

**GOVERNMENT COLLEGE (AUTONOMOUS)**

**RAJAMAHENDRAVARAM**

**(ESTD: 1853, NAAC Re-Accredited with Grade A+)**

## **DEPARTMENT OF BOTANY**

**B.Sc., HORTICULTURE**



**BOS MEETING FOR B.Sc., HORTICULTURE**

**2022-23**

| Semester                                 | Course | Title of the Course                                  | Hrs./<br>Week | Credits | CCE | E.E. | Total |
|--|--------|--|---------------|---------|-----|------|-------|
| <b>FIRST YEAR</b>                        |        |  |               |         |     |      |       |
| Sem.-I                                   | 1      | Fundamentals of Horticulture and Soil Science        | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical - 1  | 2             | 1       | -   | 50   | 50    |
| Sem.-II                                  | 2      | Plant Propagation and Nursery Management             | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical - 2  | 2             | 1       | -   | 50   | 50    |
| Apprentice/On Job Training for 02 months |        |  |               |         |     |      |       |
| <b>SECOND YEAR</b>                       |        |  |               |         |     |      |       |
| Sem.-III                                 | 3      | Olericulture   | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical - 3  | 2             | 1       | -   | 50   | 50    |
| Sem.-IV                                  | 4      | Concepts of Pomology                                 | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical - 4  | 2             | 1       | -   | 50   | 50    |
|  | 5      | Diseases of horticulture plants and their management | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical - 5  | 2             | 1       | -   | 50   | 50    |
| <b>THIRD YEAR</b>                        |        |  |               |         |     |      |       |
| Sem.-5                                   | 6A     | Ornamental Horticulture                              | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |
|  | 7A     | Commercial Floriculture                              | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |
|  | 6B     | Precision Farming and Protected Cultivation          | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |
|  | 7B     | Post-harvest Management of Horticultural Crops       | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |
|  | 6C     | Water Management in Horticultural Crops              | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |
|  | 7C     | Soil Fertility and Nutrient Management               | 4             | 4       | 50  | 50   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |
|  | 7A     | Dry land Horticulture                                | 4             | 4       | 25  | 75   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |
|  | 7B     | Plantation Crops                                     | 4             | 4       | 25  | 75   | 100   |
|  |        | Practical  | 2             | 1       | -   | 50   | 50    |

**BOT -133**  
**Government College (Autonomous) Rajamahendravaram**  
**I B.SC. HORTICULTURE-1/I SEMESTER END (W.E.F) 2018-19**

**THEORY SYLLABUS**  
**PAPER -I Fundamentals of Horticulture and Soil Science**

Total Hours of Teaching 60 Hrs. @ 4 Hrs. per Week

Credits: 03

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Understand the scope and potential of horticulture products in India and Andhra Pradesh.
- Classify the horticulture plants based on soil and climate.
- Illustrate different systems of planting in an orchard and predict the number of plants in a given land.
- Demonstrate the methods and types of training and pruning.
- Explain the basics of soil science and justify the role of soil as a medium for plant growth
- Explain about integrated nutrient management and demonstrate the skills of soil testing

**Unit I: Introduction to Horticulture**

**12 Hrs.**

1. Horticulture: Definition, importance of horticulture in terms of economy, production, employment generation, environmental protection and human resource development.
2. Divisions of horticulture with suitable examples and their importance.
3. Area, production of Horticultural crops in A.P. and India.
4. Fruit and vegetable zones of India and Andhra Pradesh.
5. **Export scenario and scope for Horticulture in India.**

**Unit II: Classification Horticulture Crops**

**12 Hrs.**

1. **Classification of horticultural crops based on soil and climatic requirements.**
2. **Vegetable crop gardens – Nutrition and kitchen garden – tracer garden – vegetable forcing –market garden – roof garden.**
3. Gardens in floriculture – flower gardens – soil and mixed gardens; land scape Horticulture.

**Unit III: Characteristics of Orchards**

**12 Hrs.**

1. **Orchard: Definition, different systems of planting orchards – square, rectangular Quincunx, hexagonal and contour.**
2. **Calculation of planting densities in different systems of planting.**
3. **Different types and methods of pruning.**
4. **Training: Definition, principles and objectives; merits and demerits of open and close centered, and modified leader systems.**

**Unit IV: Physico-chemical characteristics of Soil**

**12 Hrs.**

1. Soil: Definition, minerals and weathering to form soils; factors of soil formation.
2. **Soil taxonomy; soil color, texture and structure; other physical properties and stability.**
3. Soil colloids and charges; ion adsorption and exchange; soil temperature and soil air.
4. **Soil pH and acidity; soil alkalinity and salinity.**

**Unit V: Soil as a living matter**

**12 Hrs.**

1. Soil organic matter – composition and decomposability.
2. Humus – fractionation of organic matter.
3. Soil biology: Soil microorganisms and fauna –beneficial and harmful roles.
4. **Integrated nutrient management and soil tests.**

**Text books:**

- **Prasad and Kumar , 2014.:** Principles of Horticulture 2<sup>nd</sup> Edition Agribios India
- **Kumar, N., 1990** Introduction to Horticulture. Rajyalakshmi Publications, Nagarkoil, Tamilnadu
- **Jithendra Singh, 2002.** Basic Horticulture. Kalyani Publishers, Hyderabad
- **Kausalkumar Misra and Rajesh Kumar, 2014** Fundamentals of Horticulture, Biotechbooks
- **Brady Nyle C and Ray R Well 2014** Nature and Properties of Soil, Pearson Educational Inc , New Delhi
- Indian society of Soil Science IARI, New Delhi.

**BOT -133**

**Government College (Autonomous), Rajahmundry**  
**I B.Sc., Horticulture Practical Examinations at the end of I Semester (w.e.f. 2018-19)**

(Fundamentals of Horticulture and Soil Science)

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

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**Course Outcomes:** On successful completion of this course, the students shall be able to:

1. Make a layout of an orchard in a given area.
2. Use various tools and implements to raise nursery and cultivate a horticulture crop.
3. Prepare fertilizer mixtures and PGRs for plants.
4. Study of features of orchard planning and layout orchard.
5. Study of tools and implements in Horticulture.
6. Identification of various Horticulture crops.
7. Lay out of nutrition garden.
8. Preparation of nursery beds to sow vegetable seeds.
9. Digging of pits for fruit plants.
10. Layout of different Planting systems.
11. Study of different methods of training.
12. Study of different methods of pruning.
13. Preparation of fertilizer mixtures and field application.
14. Preparation and application of growth regulators.
15. Layout of different irrigation systems.
16. Identification and management of nutritional disorders in important fruit, vegetable and flower crops.

