DEPARTMENT OF BOTANY

COURSE STRUCTURE & SYLLABI
(For the students admitted from year 2023-2024 onwards)

Programme : DIPLOMA IN HORTICULTURE

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JAMAL MOHAMED COLLEGE (AUTONOMOUS)
Accredited with A++ Grade by NAAC (4th Cycle) with CGPA 3.69 out of 4.0
(Affiliated to Bharathidasan University)
TIRUCHIRAPPALLI – 620 020

DIPLOMA IN HORTICULTURE

Sem	Part	Course	Course Code	Course Title	Total Hours	Credits	Marks		Total
							CIA	ESE	
I	I	General	23DHO1CC1	Fundamentals of horticulture	60	4	25	75	100
	I	General	23DHO1CC2	Plant propagation practices	60	4	25	75	100
	I	General	23DHO1CC3	Floriculture	60	4	25	75	100
	II	Skill	23DHO1CC4P	Fundamentals of horticulture - Practical	180	6	20	80	100
	II	Skill	23DHO1CC5P	Plant propagation practices - Practical	180	6	20	80	100
	II	Skill	23DHO1IN	Floriculture - Internship	180	6	-	-	100
	Total				**720**	**30**	**115**	**385**	**600**
Exit Qualification: Certificate NSQF Level: 4 Exit Qualification Pack: Florist AGR/ Q0703									
II	I	General	23DHO2CC6	Seed science and technology	60	4	25	75	100
	I	General	23DHO2CC7	Horticultural pre and post-harvest practices	60	4	25	75	100
	I	General	23DHO2CC8	Landscape gardening and greenhouse technology	60	4	25	75	100
	II	Skill	23DHO2CC9P	Seed science and technology - Practical	180	6	20	80	100
	II	Skill	23DHO2CC10P	Horticultural pre and post- harvest practices - Practical	180	6	20	80	100
	II	Skill	23DHO2IN	Landscape gardening and greenhouse technology - Internship	180	6	-	-	100
	Total				**720**	**30**	**115**	**385**	**600**
	Grand Total				**1440**	**60**	**230**	**770**	**1200**
Exit Qualification: Diploma NSQF Level: 5 Exit Qualification Pack: Heritage Gardener AGR/Q0810 Horticulture supervisor AGR/Q0811									

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23DHO1CC1	General	60	4	25	75	100

Course Title	FUNDAMENTALS OF HORTICULTURE

SYLLABUS

Unit	Contents	Hours
I	**Fundamentals of horticulture:** Definition, classification, scope and importance. Soil – Kinds of soil, physical and chemical properties and soil fertility. Climate – Basic environmental components. Systems of irrigation – surface, underground and special irrigation methods.	12
II	**Establishment of orchards and cultivation:** Location, site, planning, layout, planting seasons, systems, distance and transplanting methods of orchards. Methods of soil management practices – clean culture, cover culture, mulching, sod and sod mulching. Inter, mixed and multitier cropping. Training, pruning and *weed management in orchards*.	12
III	**Nutrients of horticultural crops:** Organic manures – night soil, guana, bones, oil cakes, leaf mould, farmyard manure and vermi-compost. Inorganic fertilizers – nitrogen, phosphate, potash and mixed fertilizers. *Biofertilizers – Algal, fungi and Bacterial*. Application of fertilizers and manures.	12
IV	**Horticultural applications of growth regulators:** History and types. Role of plant growth regulators in horticulture – Propagation of plant, control of flowering, fruit setting, fruit size and quality, pre-harvest fruit drop, *weed and dormancy*. induction of parthenocarpy, blossom thinning, fruit ripening and arresting plant growth.	12
V	**Pomology and olericulture:** Classification and types of fruits, cultivation practices of Mango, Papaya, Jack fruit, Pomegranate and Citrus. Classification of vegetables, types of vegetable growing and *cultural aspects of vegetables*. Vegetables cultivation suitable for tropical climate – Brinjal, Lady's finger, Tomato and cucurbit varieties.	12
VI	**Current Trends (For CIA only) –** Horticultural zones in Tamil Nadu and India and cultural aspects of vegetables	

…… Self Study

Text Book(s):

1. Gupta SN, Instant Horticulture, 16th Edition, Jain Brothers Pvt Ltd, New Delhi, India, 2010.
2. Sheela VL, Horticulture, 1st Edition, MJP Pvt Ltd, Chennai, Tamil Nadu, India, 2011.
3. Kumar N, Introduction to Horticulture, 8th Edition, Medtech, Scientific International Pvt Ltd, New Delhi, India, 2017.

