NEW COURSES

Structure and Syllabus under CBCS of Subject:

HORTICULTURE

Recommended Combination – B.Sc.;
Botany, Chemistry & Horticulture

Course Structure and Syllabus of HORTICULTURE

Semester	Paper	Subject	Hrs.	Credits	CCE	E.E.	Total
FIRST YEAR							
Sem-1	I	Basic concepts of Horticulture and Soil Science	4	3	25	75	100
		Practical –I	2	2	-	50	50
Sem-2	II	Plant propagation methods and nursery management	4	3	25	75	100
		Practical-II	2	2	-	50	50
SECOND YEAR							
Sem -3	III	Olericulture	4	3	25	75	100
		Practical –III	2	2	-	50	50
Sem-4	IV	Ornamental Horticulture, Floriculture and Landscaping	4	3	25	75	100
		Practical –IV	2	2	-	50	50
THIRD YEAR							
Sem -5	V	Concepts of Pomology	3	3	25	75	100
		Practical –V	2	2	-	50	50
	VI	Diseases of Horticultural plants and their management	3	3	25	75	100
		Practical –VI	2	2	-	50	50
	VII (A/B/C)	**Elective – I**	3	3	25	75	100
		A. Breeding of Horticultural crops (Syllabus will be finalized in due course)					

		B. Weed and Water Management in Horticultural Crops (Syllabus will be finalized in due course)					
		C. Nutrition of Horticultural crops and its management (Syllabus will be finalized in due course)					
		Practical - VII	2	2	-	50	50
	VIII – Cluster Elec. A-1, 2 & 3 (OR) B-1, 2 & 3	**Elective – II (Cluster – A)**					
		1. Protected cultivation of Horticultural crops					
		2. Post-harvest technology of Horticultural crops (Syllabus will be finalized in due course)	3	3	25	75	100
		3. Horticulture extension and value added products					
		Project work	2	2	20	30	50
		Elective – II (Cluster – B)					
		1. Seed Production Technology of Horticultural Crops (Syllabus will be finalized in due course)					
		2. Production Technology of Medicinal and Aromatic Crops (Syllabus will be finalized in due course)	3	3	25	75	100
		3. Production Technology of Spices and Plantation Crops (Syllabus will be finalized in due course)					
		Project work	2	2	20	30	50

Semester – I :Basic concepts of Horticulture and Soil Science

Theory (60 Hours/Semester)

Unit I : Introduction to Horticulture (12 Hrs.)

1. Definition of Horticulture, Importance of horticulture in terms of economy, production,
2. Employment generation, environmental protection and human resource development.
3. Scope for horticulture in India.
4. Divisions of horticulture with suitable examples and their importance. Fruit and Vegetable zones of India and Andhra Pradesh.

Unit II :Classification and Nutritional values of Horticulture crops (12 Hrs.)

1. Classification of Horticultural crops based on soil and climatic requirements.
2. Nutritive value of horticultural crops.
3. Export and import of horticulture plants

Unit III :Environmental factors - Horticulture crops (12 Hrs.)

1. Influence of soil – physical and chemical properties
2. Climatic factors – light, photoperiod, temperature, relative humidity, rainfall.
3. Micro climate, pollution
4. Influence of biotic and abiotic stresses on crop production.

Unit IV :Soil as a Medium for Plant Growth (12 Hrs.)

1. Minerals and Weathering to Form Soils; Factors of Soil Formation.
2. Soil Taxonomy; Soil color, texture and structure; Other Physical Properties and Stability.
3. Soil Colloids and Charges; Ion adsorption and exchange.
4. Soil pH and Acidity; Soil Alkalinity and Salinity

UnitV :Mineral nutrition of plants (12 Hrs.)

1. Soil organic matter.
2. Soil Microorganisms; Soil faunal Ecology.
3. Integrated nutrient management and soil tests.

Semester – I :Basic concepts of Horticulture and Soil Science

Practicals (30 Hours/Semester)

1. Study of tools and implements in horticulture.
2. Layout of different planting systems.
3. Layout of nutrition garden.
4. Preparation of nursery beds for sowing of vegetable seeds.
5. Digging of pits for fruit plants.
6. Preparation of fertilizer mixtures and field application.
7. Identification and management of nutritional disorders in vegetables.
8. Collection and preparation of soil samples, estimation of moisture, EC, pH and bulk density.
9. Textural analysis of soil by Robinson‟s pipette method, chemical analysis of soil – Fe_2O_3, P, K, Ca, Mg and S, total N, organic carbon and cation exchange capacity

Suggested readings :

- Kumar, N. 1990. Introduction to Horticulture, Rajyalakshmi Publications, Nagarcoil, Tamilnadu.
- Jitendra Sing, 2002. Basic Horticulture, Kalyani Publishers, Hyderabad.
- Yerima Bernard P.K. and E. van Ranst, 2005. Introduction to Soil Science, Trafford Publishing.

