

REVISED UG SYLLABUS UNDER CBCS
(Implemented from Academic Year 2020-21)
PROGRAMME: FOUR YEAR B.Sc. (Hons)

Domain Subject: **B. Sc - Horticulture**
Skill Enhancement Courses (SECs) for Semester V, from 2022-23 (Syllabus/Curriculum)
Pair Options of SECs for Semester-V

(To choose one pair from the five alternate pairs of SECs)

Univ. Code	Course NO. 6 & 7	Name of Course	Th. Hrs. / Week	IE Mar-ks	EE Mar-ks	Credits	Prac. Hrs./ Week	Mar-ks	Credits
	6A	Ornamental Horticulture	3	25	75	3	3	50	2
	7A	Commercial Floriculture	3	25	75	3	3	50	2

OR

	6B	Precision Farming and Protected Cultivation	3	25	75	3	3	50	2
	7B	Post-harvest Management of Horticultural Crops	3	25	75	3	3	50	2

OR

	6C	Water Management in Horticultural Crops	3	25	75	3	3	50	2
	7C	Soil Fertility and Nutrient Management	3	25	75	3	3	50	2

OR

	6D	Dryland Horticulture	3	25	75	3	3	50	2
	7D	Plantation Crops	3	25	75	3	3	50	2

Note: For Semester-V, for the domain subject History, any one of the four pairs of SECs shall be chosen as courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C or 6D & 7D. The pair shall not be broken (ABCD allotment is random, not on any priority basis).

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc. (Hons) - Semester – V (from 2022-23)
Subject: **B. Sc - Horticulture**
Course-6A: **Ornamental Horticulture**
(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Acquire a critical knowledge of ornamental gardening and its significance.
2. Identify and explain living and non-living components in an ornamental garden.
3. Acquire skills on propagation and planting of various ornamental plants.
4. Perform managerial skills related to ornamental gardening.
5. Demonstrate skills of designing and developing ornamental gardens in public places.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Ornamental Horticulture (10h)

1. History, Definition, scope of gardening, aesthetic values; types of gardens in India.
2. Landscaping, basic principles and basic components.
3. Principles of gardening, garden components and adornments.
4. Lawn types, establishment and maintenance; methods of designing rockery and water garden.

Unit -2: Types of Ornamental gardens (10h)

1. Special types of gardens, trees, their design, their walk-paths, bridges, constructed features.
2. Garden structures – greenhouse, glass house, net house.
3. Values in landscaping; propagation-planting of shrubs and herbaceous perennials.

Unit-3: Plants in Ornamental gardens (10h)

1. Importance, design values, propagation, planting of following annuals, biennials and perennials:
(a) Climbers (b) Creepers (c) Palms (d) Ferns (e) Grasses (f) Cacti (g) Succulents

Unit-4: Ornamental gardening – public utility (10h)

1. Cultural operations in ornamental gardens.
2. Bio-aesthetic planning, definition, need; round country planning; urban planning and planting - avenues, educational institutions, villages.
3. Beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, Planting material for play grounds.

Unit-5: Ornamental gardening in residences (10h)

1. Bottle garden, terrariums.
2. Vertical gardens, roof gardens.
3. Culture of bonsai, art of making bonsai.

References:

1. Chadha, K.L. and Chaudhary, B. 1986. Ornamental Horticulture in India. Publication and Information division. ICAR, New Delhi.
2. K.V.Peter. 2009. Ornamental plants. New India Publishing Agency, New Delhi.
3. Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana
4. Bimaldas Chowdhury and Balai Lal Jana. 2014. Flowering Garden trees. Pointer publishers, Jaipur. India.

Co-Curricular Activities (student field training by teacher: 05 hours):**a) Mandatory:**

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on garden operations, lawn making, art of bonsai, plant propagation methods; using CAD in landscaping.
2. **For Student:** Individual laboratory work and visit to parks in public and private places, studying the living and non-living elements of an ornamental garden – landscaping; culminating writing and submission of a hand-written Field Work Report (various plants, growth habit, propagation, design of garden) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identifying ornamental plants, types and styles of gardens, propagation of garden plants, landscaping)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on plant propagation, garden operations, ornamental gardening.
5. Collection of material/figures/photos related to gardening and landscaping in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to gardens and parks in public places and/or private firms; famous gardens in A.P. and India etc.
7. Invited lectures and presentations on related topics by field/industrial experts

Course 6A: Ornamental Horticulture – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify various components required for ornamental garden development.
2. Perform various skills related to establishment and maintenance of an ornamental garden.
3. Demonstrate skills of making developing a lawn and bonsai.
4. Make landscape design using CAD.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification and description of various plants grown in ornamental gardens.
2. Tools, implements and containers used in ornamental gardening.
3. Planning, designing and establishment of garden features viz. lawn, hedge and edge, rockery etc.,
4. Demonstration of types and styles of gardens using photos or videos.
5. Planning, designing and establishment of water garden, carpet bedding, shade garden, roof garden.
6. Preparation of land for lawn and planting.
7. Exposure to CAD (Computer Aided Designing)
8. Demonstration of bonsai making.
9. Study and creation of terrariums, vertical garden.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Ornamental Horticulture

Max. Time: 3 Hrs.