**BOT -133**

**Government College (Autonomous), Rajamahendravaram**  
**I B.Sc., Horticulture Practical Examinations at the end of I Semester**  
**(Fundamentals of Horticulture and Soil Science)**  
**Botany Practical Paper - I model (w.e.f. 2018-19)**

**Time: 2 hours**

**Max.Marks: 50**

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1. Identify the horticulture tool/equipment and write its uses. 6 M
2. Draw the layout of a kitchen garden. 6 M
3. An irrigation method followed for horticulture crops with a neat sketch. 6 M
4. A) A planting system followed in an orchard with a neat diagram. 6 M
5. A farmer wants to raise a mango orchard in one hectare of land with a spacing of  $8 \times 8$  m and now calculate the number of plants he can be adopted if he chose the quincunx system of planting. 4 M
6. A farmer wants to raise oil palm in one hectare of land with a spacing of  $7.5 \times 7.5$  m and now calculate the number of plants he can be adopted if he chose the hexagonal system of planting. 4 M
7. Demonstration of a training method. 4 M
8. Record + viva voice 10+4=14 M

## Suggested co-curricular activities for Horticulture Core Course - 1 in Semester- I:

### A. Measurable:

#### a. Student seminars:

1. Importance, scope and statistics of horticulture in India and Andhra Pradesh.
2. Branches of horticulture with suitable examples.
3. Climatic zones of horticulture in India and Andhra Pradesh.
4. Classification of horticultural crops based on soil and climate.
5. Vegetable gardens.
6. Ornamental gardens.
7. Systems of planting in an orchard.
8. Types and methods of pruning in horticultural crops.
9. Training methods in horticultural crops.
10. Soil taxonomy.
11. Weathering process.
12. Integrated nutrient management

#### b. Student Study Projects:

1. A report on kitchen gardens in his/her residential area
2. A report on methods of planting systems for horticultural crops his/her residential area.
3. Observations and preparation of soil colour charts for his/her native district.
4. Collection and nutrient analysis of soil samples of a locality.
5. A report on acidity, alkalinity and salinity of soil samples in his/her native district.
6. A report on soil fauna of a locality.
7. Determination of pH, EC and Organic carbon of soil sample from a locality.
8. Collection and identification of weeds in local horticulture crop fields.
9. Isolation and enumeration of soil microorganisms of a horticulture crop field.
10. Isolation of N<sub>2</sub> fixing and phosphate solubilizing microorganisms of a horticulture crop field
11. Collection and documentation of data on nutritional disorders of horticultural crops in a locality.
12. Study of different tools and implements being used in horticulture farms by local farmers.

**c. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

### B. General:

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.
2. Visit to Horticulture University/Research station.

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**Government College (Autonomous), Rajamahendravaram**

**I year B.Sc., Program Examinations at I Semester End**  
**Botany -1: Fundamentals of Horticulture and Soil Science**  
**Model Question Paper (w.e.f. 2022-23)**

**Time: 2 ½ Hrs.**

**Max. Marks: 50**

**Section – A**

**5 x 4 = 20M**

**Answer any Five of the following questions. Draw diagrams wherever necessary.**

1. (a) Olericulture (b) Pomology
2. Kitchen garden
3. (a) Kitchen garden (b) Market garden
4. (a) Hexagonal orchard (b) Contour orchard
5. Soil
6. (a) Acidity (b) Alkalinity
7. Humus
8. Integrated Nutrient Management

**Section – B**

**3 x 10 = 30 M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Discuss about fruit and vegetable zones in Andhra Pradesh.
10. Describe how horticulture plants are classified based on soil requirement?
11. Describe calculation methods used in different planting systems.
12. Discuss about soil taxonomy.
13. Describe the soil microorganisms and soil fauna. Add a note on their beneficial and harmful roles.
14. Write an essay on influence of climatic factors on horticulture crops growth

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**Blue Print**

| Unit no. / Title  | SAQ | LAQ | Marks allotted to the Module |
|---|-----|-----|------------------------------|
| Unit- 1 / Introduction to horticulture                          | 1   | 1   | 14                           |
| Unit- 2 / Classification of horticulture crops                  | 1   | 2   | 24                           |
| Unit – 3/ Characteristics of Orchards                           | 2   | 1   | 18                           |
| Unit- 4 / Physico-chemical characteristics of Soil              | 2   | 1   | 18                           |
| Unit– 5 / Soil as a living matter                               | 2   | 1   | 18                           |
| <b>Total marks allotted to all questions including choice =</b> | 08  | 06  | 92                           |

**Note:** Question paper setters are requested to adhere strictly to the above bluePrint while preparing the said paper

**BOT - 134**  
**Government College (Autonomous), Rajamahendravaram**  
**I B.SC. HORTICULTURE-2/II SEMESTER END (w.e.f. 2018-19)**  
**THEORY SYLLABUS**

**PAPER -II Plant Propagation Methods and Nursery Management**

**Total Hours of Teaching 60 Hrs. @ 4 Hrs per Week**

**Credits: 03**

**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Explain sexual and asexual propagation methods of plants.
- Demonstrate skills on vegetative propagation of plants.
- Demonstrate the techniques on raising of different types of nursery beds
- Justify the role of various propagation structures used to raise horticulture plants.
- Understand the regulation to establish a plant nursery and quality parameters to be maintained.
- Implement different routine/regular activities in a nursery.
- Understand the economics of a plant nursery and can maintain necessary records.

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**Unit -1: Sexual propagation**

**12 Hrs.**

1. Sexual propagation – advantages and disadvantages.
2. Seed germination, process of seed germination; factors affecting seed germination;
3. Pre-germination treatments and viability tests; sowing methods of seeds.
4. Polyembryony in propagation of *Opuntia*, trifoliolate orange, mango and *Citrus*.

**Unit -2: Asexual propagation**

**12 Hrs.**

1. Asexual propagation – advantages and disadvantages.
2. Using bulbs, corms, tubers and rhizomes to raise nursery.
3. Stolons, runners and offsets in raising nursery.
4. Apomixis : Definition; role of apomictics in propagation of apple, mangosteen and *Citrus*.

**Unit- 3: Vegetative propagation techniques**

**12 Hrs.**

1. Cuttings: Definition, propagation by root, leaf and stem cuttings.
2. Layering: Definition, techniques of simple, serpentine, mound, trench and air layering.
3. Grafting: Definition; approach and detached scion (Veneer, whip, cleft, side and bark)grafting techniques.
4. Budding: Definition; techniques of T- , patch and chip budding.

**Unit - 4 : Basic requirements of a nursery**

**12 Hrs.**

1. Plant nursery: Definition, importance; Basic facilities for a nursery; layout and components of a good nursery.
2. Nursery beds – types, their merits and demerits; precautions to be taken during preparation.
3. Brief account of growing media; nursery tools and implements.
4. Containers for plant nursery.
5. Brief account of plant propagation structures.

**Unit -5: Nursery management**

**12 Hrs.**

1. Bureau of Indian Standards (BIS-2008) related to nursery; guidelines for nursery raising.
2. Nursery accreditation and Certification.
3. Seasonal activities and routine operations in a nursery; watering, weeding and control of pests and diseases.
4. Common possible errors in nursery activities.
5. Economics of nursery development and record maintenance; online nursery information and sales systems.

### Text books:

- **Sadhu . M .K. 1996.** Plant propagation, New Age International Publishers, New Delhi
- **Sarma. R. R. 2002** Propagation of Horticultural crops : Principles and practices KalyaniPublishers, New Delhi
- **Hartman, H.T. and D.E. Kester 1976** Plant propagation. Principles and Practices, PrenticeHall of India Pvt. Limited, Mumbai
- **Ratha Krishnan, P. 2014.** Plant Nursery Management: Principles and Practices. Central AridZone Research Institute (ICAR), Jodhpur

**BOT -134**  
**GOVERNMENT COLLEGE (AUTONOMOUS),**  
**RAJAHMUNDRY**

I B.Voc. Botany Practical Examinations at the end of II Semester (w.e.f. 2018-19)

(Plant Propagation Methods and Nursery Management)

**Total hours of laboratory Exercises 30hrs @ 2 per week** **Credits 02**

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**Course outcomes:** On successful completion of this course, the students shall be able to:

- Practice a suitable propagation method for a given horticulture plant species.
- Perform skills to remove dormancy in seeds and other propagules of horticulture plants.
- Prepare media to raise nursery and to cultivate various horticulture plants.
- Demonstrate skill of various vegetative propagation technics used in Horticulture
- Observations on causes for dormancy in seeds and vegetative propagules.

