

Certificate in Entrepreneurial Agriculture (CEA)

CURRICULUM Scheme and Syllabus

Duration: 06 Months (Two Trimesters)

Eligibility: Any one youth and farmers who interested

Credits: 16

Contact Hrs.: 132

Objective: To train manpower for Entrepreneurship development activities in Rural and Urban sectors
To prepare Young Entrepreneurs for self-employment
To develop facilities for agri - production and sale & marketing of agri-products

Course Offered:

Course Code	Course Title	Credits
CEA 001	Entrepreneurship Development	1
CEA 002	Introductory Agriculture	1
CEA 003	Principles of Agri Business Management	1
CEA 004	Integrated Farming System	1
CEA 005	Post Harvest Management and Value Addition of Fruits and Vegetables	2
CEA 006	Plant Protection	2
CEA 007	Apiculture	2
CEA 008	Mushroom Cultivation	2
CEA 009	Organic and Natural Farming	2
CEA 010	Precision Farming and Protected Cultivation Technology	2
	Total	16

Syllabus
Certificate in Entrepreneurial Agriculture (CEA)
Course Structure

Trimester – I:

Course Code	Course Title	Hrs.		Credits
		Lecture (L)	Practical (P)	
CEA 001	Entrepreneurship Development	1	0	1
CEA 002	Introductory Agriculture	1	0	1
CEA 003	Principles of Agri Business Management	1	0	1
CEA 004	Integrated Farming System	1	0	1
CEA 005	Post Harvest Management and Value Addition of Fruits and Vegetables	1	2	2
	Total	5	2	6

Contact hrs.: 07

Trimester – II:

Course Code	Course Title	Hrs.		Credits
		Lecture (L)	Practical (P)	
CEA 006	Plant Protection	1	2	2
CEA 007	Apiculture	1	2	2
CEA 008	Mushroom Cultivation	1	2	2
CEA 009	Organic and Natural Farming	1	2	2
CEA 010	Precision Farming and Protected Cultivation Technology	1	2	2
	Total	5	10	10

Contact hrs.: 15

Examination Scheme:

Components	CT	HA	C	V	A	ETE
Weightage (%)	10	5	5	5	5	70

(C - Case Discussion/ Presentation; HA - Home Assignment; V - Viva; CT- Class Test; A - Attendance; EE - End Trimester Examination)

Syllabus
Certificate in Entrepreneurial Agriculture (CEA)
Course Content

Trimester – I

CEA 001: Entrepreneurship Development

Objective: The goals of this programme are to inspire students and help them imbibe an entrepreneurial mind-set. The students will learn what entrepreneurship is and how it has impacted the world and their country. They will be introduced to key traits and the DNA of an entrepreneur, and be given an opportunity to assess their own strengths and identify gaps that need to be addressed to become a successful entrepreneur.

Theory

Unit-I: Concept and overview of entrepreneurship

Definition, nature and characteristics, need and importance, benefits of being an entrepreneur, types of entrepreneurs, entrepreneur and entrepreneurship, evolution and growth of entrepreneurship in India— factors affecting growth of entrepreneurship in India, Indian society and entrepreneurship development; role of entrepreneurship in economic development

Unit-II: Entrepreneurial characteristics, skills and competencies

Role of entrepreneurs, Entrepreneurial input; entrepreneurial behaviors and entrepreneurial motivation, entrepreneurial development programme in India, Government policy towards MSMEs

Unit-III: Goal Setting in Entrepreneurship

Rural entrepreneur, women entrepreneur, goal settings-goal settings theory

Unit-IV: Entrepreneurship Policy

Business opportunities in the context of industrial policy of the State, role of business incubation centres in promoting entrepreneurship, start-up policy framework and incentives, Entrepreneurial success in rural areas, case study of successful entrepreneurs

Unit-V: Sources and Criteria of Financing

Fixed and working capital assessment, technical assistance, marketing assistance

CEA 002: Introductory Agriculture

Objective: This course helps students understand the importance of agriculture in daily life by exploring basic principles of crop cultivation, natural resources, horticulture, agricultural machineries, and animal science and to introduce the students to the variety of new areas in agriculture.

