The Poona Gujarati Kelavani Mandal's
HARIBHAI V. DESAI COLLEGE
of Arts, Science & Commerce (Autonomous)
Affiliated to Savitribai Phule Pune University
(Linguistic Minority Institution) AICTE NO. : 1-44457797714
ID No.: PU / PN / ASC / 057/ (1984)
NAAC Grade B++ (2.86 CGPA) ■ AISHE CODE : C-41829
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Restructured Syllabus (CBCS Pattern as per NEP 2020)

To be implemented from Academic Year: 2024-25

Faculty	**Science**
Program	**B.Sc. Botany**
Class	**F.Y.B.Sc.**

PGK Mandal's

Haribhai V. Desai College of Arts Science and Commerce, Pune-02

(Autonomous)

Undergraduate Degree Program in Botany (B.Sc. Botany)

(Faculty of Science & Technology)

Revised Syllabi as per National Education Policy (2020) for

F.Y.B.Sc. Botany (Semester-I and II)

To be implemented from

Academic Year 2024-2025

Framed by

BOARD OF STUDIES IN BOTANY

Haribhai V. Desai College,

596 Badhwar Peth Pune -41100

Sem.	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
I	**Subject Code: BOT-101-TH.**	**Subject 1**	**Applied Aspects of Plant Sciences**	**Theory**	**02**	**03**

Course Objectives:

1. Equip students with the practical skills needed to apply theoretical knowledge in plant sciences to real-world scenarios, such as agriculture, horticulture, and environmental management.
2. Familiarize students with modern techniques and technologies used in plant scienceresearch and applications, including genetic engineering, biotechnology, and molecular biology.
3. Educate students about sustainable practices in plant production and resource management, emphasizing the importance of environmental conservation and sustainable agriculture.
4. Enhance students' ability to analyse and solve complex problems in plant sciences, including issues related to crop productivity, pest management, and environmental sustainability.
5. Foster a culture of innovation and creativity among students, encouraging them to explore new ideas and approaches to address challenges in plant sciences and agriculture.

Unit	Title and Contents Credit 1	No. of lectures in Clock Hours
1	Introduction to Applied Plant Sciences 1.1. Overview of key concepts and principles Importance of applied plant sciences in addressing global challenges.	02
2	Plant Biotechnology 2.1. Genetic engineering techniques in crop improvement. 2.2. Plant Tissue Culture for improvement of crop productivity. 2.3. Biopharmaceuticals and plant-derived drugs. Applications of biotechnology in plant breeding and biotic/abiotic stress tolerance.	04
3	Precision Agriculture 3.1. Remote sensing and GIS applications in agriculture. Use of drones and sensors for crop monitoring and management.	03
4	Sustainable Agriculture Practices 4.1. Organic farming methods and principles. Integrated pest management strategies.	03
5	Plant-Microbe Interactions 5.1. Role of plant-associated microbes in plant health and	03

	productivity. Applications of beneficial microbes in agriculture.	
		15
	Credit II	
6	Climate Change and Plant Sciences 6.1. Impact of climate change on plant growth and agriculture. Strategies for mitigating climate change effects through plant science interventions.	03
7	Urban Agriculture and Vertical Farming 7.1. Challenges and opportunities in urban agriculture. 7.2. Vertical farming technologies and their applications. 7.3. Ornamental plant cultivation. Urban gardening and landscaping.	03
8	Plant Health and Disease Management 8.1. Diagnosis and management of plant diseases. 8.2 Emerging technologies for disease detection and control.	03
9	Postharvest Technology 9.1 Techniques for prolonging shelf life and maintaining quality of harvested produce. 9.2 Importance of postharvest management in reducing food loss and waste.	03
10	Environmental applications 10.1. Plant ecology and conservation 10.2. Ecological restoration techniques 10.3 Phytoremediation and air purification.	03
		15
		Total =30

Course Outcomes:

1. Students will be able to apply advanced plant biotechnology techniques, such as genetic engineering and tissue culture, to improve crop productivity, develop genetically modified crops, and produce plant-derived pharmaceuticals.
2. Students will demonstrate the ability to implement and evaluate sustainable agricultural practices, including organic farming, integrated pest management, and the use of biofertilizers, to enhance soil health and crop yields while minimizing environmental impact.
3. Students will be proficient in utilizing precision agriculture technologies, such as remote sensing, GIS, drones, and sensors, to monitor and manage crop health, optimize resource use, and improve overall farm management efficiency.
4. Students will understand the role of plant-associated microbes in enhancing plant health and productivity, and be able to apply knowledge of beneficial microbes (e.g., *Rhizobium*, mycorrhizal fungi, PGPR) to improve soil fertility and plant growth in agricultural settings.

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Sem.	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
I	Practical based on BOT-101-TH.	Practical's based on Subject 1	Bot.102 PR	Practical	02	04 Hrs. per Pra. Batch

Course Objectives:

1. To equip students with hands-on experience in using essential laboratory instruments and equipment.
2. To provide students with a thorough understanding of the genetic engineering processes.
3. To train students soil health analysis and interpret the results in the context of soil health and sustainable agriculture.
4. To teach students the process of composting organic waste to produce biofertilizer and to evaluate its effectiveness in enhancing soil fertility and plant growth.
5. To demonstrate and practice post-harvest techniques. To organize visits to nurseries and plant-based industries and train students forpreparing visit reports to link theory with real-world application.

Unit	Title and Contents	No. of lectures in Clock Hours
1	Introduction to Stains, Mounting Media, Dissection box & Microscopes	**1P**
2	Study of life cycle of *Spirogyra* w.r.t. thallus, cell structure and reproduction.	**1 P**
3	Study of life cycle of *Albugo*/ Cystopus w.r.t. host, occurrence, morphology andreproduction.	**1 P**
4	Study of forms of lichens based on their external morphology – Crustose, Foliose and Fruticose.	**1 P**
5	Study of life cycle of *Riccia* w.r.t. external and internal morphology ofthallus and reproduction.	**1 P**
6	Study of *Nephrolepis* w.r.t. external morphology of sporophyte; Internal	**1 P**

	morphology of rachis and leaflet/ pinna passing through sori.	
7	Study of *Cycas* w.r.t. external morphology of sporophyte; Internal morphology of leaflet / pinna; Reproduction – male and female cone.	**1 P**
8	Study of comparative account of Dicotyledonous and Monocotyledonous plants with suitable examples.	**1 P**
9	Study of types of inflorescences.	**1 P**
10	Study of typical flower w.r.t. floral whorls calyx, corolla, perianth, androecium, gynoecium (*Hibiscus*, *Datura*, *Brassica*, *Glyricidia* / *Clitoria* /*Bean*, *Adhatoda* / *Ocimum*, *Polyanthus*, *Bouganvelia*, *Citrus*, Sunflower, *Cucurbita*)	**1 P**
11	Study of types of fruits.	**1 P**
12	Study of internal structure of Dicot and Monocot root	**1 P**
13	Study of internal structure of Dicot and Monocot Stem	**1 P**
14	Study of internal structure of Dicot and Monocot Leaf	**1 P**
15	Botanical Excursion to nearby locality to study the vegetation and diversity among various plant groups.	**1 P**
		15 P

Course Outcomes:

1. Students will develop hands-on expertise in using essential laboratory instruments and equipment.
2. Students will gain practical knowledge in demonstrating and evaluating genetically modified crops and evaluate the agronomic performance, environmental impact, and socio-economic benefits of these genetically modified crops.
3. Students will acquire the ability to estimate soil organic carbon using methods like Walkley-Black or similar wet oxidation techniques and interpret the significance of these measurements in soil health and sustainable agriculture.
4. Students will demonstrate the ability to compost kitchen waste and convert it into biofertilizer, highlighting the principles of organic waste management and sustainable recycling.
5. Students will study the effect of Mycorrhiza on crop plant growth attributes and understand the role of various plant-associated microbes, such as Rhizobia, Mycorrhizal fungi, PGPR, endophytic fungi, and nitrogen-fixing cyanobacteria, in improving plant health and productivity.
6. Students will demonstrate post-harvest techniques, including the preparation, value addition and preservation of agricultural products.
7. Students will visit nurseries and plant-based industries to explore exotic ornamental plants and industry products and by-products, preparing visit reports to understand their applications in indoor gardening and economic importance.

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Sem.	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
I	SEC 103 Bot. PR	SEC	Algal Technology	Practical	02	04 Hrs. per Batch

Objectives:

1. Gain an understanding of algal biology, including the diversity of algae species, their classification, and their ecological roles.
2. Learn various techniques for cultivating algae, including open pond systems, closed photo-bioreactors, and hybrid systems, to maximize biomass production.
3. Acquire skills in harvesting algae biomass and processing it into valuable products, such as biofuels, biofertilizers, and nutraceuticals.
4. Understand the potential of algae in bioremediation, including their ability to remove pollutants from water and air, and develop skills in applying algal technology for environmental remediation.
5. Develop skills in the development of value-added products from algae, such as cosmetics, pharmaceuticals, and food additives, to explore the commercial potential of algal technology.

Unit	Title and Contents	No. of lectures in Clock Hours
1	**Title of the Practical**	**1P**
2	To study the methods of collection, preservation and staining of algae.	**1 P**
3	Study of algae from freshwater bodies.	**1 P**
4	Study of thallus organization of - Unicellular algae - Non motile: *Chlorella* and Motile: *Chlamydomonas*; Colonial algae - *Volvox*; Filamentous algae: *Anabaena / Spirogyra*; Siphonous algae: *Caulerpa / Chara*; Parenchymatous algae: *Sargasssum / Gracillaria.*	**1 P**
5	Preparation of culture media for freshwater algae - Bolds Basal medium for Blue Green Algae, Modified Chu-10 medium, Nitsch	**1 P**

	medium.(Demonstration).	
6	Isolation of algae by dilution and streak culture technique (Demonstration).	**1 P**
7	Cultivation of *Spirulina.*	**1 P**
8	Study of commercial products of *Spirulina.*	**1 P**
9	Utilization of algae in Biofuel, agriculture and pharmaceuticals industries.(Demonstration).	**1 P**
10	Utilization of algae in food and fodder industry, algae and space research. (Demonstration).	**1 P**
11	Preparation of culture media for BGA.	**1 P**
12	Preparation of Blue Green Algae as a Biofertilizers.	**1 P**
13	Study of wastewater algae.	**1 P**
14	Study of algal bioluminescence (Demonstration).	**1 P**
		14 P

Course Outcomes:

1. Develop proficiency in cultivating algae using various methods, including open pond systems and photobioreactors, to maximize biomass production.
2. Acquire expertise in harvesting algae biomass and processing it into valuable products, such as biofuels, biofertilizers, and high-value chemicals.
3. Gain knowledge of algal biotechnology techniques, such as genetic engineering and strain selection, to enhance algal productivity and product quality.
4. Develop skills in using algae for bioremediation purposes, including the removal of pollutants from wastewater and the sequestration of carbon dioxide from the atmosphere.
5. Develop the ability to develop innovative algal-based products, such as cosmetics, pharmaceuticals, and functional foods, to meet market demands and promote sustainable development.

Unit	Title and Contents	No. of lectures in Clock Hours
	Credit I - PLANT KINGDOM	**15**
1	**Introduction to Plant Diversity** 1.1 Definition and concept of Plant Diversity. 1.2 General outline of Plant Kingdom. Avenues / Career opportunities available to Botanists	**02**
2	**Algae** 2.1 Introduction, definition and characters of Algae, suitable examples. Economic and Biotechnological Importance of Algae – 2.1 Algae as food: nutritional value and culinary uses. 2.1.1 Algae in industry: biofuels, pharmaceuticals, and bioremediation. 2.1.2 Biotechnological applications: algae cultivation, genetic engineering, and algae-based products.	**02**
3	**Fungi** 3.1. Introduction, definition and general characters of fungi; suitable examples. 3.2. Ecological and Economic Importance of Fungi – 3.2.1 Fungi in nutrient cycling and decomposition. 3.2.2 Symbiotic relationships: mycorrhizae, lichens. 3.2.3 Economic importance of fungi in industry and agriculture. Fungi in food production and fermentation processes.	**02**
4	**Lichens** 4.1 Introduction; definition and general characters of lichen; Types– crustose, foliose and fruticose. Importance of Lichen – Ecological significance: contribution to nutrient cycling, soil formation, and erosion control; Role of lichens as bio- indicators of environmental health.	**01**
5	**Bryophytes** 5.1 Introduction; definition and general characters; suitable examples. 5.2 Ecological and Economic Importance of Bryophytes – Ecological Importance of bryophytes - in Ecosystems, Soil formation and Stabilization, Habitat creation, Water retention and nutrient cycling. 5.2.2 Economic Importance of bryophytes – role of mosses in horticulture and landscaping, traditional and modern uses of bryophytes in medicine, economic value of bryophytes in industries such as forestry and agriculture.	**02**
6	**Pteridophytes** 6.1 Introduction; definition and general characters; suitable examples. 6.2 Ecological and Economic Importance of Pteridophytes – 6.2.1 Ecological Importance of Pteridophytes - Role of Pteridophytes in plant evolution; transition from aquatic to terrestrial habitat; Contribution to ecosystem diversity; Role in soil stabilization and conservation. 6.2.2 Economic Importance of Pteridophytes – Ornamental uses: landscaping and indoor plants; Medicinal uses: traditional	**02**

	and modern applications.	
7	**Gymnosperms** 7.1 Introduction; definition and general characters of gymnosperms; suitable examples. Ecological and Economic Importance – Economic significance: timber, paper, resin, ornamental and medicinal uses, etc.	**02**
8	**Angiosperms** 8.1 Introduction; definition and general characters of angiosperms; suitable examples. 8.2 Ecological and Economic importance of Angiosperms: – 8.2.1 Ecological Importance of Angiosperms: Role as Primary producers, in habitat and biodiversity, soil conservation, water regulation; pollinator support. Economic Importance of Angiosperms: Food, Fodder, Fiber, Medicine, Timber, Ornamental, Horticulture and Landscaping, Biofuel production.	**02**
	Credit II – PLANT MORPHOLOGY INTRODUCTORY ANATOMY	**15**
9	**Introduction to Plant Morphology** 9.1. Introduction, Definition; Types of morphology – Descriptive and Interpretative. 9.2. Importance of Morphology. Importance of Anatomy	**02**
10	**Morphology of Inflorescence** 10.1Definition, Parts of Inflorescence. Types of Inflorescences – a) Racemose – i) Main Axis Elongated – Raceme, Spike. ii) Main Axis Shortened – Umbel andCorymb; iii) Main Axis Flattened – Capitate, Head / Capitulum; b) Cymose – Solitary, axillary, Terminal, Uniparous (Monochasial), Biparous (Dichasial), Multiparous (Polychasial) Cyme; c) Special Type – Verticilliaster, Cyathium, Hypanthodium.	**02**
11	**Morphology of Flower** 11.1Definition, typical structure of flower. 11.2Types of flowers based on Symmetry, Insertion of floral whorls on thalamus. 11.3Floral whorls – I) Accessory whorls: a) Calyx: member - sepals, number, cohesion, types of calyces; Modifications of calyx – Petaloid, Pappus, Spurred. b) Corolla: member – petals: Claw and Limb; number, cohesion, types / forms of corolla – Polypetalous Regular – Cruciform; Polypetalous irregular – Papillionaceous; Gamopetalous Regular – Infundibuliform; Gamopetalous Irregular – Bilabiate. c) Perianth: member – tepals, number, cohesion, modifications – sepaloid and petaloid tepals. Aestivation – Definition; aestivation in calyx, corolla and perianth; types of aestivations. II) Necessary / Essential whorls: a) Androecium: member – stamen, Structure of stamen; Cohesion and Adhesion. b) Gynoecium: member – Carpel / Pistil; structure of carpel; Types of	**05**

	gynoecium based on carpel number and fusion; Placentation- Definition; types.	
12	**Morphology of Fruit:** Fruit: Definition and parts of fruit.	**01**
	INTRODUCTORY ANATOMY	
13	Introduction to Meristematic Tissues • Definition and characteristics of meristematic tissues • Classification based on position: ➢ Apical meristems ➢ Lateral meristems ➢ Intercalary meristems • Functions and significance in plant growth and development Detailed Classification of Meristematic Tissues • Primary vs. Secondary meristematic tissues • Role of meristematic tissues in plant morphogenesis Practical examples and case studies in plant tissue analysis	**02**
14	Permanent Tissues - Part I (Simple Tissues) • Overview of permanent tissues and their differentiation from meristematic tissues • Simple Tissues: ➢ Parenchyma: Structure, functions, and occurrence ➢ Collenchyma: Characteristics, role in plant flexibility and support ➢ Sclerenchyma: Properties, mechanical strength, and occurrence Permanent Tissues - Part II (Complex Tissues) • Complex Tissues: ➢ Xylem: Components (tracheids, vessels, fibers, parenchyma), structure, and functions ➢ Phloem: Elements (sieve tubes, companion cells, fibers, parenchyma), functions, and transport mechanisms • Comparative analysis of simple vs. complex tissues in plants	**02**
15	Tissue Systems - The Epidermal Tissue System • Definition and overview of tissue systems • Components of the epidermal tissue system: ➢ Epidermal cells, guard cells, stomata, trichomes ➢ Role in plant protection, gas exchange, and transpiration • Modifications of epidermal tissue in different plant species Practical and Applied Aspects of Plant Tissue Systems • Case studies on tissue system adaptations in various environmental conditions • Overview of tissue functions in plant physiology • Applications of tissue study in agriculture, plant breeding, and biotechnology	**02**
		Total =30

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Faculty	**Science**
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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
II	Bot- 151-T	Subject 1	Basics of Plant Science	Theory	02	03 Per Week

Course Objectives:

1. Develop a comprehensive understanding of the concept and importance of plant diversity, including an overview of the plant kingdom and the classification of various plant groups.
2. Gain knowledge about the characteristics, economic importance, and biotechnological applications of algae, including their use in food, industry, and bioremediation.
3. Understand the ecological roles and economic importance of fungi, including their roles in nutrient cycling, symbiotic relationships, and applications in food production and industry.
4. Explore the characteristics, ecological significance, and economic uses of lichen and bryophytes, including their roles in environmental monitoring, soil formation, and horticulture.
5. Gain insight into the characteristics and ecological and economic importance of pteridophytes, gymnosperms, and angiosperms, including their roles in ecosystems, agriculture, and industry.

Course Outcomes:

1. Students will demonstrate a clear understanding of the definition and concept of plant diversity, including the general outline of the plant kingdom and its major groups.
2. Students will be able to identify and describe the characteristics of algae, and explain their economic and biotechnological importance, including their roles in food, industry, and future research prospects.

3. Students will understand the ecological roles of fungi in nutrient cycling and symbiotic relationships, and recognize their economic importance in industry, agriculture, and food production.
4. Students will identify different types of lichens and bryophytes, and describe their ecological significance and economic uses, including their roles in environmental monitoring and traditional medicine.
5. Students will demonstrate knowledge of the characteristics and importance of pteridophytes, gymnosperms, and angiosperms, including their ecological roles, economic significance, and contributions to ecosystems and human welfare.

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Program	**B.Sc.**
Class	**F.Y.B.Sc.**

Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
II	BOT 151-BOT-T	Regular	Practical's Based on BOT 151-BOT-T	Practical	02	04 Hrs per week per batch

Course Objectives:

6. To equip students with hands-on experience in using essential laboratory instruments and equipment.
7. To provide students with a thorough understanding of the genetic engineering processes.
8. To train students soil health analysis and interpret the results in the context of soil health and sustainable agriculture.
9. To teach students the process of composting organic waste to produce biofertilizer and to evaluate its effectiveness in enhancing soil fertility and plant growth.
10. To demonstrate and practice post-harvest techniques.
11. To organize visits to nurseries and plant-based industries and train students.

Unit	Title of the Practical	No. of lectures in Clock Hours
1	Study of principles, working and practical applications of instruments andequipment used in plant tissue culture - pH meter, Autoclave, Hot air oven, Laminar Air Flow, Micropipettes, Digital One Pan Balance, Glass Distillation Unit).	1 P
2	Demonstration of genetically modified crops – Bt –Cotton, Bt-Maize, Golden Rice, Round-up ready Soybean.	1 P
3	Estimation of soil organic carbon by using Walkley-Black or Similarmethod (Wet oxidation).	1 P
4	To study the degradation of toxic textile dyes using plant biomass and its characterization using UV-Spectrophotometer and/or FTIR.	1 P
5	Study of petiole analysis of stressed and unstressed plants.	1 P
6	To demonstrate the composting of kitchen waste for the preparation ofbiofertilizer.	1 P
7	Demonstration of *Azolla* cultivation, nutrition and production attributes and its application as biofertilizer.	1 P
8	Preparation of 'Sanjivani Amrut' and its application to the crop and garden plants.	1 P
9	To study the effect of Mycorrhiza on growth attributes of crop plants.	1 P
10	Study on preparation of Dashparni Ark and EM solution.	1 P
11	Study of various plant-associated microbes useful in improvement of plant health and productivity – