

## Course Information Sheet

|   |  |                         |
|---|--|-------------------------|
| <b>Programme:</b> UG                                    | <b>Degree:</b> B. Tech (AGRI)                                |                         |
| <b>Course Code:</b>                                     | <b>Course Title:</b> FUNDAMENTALS OF HORTICULTURE            |                         |
| <b>Year:</b> II <b>Sem:</b> II<br><b>A.Y. :</b> 2025-26 | <b>Regulation:</b> IS23<br><b>University:</b> JNTU Kakinada. |                         |
| <b>L T/P/D C:</b> 3/0/0/3                               | <b>Credits:</b> 3  | <b>Contact Hrs:</b> 5   |
| <b>Mid Marks:</b> 30                                    | <b>External Marks:</b> 70                                    | <b>Total Marks:</b> 100 |
| <b>Teaching Hrs:</b> 60                                 | <b>Exam Duration:</b> 3 hrs.                                 |                         |

### Course Pre-Requisites: Agricultural Engineering

| Course Code | Course Name                  | Description   | Year-Sem                |
|-------------|------------------------------|---|-------------------------|
|             | FUNDAMENTALS OF HORTICULTURE | This Fundamentals of Horticulture course provides a foundational understanding of the science and art of growing fruits, vegetables, flowers, and ornamental plants, covering topics from plant identification to propagation and orchard management. | II AGRI<br>Semester -II |

### Course outcomes:

Student will able to

| No.          | Description  | Skill /Bloom's Taxonomy Level     |
|--------------|--|-----------------------------------|
| <b>CO1</b>   | Familiarization with principles and practices of propagation and nursery management for Horticultural Crops. | Remember<br>Understand<br>TL1/TL2 |
| <b>CO 2</b>  | Can demonstrate advanced technologies like training, pruning, etc in horticulture                            | Apply/TL3                         |
| <b>CO 3:</b> | Knowledge of orchard management, orchard establishment and orchard rules and regulation                      | Create /TL4                       |
| <b>CO4</b>   | Explain the importance and scope of horticulture in day to day life as well as in agro based industry.       | Design/TL 6                       |

|            |   |   |
|------------|---|---|
| <b>CO5</b> | Explain the several practices involved in cultivation and management of various horticultural crops. Identify various horticultural crops like fruits, vegetable, flower seeds, plant types in their natural existence. | Derived it from lower-level Blooms /TL5 |
|------------|---|---|

### Course Articulation Matrix:

Mapping of Course Outcomes (CO) with Program Outcomes (PO) and Program Specific Outcomes (PSO's):

| Course Outcomes (CO) | Program Outcomes (PO) |            |          |          |            |            |            |     |     |            |            |            | Program Specific Outcomes (PSO's) |            |
|----------------------|-----------------------|------------|----------|----------|------------|------------|------------|-----|-----|------------|------------|------------|-----------------------------------|------------|
|                      | PO 1                  | PO2        | PO3      | PO4      | PO5        | PO6        | PO7        | PO8 | PO9 | PO10       | PO11       | PO12       | PSO1                              | PSO2       |
| <b>CO1</b>           | 2                     | 3          | 2        | 1        | -          | -          | -          | -   | -   | -          | -          | -          | 2                                 | 1          |
| <b>CO2</b>           | 2                     | 3          | 1        | 2        | -          | -          | 1          | -   | -   | -          | -          | 1          | 2                                 | 1          |
| <b>CO3</b>           | 2                     | 2          | 1        | 2        | 1          | 1          | 3          | -   | -   | 1          | -          | 1          | 2                                 | --         |
| <b>CO4</b>           | 2                     | 3          | 3        | 3        | 1          | 1          | 2          | -   | -   | -          | 2          | 1          | 2                                 | 2          |
| <b>CO5</b>           | 2                     | 3          | 3        | 2        | 1          | 1          | 2          | -   | -   | -          | 2          | 1          | 1                                 | 2          |
| Overall              | <b>2</b>              | <b>2.8</b> | <b>2</b> | <b>2</b> | <b>0.6</b> | <b>0.6</b> | <b>1.6</b> | -   | -   | <b>0.2</b> | <b>0.8</b> | <b>0.8</b> | <b>1.8</b>                        | <b>1.2</b> |