Semester – II : Plant propagation methods and nursery management

Theory (60 Hours/Semester)

Unit -1 :Basics of propagation; structures and media for propagation (12 Hrs.)

1. Introduction, principles and classification of plant propagation methods.
2. Selection of site for commercial nursery.
3. Ecological and economic factors.

Unit – 2 : Sexual propagation/Seed propagation (12 Hrs.)

1. Sexual propagation and its importance.
2. Seed germination, process of seed germination.
3. Factors affecting seed germination
4. pre-germination treatments and viability tests.

Unit – 3 : Propagation through vegetative organs (12 Hrs.)

1. Asexual propagation and its importance.
2. Plant propagation structures, containers and media.
3. Orchid propagation by rhizome.

Unit – 4 :Vegetative propagation techniques (12 Hrs.)

1. Propagation by cuttings : Root, leaf and stem cuttings
2. Plant propagation by layering – Simple, serpentine, mound and air layering.
3. Plant propagation by grafting – approached and detached (whip , cleft, side veneer and bark)
4. Plant propagation by budding – T-, patch and chip budding techniques.

Unit –5 : Nursery management practices (12 Hrs.)

1. Definition of nursery; Nursery- site selection, lay out, records
2. Different types of nursery beds – flat beds, raised beds and sunken beds, their merits and demerits.
3. Nursery structures - Potting, repotting; Different nursery techniques and their management.
4. Problems in nursery management and its control; Nursery accreditation and certification.

Semester – II : Plant propagation methods and nursery management

Practicals (30 Hours/Semester)

1. Media for propagation of plants in nursery beds, pot and mist chamber.
2. Preparation of nursery beds and sowing of seeds. Raising of rootstock.
3. Seed treatments for breaking dormancy.
4. Preparation of plant material for potting. Hardening plants in the nursery.
5. Practicing different types of cuttings, layering, graftings and buddings.
6. Preparation of plant growth regulators for seed germination and vegetative propagation.

Suggested readings :

- Sadhu, M.K. 1996. Plant Propagation. New Age International Publishers, New Delhi.
- Sarma, R.R. 2002.Propagation of Horticultural Crops: Principles and Practices, Kalyani Publishers, New Delhi.
- Hartman, HT and Kester, D.E.1976. Plant Propagation. Principles and Practices, Prentice Hall of India Pvt. Ltd. Bombay.

Semester – III :Olericulture

Theory (60 Hours/Semester)

Unit – 1 : Solanaceous vegetables (12 Hrs.)

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

1. Cultivation of Brinjal
2. Cultivation of omato
3. Cultivation of *Capsicum*

Unit – 2 : Leafy vegetables (12 Hrs.)

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

1. Cultivation of Amaranth and Spinach
2. Cultivation of Coriander and *Mentha*

Unit – 3 : Root and Tuber crops (12 Hrs.)

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

1. Cultivation of *Colocasia* and *Dioscorea*
2. Cultivation of Sweet Potato and Tapioca
3. Cultivation of Carrot and Beet root

Unit – 4 : Cole crops (12 Hrs.)

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

1. Cultivation of Cabbage
2. Cultivation of Cauliflower

Unit – 5 : Leguminous vegetables (12 Hrs.)

Importance, morphology and taxonomy, varieties, climate and soil, seeds and sowing, manuring, irrigation, intercultural operations, diseases and their control, harvesting and yield of following crops:

1. Cultivation of Cluster bean and double bean
2. Cultivation of Cow pea and *Dolichos*

Semester – III :Olericulture

Practicals (30 Hours/Semester)

1. Identification of vegetable seeds and vegetable crops at different growth stages
2. Sowing/ transplanting of vegetables in main field
3. Determining the germination percentage of vegetable seed
4. Preparing vegetable nursery beds
5. Raising vegetable seedlings in nursery bed and portrays
6. Land preparation for sowing/ transplanting of vegetable crops
7. Fertilizer application for vegetable growing
8. Identification of major diseases and insect pests of vegetables
9. Visit to vegetable field to study methods of vegetable cultivation

Suggested readings :

- Bose T K et al. (2003) Vegetable crops, Naya Udhyog Publishers, Kolkata.
- Singh D K (2007) Modern vegetable varieties and production, IBN Publisher Technologies, International Book Distributing Co, Lucknow.
- Premnath, Sundari Velayudhan and D P Sing (1987) Vegetables for the tropical region, ICAR, New Delhi

Semester IV : Ornamental Horticulture, Floriculture and Landscaping

Theory (60 Hours/Semester)

Unit – 1 : Leafy and flower ornamentals (12 Hrs.)