Theory

Unit- I: Introduction to Agriculture

Agriculture: definition and different branches of agriculture.

Unit- II: Scenario of Agriculture in India

Roles of agriculture in Indian economy. Major problems of Indian Agriculture. Major scopes of agro-enterprises in different regions.

Unit-III: Principles of Crop Production

Climatic factors, Effect of different climatic factors on crop production Describe significance of Soil, organic carbon and humus Explain mineralization, immobilization, amminization, ammonification, nitrification and denitrification. Importance of Climate (e.g. temperature, rainfall, wind velocity etc.) as a factors effecting agricultural production. The soil and its importance in crop production Role of manures and fertilizers Enlist States with major contribution to the cultivation of the crops like Wheat, Paddy, Soyabean, Cheickpea, Sugarcane, Cotton. Irrigation and drainage

Unit-IV: Animal Science

Types of cattle, buffaloes and fishes and their important breeds. Different types of sheep and goat and their important breeds. Housing and space requirements of animals and poultry. Feeding and nutritional requirements of animals and poultry.

Unit-V: Agricultural Farm Machinery and Tools

Farm implements and their use. Tillage and types of tillage, Seed drill, Care and maintenance of farm implements. Identification of various types of tools and accessories, micro irrigation system, management of poly house and shed net house.

CEA 003: Principles of Agri Business Management

Objective: The course in Agricultural Business Management is designed for the student who plans to seek employment on, manage, or own a farm; or seek employment in an agribusiness field. Students will be involved in learning activities that generally prepare him/her to apply the economic and business principles involved in the organization, operation, and management of the farm, ranch, or agribusiness.

Theory

Unit-I: Introduction to Agri-Business

Meaning, definition, history and scope of agri-business (Input, Farm Product Sectors). Importance of agri-business in the Indian economy. Changing dimension of agricultural business.

Unit-II: Features and Components

Agri-business Management-distinctive features, nature and components.

Unit-III: Introduction to Management

Management functions -Management levels-Managerial roles Management skills-Definitions of management-Role of management. Elements, Levels, Process & Functions of Management,

Unit-IV: Functions of Management

1. Planning: Definition importance, characteristics, Steps in planning Types of planning Nature and importance-Purpose of planning-Forms of planning- types of planning -Steps in planning -Limitations of planning. 2. Organizing: Meaning- definition, importance, Characteristics/Nature of organization. Principles & Process of organization. 3. Directing-definition, functions, techniques, qualities of good supervisor. 4. Controlling -Definition, Elements, Process of control, Techniques/ Tools of control.

Unit-V: Farm Business Analysis

Farm efficiency measures, farm financial & cash accounts, Net worth statement, systems of book keeping.

CEA 004: Integrated Farming System

Objective: To apprise about different enterprises suitable for different agro-climatic conditions for sustainable agriculture. To sensitize students about importance, scope, components and interaction within components of Integrated farming system

Theory

Unit-I: Farming systems

Definition and importance; classification of farming systems according to type of rotation, intensity of rotation, degree of commercialization, water supply, enterprises. Concept of sustainability in farming systems; efficient farming systems; natural resources - identification and management.

Unit-II: Integrated Farming System

Meaning, importance and scope; advantages, components of IFS; Production potential of different components of farming systems; interaction and mechanism of different production factors; stability in different systems through research; eco-physiological approaches to intercropping; IFS for different Agro-climatic conditions.

Unit-III: Various agriculture related concepts and their relevance in IFS

Crop rotations, cropping systems, cropping pattern, sustainable agriculture, farming systems, monoculture, multiple cropping, intercropping, mixed cropping, sequential cropping, multi-storey cropping, terra farming, Agro-forestry systems, permaculture, Allelopathy, organic farming, mushroom cultivation, bee keeping, sericulture, pisciculture in pond, aqua forestry, boundary plantations, shelterbelts, wind breaks, duckery, poultry farming, vermin-composting,

Unit-IV: Simulation models for Intercropping

soil nutrient in intercropping; Study of different Integrated farming system models; evaluation of different farming systems

Unit- V: Production and Economics of IFS

IFS for small and marginal farmers

CEA 005: Post Harvest Management and Value Addition of Fruits and Vegetables

Objective: The students will gain the knowledge on pre and post-harvest physiology and management technologies of fruits and vegetables. Students are also expected to gain knowledge on conventional and modern packaging and preservation technology of fruits and vegetables crops.