1. **Methods of breaking dormancy in seeds, tubers, vegetative buds and other vegetative propagules.**
2. **Media for propagation of plants in nursery beds, pots and Mist chamber.**
3. **Preparation of nursery beds and sowing of seeds5 Raising of root stock.**
4. **Preparation of plant material for potting.**
5. **Hardening of plants in the nursery.**
6. **Practicing different types of vegetative propagation techniques - cutting, layeringgrafting and budding.**
7. **Preparation of plant growth regulators for seed germination and vegetativepropagation**

**Model Question Paper for**  
**PracticalExaminationII Semester /Horticulture**  
**Plant Propagation and Nursery Management**

Max. Time: 3 Hrs.

Max. Marks: 50

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- |  |               |
|--|---------------|
| 1. Demonstrate methods to break seed dormancy.       | 8 M           |
| 2. Demonstrate a method of vegetative propagation.   | 8 M           |
| 3. Demonstrate routine practices in a nursery        | 8 M           |
| 4. Identify the tool/ equipment used in horticulture | 3× 4 = 12M    |
| 5. Record + viva voice                               | 10 + 4 = 14 M |



## **Suggested co-curricular activities for Horticulture Core Course - 2 in Semester- II:**

### **A. Measurable :**

#### **Student seminars:**

1. Asexual and sexual methods for propagation of horticulture plants.
2. Various methods of cuttings for propagation of horticulture plants.
3. Various methods of layering for propagation of horticulture plants.
4. Various methods of grafting for propagation of horticulture plants.
5. Various methods of budding for propagation of horticulture plants.
6. Raising and management of nursery.
7. Plant propagation structures - care and maintenance.
8. Role of apomicts for propagation of horticulture plants.
9. Nursery certification procedure.
10. Pest and disease Management in a nursery.

#### **Student Study Projects:**

1. Propagation of some horticulture plants through cuttings.
2. Propagation of some horticulture plants through layering
3. Propagation of some horticulture plants through grafting
4. Propagation of some horticulture plants through budding
5. Collection of data on disease symptoms in a local nursery.
6. A report on economics of different media used in nursery.
7. A report on different plant growing containers in their local area.
8. Preparation of different models of Propagation structures.
9. A report on cost of establishing various plant propagation structures.
10. A report on propagation methods practiced by locals farmers.

**Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

### **B. General :**

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.
2. Visit to a nursery in a Horticulture University/Research station or Commercial nursery.

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**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**I year B.Sc., Program Examinations at VI Semester End**  
**Paper – 2: Plant Propagation methods and Nursery Management**  
**Model Question Paper (w.e.f. 2018-19)**

**Time: 3 Hrs.**

**Max. Marks: 50**

**Section –A**

**5 x 4=20 M**

**Answer any Four of the following questions. Draw diagrams wherever necessary.**

1. Advantages and disadvantages of sexual propagation
2. Sowing methods of seeds
3. Advantages and disadvantages of asexual propagation
4. Offsets used to raise nursery
5. (a) Patch budding (b) Chip budding
6. Importance of plant nursery
7. Bureau of Indian Standards (BIS-2008) related to nursery
8. Online nursery information and sales systems.

**Section – B**

**3 x 10=30 M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Write an essay on pre-germination treatments and viability tests.
10. Describe bulbs, corms, tubers and rhizomes used to raise nursery.
11. Define layering. Discuss any four layering techniques practiced in horticulture.
12. Describe the layout of a horticulture nursery and its components.
13. Discuss the seasonal activities and routine operations in a plant nursery.
14. Write an essay on Plant propagation structures.

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**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

**Blue Print**

| <b>Unit no. / Title</b>                                  | <b>SAQ</b> | <b>LAQ</b> | <b>Marks allotted to the Module</b> |
|--|------------|------------|-------------------------------------|
| <b>Unit – 1 / Sexual propagation.</b>                    | <b>1</b>   | <b>1</b>   | <b>14</b>                           |
| <b>Unit – 2 / A sexual Propagation</b>                   | <b>1</b>   | <b>2</b>   | <b>24</b>                           |
| <b>Unit – 3 / Vegetative propagation techniques</b>      | <b>2</b>   | <b>1</b>   | <b>18</b>                           |
| <b>Unit – 4 / Basic requirements of a nursery</b>        | <b>2</b>   | <b>1</b>   | <b>18</b>                           |
| <b>Unit – 5 / Nursery management</b>                     | <b>2</b>   | <b>1</b>   | <b>18</b>                           |
| Total marks allotted to all questions including choice = |            |            | 92                                  |

**Note:** Question paper setters are requested to adhere strictly to the above bluePrint while preparing the said paper

**BOT - 140**  
**GOVERNMENT COLLEGE (AUTONOMOUS),**  
**RAJAMAHENDRAVARAM**

**II B.Sc., – Horticulture - 3 / III Semester End (W.E.F. 2019-20)**  
**Olericulture**

Total Hrs. of Teaching-Learning: 60 @ 4 h / Week      Total Credits: 03

**Learning Outcomes:** On successful completion of this course, the students will be able to

- Distinguish the growing of vegetables according to season and climate
  - Get detailed knowledge on cultivation aspects of different vegetables
  - Understand and explain the special intercultural operations done in vegetable crops
  - Study of morphology and taxonomy of different vegetable crops
  - Study of different varieties of vegetable crops
  - Identify the diseases and pests of vegetable crops and their management
- 

**Unit – 1: Solanaceous vegetables**

**(12 Hrs.)**

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

1. Cultivation of Brinjal 2. Cultivation of tomato 3. Cultivation of Chillies

**Unit – 2: Leafy vegetables**

**(12 Hrs.)**

Importance, morphology and taxonomy, Propagation, manuring, irrigation, harvesting and yield of following crops: 1. Cultivation of Spinach 2. Cultivation of Mentha

**Unit – 3: Root and Tuber crops**

**(12 Hrs.)**

Importance, morphology and taxonomy, Propagation, manuring, irrigation, harvesting and yield of following crops: 1. Cultivation of Colocasia 2. Cultivation of Sweet Potato 3. Cultivation of Carrot

**Unit – 4: Cole crops**

**(12 Hrs.)**

Importance, morphology and taxonomy, Propagation, manuring, irrigation, harvesting and yield of following crops: 1. Cultivation of Cabbage 2. Cultivation of Cauliflower

**Unit – 5: Leguminous vegetables**

**(12 Hrs.)**

Importance, morphology and taxonomy, Propagation, manuring, irrigation, harvesting and yield of following crops: 1. Cultivation of Cluster bean 2. Cultivation of Dolichos

**BOT -140**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**  
**II B.Sc., Horticulture Practical Paper - III Practical Syllabus (w.e.f. 2019-20)**

**Olericulture**

**Total hours of laboratory Exercises 30hrs @ 2 per week** **Credits 02**

**Course outcomes:** On successful completion of this course, the students shall be able to:

- Perform various tests for seed germination, viability and vigour.
- Make observations and record data on various growth stages of a given vegetable plant.
- Identify the pathogens and suggest control measures for diseases of vegetable crops.
- Practice suitable irrigation and fertigation methods for various horticulture crops.
  - Identification of vegetable seeds and vegetable crops at different growth stages
  - Sowing/ transplanting of vegetables in main field
  - Determining the germination percentage of vegetable seed
  - Preparing vegetable nursery beds
  - Raising vegetable seedlings in nursery bed and portrays
  - Land preparation for sowing/ transplanting of vegetable crops
  - Fertilizer application for vegetable growing
  - Identification of major diseases and insect pests of vegetables
  - Visit to vegetable field to study methods of vegetable cultivation