Max. Marks: 50

1. Demonstration of making a lawn /creating water garden ‘A’	8
2. Demonstration of making hedge and edge/ garden operations’ ‘B’	10
3. Demonstration of bonsai technique/ designing a landscape ‘C’	12
4. Scientific observation and data analysis	4 x 3 = 12
D. Climber/creeper/ palm	
E. Fern/Cactus/succulent	
F. Garden adornments	
G. Tool/implement/container	
5. Record + Viva-voce	5+3 = 8

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc. (Hons) - Semester – V (from 2022-23)
Subject: **B. Sc - Horticulture**
Course-7A: **Commercial Floriculture**
(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the significance of flowers in human life.
2. Acquire skills related to production techniques in floriculture.
3. Explain the breeding techniques of some flowering plants.
4. Demonstrate skills of protected cultivation in floriculture.
5. Perform skills in relation to post-harvest operations in floriculture.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)
(*Syllabi of theory and practical together shall be completed in 80 hours*)

Unit-1: Basic concepts of floriculture (10h)

1. Aesthetic, cultural and industrial importance of flowers; domestic and export marketing of flowers.
2. Floriculture - Importance, area and production in Andhra Pradesh and India.
3. Scope and importance of commercial floriculture in A.P., and India.

Unit-2: Production technology-1 (10h)

1. Production techniques of following flowering plants for domestic and export market:
(a) Rose (b) *Chrysanthemum* (c) Marigold (d) Tuberose (e) *Crossandra* (f) Jasmine

Unit-3: Production technology-2 (10h)

1. Production techniques of following flowering plants for domestic and export market:
(a) *Anthurium* (b) *Gerbera* (c) *Gladiolus* (d) *Dahlia* (e) *Heliconia* (f) Orchid

Unit-4: Plant breeding of flowering ornamentals (10h)

1. Objectives and techniques in ornamental plant breeding.
2. Introduction, selection, hybridization, mutation and biotechnological technique for improvement of following ornamental and flower crops.
(a) Carnation (b) *Petunia* (c) *Geranium* (d) *Cosmos* (e) *Hibiscus* (f) Snapdragon

Unit-5: Post-harvest practices in floriculture (10h)

1. Growing of flowering plants under protected environments such as glass house, plastic house, net house, etc.
2. Importance of flower arrangement; Ikebana - techniques, types, suitable flowers and cut foliage.
3. Post-harvest technology of cut and loose flowers in respect of commercial flower crops.
4. Dehydration techniques for drying of flowers, scope importance and status.

References:

1. T.K. Bose, L.P. Yadav, P. Patil, P. Das and V.A. Partha Sarthy.2003. Commercial flowers. Partha Sankar Basu, Nayaudyog,206, Bidhan Sarani, Kolkata
2. S.K. Bhattacharjee and L.C. De. 2003. Advanced Commercial Floriculture. Aavishkar Publishers, Distributors, Jaipur, India.
3. V.L. Sheela, 2008. Flower for trade. New India Publishing Agency, New Delhi
4. Dewasish Choudhary and Amal Mehta. 2010. Flower crops cultivation and management. Oxford Book Company, Jaipur, India.

Co-Curricular Activities (student field training by teacher: 05 hours):**a) Mandatory:**

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on intercultural operations in floriculture, propagation techniques, breeding methods, post-harvest handling of flowers; floral designs and bouquet making.
2. **For Student:** Individual laboratory work and visit to floriculture fields/floriculture department in a Horticulture University/college - studying the cultivation practices from sowing/planting to harvesting of flowers, post-harvest techniques - written Field Work Report (various flowering plants, propagation, utilization/marketing) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identifying commercially important flowering plants, cultivation practices, propagation and breeding methods, post-harvest practices)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on intercultural operations, cultivation, shelf and vase-life, commercial products from flowers.
5. Collection of material/figures/photos related to commercial floriculture in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to Floriculture fields and Horticulture University/college.
7. Invited lectures and presentations on related topics by field/industrial experts.

Course 6A: Commercial Floriculture – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify different flowering plants of commercial value.
2. Perform skills in propagation of flowering plants.
3. Demonstrate skills of post-harvest handling of flowers.
4. Perform skills of floral arrangements or making floral products.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification of commercially important floricultural crops.
2. Propagation technique in *Hibiscus*/Rose/*Chrysanthemum*/tuberose.
3. Propagation technique in *Gladiolus*/carnation/*Petunia*
4. Sowing of seeds and raising of seedlings of a flowering plant.
5. Training and pruning of rose/Jasminum.
6. Drying and preservation of flowers.
7. Use of chemicals and other compounds for prolonging the vase life of cut flowers.
8. Flower arrangement practices.
9. Preparation of bouquets, garland,veni and gajara.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Commercial Floriculture

Max. Time: 3 Hrs.

Max. Marks: 50

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| 1. Perform seed sowing and nursery raising /propagation of a flowering plant ‘A’ | 8 |
| 2. Perform a breeding technique of a flowering plant/making floral design ‘B’ | 10 |
| 3. Making of bouquet/ garland/veni/gajara ‘C’ | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Commercially important flowering plant | |
| E. Propagule for establishment | |
| F. Preservation method | |
| G. Product of floriculture | |
| 5. Record + Viva-voce | 5+3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc. (Hons) - Semester – V (from 2022-23)
Subject: **B. Sc - Horticulture**
Course-6B: **Precision Farming and Protected Cultivation**
(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the importance of precision farming in present scenario.
2. Explain different types of green houses used for precision farming.
3. Acquire skills on construction of green houses.
4. Perform managerial skills related to precision farming under protected structures.
5. Demonstrate skills on cultivation high-value horticulture plants through precision farming.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Precision farming (10h)

1. Precision farming – Introduction and history, Importance and Scope.
2. Laser leveling, mechanized direct seed sowing seedling and sapling transplanting.
3. Mapping of soils and plant attributes.

Unit -2: Management in Precision farming (10h)

1. Site specific input application.
2. Weed management, Insect pests and disease management.
3. Yield mapping in horticultural crops.

Unit-3: Types of Green houses (10h)

1. Green house technology – Introduction viz. Importance, scope, advantages and disadvantages.
2. Types of Green Houses based on shape, utility, construction and cladding materials.
3. Plant response to Greenhouse environment.

Unit-4: Construction of Green house (10h)

1. Planning and design of greenhouses.
2. Design criteria of greenhouse for cooling and heating purposes.
3. Green house equipment; Materials of construction for traditional and low cost green houses.
4. Irrigation systems used in greenhouses.

Unit-5: Farming in Green house (10h)

1. Net house cultivation, Passive solar green house, Green house drying.
2. Choice of crops for cultivation under greenhouses: Capsicum, Cucumber, Broccoli, Cabbage, Spinach, Lettuce.
3. Cost estimation and economic analysis.

References:

1. Balraj Singh. 2006. Protected cultivation of vegetable crops. Kalyani Publishers, Ludhiana.
2. Brahma Singh, 2014. Advances in Protected Cultivation. New India Publishing Agency. New Delhi.
3. Jitendra Singh, 2015. Precision Farming in Horticulture. New India Publishing Agency. New Delhi.
4. Reddy, P. and Parvatha. 2011. Sustainable crop protection under Protected Cultivation. Springer Publications. USA.

Co-Curricular Activities (student field training by teacher: 05 hours):

a) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on equipment and material in green house, preparation of soil and other media, irrigation systems and other practices in a green house.
2. **For Student:** Individual laboratory work and visit to green house in a Horticulture University/ college and/or private sector, studying the structure, material and equipment, growing media, farming practices, irrigation, INM and IPM; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like types and styles of green houses, material and equipment, advantages and disadvantages of protected cultivation, yield-cost benefit analysis)
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on precision farming; protected cultivation of high value fruit and vegetable crops.
5. Collection of material/figures/photos related to protected cultivation of horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to protected cultivation facilities in a Horticulture University or college and/or private firms.
7. Invited lectures and presentations on related topics by field/industrial experts

Course 6B: Precision Farming and Protected Cultivation – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify various material and equipment required for green house construction.
2. Perform various skills related to preparation of soil and other media for cultivation under a protected structure.
3. Demonstrate operational skills related to equipment in a green house.
4. Make the calculation related to input-output economics.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of different types of greenhouses based on shape, utility.
2. Study of different types of greenhouses based on construction and cladding materials.
3. Testing of soil and water to study its suitability for growing crops in greenhouses.
4. Growing media, Soil culture- type of soil required.
5. Study of irrigation, drainage - flooding and leaching.
6. Soil pasteurization in peat moss and mixtures, Rock wool and other inert media.
7. Nutrient film technique (NFT), Hydroponics.
8. Study of cultivation of a crop in green house.
9. Economics of protected cultivation.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Precision Farming and Protected Cultivation

Max. Time: 3 Hrs.

Max. Marks: 50

1. Performing skill on type and style of a green house using a model 'A'	8
2. Making a growing medium used in protected cultivation 'B'	10
3. Performing NFT or Hydroponics 'C'	12
4. Scientific observation and data analysis	4 x 3 = 12
D. Material for green house	
E. Equipment in green house	
F. Style of green house	
G. Modern techniques in precision farming/high value crop	
5. Record + Viva-voce	5+3 = 8

Semester-wise Revised Syllabus under CBCS, 2020-21

Four Year B.Sc. (Hons) - Semester – V (from 2022-23)

Subject: **B. Sc - Horticulture**

Course-7B: **Post-harvest Management of Horticultural Crops**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the basic concepts in post-harvest handling of horticulture produce.
2. Explain maturity and harvesting indices of horticulture products.
3. Acquire skills on identifying factors for post-harvest losses in horticulture.
4. Perform managerial skills related to storage of horticulture products.
5. Demonstrate skills on packaging and forwarding horticulture products to market.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Post Harvest Technology (10h)

1. Importance of Postharvest Technology in horticultural crops; Pre-harvest factors affecting quality.
2. Maturity, types of maturity and factors affecting maturity of horticultural crops.
3. Maturity indices, harvesting, handling, grading of fruits- Mango, Banana, Papaya, Citrus and Guava.