1. Introduction and classification of ornamentals.
2. Different types of leafy ornamentals.
3. Different types of flower ornamentals.
4. Commercial value of ornamentals in India and abroad.

Unit – 2 :Fundamentals of Landscaping (14 Hrs.)

1. Principles, importance and scope of landscaping.
2. History, art principles, important terms of landscape gardening; garden adornments.
3. Garden features : wall, fencing, steps, garden, lawn, carpet bedding; flower beds, , water gardens, bonsai.
4. Garden types and styles : Indoor and outdoor gardens; Formal, informal, free style, special type, terrace, rock and sunken garden styles.

Unit – 3 :Cultivation of ornamentals (16 Hrs.)

1. Importance, description, cultivation and use of annuals; biennials, herbaceous perennials, woody perennials.
2. Identification, classification and growth habits of ornamental trees, shrubs and climbers used for various purposes.
3. Cacti and succulents, ferns, palms and foliage plants.
4. Flower shows, judging. Flower arrangements. Growing of flowers for exhibitions and competitions.

Unit – 4 : Commercial floriculture (10 Hrs.)

1. Scope and importance of commercial floriculture in India
2. Cultivation of Rose, Jasmine, *Chrysanthemum* and Marigold
3. Cultivation of Tuberose, Aster and Dahlia
4. Cultivation of Gerbera, Gladiolus

Unit – 5 :Management practices for ornamental plants (08 Hrs.)

1. Plant protection; use of Plant Growth Regulators.
2. Special horticultural practices.
3. Harvesting and post harvest handling.
4. Grading, packing, storage and marketing of ornamental flowers.

Semester V : Ornamental Horticulture, Floriculture and Landscaping

Practicals (30 Hours/Semester)

1. Identification, classification and description of annuals, herbaceous perennials, bulbous plants, cacti and succulents, foliage plants, ferns and palms.
2. Bonsai culture and flower arrangements.
3. Identification of garden components, lawn, annuals, shrubs, climbers, creepers, cactus, succulents, trees with specialized gardens, line roof garden, Japanese garden.
4. Visit to floriculture farms.
5. Visit to different gardens to observe landscaping components and styles.

Suggested readings :

- Das P, G Maiti and R S Duha (1999)Floriculture and Landscaping,N P Sales Pvt.Ltd.
- Sabina, GT and Peter KV. 2008. Ornamental Plants for Gardens. New India Publ. Agency.
- Lauria A and Victor HR. 2001. Floriculture – Fundamentals and Practices Agrobios.
- Nambisan KMP.1992. Design Elements of Landscape Gardening. Oxford IBH.

Semester V : Concepts of Pomology
Theory (60 Hours/Semester)

Unit – 1 :Introduction to Fruit crops (10 Hrs.)

1. Importance of growing fruit crops in India and Andhra Pradesh.
2. Nutritive value of fruits.
3. Area and production of fruit crops in Andhra Pradesh and India
4. Export and import potential of fruits in India.

Unit – 2 :Tropical Fruit Crops (12 Hrs.)

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield, diseases and pests of the following tropical fruit crops:

1. Mango 2. Guava 3. Papaya

Unit – 3 :Sub-tropical and temperate fruit crops (12 Hrs.)

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield, diseases and pests of the following sub-tropical and temperate fruit crops:

1. Grapes 2. Pomegranate 3. Apple

Unit – 4 :Arid and minor fruit crops (16 Hrs.)

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, inter cropping, harvesting and yield, diseases and pests of the following arid fruit crops:

1. Amla 2. Dates 3. Wood apple

Unit – 5 : Management practices for fruit crops (10 Hrs.)

1. Sustainable Production Practices for Local Fruit Production
2. Principles of Integrated Pest Management.
3. Harvesting and Labor Concerns
4. Grading, packing, storage and marketing of fruits.