**Level:** 1- Low correlation (Low), 2- Medium correlation (Medium), 3-High correlation (High)

## JUSTIFICATIONS OF CO –PO MAPPING

| AGE402.1     |   |   |
|--------------|---|---|
| AGE402.2-P01 | 2 | Understand the basic principles of horticulture, plant propagation, and management practices.                                       |
| AGE402.2-P02 | 3 | Apply the knowledge of plant science, soil science, and agricultural engineering to understand fundamental horticultural practices. |
| AGE402.2-P03 | 2 | Identify and analyze different horticultural practices and their impact on crop growth using scientific principles.                 |
| AGE402.2-P04 | 1 | Develop solutions for improving plant health and productivity while considering environmental and societal factors.                 |
| AGE402.2-P05 | - | Utilize research-based knowledge to analyze plant growth data, soil conditions, and climate effects on horticultural crops.         |
| AGE402.2-P06 | - |   |
| AGE402.2-P07 | - |   |
| AGE402.2-P08 | - |   |
| AGE402.2-P09 | - |   |
| AGE402.2-P10 | - |   |
| AGE402.2-P11 | - |   |
| AGE402.2-P12 | - |   |

| AGE402.2     |          |  |
|--------------|----------|--|
| AGE402.2-P01 | 2        | Learn about different horticultural crops, their classification, and production technologies.                                  |
| AGE402.2-P02 | 3        | Apply scientific knowledge to classify horticultural crops and understand their production techniques.                         |
| AGE402.2-P03 | 1        | Analyze research literature on improved cultivation practices, disease management, and crop productivity.                      |
| AGE402.2-P04 | 2        | Design sustainable horticultural systems that meet market and environmental requirements                                       |
| AGE402.2-P05 | -        |  |
| AGE402.2-P06 | -        |  |
| AGE402.2-P07 | <b>1</b> | Use experimental methods to evaluate soil properties, water management, and plant growth parameters for better yield outcomes. |
| AGE402.2-P08 | -        |  |
| AGE402.2-P09 | --       |  |

|              |          |   |
|--------------|----------|---|
| AGE402.2-P10 | -        |   |
| AGE402.2-P11 | -        |   |
| AGE402.2-P12 | <b>1</b> | Utilize research-based knowledge to analyze plant growth data, soil conditions, and climate effects on horticultural crops. |

#### AGE402.3

|              |          |   |
|--------------|----------|---|
| AGE402.2-P01 | 2        | Understanding horticulture and its branches helps students build foundational knowledge.                                      |
| AGE402.2-P02 | 2        | The study of horticulture's economic and environmental importance fosters an awareness of societal and sustainability aspects |
| AGE402.2-P03 | 1        | Scientific classification develops analytical skills.   |
| AGE402.2-P04 | 2        | Understanding climatic and soil requirements enhances problem-solving abilities in sustainable crop production                |
| AGE402.2-P05 | <b>1</b> | Mastery of sexual and asexual propagation enables innovation in plant production.   |
| AGE402.2-P06 | <b>1</b> | Knowledge of structures like greenhouses and mist chambers enhances experimentation and technological applications.           |
| AGE402.2-P07 | <b>3</b> | Practical grafting methods develop hands-on skills in plant propagation.  |
| AGE402.2-P08 | -        |   |
| AGE402.2-P09 | -        |   |
| AGE402.2-P10 | <b>1</b> | Understanding rootstocks improves crop resilience and productivity.   |
| AGE402.2-P11 |          |   |
| AGE402.2-P12 | <b>1</b> | Planning orchards integrates engineering solutions for better yields.   |