**BOT 140**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**  
**II B.Sc., Horticulture Practical Examinations at the end of III Semester**

**Basic science of vegetables (Olericulture)**

**Model Practical Question Paper - III (w.e.f. 2018-19)**

**Time: 3hours**

**Max.Marks: 50**

- 
- |   |          |
|---|----------|
| 1. Experiment – A                                       | 12M      |
| 2. Experiment – B (Demonstration method)                | 08M      |
| 3. Write a NOTES on C,D,E and F<br>C.<br>D.<br>E.<br>F. | 4×5= 20M |
| 4. Record + Viva voce                                   | 5+5= 10M |

### **Text books:**

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

### **Suggested co-curricular activities for Horticulture Core Course -3 in Semester- III:**

#### **A. Measurable :**

##### **a. Student seminars:**

1. Production technology of solanaceous crops.
2. Production technology of leafy vegetables.
3. Production technology of root and tuber crops.
4. Production technology of cole crops.
5. Production technology of leguminous crops.
6. Special intercultural operations in vegetable crops.
7. Major pests and diseases of vegetable crops and their management.
8. Morphological characters of vegetable crops.
9. Maturity and harvesting indices of vegetable crops.
10. Nutritional aspects of vegetable crops

##### **a). Student Study Projects:**

1. A report on vegetable crops in a locality.
2. Collection and preparation of herbarium of vegetable crops in their locality.
3. A report on various inter-culture practices for a vegetable crop.
4. Study report on nutritional disorders of vegetable crops in a locality.
5. Study report on diseases of vegetable crops in a locality.
6. A report on harvest to marketing for a vegetable crop.
7. A report on use of fertilizers, pesticides and herbicides in a local vegetable crop field.
8. Report on economics of a vegetable crop in their locality.
9. A study report on irrigation practices for vegetable crops in an area.

**a. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

#### **General: B**

1. Group Discussion (GD)/ Quiz/ Just a Minute (JAM) on different modules in syllabus of the course.
2. Visit to Horticulture University/ Research Station to learn about various vegetable crops.
3. Visit to a vegetable nursery and vegetable crop field.

**BOT – 140**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

II B.Sc., – Horticulture - 3 / III Semester End (W.E.F. 2019-20)

**Paper – 3: Olericulture**  
**Model Question Paper (w.e.f. 2019-20)**

**Time: 3 Hrs.**

**Max. Marks: 50**

**Section – A**

**4 x 5 = 20 M**

**Answer any Four of the following questions. Draw diagrams wherever necessary.**

1. Nutritive value of vegetables
2. Constraints in vegetable production
3. Morphology and taxonomy of Brinjal
4. Climate and soil for carrot
5. Intercultural operations in Tapioca
6. Diseases of Cabbage and their control
7. Morphology and taxonomy of Cluster bean
8. Climate and soil for Cluster bean

**Section – B**

**3 x 10 = 30 M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Discuss the importance of vegetable cultivation in India and Andhra Pradesh.
10. Describe the cultivation practices for Tomato.
11. Write an essay on cultivation practices for *Colocasia*.
12. (a) Morphology and taxonomy of Cabbage (b) Varieties of Cauliflower
13. Discuss the cultivation practices for Cowpea
14. Cultivation of sweet potato

**Bot -140**

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

**Blue Print**

| Unit no. / Title                            | SAQ | LAQ | Marks allotted to the Module |
|---|-----|-----|------------------------------|
| Unit – 1 / Introduction to Vegetable crops  | 1   | 1   | 14                           |
| Unit – 2 / Solanaceous and Leafy vegetables | 1   | 1   | 14                           |
| Unit – 3 /Root and Tuber crops              | 2   | 2   | 28                           |
| Unit – 4 /Cole crops                        | 2   | 1   | 18                           |
| Unit – 5 /Leguminous vegetables             | 2   | 1   | 18                           |
|   |     |     | 92                           |

**Note:** Question paper setters are requested to adhere strictly to the above blueprint while preparing the said paper.

**BOT-143**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

**III B.Sc. – Horticulture -4 / IV Semester End (W.E.F. 2020-21)**  
**Concepts of Pomology**

**Total Hrs. of Teaching-Learning: 60 @ 3 h / Week**

**Total Credits: 03**

**Learning Outcomes:** On successful completion of this course, the students will be able to

- Realize the value of fruits in terms of human nutrition and economy of nation.
- Explain the potential fruit zones in various states of our country.
- Classify the fruiting plants based on temperature requirements.
- Acquire knowledge related to various cultivation practices for different fruit crops
- Demonstrate the special intercultural operations done in fruit crops
- Comprehend the knowledge on varieties of different fruit crops.
- Examine the pests and diseases of fruit crops and develop skills to manage the same,
- Explain about Integrated Orchard Management
- Develop knowledge on various entrepreneurial skills related to fruit science.

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**Unit – 1: Introduction to Fruit crops**

**(10 Hrs.)**

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

**Unit – 2: Tropical Fruit Crops**

**(12 Hrs)**

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

- 1. Mango 2. Guava 3. Papaya**

**Unit – 3: Sub-tropical and temperate fruit crops**

**(12Hrs.)**

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

- 1. Grapes 2. Pomegranate 3. Apple**

**Unit – 4: Arid and minor fruit crops**

**(16Hrs.)**

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

- 1. Amla 2. Dates 3. Wood apple**

**Unit – 5: Management practices for fruit crops**

**(12Hrs.)**

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

**BOT - 143**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

III B.Sc., Botany Practical Examinations at the end of IV Semester

**Concepts of Pomology**

Practical Paper - IV (w.e.f. 2020-21)

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits: 02**

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**Course Outcomes:** On successful completion of this course, the students shall be able to:

- Identify different varieties of tropical, sub-tropical and temperate fruit crops.
  - Estimate and apply required dosage of fertilizer/manure/biofertilizer for a fruit crop.
  - Use required PGR to check the leaf fall, flower fall and fruit fall in a crop species.
  - Identify pest and diseases of various fruit crops and suggest control measures.
1. Study of varieties of Mango and Banana
  2. Study of varieties of Grape and Citrus
  3. Study of varieties of papaya and Guava
  4. Manure and fertilizer application including bio fertilizers in different fruit crops
  5. Methods of application calculation of the required quantity of manure and fertilizers based on the nutrient content
  6. Study of varieties of Pomegranate, custard apple and Dates
  7. Study of varieties of Apple
  8. Study of varieties of minor fruit crops
  9. Use of growth regulators in fruit crops
  10. Identification and collection of important pests in fruit crops
  11. Identification and collection of important diseases in fruit crops and Herbarium preparation
  12. Visit to a fruit market.



**BOT 143**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

III B.Sc., Horticulture Practical Examinations at the end of IV Semester

**Concepts of Pomology**

Model Practical **Question** Paper -I V (w.e.f. 2020-21)

Time: 3hours

Max.Marks : 50

- 
- |   |                 |
|---|-----------------|
| <b>1. Experiment - A</b>                        | <b>12M</b>      |
| <b>2. Experiment - B (Demonstration method)</b> | <b>08M</b>      |
| <b>3. Write a NOTES on C,D,E and F</b>          | <b>4×5= 20M</b> |
| C.  |                 |
| D.  |                 |
| E.  |                 |
| F.  |                 |
| <b>4. Record + Viva voce</b>                    | <b>5+5= 10M</b> |

**Text books:**

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

**a. Student Study Projects:**

1. A report on vegetable crops in a locality.
2. Collection and preparation of herbarium of fruit crops in their area.
3. A report on various inter-culture practices for a fruit crop.
4. Study report on nutritional disorders of fruit crops in a locality.
5. Study report on diseases of fruit crops in a locality.
6. A report on use of fertilizers, pesticides, herbicides and PGRs for local fruit crops.
7. A report on harvest to marketing for a fruit crop.
8. Report on economics of a fruit crop in their locality.
9. A study report on different methods of irrigation of fruit crops in a locality.