Reference Book(s):
1. George A, Horticulture: Principles and Practices, 4th Edition, Prentice Hall India Learning Pvt Ltd, New Delhi, India, 2009. 2. Peter KV, Basics of Horticulture, 2nd Revised Edition, New India Publishing Agency Pvt Ltd, New Delhi, India, 2009.
Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Describe the scope and significance of horticultural practices.	**K1**
CO2	Observe and develop orchards and recall its managements.	**K2**
CO3	Apply the green manuring and organic fertilizers.	**K3**
CO4	Analyze and appraise appropriate plant growth stimulating and inhibiting hormones.	**K4**
CO5	Estimate economic implications of cultivation of tropical and subtropical fruits and vegetable crops.	**K5**

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	03	02	02	01	02	03	02	01	02	02	**2.0**
CO2	02	03	02	02	01	02	03	02	02	01	**2.0**
CO3	01	02	03	02	02	02	01	03	02	02	**2.0**
CO4	03	01	02	01	02	02	02	02	03	02	**2.0**
CO5	02	02	01	02	02	02	02	02	01	03	**1.9**
Mean Overall Score											**2.0**
Correlation											**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23DHO1CC2	General	60	4	25	75	100

Course Title	PLANT PROPAGATION PRACTICES

SYLLABUS

Unit	Contents	Hours
I	**Asexual and Sexual propagation:** Definition. Microsporogenesis and megasporogenesis. Apomixis – types and significance. Polyembryony. Advantages and disadvantages of asexual and sexual propagation. Genetic instability. *Propagation by specialized plants parts*.	12
II	**Plant propagation through cottage:** Types and methods of cuttage (leaf, leaf bud, stem and root). Regeneration of plants from cuttage. *Advantages and disadvantages*.	12
III	**Plant propagations through layering:** Types and methods of layering (simple, serpentine trench, tip, stooling and air layering). Anatomical and physiological basis of rooting. *Advantages and disadvantages of layering*.	12
IV	**Plant propagations through grafting and budding:** Grafting – Stock and scion concept, rootstocks, factors for successful graft union, formation of graft union, grafting types, methods and incompatibility. Budding – types, methods and limitations. *Advantages and disadvantages*.	12
V	**Micropropagation:** Scope and requirements. Procedure for micropropagation. Various methods of culturing plant tissues and organs. Deflasking, hardening and acclimatization. Potting mixtures for micropropagated plants. *Advantages and bottlenecks in micropropagation*.	12
VI	**Current Trends (For CIA only) –** Propagation by specialized plants parts	

…… Self Study

Text Book(s):

1. Reddy M and Rao A, Plant propagation in Horticulture, 1st Edition, Pacific Book International Pvt Ltd, New Delhi, India, 2009.
2. Sheela VL, Horticulture, 1st Edition, MJP Pvt Ltd, Chennai, Tamil Nadu, India, 2011.
3. Kumar N, Introduction to Horticulture, 8th Edition, Medtech, Scientific International Pvt Ltd, New Delhi, India, 2017.

Reference Book(s):

1. Michael Dirr A and Charles Heuser W, Reference manual of woody plant propagation: From seed to tissue culture, 2nd Edition, Timber Press Pvt Ltd, United States of America, 2006.
2. Hartmann HT, Kester DE, Fred T, Davies JR, Robert LG, Plant Propagation: Principle and Practices, 1st Edition, Pearson Education Pvt, Ltd, United States of America, 2017.

Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Enumerate the concept of natural propagation, growth and development system in plants.	**K1**
CO2	Select suitable planting materials for cottage, layering, graftage and budding mediated plant propagation.	**K2**
CO3	Determine the advantages and disadvantages of various propagation system.	**K3**
CO4	Analyze factors affecting artificial plant propagation.	**K4**
CO5	Evaluate pathogen free clones *in vitro* and maintenance of true to true type of plant species.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	03	02	02	01	02	03	02	01	02	02	**2.0**
CO2	02	03	02	02	01	02	03	02	02	01	**2.0**
CO3	01	02	03	02	02	02	02	03	02	02	**2.1**
CO4	03	01	02	02	02	02	02	02	03	02	**2.1**
CO5	02	02	02	02	02	02	02	02	02	03	**2.1**
Mean Overall Score											**2.1**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23DHO1CC3	General	60	4	25	75	100

