

**ADIKAVI NANNAYA UNIVERSITY :: RAJAMAHEMDRAVARAM**

**HORTICULTURE COURSES**

**Under C.B.C.S. pattern**

**(w.e.f. 2020-'21 Academic Year)**

**CURRICULUM OF HORTICULTURE COURSES W.E.F.2020-21**

Semester	Course	Title of the Course	Hrs./ Week	Credits	CCE	E.E.	Total
<b>FIRST YEAR</b>							
Sem.-I	1	Fundamentals of Horticulture and Soil Science	4	4	25	75	100
		Practical - 1	2	1	-	50	50
Sem.-II	2	Plant Propagation and Nursery Management	4	4	25	75	100
		Practical - 2	2	1	-	50	50
Apprentice/On Job Training for 02 months							
<b>SECOND YEAR</b>							
Sem.-III	3	Basics of Vegetable Science	4	4	25	75	100
		Practical - 3	2	1	-	50	50
Sem.-IV	4	Basics of Fruit Science	4	4	25	75	100
		Practical - 4	2	1	-	50	50
	5	Pests and diseases of horticulture plants and their management	4	4	25	75	100
		Practical - 5	2	1	-	50	50
Apprentice/On Job Training for 02 months							
<b>THIRD YEAR</b>							
Sem. -5	6	Domain related Skill Enhancement Courses (02). Three (3) pairs of courses (each pair has 2 related courses) will be offered, student has to choose a pair of courses.	4	4	25	75	100
			2	1	-	50	50
	7		4	4	25	75	100
			2	1	-	50	50
Sem.-6	8	Apprentice/On Job Training for 06 months	-	-	-	-	-

**CBCS / Semester System (w.e.f. 2020-'21 Admitted Batch)**  
**I Semester /Horticulture Core Course - 1**  
**Fundamentals of Horticulture and Soil Science**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

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**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.
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**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 – tray's 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, Biotech books
- **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

**Practical syllabus of Horticulture Core Course – 1/ Semester – I**  
**Fundamentals of Horticulture and Soil Science**  
(Total hours of teaching – 30 @ 02 Hrs./Week)

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

- Make a layout of an orchard in a given area.
- Use various tools and implements to raise nursery and cultivate a horticulture crop.
- Prepare fertilizer mixtures and PGRs for plants.

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

**Model Question Paper for Practical Examination**  
**I Semester /Horticulture Core Course - 1**  
**Fundamentals of Horticulture and Soil Science**

Max. Time: 3 Hrs.

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          |
| B) 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          |
| C) 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          |
| 5. Demonstration of a training method.   | 4 M          |
| 6. 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.

**II Semester /Horticulture Core Course - 2**  
**Plant Propagation and Nursery Management**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

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**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*, trifoliate 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.



## **Practical syllabus of Horticulture Core Course -2/ Semester - II**

### **Plant Propagation and Nursery Management**

(Total hours of teaching – 30 @ 02 Hrs./Week)

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

## Model Question Paper for Practical Examination

### II Semester /Horticulture Core Course - 2

#### 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 |

#### 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 Kalyani Publishers, New Delhi
- **Hartman, H.T. and D.E. Kester 1976** Plant propagation. Principles and Practices, Prentice Hall of India Pvt. Limited, Mumbai
- **Ratha Krishnan, P. 2014.** Plant Nursery Management: Principles and Practices. Central Arid Zone Research Institute (ICAR), Jodhpur

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

##### A. Measurable :

##### a. 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.

**b. 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.

**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 a nursery in a Horticulture University/Research station or Commercial nursery.

**III Semester /Horticulture Core Course - 3**  
**Basics of Vegetable Science (Olericulture)**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

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

**12 Hrs.**

1. Importance of vegetable cultivation in India and Andhra Pradesh.
2. Classification and Nutritive value of vegetables.
3. Area and production of vegetables in India and Andhra Pradesh.
4. Export and import potential of vegetables in India. Constraints in vegetable production and remedies to overcome them.

**Unit – 2 : Solanaceous and Leafy vegetables**

**12 Hrs.**

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

Cultivation of (a) Brinjal (b) Tomato (c) *Capsicum* (d) Spinach (e) Coriander and (d) *Mentha*

**Unit – 3 : Root and Tuber crops**

**16 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:

Cultivation of (a) Carrot (b) Beet root (c) Tapioca and (d) *Colocasia*

**Unit – 4 : Cole crops**

**08 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:

Cultivation of (a) Cabbage and (b) Cauliflower

**Unit – 5 : Leguminous vegetables**

**12 Hrs.**

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

Cultivation of (a) Cluster bean (b) Cow pea and (d) *Dolichos*

### **Practical syllabus of Horticulture Core Course – 3/Semester-III**

#### **Basics of Vegetable Science (Olericulture)**

(Total hours of teaching – 30 @ 02 Hrs./Week)

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**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.
  1. Demonstration of seed germination test for a vegetable seed.
  2. Demonstration of seed viability test.
  3. Identification of vegetable seeds and vegetable crops at different growth stages.
  4. Preparing vegetable nursery beds.
  5. Raising vegetable seedlings in nursery bed and portrays.
  6. Identification of major diseases and insect pests of vegetables.
  7. Land preparation for sowing/ transplanting of vegetable crops.
  8. Sowing/ transplanting of vegetables in main field.
  9. Fertilizer application for vegetable growing.
  10. Irrigation practices in a vegetable crop field.