#### AGE402.4

|              |          |   |
|--------------|----------|---|
| AGE402.2-P01 | 2        | Scientific pruning enhances plant architecture and productivity.  |
| AGE402.2-P02 | 3        | Investigating physiological plant stages supports problem analysis and research.  |
| AGE402.2-P03 | 3        | Addressing factors affecting fruiting enhances analytical and problem-solving skills.                                   |
| AGE402.2-P04 | 3        | Recognizing pollinators' role in sustainability. Understanding natural and artificial fertilization processes.          |
| AGE402.2-P05 | <b>1</b> | Encouraging urban and commercial gardening fosters environmental consciousness.   |
| AGE402.2-P06 | <b>1</b> | Designing gardens integrates aesthetics with engineering principles. Practical lawn management builds technical skills. |
| AGE402.2-P07 | <b>2</b> | Knowledge of growth regulators aids in precision farming.   |
| AGE402.2-P08 | -        |   |

|              |          |   |
|--------------|----------|---|
| AGE402.2-P09 | -        |   |
| AGE402.2-P10 | -        |   |
| AGE402.2-P11 | <b>2</b> | Sustainable irrigation practices. Applying fertilizers efficiently supports modern agricultural techniques. |
| AGE402.2-P12 | <b>1</b> | Applying fertilizers efficiently supports modern agricultural techniques.                                   |

| AGE402.5     |          |   |
|--------------|----------|---|
| AGE402.2-P01 | <b>2</b> | Solving incompatibility issues requires investigative and technical skills.   |
| AGE402.2-P02 | <b>3</b> | Commercial horticulture contributes to economic development and sustainability  |
| AGE402.2-P03 | <b>3</b> | Modifying trees for better yield integrates investigation with practical skills.  |
| AGE402.2-P04 | <b>2</b> | Addressing climate change in agriculture.   |
| AGE402.2-P05 | <b>1</b> | Enhancing crop varieties integrates research and innovation.  |
| AGE402.2-P06 | <b>1</b> | Soil-less cultivation techniques promote sustainable agriculture.   |
| AGE402.2-P07 | <b>2</b> | Advanced propagation techniques develop technical expertise, Landscaping improves urban environments and mental well-being. |
| AGE402.2-P08 | -        |   |
| AGE402.2-P09 | -        |   |
| AGE402.2-P10 | -        |   |
| AGE402.2-P11 | <b>2</b> |   |

**Justification for Avg CO-PO Mapping**

| <b>Mapping</b> | <b>Level</b> | <b>Justification</b>   |
|----------------|--------------|--|
| AGE402.2-P01   | 1            | Understanding export protocols enhances global trade.  |
| AGE402.2-P02   | 2            | Controlled environments enhance productivity.  |
| AGE402.2-P03   | 1            | Beneficial fungi support sustainable soil health, Recycling plant waste promotes sustainability. |
| AGE402.2-P04   | 1            | Resilient strategies address climate change.   |
| AGE402.2-P05   | 1            | Space-efficient gardening supports sustainable urbanization.                                     |
| AGE402.2-P06   | 1            | Selective breeding enhances crop performance.  |
| AGE402.2-P07   | 1            | Satellite data optimizes farm management.  |
| AGE402.2-P08   | --           |  |
| AGE402.2-P09   | --           |  |
| AGE402.2-P10   | --           |  |
| AGE402.2-P11   | --           |  |
| AGE402.2-P12   | -            |  |

## Justification for CO-PSO Mapping

### Topics beyond Syllabus

| S.No. | Description | Proposed Actions |
|-------|-------------|------------------|
| 1     |             | Assignment       |
| 2     |             | Seminar          |

### TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/PROJECTS/NPTEL ETC

#### Topic beyond Syllabus: Mapping with PO and PSO:

| Topic beyond syllabus | Program Outcomes (PO) |     |     |     |     |     |     |     |     |      |      |      | Program Specific Outcomes (PSO's) |      |
|-----------------------|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----------------------------------|------|
|                       | PO1                   | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1                              | PSO2 |
| 1.                    | 3                     | 3   | 2   | 3   | 3   | -   | -   | -   | -   | -    | -    | 2    | 3                                 | 2    |

#### Justification for Topic beyond the Syllabus (TBS) -PO Mapping.

| Mapping  | Level | Justification  |
|----------|-------|--|
| TBS-PO1  | 3     | Apply the knowledge of Mathematics, science, Engineering Fundamentals and an Engineering Specialization to the Solution of complex Engineering problems.   |
| TBS-PO2  | 3     | Identify formulate, review Research literature and Analyze Complex Engineering Problems reaching Substantiated conclusions using first principles of Mathematics , Natural Sciences , and Engineering Sciences   |
| TBS-PO3  | 2     | Design Solutions for Complex Engineering and Problems and design System Components are processes that meet the specified needs with appropriate Consideration for the public health and Safety and the cultural, Societal and Environmental Considerations |
| TBS -PO4 | 3     | Use research-based Knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide conclusions  |
| TBS -PO5 | 3     | Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to Complex Engineering Activities with an understanding of the limitations   |

**Justification for Topic Beyond the Syllabus (TBS) -PSO Mapping.**

| <b>Mapping</b> | <b>Level</b> | <b>Justification</b>   |
|----------------|--------------|--|
| TBS-PSO1       | 3            | Ability in terms of innovative and creative thinking, formulate problem solutions towards real and practical field problems in Agricultural Engineering(Core Skills).  |
| TBS-PSO2       | 2            | Ability to learn new Scientific technologies by acquiring knowledge in agricultural engineering to generate employment and entrepreneurship opportunities in agricultural engineering(Professional Development). |

**WEB SOURCE REFERENCES :**

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>2</b> |  |

## Syllabus / Lesson Plan:

| S.No            | SYLLABUS   | Periods   | Methodology                         | Text book/references /web references and additional text book reference |
|-----------------|--|-----------|-------------------------------------|---|
| <b>UNIT – I</b> |  |           |                                     |   |
| 1               | Horticulture – Definition - Divisions of horticulture with suitable examples.  | 1         | Chalk & Talk                        | T2, A1  |
| 2               | Scope and importance of horticulture   | 1         |                                     |   |
| 3               | Importance of horticulture in terms of income, employment generation, industry, religious, aesthetic, food & nutritive value and export. | 1         | Chalk & Talk,                       | T1, T2, A1  |
| 4               | Horticultural classification based on soil, climate and botanical classification.  | 1         | Chalk & Talk,                       | T2, A1  |
| 5               | Climate and soil for horticultural crops   | 1         | Chalk & Talk,                       | T1,T2   |
| 6               | Influence of environmental factors on horticultural crop production  | 1         |                                     |   |
| 7               | Temperature, humidity, wind, rainfall and solar radiation  | 1         | Chalk & Talk                        | T2, A1  |
| 8               | Influence of soil factors  | 1         | Chalk & Talk                        | T2, A1, A2  |
| 9               | Soil type, pH, EC.   | 1         | Chalk & Talk<br>Demo of mechanisms. |   |
|                 | <b>Total</b>   | <b>09</b> |                                     |   |
| <b>Unit II</b>  |  |           |                                     |   |
| 10              | Propagating structures- Plant propagation- Methods - Sexual and asexual .  | 1         | Chalk & Talk                        | T1, A1,A2   |
| 11              | Propagation by cuttings – Definition of cutting – Stem cuttings – Leaf cuttings – Root cuttings.   | 1         | Chalk & Talk                        | T1, A1,A2   |
| 12              | Propagation by Layering - Types of layering (tip, simple, compound, mound, trench, air layering)   | 1         | Chalk & Talk                        | T1, A1,A2   |
| 13              | Natural  | 1         | Chalk & Talk                        | T1, A1,A2   |