**b. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

**B. General:**

1. Group Discussion (GD)/ Quiz/ Just a Minute (JAM) on different modules in syllabus of the course.

Visit to Horticulture University/ Research Station/ Commercial Orchard

**BOT - 143**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

II B.Sc., – Horticulture -4 / IV Semester End (w.e.f. 2020-21)

**Concepts of Pomology**  
**Model Question Paper**

**Time: 3 Hrs.**

**Max. Marks: 50**

**Section –A**

**5 x 4 = 20M**

**Answer any Four of the following questions. Draw diagrams wherever necessary.**

1. Export potential of fruits in India
2. Irrigation of Guava
3. fertilizer application of Grape
4. soil and climatic requirements of Pomegranate
5. inter cropping of Wood Apple
6. harvesting and yield of Dates
7. Principles of IPM
8. Marketing of fruits

**Section – B**

**3 x 10 = 30M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Write an essay on Nutritive value of fruits
10. Describe the Cultivation of Mango
11. Write an essay on Cultivation of Apple.
12. Write an essay on the Cultivation of Amla.
13. Write an essay on the Harvesting and Labor Concerns of Fruit Crops.
14. Write an essay on Cultivation of Pomegranate

**BOT - 143**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

| Unit no. / Title |  | LAQ | SAQ | Marks allotted to the Module |
|------------------|--|-----|-----|------------------------------|
| Unit – 1         | Introduction to Fruit crops            | 1   | 1   | 14                           |
| Unit – 2         | Tropical Fruit Crops                   | 1   | 1   | 14                           |
| Unit – 3         | Sub-tropical and temperate fruit crops | 1   | 2   | 18                           |
| Unit – 4         | Arid and minor fruit crops             | 1   | 2   | 18                           |
| Unit – 5         | Management practices for fruit crops   | 1   | 2   | 18                           |
|                  |  |     |     | 92                           |

**Note: Question paper setters are requested to adhere strictly to the above bluePrint while preparing the said paper Blue Print**

## BOT-144

### GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM

III B.Sc., – Horticulture -V/ IV Semester End (W.E.F. 2020-21)

#### Diseases of horticulture plants and their management

Total Hrs. of Teaching-Learning: 60 @ 3 h / Week      Total Credits: 03

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**Learning Outcomes:** On successful completion of this course, the students will be able to:

- Develop a critical understanding of insect pests and plant disease symptoms.
- Examine and identify the pests and diseases of vegetable crops and their management
- Examine and identify the pests and diseases of ornamental crops and their management
- Examine and identify the pests and diseases of fruit crops and their management
- Identify and classify various insect pests on horticulture plants.
- Justify the significance of Integrated Plant Disease Management for horticultural crops.
- Classify the pesticides based on use, chemical nature, formulation, toxicity and action.

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#### Unit – I: Disease of vegetable crops

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

#### Unit – II: Diseases of ornamental crops

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

#### Unit – III: Diseases of fruit crops

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

#### Unit – IV: Integrated pest and disease management

Pesticide classification on use chemical nature formulation toxicity and action

1. Pesticides dissipation residue dynamics different methods steps in Residue analysis
2. Pesticide management

#### Unit – V: Pesticides

1. Integrated Pest and Disease management practices in Fruits Vegetables, Flower crops, Medicinal and Plantation Crops
2. **Insect pests in horticultural crops and their management**
3. **Nematode Pests in Horticulture crops and their management**

**BOT-144**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

**II B.Sc., – Horticulture -V/IV Semester End (W.E.F. 2020-21)**

**Diseases of horticulture plants and their management**

**Practical Syllabus**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

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**Course Outcomes:** On successful completion this course, the students shall be able to:

- Identify the insect pests and microbial pathogens on various horticulture plants.
- Identify the disease symptoms and attribute them to a pest or a microbe.
- Suggest the dose and rate of application of a pesticide/fungicide to control the diseases in horticulture plants.

1. Field visit and acquaintance with diseases of crops
2. Study of pathogens where possible important diseases are are
  - i. **Late blight of Potato**
  - ii. **Wilt of Tomato**
  - iii. **Anthracnose of beans**
  - iv. **Powdery mildew of pea**
  - v. **Rhizome rot of Ginger**
  - vi. **Stem Gall of Coriander**
  - vii. **Powdery mildew**
  - viii. **Downy mildew of Cucurbits**
  - ix. **Rust of onion and garlic**
3. Acquaintance with common states and their methods of application

**BOT-144**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

**III B.Sc., – Horticulture -V /I V Semester End (W.E.F. 2020-21)**

**Practical Model Question Paper**

**Diseases of horticulture plants and their management**

**Time: 3hours**

**Max.Marks: 50**

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- |  |                 |
|--|-----------------|
| 1. Experiment – A                        | <b>12M</b>      |
| 2. Experiment – B (Demonstration method) | <b>08M</b>      |
| 3. Write a NOTES on C,D,E and F          | <b>4×5= 20M</b> |
| C.                                       |                 |
| D.                                       |                 |
| E.                                       |                 |
| F.                                       |                 |
| 4. Record + Viva voce                    | <b>5+5= 10M</b> |

**Text books :**

- **Verma L R and R C Sharma 1999.** Diseases of Horticultural Crops – Fruits, Indus Publishing, New Delhi.
- Diseases of Horticulture Crops and their management, TNAU Publ. Agrimoon.Com
- **Jagatap G P, D N Dhutraj and Utpal Dey. 2001.** Diseases of Horticultural crops and their management, Agrobios Publications

## **Suggested co-curricular activities for Semester- IV:**

### **A. Measurable :**

#### **a. Student Seminars:**

1. Disease symptoms and their management of vegetable crops
2. Disease symptoms and their management of ornamental crops
3. Disease symptoms and their management of fruit crops
4. Disease symptoms of nematode and their management in horticultural crops
5. Role of Integrated Pest Management (IPM) in horticultural crops
6. Role of Integrated Disease Management (IDM) in horticultural crops
7. Classification of insecticides
8. Classification of fungicides

#### **b. Student Study Projects:**

1. Identification and herbarium preparation of disease symptoms of vegetable crops
2. Identification and herbarium preparation of disease symptoms of ornamental crops.
3. Identification and herbarium preparation of disease symptoms of fruit crops
4. Preparation of laminated photos of major diseases of horticultural crops
5. Preparation of laminated photos of major fungicides used in horticultural crops
6. Preparation of laminated photos of major insecticides used in horticultural crops

**c. Assignments:** Written assignment at home / during '0' hour at college; preparation of charts with drawings, making models etc., on topics included in syllabus.

### **B. General :**

1. Group Discussion (GD)/ Quiz/ Just A Minute (JAM) on different modules in syllabus of the course.
2. Visit to Horticulture University/ Research Station/Horticultural fields.
3. Visit to Pesticide industries/shops.

## **RECOMMENDED ASSESSMENT OF STUDENTS:**

### **Recommended continuous assessment methods for all courses:**

Some of the following suggested assessment methodologies could be adopted. Formal assessment for awarding marks for Internal Assessment in theory.