**Model Question Paper for Practical Examination**  
**III Semester /Horticulture Core Course - 3**  
**Basics of Vegetable Science (Olericulture)**

Max. Time: 3 Hrs.

Max. Marks: 50

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|---|---------------------------|
| 1. Demonstration of seed germination/ viability test (A).   | <b>10 M</b>               |
| 2. Demonstration of preparing nursery bed/ cultivation practice for a vegetable crop (B).             | <b>10 M</b>               |
| 3. Identification of material (C & D -Vegetable plants) and writing scientific name, family and uses. | $2 \times 4 =$ <b>8 M</b> |
| 4. Identification of a disease on vegetable plant (E)   | <b>4 M</b>                |
| 5. Identification and comment on a cultivation practice (F)   | <b>4 M</b>                |
| 6. Record + Viva Voice  | $10 + 4 =$ <b>14 M</b>    |

**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.

**b. 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.

**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.
1. Visit to Horticulture University/ Research Station to learn about various vegetable crops.
3. Visit to a vegetable nursery and vegetable crop field.



**IV Semester /Horticulture Core Course - 4**  
**Basics of Fruit Science (Pomology)**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

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**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**

**12 Hrs.**

1. Importance of fruit growing in India and Andhra Pradesh.
2. Nutritive value of fruits.
3. Area and production of India and Andhra Pradesh.
4. Export and import potential of fruits in India. Constraints in fruit production and remedies to overcome them.

**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:

(a) Mango (b) Guava and (c) Papaya

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

**12 Hrs.**

Origin, history, distribution, area and production, uses and composition, varieties, soil and climatic requirements, propagation, planting, training and pruning, manuring and fertilizer application, irrigation, intercropping, harvesting and yield,

diseases and pests of the following sub-tropical and temperate fruit crops:

(a) Grapes (b) Pomegranate (c) Citrus and (d) Apple

**Unit – 4 : Arid and minor 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, inter cropping, harvesting and yield, diseases and pests of the following arid fruit crops:

(a) Amla (b) Dates and (c) Wood apple

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

**12 Hrs.**

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

## **Practical syllabus of Horticulture Core Course – 4/ Semester IV**

### **Basics of Fruit Science (Pomology)**

(Total hours of teaching – 30 @ 02 Hrs./Week)

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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, Papaya and Guava.
  2. Study of varieties of Grape, Pomegranate, Citrus and Apple.
  3. Study of varieties of Amla, Dates and Wood apple.
  4. Manure and fertilizer application including biofertilizers in different fruit crops.
  5. Methods of application, calculation of the required quantity of manure and fertilizers based on the nutrient content.
  6. Use of growth regulators in fruit crops.
  7. Identification and collection of important pests in fruit crops.
  8. Identification and collection of important diseases in fruit crops and herbarium preparation.
  9. Visit to a local fruit market/commercial orchard.

**Model Question Paper for Practical Examination**

**IV Semester /Horticulture Core Course - 4**

**Basics of Fruit Science (Pomology)**

Max. Time: 3 Hrs.

Max. Marks: 50

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| 1. Describing cultivation practice for a fruit crop.                     | <b>10 M</b>          |
| 2. Identification with remarks on Mango/ Guava/Papaya variety.           | <b>5 M</b>           |
| 3. Identification with remarks Grape/Pomegranate/Citrus/Apple variety.   | <b>5 M</b>           |
| 4. Identification with remarks Amla, Dates and Wood apple.               | <b>5 M</b>           |
| 5. Identify the disease and pest symptoms and write its causal organism. |                      |
|  | <b>2 x 5 = 10 M</b>  |
| 6. Record + Viva Voice   | <b>10 + 5 = 15 M</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

**Suggested co-curricular activities for Horticulture Core Course - 4 in Semester- IV :**

**A. Measurable :**

**a. Student seminars:**

1. Nutritional value of fruits growing in India and Andhra Pradesh
2. Production technology of major tropical fruit crops
3. Production technology of major subtropical and temperate fruit crops
4. Production technology of major arid and minor fruit crops
5. Special intercultural operations in fruit crops
6. Intercropping in fruit crops.
7. Methods of irrigation of fruit crops.
8. Methods of fertilizer application of fruit crops.
9. Major pests and diseases of fruit crops and their management.
10. Maturity and harvesting indices of fruit crops.
11. Principles of Integrated Orchard Management (IOM).