Course Title	FLORICULTURE

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Diversification of floriculture:** Scope and importance of floriculture. Classification of flowering plants. Traditional and protected cultivation of flowers (site, soil and layout). Flower seed production and flower beds. *Colour scheme and grouping*.	12
II	**Cultivation methods:** Cultivation methods of Rose, Marigold, Chrysanthemum, Jasmine, Dahlia, Orchid and Crossandra. Training and pruning of flowering plants. *Ornamental bulbous plant – Cacti, succulents, palms, cycads and ferns*.	12
III	**Cut flower technology:** Production, packaging, drying and preservation. Post-harvest technology of cut flowers. Cut flower production techniques for domestic and export market with special reference to rose, *Marigold, Chrysanthemum*, Anthurium, Gladiolus, Jasmine, Dahlia, Tuberose, Gerbera, Orchid and Crossandra.	12
IV	**A profitable floriculture industry:** Vase life – prolonging the vase life of flowers. Flower arrangements – Practices and preparation of floral bouquets and decorations. *Preparation of floral rangoli, veni and ikebana*. Dry flowers – techniques of drying, preservation, bleaching, dyeing, painting, storage and products.	12
V	**Entrepreneurship in Floriculture:** Marketing of floriculture products – methods, publicity and marketing mix. Schemes and supporting agencies for entrepreneurship of floriculture – APEDA, DIC, SIDA, SISI, NSIC, SIDO. Investment procurement – project formation, feasibility, legal formalities, shop act, estimation and costing, investment procedure, loan procurement, *banking processes and export strategies*.	12
VI	**Current Trends (For CIA only) –** Knowledge on export and import strategies of floriculture. Environmental impact on cut flower industry.	

…… Self Study

Text Book(s):

1. Sheela VL, Horticulture, 1st Edition, MJP Pvt Ltd, Chennai, Tamil Nadu, India, 2011.
2. Arora JS, Introductory Ornamental Horticulture, 2nd Edition, Kalyani Publishers Pvt Ltd, New Delhi, India, 2016.
3. Randhawa GS and Mukhopadyay AN, Floriculture in India, 1st Edition (Reprinted), Allied Publishers Pvt Ltd, Chennai, Tamil Nadu, India, 2015.

Reference Book(s):

1. Brain M, Flowering Bulbs for the Garden (The Royal Botanical Gardens, KEW in association with COLLINGRIDE), 8th Edition, The Himalayan Publishing Group Pvt Ltd, Kew, London, 2013.
2. Chadha KL and Choudhury B, Ornamental Horticulture in India, 6th Edition, ICAR, New Delhi, India, 2014.

Web Resource(s):
1. http://www.apeda.gov.in/apedawebsite/SubHead_Products/Floriculture.htm 2. https://agriexchange.apeda.gov.in/indexp/Product_description_32head.aspx?gcode=01013 3. https://agriexchange.apeda.gov.in/FTP/ftp2015-20E 4. www.Anilrana13014.webbly.com 5. https://www.zauba.com/export-INDIAN+FRESH+FLOWERS-hs-code.html

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Recognize the fundamentals of floriculture.	**K1**
CO2	Employ various cultivation practices for flowering plants in commercial scale.	**K2**
CO3	Construct quality planting material of ornamentals and flowering plants.	**K3**
CO4	Standardize and practices for production, preparation, and packaging of the commercially important cut flowers and flower based decorative products.	**K4**
CO5	Explain the personal finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.	**K5**

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	02	02	03	02	01	02	02	03	02	01	**2.0**
CO2	01	03	02	02	02	02	03	01	02	02	**2.0**
CO3	02	02	02	03	02	02	01	03	02	02	**2.1**
CO4	02	01	02	03	02	01	02	02	03	02	**2.0**
CO5	03	02	02	02	03	02	02	02	02	03	**2.2**
										Mean Overall Score	**2.6**
										Correlation	**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23DHO1CC4P	Skill	180	6	20	80	100

Course Title	FUNDAMENTALS OF HORTICULTURE – PRACTICAL

SYLLABUS		
Unit	**Contents**	**Hours**
	List of Practical's: 1. Categorization of horticultural crops in Tamil Nadu based on use, plant type and usable plant part. 2. Soil less plant culture – Hydroponics. 3. Skill learning and practicing nursery bed preparation. 4. Practicing irrigation for irrigated crops. 5. Use of plant growth regulators – IAA/NAA/IBA, Kinetin, ABA and GA. 6. Identify horticultural orchard weed and earthing up. 7. Practicing application of organic, inorganic and green manures. 8. Spray volume calculation and foliar application of fertilizers. 9. Pruning practices in horticultural trees. 10. Practicing the use of special garden implements (Seed drill, rotary weeder, Mower and sprayers, litter blower). 11. Identification of major conditions responsible for spoilage of horticultural crops. 12. Field trips: Field visit to standing crop sites, nurseries, vegetable gardens and horticultural fields at agricultural institutes / universities or other suitable locations.	**180**

Text Book(s):

1. Sheela VL, Horticulture, 1st Edition, MJP Pvt Ltd, Chennai, Tamil Nadu, India, 2011.
2. Arora JS, Introductory Ornamental Horticulture, 2nd Edition, Kalyani Publishers Pvt Ltd, New Delhi, India, 2016.
3. Randhawa GS and Mukhopadyay AN, Floriculture in India, 1st Edition (Reprinted), Allied Publishers Pvt Ltd, Chennai, Tamil Nadu, India, 2015.