Unit -2: Maturity and harvesting indices (10h)

1. Maturity indices, harvesting, handling, grading of:
 - (a) Vegetables - Tomato, Cabbage, Onion
 - (b) Cut flowers - Rose, *Chrysanthemum*, Tuberose
 - (c) Plantation crops - Coconut, Cashew nut, Coffee

Unit-3: Post harvest problems and treatments (10h)

1. Factors responsible for deterioration of fruits, vegetables, cut flowers.
2. Physiological and bio-chemical changes during ripening; Hastening and delaying ripening process.
3. Postharvest treatments of horticultural crops –VHT, HWT, irradiation, fungicidal and chemical.

Unit-4: Storage of Horticulture products (10h)

1. Quality parameters and specification in fruits, vegetables and cut flowers.
2. Structure of fruits, vegetables and cut flowers related to physiological changes after harvest.
3. Methods of storage for local market and export.
4. Pre-harvest treatment and pre-cooling, pre-storage treatments.

Unit-5: Farming in Green house (10h)

1. Different systems of storage.
2. Packaging methods and types of packages, recent advances in packaging-vacuum packaging, poly shrink packaging, grape guard.
3. Types of containers and cushioning materials, packing treatments and cold storage; Modes of transport.

References:

1. Jacob John, P. 2008. A Handbook on Post Harvest management of Fruits and vegetables. Daya Publishing House, Delhi
2. Battacharjee, S. K. and De, L. C. 2005. Post Harvest Technology of Flowers and Ornamentals Plants. Ponteer Publisher, Jaipur, India.
3. Neetu Sharma and Mashkoo Alam, M. 1998. Post Harvest Diseases of Horticultural Perishables. International Book Distributing Co., Lucknow.
4. Saraswathy, S. et. al. 2008. Post harvest Management of Horticultural Crops. Agribios (India).
5. Wiils, McGlasson and Graham, J. 2007. Post Harvest- An Introduction to the Physiology and Handling of Fruits, Vegetables and ornamentals. Cab International

Co-Curricular Activities (student field training by teacher: 05 hours):**a) Mandatory:**

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on maturity indices of horticulture products, reaping and post-harvest handling, modern methods in storage.
2. **For Student:** Individual laboratory work and visit to Dept. of PHT in a Horticulture University/ college; store houses of horticulture products, studying post-harvest practices – grading, treatments, storage methods etc., culminating writing and submission of a hand-written Field Work Report (various horticulture crops, harvesting methods, storage practices, packaging and transport) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like harvesting practices, maturity indices, causes of spoilage, storage structures and practices, packaging, transport and marketing).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on PHT of different horticulture products; harvesting and grading, storage methods.
5. Collection of material/figures/photos related to PHT practices of horticulture products in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to protected cultivation facilities in a Horticulture University or college and/or storage units.
7. Invited lectures and presentations on related topics by field/industrial experts

Course 7B: Post-harvest Management of Horticultural Crops – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify the maturity and harvesting indices of horticulture products.
2. Perform various skills related to manual and mechanical grading of horticulture products.
3. Identify causes for losses of horticulture products in store houses.
4. Demonstrate skills on packaging and transport of horticulture products.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of maturity indices of fruits, vegetables, flowers and plantation crops.
2. Determination of physiological loss in weight and quality
3. Grading of horticultural produce (manual and mechanical).
4. Post-harvest treatment of horticultural crops, physical and chemical methods.
5. Identification of pests and diseases of Horticulture products in storage.
6. Study of post-harvest disorders in horticultural produce.
7. Study of facilities of storage units and methods of storage.
8. Packaging in fruits, vegetables by using different packaging materials
9. Packaging in plantation crops and cut flowers by using different packaging materials.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Post-harvest Management of Horticultural Crops

Max. Time: 3 Hrs.

Max. Marks: 50

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| 1. Determination of maturity and harvesting indices of two horticulture products ‘A’ | 8 |
| 2. Grading practice of any two horticulture products ‘B’ | 10 |
| 3. Identifying a pest and a disease of horticulture product ‘C’ | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Maturity/harvest index of fruit/vegetable crop | |
| E. Maturity/harvest index of flower/plantation crop | |
| F. Post- harvest disorder/pest/disease of a horticulture crop | |
| G. Packaging material/ practice | |
| 5. Record + Viva-voce | 5+3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc. (Hons) - Semester – V (from 2022-23)
Subject: **B. Sc - Horticulture**
Course-6C: **Water Management in Horticultural Crops**
(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the importance of water for horticulture crops.
2. Explain different irrigation practices and factors influencing them.
3. Acquire skills on layout of sprinkler and drip irrigation.
4. Perform managerial skills related to water management in horticultural crop fields.
5. Demonstrate skills on efficient use of irrigation methods for different types of soils.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Importance of water for plants (10h)

1. Importance of water to plants, hydrological cycle; water resources in Andhra Pradesh and India.
2. Area of different crops under irrigation; function of water for plant growth.
3. Effect of moisture stress on crop growth; Available and unavailable soil moisture – distribution of soil moisture.
4. Water budgeting – kinds of water- rooting characteristics – moisture extraction pattern.

