	4	PO5, PO8, PO11
CO5	Analyse Practical study of Seed vigour and viability tests, seed germination, leaf area measurement, Growth analysis.	4	PO5, PO8, PO11

Syllabus

Natural resources, including forests, water, minerals, food, energy, and land, face exploitation and associated problems such as deforestation, over-utilization, and environmental degradation. Case studies illustrate the impacts of timber extraction, dams, mineral exploitation, agricultural practices, and energy consumption, emphasizing the need for sustainable resource management. Individuals play a crucial role in conservation efforts, promoting equitable use for sustainable lifestyles and mitigating the adverse effects of resource exploitation on ecosystems and communities.

Biodiversity, encompassing genetic, species, and ecosystem diversity, holds intrinsic and utilitarian values crucial for sustenance and cultural integrity, with India recognized as a mega-diversity nation harboring biodiversity hotspots. Threats like habitat loss and poaching endanger endemic species, prompting conservation efforts through in-situ and ex-situ measures. Environmental pollution, spanning air, water, soil, marine, noise, thermal, and nuclear hazards, necessitates comprehensive control measures, underscoring individual responsibility in pollution prevention through waste management practices and case studies highlighting effective strategies.

Disaster management entails understanding the nature and types of natural and man-made disasters, including floods, earthquakes, chemical spills, and transportation accidents, each with distinct effects and response requirements. International strategies for disaster reduction complement national frameworks, involving coordination among governmental, non-governmental, and community-based organizations, alongside media engagement. Effective disaster response relies on integrated efforts across central, state, and local administrations, involving various agencies such as armed forces, police, and emergency services to mitigate impacts and ensure swift recovery.

Addressing social issues necessitates transitioning from unsustainable to sustainable development paradigms, underscored by legislative measures like the Environment Protection Act and specialized acts focusing on air, water, wildlife, and forest conservation. Additionally, tackling contemporary challenges such as HIV/AIDS requires comprehensive approaches, while leveraging information technology offers innovative solutions for environmental management and promoting human health.

Reference Books

1 Text book of Environmental Studies for undergraduate courses., Bharucha, E., 3,2021, Orient Blackswan Pvt Ltd.

2 C for Environmental Scientists and Engineers, Anjaneyalu, Y, 1,20202, Dreamtech Press.

3 Environmental Impact Assessment Methodologies, Dr Khul, 2,2011, CRC Press.

4 Fundamentals of Environmental Science and Ecology, S VAIDYANATHAN, 1,2021, Zigmakart Publishers.

24SMCA201 - AGRICULTURAL INFORMATICS AND ARTIFICIAL INTELLIGENCE (R)

CourseCode	Course Title	Acronym	Mode	L	T	P	S	CR
24SMCA201	AGRICULTURAL INFORMATICS AND ARTIFICIAL INTELLIGENCE	AIAF	R	2	0	2	0	3

Course Outcomes

CO#	CO Description	BTL	PO/PSO
CO1	Introduction to Computers, concepts, applications and statistical analysis	2	PO1, PO4, PO8, PO11
CO2	Computer programming, concepts and basic operations	3	PO1, PO4, PO8, PO11
CO3	ICT tools and decision support system in agriculture	3	PO1, PO4, PO8, PO11
CO4	Introduction to artificial intelligence and its application in smart agriculture	4	PO1, PO4, PO8, PO11
CO5	Study of computer components, applications, programming language, crop simulation models and decision support system	5	PO1, PO4, PO8, PO11

Syllabus

Computer anatomy, memory concepts; Operating System: definition and types; Applications of MS-Office for statistical analysis, expressions; Database, concepts and types; Uses of DBMS in Agriculture, Internet and World Wide Web (WWW), Concepts and components.