Reference Book(s):

1. Brain M, Flowering Bulbs for the Garden (The Royal Botanical Gardens, KEW in association with COLLINGRIDE), 8th Edition, The Himalayan Publishing Group Pvt Ltd, Kew, London, 2013.
2. Chadha KL and Choudhury B, Ornamental Horticulture in India, 6th Edition, ICAR, New Delhi, India, 2014.

Web Resource(s):

1. http://www.apeda.gov.in/apedawebsite/SubHead_Products/Floriculture.htm
2. https://agriexchange.apeda.gov.in/indexp/Product_description_32head.aspx?gcode=01013
3. https://agriexchange.apeda.gov.in/FTP/ftp2015-20E
4. www.Anilrana13014.webbly.com
5. https://www.zauba.com/export-INDIAN+FRESH+FLOWERS-hs-code.html

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Recognize the fundamentals of floriculture.	**K1**
CO2	Employ various cultivation practices for flowering plants in commercial scale.	**K2**
CO3	Construct quality planting material of ornamentals and flowering plants.	**K3**
CO4	Standardize and practices for production, preparation, and packaging of the commercially important cut flowers and flower based decorative products.	**K4**
CO5	Explain the personal finance, entrepreneurship and manage/organize related task in day-to-day work for personal & societal growth.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**02**	**02**	**03**	**02**	**01**	**02**	**02**	**03**	**02**	**01**	**2.0**
CO2	**01**	**03**	**02**	**02**	**02**	**02**	**03**	**01**	**02**	**02**	**2.0**
CO3	**02**	**02**	**02**	**03**	**02**	**02**	**01**	**03**	**02**	**02**	**2.1**
CO4	**02**	**01**	**02**	**03**	**02**	**01**	**02**	**02**	**03**	**02**	**2.0**
CO5	**03**	**02**	**02**	**02**	**03**	**02**	**02**	**02**	**02**	**03**	**2.2**
Mean Overall Score											**2.6**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23DHO1CC5P	Skill	180	6	20	80	100

Course Title	PLANT PROPAGATION PRACTICES – PRACTICAL

SYLLABUS		
Unit	**Contents**	**Hours**
	List of Practical's Plant propagation techniques 1. Cuttage. 2. Layering 3. Grafting. 4. Budding. 5. Propagation by using specialized plant parts. 6. Preparation of pot mixture, potting and repotting. 7. Micropropagation. a) Sterilization procedures. b) Handling of weighing balance, laminar air flow chamber, pH meter and autoclave. c) Preparation of stock solutions for medium preparation. d) Preparation of solid and liquid medium. e) *In vitro* culture methods using different types of explants. f) Hardening and transplantation of regenerated plants.	**180**

Text Book(s):

1. Sheela VL, Horticulture, 1st Edition, MJP Pvt Ltd, Chennai, Tamil Nadu, India, 2011.
2. Arora JS, Introductory Ornamental Horticulture, 2nd Edition, Kalyani Publishers Pvt Ltd, New Delhi, India, 2016.
3. Randhawa GS and Mukhopadyay AN, Floriculture in India, 1st Edition (Reprinted), Allied Publishers Pvt Ltd, Chennai, Tamil Nadu, India, 2015.

Reference Book(s):

1. Brain M, Flowering Bulbs for the Garden (The Royal Botanical Gardens, KEW in association with COLLINGRIDE), 8th Edition, The Himalayan Publishing Group Pvt Ltd, Kew, London, 2013.
2. Chadha KL and Choudhury B, Ornamental Horticulture in India, 6th Edition, ICAR, New Delhi, India, 2014.

Web Resource(s):

1. http://www.apeda.gov.in/apedawebsite/SubHead_Products/Floriculture.htm
2. https://agriexchange.apeda.gov.in/indexp/Product_description_32head.aspx?gcode=01013
3. https://agriexchange.apeda.gov.in/FTP/ftp2015-20E
4. www.Anilrana13014.webbly.com
5. https://www.zauba.com/export-INDIAN+FRESH+FLOWERS-hs-code.html

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Observe the plants according to their nature and parts used.	**K1**
CO2	Identify soil and soil less cultivation methods.	**K2**
CO3	Determine nursery bed preparation, utilizing hormones and methods of irrigation.	**K3**
CO4	Distinguish orchard weeds & their control and know how to apply the organic & inorganic fertilizers.	**K4**
CO5	Appraise special garden equipment's and machinery.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	03	02	02	01	02	03	02	01	02	02	1.9
CO2	02	03	02	02	01	02	03	02	02	01	2.0
CO3	01	02	03	02	02	02	01	02	02	02	1.9
CO4	03	01	02	01	02	02	02	02	03	02	2.0
CO5	02	02	01	02	02	02	02	02	01	03	1.9
Mean Overall Score											1.8
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23DHO1IN	Skill	180	6	--	--	100