#### **(a) Formal:**

1. The oral and written examinations (Scheduled and surprise tests),
2. Simple, medium and Critical Assignments and Problem-solving exercises,
3. Practical assignments and laboratory reports,
4. Assessment of practical skills,
5. Individual and group project reports,
6. Seminar presentations,
7. Viva voce interviews.

#### **(b) Informal:**

1. Computerized adaptive testing, literature surveys and evaluations,
2. Peers and self-assessment, outputs from individual and collaborative work
3. Closed-book and open-book tests,



**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY****III B.Sc., – Horticulture -5 /IV Semester End (w.e.f. 2020-21)****Pests and Diseases of Horticulture Plants and their Management****Model Question Paper****Time : 3 Hrs.****Max. Marks: 50****Section – A****4 x 5 = 20M****Answer any Four of the following questions. Draw diagrams wherever necessary.**

1. Late blight of Tomato
2. Septoria leaf spot Diseases of Chrysanthemum
3. Black tip of Mango
4. Papaya ring spot
5. Classification of Pesticide
6. Residue analysis
7. Integrated Pest Management in plantation crops
8. Integrated Pest in Fruit Vegetables

**Section – B****3 x 10 = 30M****Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Write an essay on Anthracnose, leaf curl Diseases in Chilies
10. Write an essay on Leaf spot and bud rot diseases in Marigold
11. Write an essay on Malformation, anthracnose diseases in Mango
12. Write an essay on Pesticide management
13. Write an essay on Nematode Pests in Horticulture crops and their management
14. Write an essay on Gerbera diseases

**BOT - 144****GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY****Blue Print**

| Unit no. / Title |  | SAQ | LAQ | Marks allotted to the Module |
|------------------|--|-----|-----|------------------------------|
| Unit – 1         | Disease of vegetable crops             | 1   | 1   | 14                           |
| Unit – 2         | Diseases of ornamental crops           | 1   | 2   | 24                           |
| Unit – 3         | Diseases of fruit crops                | 2   | 1   | 18                           |
| Unit – 4         | Integrated pest and disease management | 2   | 1   | 18                           |
| Unit – 5         | Pesticides                             | 2   | 1   | 18                           |
|                  |  |     |     | 92                           |

**Note:** Question paper setters are requested to adhere strictly to the above bluePrint while preparing the said paper.

**BOT-170**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

III B.Sc., – Horticulture –VI A / V Semester End (W.E.F. 2020-21)

**Ornamental Horticulture**

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week Total Credits: 03

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**I. 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.

**II. 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, and 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.

### III. 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.

### IV. 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.
  1. Invited lectures and presentations on related topics by field/industrial experts.

BOT - 144  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

III B.Sc., – Horticulture –VI A / V Semester End (W.E.F. 2022-23)

**Ornamental Horticulture Model Question Paper**

**Time : 3 Hrs.**

**Max. Marks: 50**

**Section – A**

**5 x 4 = 20M**

**Answer any Five of the following questions. Draw diagrams wherever necessary.**

1. Scope of gardening
2. Greenhouse
3. Climbers
4. Succulents
5. River banks
6. Bio-aesthetic planning
7. Bottle garden
8. Bonsai.

**Section – B**

**3 x 10 = 30M**

**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.**

9. Give a general account on Principles of gardening.
10. Describe various types of Garden structures.
11. Write an essay on Importance, design values, propagation, planting of Cacti.
12. Write an essay on Cultural operations in ornamental gardens.
13. Discuss the Vertical gardens and roof gardens.
14. Write an essay on ornamental gardening in residences in Bottle garden

**BOT - 144  
GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY (Blue Print)**

| Unit no. / Title |   | SAQ | LAQ | Marks allotted to the Module |
|------------------|---|-----|-----|------------------------------|
| Unit – 1         | Introduction to Ornamental Horticulture | 1   | 1   | 15                           |
| Unit – 2         | Types of Ornamental gardens             | 1   | 1   | 15                           |
| Unit – 3         | Plants in Ornamental gardens            | 2   | 1   | 20                           |
| Unit – 4         | Ornamental gardening – public utility   | 2   | 1   | 20                           |
| Unit – 5         | Ornamental gardening in residences      | 2   | 1   | 20                           |
|                  |   |     |     | 90                           |

**Note:** Question paper setters are requested to adhere strictly to the above bluePrint while preparing the said paper

**BOT-170**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

III B.Sc., – Horticulture -VIA/ V Semester End (W.E.F. 2020-21)

**Ornamental Horticulture**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

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**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.

**BOT-170**

**Model Question Paper Pattern for Practical Examination**

Semester – V/VIA Horticulture Skill Enhancement Course

**Ornamental Horticulture**

Max. Time: 3 Hrs.

Max. Marks: 50

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- |   |            |
|---|------------|
| 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    |

## BOT-171

### GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM

III B.Sc., – Horticulture –VII A/ V Semester End (W.E.F. 2020-21)

#### Commercial Floriculture

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week      Total Credits: 03

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(Skill Enhancement Course (Elective))

#### I. 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.

#### II. 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.

#### III. 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.

#### **IV. 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.

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY**

III B.Sc., – Horticulture –VII A/ V Semester End (W.E.F. 2022-23)

**Commercial Floriculture Model Question Paper****Time : 3 Hrs.****Max. Marks: 50****Section – A****5 x 4 = 20M**Answer any Five of the following questions. Draw diagrams wherever necessary.

1. Industrial importance of flowers
2. Jasmine
3. *Anthurium*
4. *Heliconia*
5. Objectives of plant breeding
6. Mutations in *Petunia*
7. Net house
8. Cut flowers

**Section – B****3 x 10 = 30M**Answer any Three of the following questions. Draw neat and labeled diagrams wherever necessary.

9. Give a general account on scope and importance of commercial floriculture in India.
10. Discuss in detail about Production techniques of Rose plant.
11. Describe the Production techniques of *Gerbera*.
12. Give an account on crop improvement techniques in *Geranium*.
13. Discuss the Post-harvest technology of cut flowers with respect to commercial flower crops.
14. Write an essay on Dehydration techniques for drying of flowers.

**BOT - 171****GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY****Blue Print**

| Unit no. / Title |   | SAQ | LAQ | Marks allotted to the Module |
|------------------|---|-----|-----|------------------------------|
| Unit – 1         | Basic concepts of floriculture          | 1   | 1   | 15                           |
| Unit – 2         | Production technology-1                 | 1   | 1   | 15                           |
| Unit – 3         | Production technology-2                 | 2   | 1   | 20                           |
| Unit – 4         | Plant breeding of flowering ornamentals | 2   | 1   | 20                           |
| Unit – 5         | Post-harvest practices in floriculture  | 2   | 1   | 20                           |
|                  |   |     |     | 90                           |

**Note:** Question paper setters are requested to adhere strictly to the above bluePrint while preparing the said paper.



**BOT-171**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

III B.Sc., – Horticulture -VIIA/ V Semester End (W.E.F. 2020-21)

**Commercial Floriculture – Practical syllabus**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

**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.

**BOT-171**

**Model Question Paper Pattern for Practical Examination**

Semester – V/ VIIA Horticulture Skill Enhancement Course

**Commercial Floriculture**

Max. Time: 3 Hrs.

Max. Marks: 50

- 
- |  |            |
|--|------------|
| 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    |

## BOT-172

### GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM

III B.Sc., – Horticulture –VI B/ V Semester End (W.E.F. 2020-21)

#### Precision Farming and Protected Cultivation

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week      Total Credits:03

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(Skill Enhancement Course (Elective))

#### I. 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.

#### II. 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 dis-advantages.
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.