Semester V : Concepts of Pomology
Practicals (30 Hours/Semester)

1. Study of varieties of Mango and Banana.
2. Study of varieties of Grape and Citrus.
3. Study of varieties of Papaya and Guava.
4. Manure and fertilizer application including biofertilizers in different fruit crops
5. Methods of application, calculation of the required quantity of manure and fertilizers based on the nutrient content.
6. Study of varieties of Pomegranate, Custard apple and Dates
7. Study of varieties of Apple.
8. Study of varieties of minor fruit crops.
9. Use of growth regulators in fruit crops.
10. Identification and collection of important pests in fruit crops.
11. Identification and collection of important diseases in fruit crops and Herbarium preparation.
12. Visit to a fruit market

Suggested readings :

- Chattopadhyay, T.K.1997. Text book on Pomology (Fundamentals of fruit growing), Kalyani Publishers, Hyderabad.
- Chundawat, B.S. 1990. Arid Fruit Culture, Oxford and IBH, New Delhi.
- Gourley J H 2009. Text book of Pomology, Read Books Publ.

Semester – V : Diseases of horticulture plants and their management
(Theory (60 Hours/Semester)

Unit – 1 :Diseases of Vegetable crops (10 Hrs.)

1. Brinjal : Wilt, Sclerotinia foot rot, Little leaf of brinjal
2. Tomato : Late blight, leaf curl
3. Chilli: Anthracnose, leaf curl

Unit – 2 : Diseases of ornamental crops (16 Hrs.)

1. Rose : dieback, black spot
2. *Chrysanthemum* : Septoria leaf spot, Basal stem rots
3. Jasmine : Leaf blight, Rust
4. Marigold : leaf spot and bud rot
5. Gerbera : Blossom blight, powdery mildew
6. Gladiolus : Corm rot, Flower rot

Unit – 3 : Diseases of Fruit crops (12 Hrs.)

1. Mango: Malformation, Anthracnose, Black tip
2. Grape: Downy Mildew
3. Papaya : Papaya mosaic, Papaya ring spot, Papaya leaf curl
4. Citrus : Canker, root rot

Unit – 4 : Integrated Pest and disease management (12 Hrs.)

1. Pesticide classification on use, chemical nature, formulation, toxicity and action.
2. Pesticide Dissipation, Residue Dynamics, Different methods/ Steps in residue analysis.
3. Pesticide Management.

Unit – 5 : Pesticides (10 Hrs.)

1. Integrated Pest and Disease Management practices in Fruits, Vegetables, Flower crops, Medicinal and Plantation crops.
2. Insect pests in horticulture crops and their management.
3. Nematode pests in horticulture crops and their management.

Semester – V : Diseases of horticulture plants and their management (Adv.Elective-1)
Practicals (30 Hours/Semester)

1. Field visit and acquaintance with diseases of crops
2. Study of pathogens where possible; important diseases are :
    i. Late blight of Potato
    ii. Wilt of Tomato
    iii. Anthracnose of beans
    iv. Powdery mildew of pea
    v. Rhizome rot of Ginger
    vi. Stem gall of coriander
    vii. Powdery mildew
    viii. Downy mildew of cucurbits
    ix. Rust of onion and garlic

3. Acquaintance with common fungicides and their methods of application.

Suggested readings :

- Verma L R and R C Sharma 1999. Diseases of Horticultural Crops – Fruits, Indus Publishing, New Delhi.

- Diseses of Horticulture Crops and their management, TNAU Publ. Agrimoon.Com

- Jagatap G P, D N Dhutraj and Utpal Dey. 2001. Diseases of Horticultural crops and their management, Agrobios Publications

Semester VI : Protected cultivation of Horticultural crops

Theory (60 Hours/Semester)

Unit – 1 :Protected structures (16 Hrs.)

1. Importance and scope of protected cultivation of vegetable crops.
2. Principles used in protected cultivation, energy management, low cost structures; training methods; engineering aspects.
3. Regulatory structures used in protected structures; types of greenhouse/ polyhouse/ shade nets, hot beds, cold frames,
4. Effect of environmental factors, viz. temperature, light, CO_2 and humidity on growth of different vegetables, manipulation of CO_2, light and temperature for vegetable production, fertigation.

Unit – 2 :Agriculture finance and management (14 Hrs.)

1. Credit, Meaning, Importance and credit control. Definition, need for finance in agriculture, characteristics of good agricultural finance (credit)
2. Types of loans and classification of agricultural credit.
3. Sources of agricultural finance (Commercial banks, RRB, Lead Bank, NABARD, Cooperative Credit (PACs, Land Development Banks, National Cooperative Federation, Farmers Service Cooperatives).

Unit – 3 :Nursery production (08 Hrs.)

1. Nursery raising in protected structures like poly-tunnels,
2. Types of benches and containers
3. Different media for growing nursery under cover.

Unit – 4 :Cultivation of Horticulture crops in protected ways (12 Hrs.)