Course Title	FLORICULTURE – INTERNSHIP

SYLLABUS		
Unit	**Contents**	**Hours**
	List of Practical's come Internship 1. Soil cultivation and area preparation. 2. Flower's seed production and bed preparation. 3. Seedling for plantation. 4. Irrigation and organic mulching. 5. Practicing on flower bud caping with net material. 6. Practicing on flower harvesting and separation based on size, colour, length etc. 7. Practicing on flower bunching, packing, marketing and export. 8. Practices and preparation of floral bouquets and decorations.	**180**

Text Book(s):
Reference Book(s):
Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Select desirable flower seed materials for floral bed preparation.	**K1**
CO2	Summarize suitable varieties for plantation in different geographical locations.	**K2**
CO3	Experiment flowers based on size, shape and colour during post-harvesting of commercial flowers.	**K3**
CO4	Appraise different types of boxes used for packing and export of commercial flowers.	**K4**
CO5	Choose floral bouquets and decoration for flower shows to market their commercial flowers.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	03	02	02	02	02	03	02	02	02	02	2.2
CO2	02	03	02	02	01	02	03	02	02	02	2.1
CO3	02	02	03	02	02	02	02	03	02	03	2.1
CO4	03	02	02	02	02	02	02	02	03	02	2.2
CO5	02	02	01	03	02	02	02	02	02	03	2.2
Mean Overall Score											2.2
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23DHO2CC6	General	60	4	25	75	100

Course Title	SEED SCIENCE AND TECHNOLOGY

SYLLABUS

Unit	Contents	Hours
I	**Introduction:** Seed morphology, anatomy and its types. Seed dormancy – possible reasons and methods of breaking dormancy. Concept of seed technology, difference between seed and grains, seed quality, relationships to the other sciences, role and goals of seed technology. *Seed industries in India*.	12
II	**Seed production in vegetable crops:** General principles and methods. Identification of areas, compact area approach and *factor affecting in seed production*. Climatic requirements, cultural practices, isolation distance, rouging, seed standards, extraction and processing. Seed production techniques in solanaceous vegetables, peas, beans, okra, cucurbits, onion, cole and root crops.	12
III	**Seed production in flower crops:** Indian scenario in flower seeds production, different groups of seeds, formula mix, *pollination behavior*, isolation and pollination management. Hybrid seed production, harvesting and threshing. Seed yield in important annuals and maintenance of the variety.	12
IV	**Seed testing:** Seed sampling, determination of density, purity and genuineness of varieties. Seed viability, moisture, vigour, health, age testing and *germination*.	12
V	**Seed processing, storage, certification and marketing:** Seed processing, drying, cleaning, upgrading, treatment, packaging, handling and storage. Seed certification, minimum seed certification standards, field and seed inspection. Seed legislation, *law enforcement* and marketing.	12
VI	**Current Trends (For CIA only) –** Opportunities for seed technologists.	

…… Self Study

Text Book(s):

1. Agarwal PK, Principles of Seed Technology, 1st Edition, ICAR, New Delhi, India, 2010.
2. Basavaraju GV, Ravishankar P and Sarika G, 2nd Edition, A Text book of Seed Science and Technology, Kalyani Publishers Pvt Ltd, New Delhi, India, 2014.
3. Rattan Lal A, Seed Technology, 2nd Edition, Oxford & IBH Publishing Pvt Ltd, New Delhi, India, 2017.

Reference Book(s):

1. Lawrence OC and Miller FM, Principles of Seed Science and Technology, 1st Edition, Springer, 2002.
2. Vanangamudi K, Seed Science and Technology, 2nd Edition, New India Publishing Agency Pvt Ltd, New Delhi, India, 2014.

Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Recognize the hypothetical orientation of seed development.	**K1**
CO2	Explain the principles of seed production technology & its use for flowering and vegetable crops.	**K2**
CO3	Illustrate the concept of hybrid seed production.	**K3**
CO4	Examine various methods of seed testing.	**K4**
CO5	Distinguish seed processing, storage, certification and marketing.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	03	02	02	01	02	03	02	01	02	02	2.0
CO2	02	03	02	02	01	02	03	02	02	01	2.0
CO3	01	02	03	02	02	02	01	03	02	02	2.0
CO4	03	01	02	01	02	02	02	02	03	02	2.0
CO5	02	02	02	02	02	02	02	02	01	03	2.0
Mean Overall Score											2.0
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	23DHO2CC7	General	60	4	25	75	100