#### III. 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.

#### **IV. 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

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY****III B.Sc., – Horticulture –VI B/ V Semester End(W.E.F. 2022-23)****Precision Farming and Protected Cultivation Model Question Paper****Time : 3 Hrs.****Max. Marks: 50****Section – A****4 x 5 = 20M****Answer any FIVE questions. Each question carries 5 marks.**

1. Importance and scope of precision farming
2. Insect pests in protected cultivation
3. Plant response to green house environment
4. Heating in green houses
5. Passive solar green house
6. Cultivation of broccoli in green houses
7. Sapling transplanting in precision farming
8. Site specific input applications

**SECTION – B****Answer all the questions. Each question carries 10 marks.****5 x 10 = 50M**

9. Describe the Laser leveling, mechanized direct seedling and sowing of seeds in precision farming.
10. Write an essay on mapping of soils and plant attribution.
11. Discuss about weed management and disease management under protected cultivation
12. Discuss about the types of greenhouses based on shape and utility.
13. Discuss about the cultivation of *Capsicum* and *Cucumber* in green houses.

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY****Blue Print**

| Unit no. / Title |                                   | SAQ | LAQ | Marks allotted to the Module |
|------------------|-----------------------------------|-----|-----|------------------------------|
| Unit – 1         | Introduction to Precision farming | 1   | 1   | 15                           |
| Unit – 2         | Management in Precision farming   | 1   | 1   | 15                           |
| Unit – 3         | Types of Green houses             | 2   | 1   | 20                           |
| Unit – 4         | Construction of Green house       | 2   | 1   | 20                           |
| Unit – 5         | Farming in Green house            | 2   | 1   | 20                           |
|                  |                                   |     |     | 90                           |

**Note:** Question paper setters are requested to adhere strictly to the above bluePrint while preparing the said paper.

**BOT-172**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

III B.Sc., – Horticulture -VIB/ V Semester End (W.E.F. 2020-21)

**Precision Farming and Protected Cultivation – Practical syllabus**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

**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.

**BOT-172**

**Model Question Paper Pattern for Practical Examination**

Semester – V/ VIB Horticulture Skill Enhancement Course

**Precision Farming and Protected Cultivation**

Max. Time: 3 Hrs.

Max. Marks: 50

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- |  |            |
|--|------------|
| 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    |

## BOT-172

### GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM

III B.Sc., – Horticulture –VII B/ V Semester End (W.E.F. 2020-21)

#### Post-harvest Management of Horticultural Crops

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week      Total Credits:03

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(Skill Enhancement Course (Elective))

#### I. 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.

#### II. 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: Storage and packaging (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.

#### III. 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. Pongteer 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

**IV. 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

**BOT-172**

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

**III B.Sc., – Horticulture –VII B/ V Semester End (W.E.F. 2020-21)**

**Practical Syllabus**

**Post-harvest Management of Horticultural Crops**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

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**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

**BOT-172**

**Model Question Paper Pattern for Practical Examination**

Semester – V/ VIIB 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



## BOT-173

### GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM

III B.Sc., – Horticulture –VI C/ V Semester End (W.E.F. 2020-21)

#### Water Management in Horticultural Crops

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week      Total Credits:03

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(Skill Enhancement Course (Elective))

#### I. 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.

#### II. 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.

#### III. References:

1. Y P Rao and S. R. Bhakar, 2008. Irrigatin 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

**IV. 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.

**BOT-173**

**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

**III B.Sc., – Horticulture -VIC/ V Semester End (W.E.F. 2020-21)**

**Practical Syllabus**

**Water Management in Horticultural Crops**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

**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.**

**BOT-173**

**Model Question Paper Pattern for Practical Examination**

Semester – V/ VIC 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    |

**Soil Fertility and Nutrient Management**

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week      Total Credits: 03

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(Skill Enhancement Course (Elective))

**I. 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 bio fertilizers 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.

**II. 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 crop

**III. 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 bio fertilizers 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.

## BOT-174

### GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM

III B.Sc., – Horticulture -VIIC/ V Semester End (W.E.F. 2020-21)

#### Practical Syllabus

#### Soil Fertility and Nutrient Management

Total hours of laboratory Exercises 30hrs @ 2 per week

Credits 02

**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.

## BOT-174

### Model Question Paper Pattern for Practical Examination

Semester – V/VII C Horticulture Skill Enhancement Course

#### Soil Fertility and Nutrient Management

Max. Time: 3 Hrs.

Max. Marks: 50

- 
- |   |            |
|---|------------|
| 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  |

**BOT-175**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

III B.Sc., – Horticulture –VI D/ V Semester End (W.E.F. 2020-21)

**Dry land Horticulture**

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week      Total Credits:03

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(Skill Enhancement Course (Elective))

**I. 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.

**II. 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 Dry land 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

**III. 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.

**IV. 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.



**BOT-175**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

**III B.Sc., – Horticulture -VIIC/ V Semester End (W.E.F. 2020-21)**

**Practical Syllabus**

**Dry land Horticulture**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

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**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 dry land areas.
4. Perform skills related to irrigation methods suitable to dry land areas.
5. Perform skills on checking evapo-transpiration.

**Practical (Laboratory) Syllabus: (30 hrs.)**

1. Study of rainfall patterns.
2. Practicing contour bonding and trenching.
3. Studying micro catchments.
4. Studying soil erosion and its control in a dry land 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.

**BOT-175**

**Model Question Paper Pattern for Practical Examination**

**III B.Sc., – Horticulture -VIIC/ V Semester End (W.E.F. 2020-21)**

**Dry land 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  |

**BOT-176**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

III B.Sc., – Horticulture –VIID/ V Semester End (W.E.F. 2020-21)

**Plantation crops**

Total Hrs. of Teaching-Learning: 50 @ 3 h / Week      Total Credits: 03

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(Skill Enhancement Course (Elective))

**I. 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.

**II. 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

### III. 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.agriyan.in

### IV. 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.

**BOT-176**  
**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM**

**III B.Sc., – Horticulture -VIID/ V Semester End (W.E.F. 2020-21)**

**Practical Syllabus**

**Plantation crops**

**Total hours of laboratory Exercises 30hrs @ 2 per week**

**Credits 02**

**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.

**BOT-176**

**Model Question Paper Pattern for Practical Examination**

Semester – V/ VIID Horticulture Skill Enhancement Course

**Plantation Crops**

Max. Time: 3 Hrs.

Max. Marks: 50

- |  |            |
|--|------------|
| 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  |

## *Annexure*

### **Objectives and General Outcomes of Programme and Domain Subject**

**Programme (B.Sc.) Objectives:** The objectives of bachelor's degree programme with Horticulture are:

1. To provide a through insight on various aspects related to Horticulture.
2. To inculcate a sound knowledge on latest developments in the field of Horticulture with a practical approach.
3. To produce a student who thinks independently, critically and discuss various aspects of Horticulture.
4. To enable the graduate to prepare and pass through various examinations related to the domain subject.
5. To empower the student to become an employee or an entrepreneur in the field of Horticulture and to serve the nation.

#### **Programme Outcomes :**

1. Understand the basic concepts of Horticulture in relation to its allied core courses.
2. Distinguish the importance of various horticultural plants for the welfare of humans.
3. Demonstrate simple experiments related to plant sciences, analyze data, and interpret them with the theoretical knowledge.
4. Work in teams with enhanced inter-personal skills and hence develop the critical thinking with scientific temper.
5. Effectively communicate scientific ideas both orally and in writing.
6. Realize the potential of the horticulture to become an entrepreneur – self employment.