Unit -2: Water for horticultural crops (10h)

1. Water requirement of horticultural crops – net irrigation requirement, gross irrigation requirement.
2. Lysimeter studies, Plant water potential climatological approach – use of pan evaporimeter- Consumptive use of pan evaporimeter.
3. Definition of evaporation, transpiration, evapo-transpiration and potential evapo-transpiration.

Unit-3: Irrigation methods (10h)

1. Factor for crop growth stages – critical stages of crop growth for irrigation; irrigation scheduling – different approaches.
2. Soils quality of irrigation water, irrigation management practices for different soils and crops.
3. Methods of Irrigation- classification, border, check basin, Square and ring basin, furrow irrigation methods.

Unit-4: Modern methods of irrigation (10h)

1. Sub-surface pressurized methods; sprinkler- definition, adoptability, limitations.
2. Components and types of sprinkle irrigation system, layout, fertilizer applicator.
3. Drip irrigation system – definition, advantages, dis- advantages, components, fertilizer applicator, layout.

Unit-5: Water management (10h)

1. Water management problem, merits and demerits; Water use efficiency (WUE), factors effecting WUE.
2. Methods to improve economic use of water for irrigation.

3. Water use for maximum profit of garden/orchard ecosystem; water management for problem soils.

References:

1. Y P Rao and S. R. Bhakar, 2008. Irrigation Technology Theory & Practices AgroTech Publishing Academy, Udaipur
2. A.M. Michael, 2002. Irrigation Theory and Practice. Vikas Publishing House Pvt. Ltd. New Delhi.
3. R.K. Shivanappan Drip Irrigation Keerthi Publishing House Pvt. Ltd., Coimbatore.
4. A.M. Michael and T.P. Ojha, 1999. Principles of Agricultural Engineering Vol-II, Jain Brothers, New Delhi

Co-Curricular Activities (student field training by teacher: 05 hours):

c) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on determination of water potential and soil moisture, various irrigation practices, equipment for sprinkler and drip irrigation methods etc.
2. **For Student:** Individual laboratory work and visit to drip and sprinkler irrigation installation in a Horticulture University/ college and/or horticulture crop field, studying the layout and equipment, operation methods, irrigation schedule, fertigation, cleaning; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

d) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like determination of plant water requirements, transpiration in crops and use of anti-transpirants, traditional and modern methods of irrigation).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on irrigation methods and water management in horticulture crops.
5. Collection of material/figures/photos related to water management for horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or crop field.
7. Invited lectures and presentations on related topics by field/industrial experts

Course 6C: Water Management in Horticultural Crops – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Determine water requirement of a crop plant.
2. Perform skills related to determination of soil moisture constants.
3. Operate equipment of sprinkler and drip irrigation.
4. Make layouts for different irrigation methods.

Practical (Laboratory) Syllabus: (30 hrs)

1. Determination of water potential.
2. Estimation of soil moisture constants.
3. Determination of soil moisture by air oven method.
4. Estimation of irrigation efficiency of horticultural crops,
5. Estimation of water requirements of horticultural crops.
6. Collection of field data for designing micro-irrigation system for orchard and vegetable crops.
7. Study of different components of drip irrigation system.
8. Study of different components of sprinkler irrigation system.
9. Study of fertilizer application system.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Water Management in Horticultural Crops

Max. Time: 3 Hrs.

Max. Marks: 50

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|---|------------|
| 1. Determination of water potential/soil moisture ‘A’ | 8 |
| 2. Estimation of irrigation efficiency of a horticulture crop ‘B’ | 10 |
| 3. Making a layout for sprinkler/drip irrigation system ‘C’ | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Component for sprinkler irrigation system. | |
| E. Component for drip irrigation system. | |
| F. Soil moisture constant | |
| G. Fertigation method in modern irrigation | |
| 5. Record + Viva-voce | 5+3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2020-21

Four Year B.Sc. (Hons) - Semester – V (from 2022-23)

Subject: **B. Sc - Horticulture**

Course-7C: **Soil Fertility and Nutrient Management**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the role of macro and micro nutrients in plant nutrition.
2. Explain different types of manures, chemical and biofertilizers used for horticulture plants.
3. Acquire skills on nutrient deficiency symptoms and status of nutrients in plants.
4. Perform managerial skills related to integrated nutrient management in horticultural crop fields.
5. Demonstrate skills on efficient use of fertilizers for different types of horticulture crops.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Soil fertility and soil productivity (10h)