Course Title	HORTICULTURAL PRE AND POST - HARVEST PRACTICES

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Pre-harvest practice and disease management:** Pre-harvest factors affecting quality, factors responsible for deterioration of horticultural products, physiological and bio-chemical changes, hardening and delaying ripening process. Pre-harvest diseases –densifications of deficiency symptoms and nutritional management. *IPM strategies (genetic, biological and chemical methods for pest control)*.	**12**
II	**Post-harvest practices:** Overview and importance of post -harvest handling. Principle and methods of preservation and processing. Methods of minimizing loses during storage and transportation; Harvesting and handling of fruits, *cut flowers*, vegetables, herbs, storage tissues and organs.	**12**
III	**Post-harvest processing:** Food processing – canning, fruit juice beverages, pickles, jam, jellies, candies, food additives, labeling. Food irradiation and food safety. Importance and advantages of appropriate technologies. Evaluation of quality traits. Harvesting of produce and extent of post-harvest losses. Value addition – standardization and *improvement of quality*.	**12**
IV	**Protection of Post-harvest Produce:** Concept of maturity and maturity indices. Pre-harvest quality modifiers, Trimming, cleaning and drying technologies. Post-harvest physiology – Physiological disorders, development, identification and Control. Post-harvest diseases - source of infection, types of diseases, losses by insects. Prevention techniques for post -harvest losses. Storage techniques, *biorational approaches*.	**12**
V	**Post-harvest strategies and transportation:** Laws of food selling. Treatments prior to shipment –chlorination, waxing, chemicals, biocontrol agents and. Methods of storage: ventilated, refrigerated, MAS, CA storage, Precooling, sorting, grading, packaging, *transportation and marketing*.	**12**
VI	**Current Trends (For CIA only) –** Natural plant products and Crop sanitation and quarantine practices.	

…… Self Study

Text Book(s):

1. Upadhyaya RC, Post-Harvest Technology of Horticulture crops, 1st Edition, Anmol Publication Pvt Ltd, New Delhi, India, 2008.
2. Sharon Pastor S and Straus MC, Post-Harvest Technology of Horticultural Crops, 1st Edition, Oxford & IBH Publishing Pvt Ltd, New Delhi, India, 2010.
3. Rathore NS, Mathur GK and Chasta SS, Post-Harvest management and processing of fruits and vegetables, 1st Edition, The Energy and Resources Institute, New Delhi, India, 2012.

Reference Book(s):
1. Sudheer KP and Indira V, Post-harvest Technology of Horticultural Crops, 1st Edition, New India Publishing Agency Pvt Ltd, New Delhi, India, 2007. 2. Prakash K and Chandraprabha S, Post-harvest technology and Value Addition of Fruits and Vegetables, 1st Edition, LAP Lambert Academic Publishing, 2020.
Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Select competent pre and post-harvest techniques in horticultural crops.	**K1**
CO2	Summarize the post-harvest problems likely to be confronted.	**K2**
CO3	Practice the concept of different types of practices for value addition.	**K3**
CO4	Catergorize evaluate different post-harvest physiology, disease and protection techniques.	**K4**
CO5	Summarize the tricks of the trade and how to increase the longevity of the produce.	**K5**

Relationship Matrix:

Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**03**	**02**	**02**	**01**	**02**	**03**	**02**	**01**	**02**	**02**	**2.0**
CO2	**02**	**03**	**02**	**02**	**01**	**02**	**02**	**02**	**02**	**01**	**1.9**
CO3	**01**	**02**	**03**	**02**	**02**	**02**	**01**	**03**	**02**	**02**	**2.0**
CO4	**03**	**01**	**02**	**01**	**02**	**02**	**02**	**02**	**03**	**02**	**2.0**
CO5	**02**	**02**	**01**	**02**	**02**	**02**	**02**	**02**	**01**	**03**	**1.9**
										Mean Overall Score	**1.9**
										Correlation	**Medium**

Mean Overall Score	**Correlation**
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23DHO2CC8	General	60	4	25	75	100

Course Title	LANDSCAPE GARDENING AND GREENHOUSE TECHNOLOGY

SYLLABUS

Unit	Contents	Hours
I	**Origin, history and indoor gardening:** Introduction, world history of garden, major gardening styles of the world. *Famous Indian gardens*. Indoor gardening – containers, environmental factors, selection of plants, potting media and other aspects.	12
II	**Special types of gardens:** Formal and informal garden – garden components. Establishment, construction and management of rock, water, marsh, roof, vertical, terrace and temple garden. *Bonsai – origins, kinds and requirements for starting of bonsai*.	12
III	**Lawn establishment and its management:** Introduction, site selection, land preparation, types of grasses, planting, detaching methods, irrigation, drainage, manures, fertilizers, disease and *pest management*.	12
IV	**Construction and components of greenhouse:** An overview of different protective cultivation structures. *Construction and composition of a greenhouse*. Types of greenhouse based on covering material, environmental control and shape. Greenhouse cooling – ventilation, roof shading and evaporating cooling systems.	12
V	**Greenhouse management:** Requirements for planting in green houses –choice of cultivar, bed preparation, medium, micro-irrigation, fertigation and carbon dioxide enrichment. *Green house cultivation of some important ornamentals and vegetables*.	12
VI	**Current Trends (For CIA only) –** Abiotic and biotic factors affecting greenhouse cultivation and their management.	