|                 |   |              |               |            |
|-----------------|---|--------------|---------------|------------|
|                 | modifications of layering (runners, suckers, stolon, offset)  |              |               |            |
| 14              | Propagation by separation - Bulbs, corms; division (rhizome, stem tuber, tuberous roots).                               | 1            | Chalk & Talk  | T1, A1,A2  |
| 15              | Grafting, budding -Rootstock and scion selection – Grafting methods   | 1            | Chalk & Talk  | T1, A1,A2  |
| 16              | Attached scion methods of grafting, simple or approach grafting,  | 1            | Chalk & Talk  | T1, A1,A2  |
| 17              | detached scion methods 140 of grafting (side grafting - Veneer grafting, apical grafting-epicotyl grafting.             | 1            | Chalk & Talk  | T2,A1      |
| 18              | double, soft wood grafting, cleft grafting, tongue grafting, whip grafting)   | 1            | Chalk & Talk  | T1, A1,A2  |
| 19              | Graft incompatibility – Types – Translocated and localized incompatibility  | 1            | Chalk & Talk, | T2, A1, A2 |
| 20              | Budding – Methods of budding – T-budding, inverted T-budding, patch budding and ring budding - Top working.             | 1            | Chalk & Talk  | T1, A1,A2  |
| <b>Unit III</b> |   |              |               |            |
|                 |   | <b>Total</b> | <b>09</b>     |            |
| 24              | Principles of orchard establishment .   | 1            | Chalk & Talk  | T2, A1, A2 |
| 25              | Points to be kept in mind while selecting site for the establishment of orchards  | 1            | Chalk & Talk  | T2, A1, A2 |
| 26              | Principles and steps in orchard establishment - Layout of orchards  | 1            | Chalk & Talk  | T2, A1, A2 |
| 27              | Systems of planting - Square, rectangle, quincunx, hexagonal and contour systems of planting- their merits and demerits | 1            | Chalk & Talk  | T2, A1, A2 |
| 28              | Principles and methods of training and pruning - Definition of training,  | 1            | Chalk & Talk  | T2, A1, A2 |
| 29              | objectives and training, principles and methods of training of fruit crops  | 1            | Chalk & Talk  | T2, A1, A2 |
| 30              | Open centre, closed centre and modified leader systems their merits and demerits  | 1            |               |            |
| 31              | Definition of pruning, objectives of pruning  | 1            | Chalk & Talk  | T2, A1, A2 |
| 32              | principles and methods of pruning of fruit crops.   | 1            | Chalk & Talk  | T2, A1, A2 |

|    |  |              |           |                         |                   |
|----|--|--------------|-----------|-------------------------|-------------------|
|    |  | <b>Total</b> | <b>09</b> |                         |                   |
|    | <b>Unit IV</b>   |              |           |                         |                   |
| 33 | Unfruitfulness, factors (physiological, phylogenical, management, parasitical, climatological)   |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 34 | pollination - Self and Cross pollination, pollinizers and pollinators  |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 35 | Fertilization and parthenocarpy – Types.   |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 36 | Types of vegetables Gardens – Kitchen Garden, market garden  |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 37 | truck garden, vegetable forcing, garden for processing, seed production garden and floating garden.                                    |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 38 | Ornamental garden types  |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 39 | – Formal – Informal – Wild Garden – Parts/features of an ornamental garden.  |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
|    | <b>TOTAL</b>   |              | <b>07</b> |                         |                   |
|    | <b>UNIT - V</b>  |              |           |                         |                   |
| 46 | Use of plant bio-regulators (PBR) in horticulture  |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 47 | Introduction – Applications of PBR in fruit crops.   |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 48 | Irrigation methods in horticulture crops   |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 49 | Different methods followed in horticultural crops (check basin, furrow, ring basin, basin, flood, pitcher, funnel, drip and sprinkler) |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 50 | Fertilizer application- Different methods of application to horticultural crops Broad casting, top dressing,                           |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 51 | localized placement, contact placement   |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
| 52 | Band placement, row placement, pellet, foliar application, starter solution, fertigation.  |              | <b>1</b>  | <b>Chalk &amp; Talk</b> | <b>T2, A1, A2</b> |
|    | <b>TOTAL</b>   |              | <b>15</b> |                         |                   |
|    | <b>GRAND TOTAL</b>   |              | <b>60</b> |                         |                   |