Computer programming: General concepts, Introduction to Visual Basic, Java, Fortran, C/ C++, etc. concepts and standard input/output operations.

e-Agriculture, ICT tools, simulations models, automation, geospatial technology, decision support system for agriculture input-output management

Introduction to artificial intelligence, background and applications, Turing test. Control strategies, Breadth-first search, Depth-first search, Heuristics search techniques: Best-first search, A* algorithm, IoT and Big Data; Use of AI in agriculture for autonomous crop management, and health, monitoring livestock health, intelligent pesticide application, yield mapping and predictive analysis, automatic weeding, harvesting, sorting and other food processing applications; Concepts of smart agriculture, use of AI in food and nutrition science

Study on computers, operating systems (Windows, Unix/ Linux), important DoS Commands, MSoffice, statistical tools, Agri- information system, basic programming languages (Visual Basic, Java, Fortran, C, C++), Crop Simulation Models, Geospatial Technology, Decision support system

Reference Books

1 Fundamentals of Computer, V. Rajaroman., 1985, ..

2 Introductory AgriInformatics , Mahapatra, Subrat K et al, , 2nd (2022), Jain Brothers Publication..

3 Artificial Intelligence: A Modern Approach, Russell, Stuart, , 2013., Pearson Edition .

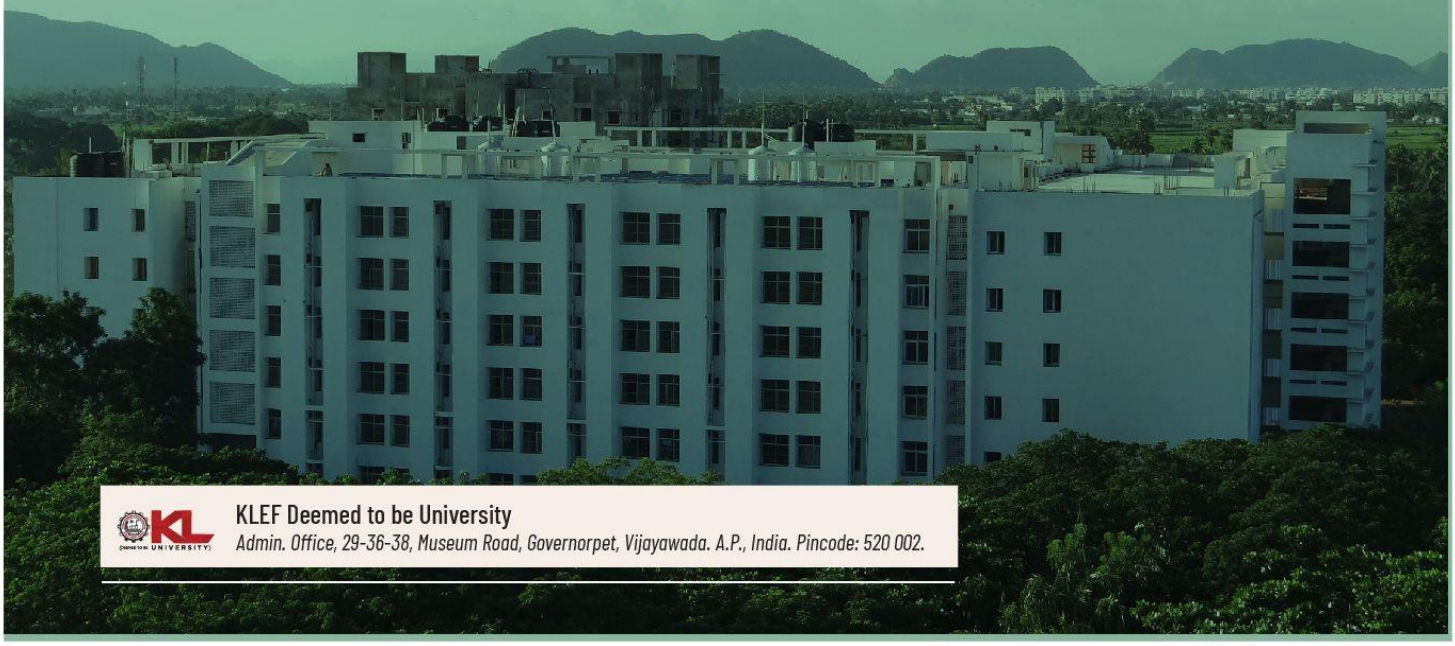
Our Campuses

Green Fields, Vaddeswaram.
Guntur District, A.P., India, Pincode : 522 302.

Aziznagar, Moinabad Road,
Near TS Police Academy, Hyderabad, Telangana,
India, Pincode : 500 075

Bowrampet, ALEAP Industrial Area,
Gajularamaram, Hyderabad, Telangana,
India, Pincode : 500 043

Plot No: 52 & 53, Jubilee Gardens Road No. 2,
Kothaguda, Kondapur, Hyderabad Telangana,
India, Pincode : 500 084



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