…… Self Study

Text Book(s):

1. Manohar KR, Greenhouse technology and management, 2nd Edition, B.S. Publishers Pvt Ltd, New Delhi, India, 2007.
2. Misra RL and Misra S, Landscape Gardening, 1st Edition, Westville Publishing House Pvt Ltd, New Delhi, India, 2012.
3. Patil NN, Greenhouse Technology – Management, operations and Maintenance, 1st Edition, Universal Prakashan Pvt Ltd, Pune, India, 2016.

Reference Book(s):

1. Tiwari GN, Greenhouse for controlled environment, 1st Edition, Alpha Science International Pvt Ltd, United Kingdom, 2003.
2. Bhattacharjee SK, Landscape Gardening and Design with Plants, 1st Edition, Avishkar Publishers Pvt Ltd, New Delhi, India, 2012.

Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Identify the principle and components of gardening.	**K1**
CO2	Differentiate various types of gardens according to the philosophy.	**K2**
CO3	Develop flower arrangement and bio-aesthetic planning.	**K3**
CO4	Evaluate the basic details of organization and functioning of greenhouse.	**K4**
CO5	Predict with crop management in greenhouse condition.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	03	02	02	02	02	03	02	02	02	02	**2.2**
CO2	02	03	02	02	02	02	03	02	02	02	**2.2**
CO3	02	02	03	02	02	03	02	03	02	02	**2.3**
CO4	03	02	02	02	03	02	02	02	03	02	**2.3**
CO5	02	02	03	02	02	02	02	02	02	03	**2.3**
Mean Overall Score											**2.4**
Correlation											**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23DHO2CC9P	Skill	180	6	20	80	100

Course Title	SEED SCIENCE AND TECHNOLOGY – PRACTICAL

SYLLABUS		
Unit	**Contents**	**Hours**
	List of Practical's 1. Germplasm collection of different types of seeds for conservation – Dicot and monocots. 2. Seed viability by using Tetrazolium Test. 3. Seed moisture analysis. 4. Seed constituent's analysis. 5. Seed priming for breaking seed dormancy. 6. Seed germination studies: Dicots and monocots. 7. Synthetic seed preparation by using sodium alginate method. 8. Short term and long-term storage of seed – Liquid Nitrogen.	**180**

Text Book(s):

1. Manohar KR, Greenhouse technology and management, 2nd Edition, B.S. Publishers Pvt Ltd, New Delhi, India, 2007.
2. Misra RL and Misra S, Landscape Gardening, 1st Edition, Westville Publishing House Pvt Ltd, New Delhi, India, 2012.
3. Patil NN, Greenhouse Technology – Management, operations and Maintenance, 1st Edition, Universal Prakashan Pvt Ltd, Pune, India, 2016.

Reference Book(s):

1. Tiwari GN, Greenhouse for controlled environment, 1st Edition, Alpha Science International Pvt Ltd, United Kingdom, 2003.
2. Bhattacharjee SK, Landscape Gardening and Design with Plants, 1st Edition, Avishkar Publishers Pvt Ltd, New Delhi, India, 2012.

Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Enumerate collection and preserve traditionally important seed varieties for conservation and commercialization.	**K1**
CO2	Discover viability of seeds by short and long-term storage techniques.	**K2**
CO3	Analyze the different dormancy types in seeds.	**K3**
CO4	Choose seed dormancy and its breaking by mechanical and chemical methods.	**K4**
CO5	Select the importance of artificial seeds and their germination techniques.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	03	02	02	02	01	02	02	03	02	02	2.0
CO2	02	03	02	02	01	02	03	02	02	01	2.0
CO3	02	02	01	02	03	02	01	03	03	02	2.0
CO4	01	03	02	01	02	02	02	02	03	02	2.0
CO5	02	02	01	02	02	02	02	02	01	03	1.9
Mean Overall Score											2.0
Correlation											Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. A. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23DHO2CC10P	Skill	180	6	20	80	100

Course Title	HORTICULTURAL PRE AND POST- HARVEST PRACTICES – PRACTICAL

SYLLABUS		
Unit	**Contents**	**Hours**
	List of Practical's 1. Field visit to some nearby cold-storage facility. 2. Handling of post-harvest equipment: Dryers, storage containers and vessels. 3. The production process of the marketable products. 4. Post-harvest processing – drying and grading. 5. Packaging and transport of produce, minimization of damage during packaging of dry fruits / nuts / herbs and herbal products. 6. Post-harvest processing for transportation. 7. Identification of major conditions responsible for early decay of produce. 8. Identification of pathogenic and non-pathogenic reasons of produce spoilage during storage. 9. Cold storage techniques for fruits and vegetables.	**180**

Text Book(s):

1. Manohar KR, Greenhouse technology and management, 2nd Edition, B.S. Publishers Pvt Ltd, New Delhi, India, 2007.
2. Misra RL and Misra S, Landscape Gardening, 1st Edition, Westville Publishing House Pvt Ltd, New Delhi, India, 2012.
3. Patil NN, Greenhouse Technology – Management, operations and Maintenance, 1st Edition, Universal Prakashan Pvt Ltd, Pune, India, 2016.

Reference Book(s):

1. Tiwari GN, Greenhouse for controlled environment, 1st Edition, Alpha Science International Pvt Ltd, United Kingdom, 2003.
2. Bhattacharjee SK, Landscape Gardening and Design with Plants, 1st Edition, Avishkar Publishers Pvt Ltd, New Delhi, India, 2012.

Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Recognize the pre and post-harvest produce.	**K1**
CO2	Identify major condition responsible for early decay of produce.	**K2**
CO3	Select suitable storage methods for pre and post-harvest produces.	**K3**
CO4	Distinguish how to grade and packaging of produces.	**K4**
CO5	Select the importance of community cold storage facilities in our country.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	03	02	02	01	02	03	02	01	02	02	2.0
CO2	02	03	02	02	01	02	03	02	02	01	2.0
CO3	01	02	03	02	02	02	01	02	02	02	1.9
CO4	03	01	02	01	02	02	02	02	03	02	2.0
CO5	02	02	01	02	02	02	02	02	01	03	1.9
										Mean Overall Score	1.6
										Correlation	Medium

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator:

Dr. N. AHAMED SHERIF

Semester	Course Code	Course Category	Total Hours	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	23DHO2IN	Skill	180	6	--	--	100

Course Title	LANDSCAPE GARDENING AND GREENHOUSE TECHNOLOGY – INTERNSHIP

SYLLABUS		
Unit	**Contents**	**Hours**
	List of Practical's come Internship 1. Field visit to Botanical gardens, to identify the trees, shrubs and other herbaceous vegetation. 2. Principles of designing indoor and outdoor garden. 3. Propagate, raise and maintenance of indoor and outdoor plants. 4. Practicing on preparation and maintenance of bonsai trees. 5. Practices in lawn establishment and maintenance. 6. Identification of pathogenic and non-pathogenic diseases of garden plants and grasses. 7. Practicing on protected cultivation of plants in green, poly and net house.	**180**

Text Book(s):

1. Manohar KR, Greenhouse technology and management, 2nd Edition, B.S. Publishers Pvt Ltd, New Delhi, India, 2007.
2. Misra RL and Misra S, Landscape Gardening, 1st Edition, Westville Publishing House Pvt Ltd, New Delhi, India, 2012.
3. Patil NN, Greenhouse Technology – Management, operations and Maintenance, 1st Edition, Universal Prakashan Pvt Ltd, Pune, India, 2016.

Reference Book(s):

1. Tiwari GN, Greenhouse for controlled environment, 1st Edition, Alpha Science International Pvt Ltd, United Kingdom, 2003.
2. Bhattacharjee SK, Landscape Gardening and Design with Plants, 1st Edition, Avishkar Publishers Pvt Ltd, New Delhi, India, 2012.

Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO1	Identify the characteristics of various plants suitable for indoor and outdoor plantation along with physical identification.	**K1**
CO2	Select indoor and outdoor gardens and train lawn establishment and maintenance.	**K2**
CO3	Examine how to prepare bonsai plants, preserving, watering, pest management, packing and export strategies.	**K3**
CO4	Estimate and construction of poly, green and net houses and know the control process of regulating temperature, humidity and light.	**K4**
CO5	Select and grow the commercial vegetable crops through protected cultivation method.	**K5**

Relationship Matrix:

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	03	02	02	01	02	02	02	01	02	02	**1.9**
CO2	02	03	02	02	01	02	03	02	02	01	**2.0**
CO3	01	02	03	02	02	02	01	03	02	02	**2.0**
CO4	03	01	02	01	02	02	02	02	03	02	**2.0**
CO5	02	02	02	02	02	02	02	02	02	03	**2.1**
										Mean Overall Score	**2.0**
										Correlation	**Medium**

Mean Overall Score	Correlation
< 1.5	Low
≥ 1.5 and < 2.5	Medium
≥ 2.5	High

Course Coordinator: Dr. N. AHAMED AHERIF