## Topic Beyond Syllabus:

| S.No. | Topic Beyond Syllabus Planning | PERIODS | Methodology      | Text book/references/web references and additional text book reference |
|-------|--------------------------------|---------|------------------|--|
| 1     |                                | 2       | Seminar          | T1, T2,A1  |
| 2     |                                | 2       | Industrial visit |  |

## Note: Bloom's Taxonomy Levels

|               |                   |             |
|---------------|-------------------|-------------|
| BTL1-Remember | BTL2 – Understand | BTL3 –Apply |
| BTL4-Analyze  | BT56 –Evaluate    | BTL6–Create |

## Text books (T) / Reference books (R)/Additional text books (A):

| T/R/A | Book Title/Author/Publication  |
|-------|--|
| T1    | Chadha, K.L. 2001. Handbook of Horticulture. ICAR, New Delhi.  |
| T2    | Jitendra Singh, 2012. Basic Horticulture. Kalyani Publishers. New Delhi.                                 |
| R1    | Randhawa, G.S. and Mukhopadhyaya, A. 1994. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi |
| R2    | Kumar, N. 1997. Introduction to Horticulture. Rajyalakshmi Publications, Nagorcoil, Tamilnadu.           |
| R3    | Singh, R. (2007) – Modern Fruit Production, Kalyani Publishers, New Delhi.                               |
| A1    | Peter, K.V. (2008) – <i>Basics of Horticulture</i> , New India Publishing Agency, New Delhi.             |
| A2    | Prasad, S. & Kumar, U. (1999) – <i>Principles of Horticulture</i> , Agrobios India.                      |

## Web References:

|    |  |
|----|--|
| W1 | ICAR – Indian Council of Agricultural Research<br><a href="https://icar.org.in">https://icar.org.in</a>  |
| W2 | NPTEL – Horticulture Online Courses<br><a href="https://nptel.ac.in/courses/126/126/126104004/">https://nptel.ac.in/courses/126/126/126104004/</a> |

|           |  |
|-----------|--|
|           |  |
| <b>W3</b> | <b>University of Horticultural Sciences, Bagalkot</b><br><a href="https://uhsbagalkot.karnataka.gov.in">https://uhsbagalkot.karnataka.gov.in</a> |

**A**  
**SSE**

**SSMENT METHODOLOGIES-DIRECT**

|   |  |   |   |
|---|--|---|---|
| <input checked="" type="checkbox"/> ASSIGNMENTS | <input checked="" type="checkbox"/> STUD. SEMINARS | <input checked="" type="checkbox"/> TESTS/MODEL EXAMS | <input checked="" type="checkbox"/> UNIV. EXAMINATION |
| <input type="checkbox"/> STUD. LAB PRACTICES    | <input type="checkbox"/> STUD. VIVA                | <input type="checkbox"/> MINI/MAJOR PROJECTS          | <input type="checkbox"/> CERTIFICATIONS               |
| <input type="checkbox"/> ADD-ON COURSES         | <input type="checkbox"/> OTHERS                    |   |   |

**ASSESSMENT METHODOLOGIES-INDIRECT**

|   |   |
|---|---|
| <input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE) | <input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE) |
| <input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS            | <input type="checkbox"/> OTHERS   |

**Prepared by**

**Approved by**