**b. 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.

**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/ Commercial Orchard.

**V Semester /Horticulture Core Course - 5**  
**Pests and Diseases of Horticulture Plants and their Management**  
(Total hours of teaching – 60 @ 04 Hrs./Week)

**Theory :**

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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 – 1 :Basics of Entomology and Plant Pathology**

**12 Hrs.**

1. Classification of Insects up to orders and families of economic importance; Study of insect pests (Distribution, host range, biology, nature of damage and management) in horticultural crops.
2. Disease triangle and disease pyramid; Plant Pathology : Definition
3. A general account on symptoms of plant diseases caused by Viruses and Bacteria.
4. A general account on symptoms of plant diseases caused by Fungi.

**Unit – 2 :Pests and diseases of Vegetables crops**

**12 Hrs.**

1. Bendi : Spotted boll worms, Red cotton bug, Yellow vein mosaic.
2. Cucurbits : Fruit flies, Pumpkin beetles; Downy and powdery mildews.
3. Potato : Potato tuber moth, Golden cyst nematode; Late blight.
4. Sweet Potato : Sweet potato weevil, Vine borer; Mottled necrosis.

**Unit – 3 :Pests and diseases of Fruit crops**

**12 Hrs.**

1. Coconut : Rhinoceros beetle, Burrowing nematode; Ganoderma root rot, Grey blight
2. Banana : Banana weevil, banana aphids; Panama wilt. Bunchy top
3. Cashew : Tea mosquito bug. Cashew stem borer; Anthracnose, 2.Pink disease
4. Custard apple : Mealy bug, Fruit boring caterpillar; Anthracnose, Glomerella fruit rots.

**Unit – 3 :Pests and diseases of Commercial Flower crops**

**12 Hrs.**

1. Rose : Rose aphid,Dieback, and black spot
2. Marigold : Aphids, leaf spot, and bud rot
3. Gerbera : Thrips, white flies and Blossom blight
4. Gladiolus :Cut worms, leaf eating caterpillar and corm rot.

**Unit – 4 :Management of Pests and Diseases**

**12 Hrs.**

1. Principles and methods of plant disease management.
2. Integrated Plant disease management.
3. Fungicides classification based on chemical nature; commonly used insecticides, fungicides, bactericides and nematicides.
4. Preparation of fungicidal solutions, slurries, pastes and their application.

**Practical syllabus of Horticulture Core Course – 5/ Semester-IV**  
**Pests and Diseases of Horticulture Plants and their Management**

(Total hours of teaching – 30 @ 02Hrs./Week)

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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. Study of characteristics of insect pests, microbial pathogens, nematodes causing diseases on different plants given in the theory syllabus.
  2. Identification of disease symptoms on different plants given in the theory syllabus.
  3. Observing and acquiring knowledge on pesticides, fungicides etc.,
  4. Acquaintance with methods of application of common fungicides.
  5. Field visit and acquaintance with disease of crops



**Model Question Paper for Practical Examination**  
**IV Semester /Horticulture Core Course - 5**  
**Pests and Diseases of Horticulture Plants and their Management**

Max. Time: 3 Hrs.

Max. Marks: 50

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1. Identify and comment on insect diseases A & B            2 x 5 = **10 M**
2. Identify and comment on microbial diseases C & D        2 x 5 = **10 M**
3. Identify and comment on nematodal diseases E & F        2 x 5 = **10 M**
4. Identify and comment on Pesticide/ Fungicides G & H  $2 \times 4 =$     **6 M**
5. Record + Herbarium + Viva Voice                                10 + 4= **14 M**

**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- V :**

**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 form individual and collaborative work
3. Closed-book and open-book tests,

**Common pattern for Question Paper for Theory Examination(s) at Semester end**

Max. Time : 3 Hrs.

Max. Marks : 75 M

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**Section – A**

**Answer all the following questions.**

**5 x 2 = 10 M**

- ✓ One question should be given from each Unit in the syllabus.

**Section – B**

**Answer any three of the following questions. Draw a labeled diagram wherever necessary**

**3 x 5 = 15 M**

- ✓ One question should be given from each Unit in the syllabus.

**Section – C**

**Answer any five of the following questions. Draw a labeled diagram wherever necessary**

**5 x 10 = 50 M**

- ✓ Two questions (a & b) are to be given from each Unit in the syllabus (internal choice in each unit). Student has to answer 5 questions by choosing one from a set of questions given from a Unit.

**Note :** Questions should be framed in such a way to test the understanding, analytical and creative skills of the students. All the questions should be given within the frame work of the syllabus prescribed.

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***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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