Theory

UNIT-I: Importance of Post Harvest Technology

Importance of post harvest technology; Composition and nutritive value of horticultural crops. Factors leading to post-harvest loss. Maturity indices of horticultural crops. Harvesting practices for specific market requirements, Pre-harvest crop management practices and their influence on quality during storage and marketing.

Unit- II: Post Harvest Handling and Treatment

Post harvest handling (harvesting, sorting, grading and packing and transportation) of fruits and vegetables. Post harvest treatments (pre cooling, hot water, hot air and vapour heat, fungicide & biologically safe chemicals, irradiation, curing, pulsing etc.) for quality retention of horticultural crops.

Unit- III: Storage Systems

On farm storage (evaporative cooled stores, ventilated storage, pit storage etc.), refrigerated storage, controlled / modified atmosphere storage, hypobaric, hyperbaric storage. Physical injuries and disorders.

Unit- IV: Present Status and Future Prospects of Preservation Industry In India

Principles and methods of preservation; Raw materials for processing. Processing of fruits and vegetables (canning; drying and dehydration; fruit beverages and juice concentrates; sugar based products; tomato products; fermented products, value added products etc.), food additives, minimal processing.

Unit- V: Packaging Technique and Storage System for Processed Products

Labels, Utilization of by products and waste management of processing industry. Preparation of various products from fruits and vegetables, and dehydrated technique.

Practical: Analyzing maturity stages of commercially important horticultural crops, physiological loss in weight of fruits and vegetables, Study of machinery and equipments used in processing of horticultural produce; Preparation of fruit jam, squashes, sauce, pickle; drying of fruits and vegetable etc.

Syllabus

Certificate in Entrepreneurial Agriculture (CEA)

Course Content

Trimester – II

CEA 006: Plant Protection

Objective: By doing this course, the learner will be able to: Study the characteristics of plant pathogens, and nature of diseases induced by pathogenic and physiogenic diseases. Study the important diseases affecting agricultural and horticultural crops.

Theory

Unit-I: Integrated Pest, Diseases and Weed Control

Introduction-Principles of Integrated Pest Management Systems-level Management- Pest and Natural Enemy Identification – Pest and Natural Enemy Biology and Life History- Economic Injury Levels and Economic (Action) Thresholds - Monitoring for Pests, Damage, and Treatment Success Multi-tactic Management Approaches- Pesticide Toxicology and Selectivity Pesticide Toxicity Ratings - Pesticide Resistance Management- Disease Management Fungal and Bacterial Diseases -Virus and Viroid Diseases Carla virus Complex-Nematodes -Abiotic Diseases

Unit-II: Methods of Plant Protection

Cultural methods – Tillage, crop rotation, trap crops, fertilizer applications, Mechanical methods – Field sanitation, Hand picking, destruction of egg masses, light traps, use of sticky bands, bagging for the pests. Physical methods – Heat and soil solarisation, Chemical methods –Brief account and uses of Bactericides, Fungicides, Insecticides, Nematicides, Acaricides, Molluscicide and Rhodenticides, Biological methods – Biological control of Insect pests and crop diseases.

Unit-III: Insect Pest and Their Management

Definition and losses (qualitative and quantitative) caused by insect pests, General characters of typical insect. Stored grain pests and their management. Recent trends in pest management - a) Attractants b) Repellents c) Antifeedents d) Pheromones e) Chemosterilants f) Precautionary measures used during pesticide application.

Unit-IV: Weeds and Weed Management

Weeds – Definition and losses caused by weeds. Study of parasitic and poisonous weeds. Methods of weed management- Mechanical methods - Ploughing, Hoeing, Hand weeding, Sickling and mowing, Burning and flooding, Mulching. Biological methods - Weed management by bacteria, fungi and insects. Chemical methods - Classification of weedicides on the basis of chemical nature, mode of action. Study of weedicides with reference to properties, mode of action, formulation and uses of i) Glyphosate ii) Gramoxane (Paraquat).

Practical: Identification of disease in major crops, formulation of and preparation of chemicals, application of insecticide and pesticide etc. . Weed management in the field. Other practical based on the theory.

CEA 007: Apiculture

Objective: To train the students in basic aspects of Bee Keeping. To train the students in Honey processing, Marketing and Generation of Employment opportunities.

Theory

Unit- I: Bee Keeping – Present Scenario & Prospects, Commercial Bee Keeping

Present scenario and prospects for bee keeping, Requirements of Commercial Bee Keeping. Pit falls in Bee Keeping. Honey Bees and Honey –Types and classification Different species and races of honey bees. Specific Characteristics and suitability for geographic condition.

Unit- II: Identification of Flora and location of sites, Use of Bee Boxes and other Tools

Climatic requirement of different bee species. Preparation of flowering calendar. Description and demonstration of use of different boxes. Cleaning of boxes. Other tools in Bee Keeping.

Unit- III: Building of Comb and Month wise Calendar wise operations

Building of comb and colony. Division of colony, Raw produce generated by different life stages of bees, Drawing details of activities month wise

Unit- IV: Production of Honey and Managing Insects and Diseases

Effect of nectar and pollen properties on honey production. Colony management during honey flow and dearth period. Common pests that attack honey bees and hives• Management of nuisance in Bee hives

Unit- V: Harvesting, Processing and Preservation of Honey and Costing, Pricing, Packaging & Marketing of Honey

Methods of harvesting honey, Processing of honey, Preservation of honey, Methodologies adopted for costing, pricing, Packaging and labeling & branding Marketing Management

Practical:

Capturing of colony and starting up of Apiary. Introduction of different stages in life cycle of Honey bees. Bee keeping unit - Handling of frames with colonies. Introduction of parts of Bee box & Tools used in Bee keeping. Colony inspection, maintenance. Identification of Queen cells, Drone cells & Brood. Sugar feeding of colonies in scarcity period. Identification of swarming tendency in a colony. Bee flora. Extraction of Honey using Honey extractor, moisture reduction, packing and storing of Honey. Disease management. Preventive and control measures of the diseases.

CEA 008: Mushroom Cultivation

Objective: To increase the production and consumption of mushrooms. To help create new employment opportunities for rural youth through mushroom cultivation. To empower rural communities with entrepreneurial skills through the production and sale of mushrooms.

Theory

Unit- I: Introduction and Health benefits of Mushrooms

History and Scope of mushroom cultivation - Edible and Poisonous Mushrooms-Vegetative characters, Different parts of a typical mushroom & variations in mushroom morphology. Key to differentiate Edible from Poisonous mushrooms. Button, Straw & Oyster- General morphology, distinguishing characteristics, spore germination and life cycle. Common edible mushrooms - Button mushroom (*Agaricus bisporus*), Milky mushroom (*Calocybe indica*), Oyster mushroom (*Pleurotus sajorajju*) and paddy straw mushroom (*Volvarella volvcea*). Nutritional and medicinal values of mushrooms

Unit- II: Life Cycle, Compost & Composting

Life Cycle of Mushroom- Vegetative Phase, Reproductive Phase and Spore Production. Principles of composting, machinery required for compost making, materials for compost preparation. Methods of Composting- Long method of composting (LMC) & Short method of composting (SMC).

Unit- III: Cultivation Technology, Spawn Production and Spawning:

Sterilization of substrates. Spawn production - culture media preparation- production of pure culture, mother spawn, and multiplication of spawn. Composting technology, mushroom bed preparation. Spawning, spawn running, harvesting. Cultivation of button, milky, oyster and paddy straw mushroom.