1. Regulation of flowering and fruiting in vegetable crops, technology for raising tomato, sweet pepper, cucumber and other vegetables in protected structures.
2. Training and staking in protected crops, varieties and hybrids
3. Problem of growing vegetables in protected structures and their remedies.
4. Insect and disease management in protected structures; soil-less culture, use of protected structures for seed production.

Unit – 5 : Crop protection (10 Hrs.)

1. Recognition and Causes of Crop Disorders; Recognition, Biology and Control of Weeds.
2. Composition, Activity and Persistence of Crop Protection Chemicals and Biological agents.
3. Application of Crop Protection Chemicals; Safe Use, Handling, Transport and Storage of Crop, Protection Chemicals.

Semester VI : Protected cultivation
Practicals (30 Hours/Semester)

1. Study of various types of structures.
2. Fertigation and nutrient management
3. Methods to control temperature, CO_2, light, media, training and pruning
4. Maintenance of parental lines and hybrid seed production of vegetables
5. Control of insect and diseases in greenhouse
6. Economics of protected cultivation
7. Visit to established green/polyhouse/net house/shade house in the region.

Suggested readings :

- Chandra S &SomV. 2000. Cultivating Vegetables in Green House. IndianHorticulture 60: 17-18.
- Prasad S & Kumar U. 2005.Greenhouse Management for HorticulturalCrops. Agrobios.
- Tiwari GN. 2003. Green House Technology for Controlled Environment.Narosa Publ. House.

Semester VI : Horticulture extension and value added products

Theory (60 Hours/Semester)

Unit – 1 : Basics of Horticulture Extension (14 Hrs.)

1. Extension education: meaning, definition, scope, objectives, principles.
2. Motivation of women community, children, youth and voluntary organizations for horticulture extension work.
3. Transfer of technology programmes like lab to land programme (LLP) national demonstration (ND), front line demonstration (FLD) Krishi Vigyan Kendras (KVK).
4. Scope and importance of Participatory Rural Appraisal (PRA) & Rapid Rural Appraisal (RRA).

Unit – 2 : Communication and programme planning (12 Hrs.)

1. Communication – meaning, definition, models, elements and their characteristics.
2. Types and barriers in communication.
3. Programme planning – meaning, definition, principles.
4. Evaluation of extension programmes.

Unit – 3 : Modern communication gadgets (10 Hrs.)

1. Modern communication sources – internet, video and teleconferencing.
2. Interactive Multimedia Compact Disk (IMCD).
3. Kissan Call Centre (KCC), mobile phone.

Unit – 4 : Processing and value addition (12 Hrs.)

1. Processing using sugar: principle – processing of jam, jelly, squash, nectar, fruit bar, preserves and candies.
2. Processing using salt: Principle – brining preservation of horticultural produces - preparation of pickles and sauces.
3. Processing of dehydrated fruit, fruit pulps, vegetable and spice products,.
4. Canning: principles, methods – preparation of canned products - spoilage of canned foods and its prevention.

Unit – 5 : Principles of preservation (12 Hrs.)

1. Preservation by low temperature: definition, principle, method, refrigeration,
2. Freezing - preparation of frozen foods, preservation by controlled atmosphere, modified atmosphere: definition, principle, method.
3. Processing by irradiation: definition, principle, method – application of irradiation in food industry.

Semester VI : Horticulture extension and value added products (Skill based Elective-2)
Practicals (30 Hours/Semester)

1. Different types of communication systems for extension.

2. Identification and documentation- propagation in medicinal crops. Visit to commercial medicinal plants field, Visit to GMP. Packaging of medicinal and aromatic plants using different packing materials. Waxing, methods of storage. Drying technology of medicinal plants.

3. Identification of major spices and plantation crops varieties - Rapid multiplication technique and nursery management.

4. Equipment used in food processing unit, preparation of beverages – Squash, Nectar, Cordial, Crush, Syrup, Wine and juice concentrate,preservation With sugar – Jam, Jelly, Candy, Preserve, Glazed candies and Crystallized fruits preservation with salt & vinegar – Pickle, Chutney, Sauce – dehydration of horticultural produces, by products from waste – freezing of fruit and vegetables, canning of fruit and vegetables – value added product from spices, preparation of herbal drinks quality control of value added products – quality analysis of horticultural produces –visit to food processing industries, spice and coffee board.

Suggested readings :

- Jitendra Singh. 2008. Spices and Plantation Crops. Aavishkar Publishers, Distributors, Jaipur.

- Tiwari, R.S and Ankur Agarwal 2004. Production technology of spices. International book distributing Co., Lucknow.

- Farooqi, M. M. Khan and M. Vasundhara. 2004. Production technology of medicinal and aromatic crops. Publ. Natural Remedies Pvt. Ltd., Bangalore