1. History of soil fertility, definition of soil fertility and productivity; essential nutrient elements and functions, deficiency symptoms.
2. Mechanism of Nutrient transport / uptake to plants and nutrient availability.
3. Acid, calcareous and salt affected soil characteristics and management

Unit -2: Soil organic matter (10h)

1. Role of micro-organisms in organic matter decomposition and humus formation.
2. Importance of C:N ratio and pH in plant nutrition soil buffering capacity.
3. Main objectives of INM, components of Integrated plant nutrient management (IPNM); soil fertility evaluation methods: chemical, biological and by visual symptoms, critical levels of different nutrients and hidden hunger in soil.
4. DRIS Approach, critical limit approach,

Unit-3: Manures and fertilizers (10h)

1. Manures and fertilizer classification and manufacturing process; properties and fate of major and micronutrient in soils.
2. NPK fertilizers: composition and application methodology, luxury consumption, nutrient reactions, deficiency symptom by visual diagnosis.
3. Secondary and Micronutrient fertilizers their types, composition, reaction in soil and effect on crop growth.
4. Time and methods of manures and fertilizers application; foliar application and its concept.

Unit-4: Modern methods of irrigation (10h)

1. Fertilizer control order; nutrient interactions, plant nutrient toxicity symptoms and remedial measures.
2. Effect of potential toxic elements in soil and plant.
3. Soil test crop response and targeted yield concept.

Unit-5: Water management (10h)

1. Biofertilizers: importance, types and use in horticultural crop.
2. Nutrients use efficiency (NUE) and management.
3. Use of vermicompost and residue wastes in crops.

References:

1. Mengel , et al., 2001. Principles of Plant Nutrition (5th Edition), Springer.
2. Yawalkar K.S, Agarwal J. P. and Bokkde, 1992. Manures and Fertilizers. Agri. Horticultural Publishing House, Nagpur.
3. Tandan HLS, 1994. Fertilizers Guide. Fertilizers Development Consultation Organizations, New Delhi.
4. Seethramaan, S. Biswas, B.C. Maheshwari, S. and Yadav, D.S. 1986 Hand Book on Fertilizers Technology. The Fertilizers Association of India, New Delhi.

IV. Co-Curricular Activities (student field training by teacher: 05 hours):

e) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on determination of macro and micro-nutrients in plants and soil, identification of nutrient deficiencies in plants, application of manures, chemical and biofertilizers and INM and IPNM etc.
2. **For Student:** Individual laboratory work and visit to a Horticulture University/ college, soil testing laboratory, and/or horticulture crop field, studying the plant-nutrient deficiencies, fertilizer application methods; equipment in a soil testing laboratory, their operation and methodology of nutrient estimation; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

f) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like identification of plant nutrient deficiencies, estimating nutrients in soils, determination of plant nutrient requirements, natural and commercial manures, chemical and biofertilizers and their application, traditional and modern methods of fertilizer application).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on methods and management practices for horticulture crops in INM and IPNM.
5. Collection of material/figures/photos related to plant nutrition management for horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or crop field; soil testing laboratory.
7. Invited lectures and presentations on related topics by field/industrial experts.

Course 6C: Soil Fertility and Nutrient Management – Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Diagnose nutrient deficiencies in plants.
2. Estimate organic matter, major and minor nutrients in soil.
3. Determine the adulteration of fertilizers.
4. Perform skills related to INM and IPNM.
5. Perform skills related to application of soil amendments.

Practical (Laboratory) Syllabus: (30 hrs)

1. Determination of organic matter (Organic carbon) in soil and interpretations.
2. Determination of available Nitrogen in soil and interpretations.
3. Determination of available P in soil and interpretations.
4. Determination of available K in soil and interpretations.
5. Determination of available S in soil and interpretations.
6. Determination of exchangeable Calcium and Magnesium by Versenate (EDTA) Method.
7. Determination of soil Micronutrients
8. Fertilizer Adulteration test / Identification of Adulteration in fertilizer / Detection of adulteration in fertilizers (Rapid test)
9. Determination of Gypsum requirement of saline and alkali soils.
10. Determination of Lime requirement of acid soils.
11. Use of soil testing kit and use of leaf colour chart for nutrient deficiency diagnosis.
12. Study of various biofertilizers.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course

Soil Fertility and Nutrient Management

Max. Time: 3 Hrs.