**Domain Subject (Horticulture) Objectives :**

1. To create awareness on various branches of Horticulture and basic aspects of soil science.
2. To teach various methods of plant propagation and imparting skills for establishment of a nursery.
3. To provide in depth knowledge on cultivation of different vegetable plants by inculcating both theoretical and practical aspects.
4. To provide a practical experience on cultivation of different fruit plants with sound theoretical background.
5. To give sufficient knowledge on pests and diseases of horticulture plants and measures to control the same.

**Domain Subject (Horticulture) Outcomes:**



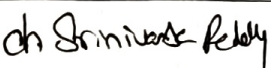
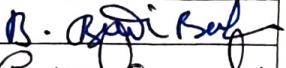
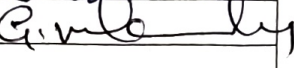
1. Students will be able to design, execute the establishment and manage orchards and horticulture gardens.
2. Students will be able to propagate plants through sexual/vegetative methods and may establish a nursery of their own.
3. Students will be able test the suitability of various soils for cultivation of horticulture plants.
4. Students will be able to discuss various aspects related to cultivation of vegetable plants.
5. Students will be able discuss various aspects related to cultivation of fruit plants.
6. Students will be able to examine, identify and control different pests and diseases of horticulture plants.
7. Students will think independently and may become an employ in the said sector or may become an entrepreneur by taking up cultivation of horticulture crops.

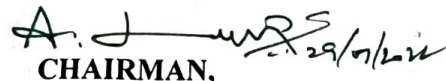
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**GOVERNMENT COLLEGE (AUTONOMOUS), RAJAHMUNDRY  
DEPARTMENT OF BOTANY**

**BOARD OF STUDIES MEETING FOR B.Sc., (B.C. HORTICULTURE): 2022-23 A.Y.**

The Board Of Studies Meeting for the courses of B.Sc., (HORTICULTURE) is convened at Department of Botany, G.C. (A), Rajahmundry on 29-07-2022 by 02:00 PM under the Chairmanship of Dr. A. Srinivasa Rao with the following members.

| S.No. | Designation        | Name  | Signature   |
|-------|--------------------|---|---|
| 1.    | Chairman           | Dr. A. Srinivasa Rao<br>Lecturer in-Charge, Department of Botany          | <br>29/07/2022 |
| 2.    | University Nominee | Dr. A. Matta Reddy, Associate Professor,<br>ANUR, Rajahmundry             |                |
| 3.    | Subject Expert     | Dr. M. Kalpana, Professor, Dr. Y.S.R.H.U,<br>Venkataramangudem            | Attended<br>online  |
| 4.    | Subject Expert     | Dr. Ch. Srinivasa Reddy, Lecturer in Botany,<br>SRR & CVR GDC, Vijayawada |              |
| 5.    | Industrial Nominee | Dr. P. Rama Krishna, Director, Sri Satyadeva<br>Nursery, Kadiyapulanka.   | Not attended  |
| 6.    | Faculty Member     | B.Bujji Babu, Lecturer  |              |
| 7.    | Faculty Member     | G.Vivekananda Swamy, Lecturer   |              |
| 8.    | Student Nominee    | Akumarthi Mani Deepika, II B.C.H.   |   |
| 9.    | Student Nominee    | Mungamurugu Rohini, II B.C.H.   |   |

  
CHAIRMAN,  
BOARD OF STUDIES  
&  
Lecturer in-Charge  
DEPARTMENT OF BOTANY  
GOVERNMENT COLLEGE (A)  
RAJAHMENDRAVARAM-533 103.

**BOARD OF STUDIES MEETING FOR B. Sc., (HORTICULTURE): 2022-23 A.Y.**

The Board Of Studies Meeting for the courses of **B. Sc., (Horticulture)** is convened at Department of Botany, G.C. (A), Rajahmundry on **29-07-2022** by **02:00 PM** under the Chairmanship of Dr. A. Srinivasa Rao, Lecturer In-Charge of the department.

**Agenda:**

1. Program wise Curriculum Design for all the Semesters
2. Designing of Course Outcomes and Course Objectives
3. Identification of unit wise assignment questions and relevant model question paper.
4. Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship in the course content and specific activity proposed.
5. Additional inputs into the curriculum
6. Designing Model Question Papers and identifying potential paper setters
7. Innovative Teaching - Learning Methodology (Learner Centric)
8. Academic activities of the Department such as seminars, fieldworks etc.
9. Any other proposal with the permission of the chair

**Minutes of the Meeting:**

**Agenda point 1: Program wise Curriculum Design for all the Semesters**

**Discussion:** The members discussed the curricular design of the B.Sc., (Horticulture) programme with one course of Horticulture in each semester to inculcate a sound knowledge.

**Resolution:** The design of the programme with combination of Botany, Chemistry and Horticulture courses offered in all the semesters (I to V) are unanimously approved by all the members of the BOS concerned.

**Agenda point 2: Designing of Course Outcomes and Course Objectives**

**Discussion:** The members who attended the meeting have gone through the course outcomes and course objectives related to the Horticulture core courses pertaining to all the semesters and discussed in detail.

**Resolution:** The outcomes and objectives written as per the Bloom's taxonomy are well appreciated and accepted unanimously.

**Agenda point 3: Identification of unit wise assignment questions and relevant model question paper.**

**Discussion:** Members who attended the meeting have read the assignment questions and discussed their relevance to the course curriculum with the teachers dealing with the said core courses.

**Resolution:** The assignment questions given for each course are accepted by the BOS members.

Dr. Srinivasa Rao

Dr. Srinivasa Rao  
Chairman



**Agenda point 4: Identifying /inclusion of components of Skill Development, Employability and Entrepreneurship in the course content and specific activity proposed.**

**Discussion:** As the Horticulture is a skill based subject. Moreover, the students pursuing the programme have to compete with the students from Horticulture Colleges affiliated to ICAR for vertical mobility, employment and entrepreneurship. Hence a dire need is felt to impart more skill based trainings to the students.

**Resolution:** The committee unanimously resolved to train the students by inviting experts in the domain subject and by conducting skill based trainings and field visits to horticulture firms in public and private sectors.

**Agenda point 5: Additional inputs into the curriculum**

**Discussion:** The additional inputs kept in the curriculum in the form of co-curricular and outreach programmes are well appreciated by all the members of BOS.

**Resolution:** All the additional inputs related to core subject are accepted by the BOS members.

**Agenda point 6: Designing Model Question Papers and identifying potential paper setters**

**Discussion:** The members of BOS gone through the model question papers of all the courses and proposed names of question papers setters and evaluators and discussed the relevance and competencies.

**Resolution:** The model question papers, names of question paper setters and evaluators are unanimously accepted by the members of BOS.

**Agenda point 7: Innovative Teaching - Learning Methodology (Learner Centric)**

**Discussion:** As the Horticulture is a skill based subject, all the students pursuing the programme should have field based knowledge and have to do more case studies related to horticulture crops to get a thorough skills in the domain area. Hence all the members felt the need of internships for the students in horticulture nurseries, crop fields and industries.

**Resolution:** It is unanimously resolved to impart skill based trainings to students in consultation with higher authorities and by linkages and collaborations with the horticulture based firms and industries.

**Agenda point 8: Academic activities of the Department such as seminars, fieldworks etc.**

**Discussion:** The members who have attended the BOS meeting discussed the annual action plan prepared by the department and the activities planned. The members felt the importance of tours and industrial visits to get an exposure to recent trends in the domain area.

**Resolution:** It is unanimously resolved to conduct one tour/field trip to Horticulture university/college/research institute and also an industry in both the semesters of an Academic Year.

Ch. Srinivas Reddy

Amr

S. Srinivas  
G. M. Srinivas