Unit- IV: Cultivation of other economically important and medicinal mushroom:

Prepare substrate and manage crop Pick, grade and pack the harvested economically important and medicinal mushroom. Kabul Dhingri (King Shiitake Mushroom oyster) Mushroom Reishi (*Ganoderma*) Mushroom Kira ghas (*Cordyceps*) Mushroom

Unit- V: Insect - Pests and Disease management in cultivated mushroom, Mushroom growing unit/ house and Value addition of mushroom

Major insect pests - Mushroom flies/ nematodes/mites. Dry Bubble and wet bubble – major diseases of cultivated mushroom Competitor/weed moulds encountered: Green, yellow and plaster moulds/ *Coprinus*. Design and develop mushroom production growing structure / unit. Prepare different value added products of mushroom

Practical: Sterilization and sanitation of mushroom house, instruments and substrates Preparation of mother culture, media preparation, inoculation, incubation and spawn production Cultivation of oyster mushroom using paddy straw/agricultural wastes.

CEA 009: Organic and Natural Farming

Objective: To produce food of high nutritional quality in sufficient quantity. To work with natural system rather than seeking to dominate them. To encourage and enhance biological cycles within farming system-involving microorganisms, soil flora and fauna, plants and animals. To maintain and increase long term fertility of soil. to impart knowledge and proficiency in Organic production practices, Certification process and Marketing of organically raised agricultural products, and to promote self employment and income generation.

Theory

Unit-I: Introduction and Organic Agriculture

Introduction, Organic Agriculture Vs. Conventional Agriculture, History of Organic Farming, Definitions, Principles, Concept, Need of Organic Farming, Mulching in Organic Agriculture, Water Management in Organic Agriculture, Nutrient Management in Organic Agriculture, Weed Management in Organic Agriculture, Soil Cultivation and Tillage in Organic Agriculture

Unit-II: Organic Fertilizers/ Manure

Why use organic fertilizers? Keeping soil fertile in natural way: Soil, Composting, Vermicomposting, Bio-fertilizers, other homemade fertilizers, Effect of Inorganic fertilizers and other agro-chemicals on soil and plants, Chemical fertilizers Vs. Organic fertilizers: Chemical fertilizers and their impact and Advantages of Organic fertilizers, Advantages of Organic Manure, Major organic sources and transformation, Residual effect of Organic manure, Green Manures: Nutrient potential of green manual, Nutrient content of important green manure, Advantage of green manure

Unit-III: Composting

Purpose of composting, What happens during composting, Factors affecting the composting process, Decomposing organisms, Limitations of composting. Vermicomposting and NADEP composting

Unit-VI: Natural Farming

Introduction, Need and Concept, Objective, Principle of Natural farming, natural insecticide, herbicide, fertilizers, fungicide etc.

Unit- V: Certification and Inspection Systems in Organic Farming in India

Organic certification, Purpose of certification, Certificate Process, Operational Structure, Standards for Organic production, Inspection and Certification process

Practical: Preparation of various type of compost including vermicompost and NADEP compost. Preparation of natural fertilizer, growth promoter, insecticide, fungicide, herbicide etc.

CEA 010: Precision Farming and Protected Cultivation Technology

Objective: The objective of protected cultivation is to modify the natural environment by practices or structures to achieve optimal productivity of crops by enhancing yields, improving quality, extending the effective harvest period and expanding production areas.

Theory

Unit- I: Introduction

Importance and scope of precision farming and protected cultivation. Problems/ constraints of greenhouse cultivation and future strategies.

Unit- II: Green House

Choice of crops for cultivation under greenhouse (tomato, capsicum and cucumber). Study of different types of greenhouses based on shape, construction and cladding materials.

Unit- III: Soil, Media and Bed Preparation

Testing of soil and water to study its suitability for growing crops in greenhouses. Media and sterilization process. Bed preparation and planting methods.

Unit- IV: Seeding, NFT, Irrigation, Training and Pruning

Laser leveling, mechanized direct seed sowing, seedling and sapling, transplanting, nutrient film technique (NFT). Irrigation and fertigation techniques used in greenhouses. Training and pruning methods.

Unit- V: GIS, Insect and Disease Management, Harvesting and Economics

Geographical information system (GIS), pest and disease management practices. Harvest and post-harvest management. Economics of precision farming and protected cultivation.

Practical: Green house structure preparation and crop management.