Max. Marks: 50

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|---|------------|
| 1. Determination of organic matter, Nitrogen/Phosphorus/ Potassium/Sulphur in a soil sample 'A' | 8 |
| 2. Determination of exchangeable Ca-Mg/soil micronutrients 'B' | 10 |
| 3. Determination of Gypsum or lime requirement/ fertilizer adulterations 'C' | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Plant nutrient deficiency symptom | |
| E. Manure/chemical fertilizer | |
| F. Biofertilizer | |
| G. Fertigation method in INM/IPNM | |
| 5. Record + Viva-voce | 5 + 3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc. (Hons) - Semester – V (from 2022-23)
Subject: **B. Sc - Horticulture**
Course-6D: **Dryland Horticulture**
(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50)

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the basic concepts of dryland horticulture and its prospects.
2. Acquire skills in relation to management of soil and water in dryland farming.
3. Demonstrate skills on various methods to check the water loss during farming.
4. Understand the cultivation practices of certain crops suitable for dryland farming.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)
(*Syllabi of theory and practical together shall be completed in 80 hours*)

Unit -1: Introduction to Dryland horticulture (10h)

1. Definition, importance and limitation of dry land horticulture.
2. Present status and future scope. Constraints encounter in dry lands.
3. Agro-climatic features in rain shadow areas, scarce water resources, high temperature, soil erosion, run-off losses etc.

Unit -2: Soil and water management (10h)

1. Techniques and management of dry land horticulture: watershed development, soil and water conservation methods-terraces, contour bunds, etc.
2. Methods of control and impounding of run-off water-farm ponds, trenches, macro catch pits, etc.
3. *in-situ* water harvesting methods, micro catchment, different types of tree basins etc.

Unit-3: Methods for efficient water use (10h)

1. Methods of reducing evapotranspiration, use of shelter belts, mulches, antitranspirants, growth regulators, etc.
2. Water use efficiency-need based, economic and conjunctive use of water, Micro systems of irrigation etc. IFS concept and alternate land use systems.
3. *in-situ* water harvesting methods, micro catchment, different types of tree basins etc.

Unit-4: Modern methods of irrigation (10h)

1. Characters, special adaptation and cultivation practices of following horticultural crops:
(a) Ber (b) Annona (c) Pomegranate (d) Tamarind

Unit-5: Water management (10h)

1. Characters, special adaptation and cultivation practices of following horticultural crops:
(a) Fig (b) Wood apple (c) Marking nut (d) Carambola

References:

1. Chadha, K. L. (ICAR)2002, 2001. Hand book of Horticulture. ICAR, New Delhi
2. Chundawat, B.S. 1990. Arid Fruit Culture. Oxford and IBH, New Delhi.
3. P.L. Taroj, B.B. Vashishtha, D.G.Dhandar. 2004. Advances in Arid Horticulture. Internal Book Distributing Co., Lucknow.
4. T. Pradeep Kumar, B. Suma, Jyothi Bhaskarand K.N.Sathesan. 2008. Management of Horticultural Crops. New India Publishing Agency.

Co-Curricular Activities (student field training by teacher: 05 hours):

a) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on watershed development, soil and water conservation methods, Micro systems of irrigation etc.
2. **For Student:** Individual laboratory work and visit to a Horticulture University/ college, sites of dryland farming, studying the water management, characteristics of plants grown in dryland areas, cultivation practices; culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

b) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like water management practices in dryland areas, methods of controlling evapotranspiration, cultivation practices for plants grown in drylands etc.,).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on methods and management practices for horticulture crops in INM and IPNM.
5. Collection of material/figures/photos related to dryland horticulture crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or dryland crop fields.
7. Invited lectures and presentations on related topics by field/industrial experts.

Course 6D: Dryland Horticulture– Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Study the rainfall pattern and water deficit conditions in an area.
2. Perform skills on harvesting and conservation of rain water.
3. Identify the adaptation of plants to dryland areas.
4. Perform skills related to irrigation methods suitable to dryland areas.
5. Perform skills on checking evapo-transpiration.

Practical (Laboratory) Syllabus: (30 hrs)

1. Study of rainfall patterns.
2. Practicing contour bunding and trenching.
3. Studying micro catchments.
4. Studying soil erosion and its control in a dryland area.
5. Study of evapotranspiration and methods to control.
6. Practicing mulching methods.
7. Irrigation systems - Surface, Sub-surface; micro irrigation methods.
8. Study of special techniques of planting and aftercare in dry lands.
9. Study special horticultural practices in dry land plants.
10. Training and pruning in dry land plants.
11. Study of morphological and anatomical features of drought tolerant fruit crops.
12. Study of morphological and anatomical features of salinity tolerant fruit crops.

Model Question Paper Pattern for Practical Examination

Semester – V/ Horticulture Skill Enhancement Course
Dryland Horticulture

Max. Time: 3 Hrs.

Max. Marks: 50

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|---|------------|
| 1. Demonstration of skills on studying rain fall/ contour bunding or trenching ‘A’ | 8 |
| 2. Demonstration of methods of controlling evapotranspiration/ layout of micro-irrigation systems ‘B’ | 10 |
| 3. Anatomical features of a drought or salinity tolerant plant ‘C’ | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Water harvesting method | |
| E. Soil erosion/control method | |
| F. Irrigation practice in dryland area. | |
| G. Morphological features of a plant adapted to dryland farming | |
| 5. Record + Viva-voce | 5 + 3 = 8 |

Semester-wise Revised Syllabus under CBCS, 2020-21
Four Year B.Sc. (Hons) - Semester – V (from 2022-23)
Subject: **B. Sc - Horticulture**
Course-7D: **Plantation crops**

(Skill Enhancement Course (Elective), 5 credits, Max Marks: 100 + 50 Course Code:

Learning Outcomes:

Students at the successful completion of the course will be able to:

1. Understand the characteristics of plantation crops.
2. Realize the contribution of plantation crops in national economy.
3. Explain the soil and climatic requirements of some important plantation crops in India.
4. Demonstrate managerial skills on farming, reaping the products and post-harvest practices in relation to plantation crops.
5. Identify the physiological disorders, pests and diseases of plantation crops.

Syllabus: (Hours: Teaching: 50, Lab: 30, Training: 05, Others incl. unit tests: 05)

(Syllabi of theory and practical together shall be completed in 80 hours)

Unit -1: Introduction to Plantation crops (10h)

6. Plantation crops: Definition, history and development, scope and importance; Differences between plantation and fruit crops
7. Area and production, export and import potential, role in national and state economy.
8. Important research stations on plantation and beverage crops and their role.

Unit -2: Oil yielding crops (10h)

1. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Coconut (b) Oil palm

Unit-3: Masticatory crops (10h)

2. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Areca nut (b) Betel vine

Unit-4: Beverage crops (10h)

1. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Coffee (b) Cacao

Unit-5: Nut and Industrial crops (10h)

3. Soil, climate requirements, varieties, propagation methods, cultivation practices, physiological disorders, pests, diseases and their management, post-harvest technology, yield and economics of:
(a) Cashew nut (b) Rubber

References:

1. Chadha, K.L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi
2. Kumar, N.J.B. M. Md. Abdul Khaddar, RangaSwamy, P. and Irrulappan, I. 1997. Introduction to spices, Plantation crops and Aromatic plants. Oxford & IBH, New Delhi.
3. Meena, S.R. 2020. Production technology for fruit and plantation crops. TNAU, Coimbatore, WWW.agrigyan.in

Co-Curricular Activities (student field training by teacher: 05 hours):

c) Mandatory:

1. **For Teacher:** Training of students by the teacher in the classroom or in the laboratory for a total of not less than 10 hours on identification of varieties, propagation methods, physiological disorders, pests and diseases of plantation crops etc.
2. **For Student:** Individual laboratory work and visit to a Horticulture University/ college, fields of plantation crops, studying the cultivation practices; post-harvest methods, study of economics etc., culminating writing and submission of a hand-written Field Work Report (various crop plants, yield, economics) not exceeding 10 pages in the given method or format.
3. Max marks for Field Work Report: 05
4. Suggested Format for Field work Report (*not exceeding 10 pages*): Title page with student details, index page, objective, stepwise work done, findings, conclusions and acknowledgements.
5. Unit tests (IE).

d) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments (including technical assignments like traditional and modern methods of cultivation, water management, weed management, disease management etc., for important plantation crops in India).
3. Seminars, Group discussions, Quiz, Debates etc. (on related topics).
4. Preparation of videos on methods and management practices for plantation crops in INM and IPNM.
5. Collection of material/figures/photos related to plantation crops in India and abroad, writing and organizing them in a systematic way in a file.
6. Visits to irrigation facilities in a Horticulture University or college and/or plantation crop fields.
7. Invited lectures and presentations on related topics by field/industrial experts.

Course 7D: Plantation Crops– Practical syllabus

Learning Outcomes: On successful completion of this practical course, student will be able to:

1. Identify the plantation crops and their varieties.
2. Make layout of orchards of plantation crops.
3. Perform skills on propagation techniques of plantation crops.
4. Identify the physiological disorders of plantation crops.
5. Identify the pests and diseases of plantation crops.

Practical (Laboratory) Syllabus: (30 hrs)

1. Identification and description of plantation crops and their varieties.
2. Designing and making layout of orchards.
3. Propagation methods and nursery techniques of plantation crops.
4. Studying physiological disorders of plantation crops.
5. Studying pests of plantation crops.
6. Study of diseases of plantation crops
7. Preparation of plant bio regulators and their uses.
8. Tapping and processing of latex in rubber.
9. Study special horticultural practices in dry land plants.
10. Training and pruning in Plantation crops.

11. Study of morphological and anatomical features of plantation crops.
12. Study of morphological and anatomical features of plantation crops.

Model Question Paper Pattern for Practical Examination
 Semester – V/ Horticulture Skill Enhancement Course
Plantation Crops

Max. Time: 3 Hrs.

Max. Marks: 50

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| 1. Making a layout of an orchard for a plantation crop 'A' | 8 |
| 2. Demonstration of a propagation technic of a given plantation crop 'B' | 10 |
| 3. Identification of Pests/diseases of a plantation crop 'C' | 12 |
| 4. Scientific observation and data analysis | 4 x 3 = 12 |
| D. Identification of variety of a plantation crop | |
| E. Propagation technic | |
| F. Physiological disorder/pest/disease | |
| G. Morphological/anatomical features of a plantation crop | |
| 5. Record + Viva-voce | 5 + 3 = 8 |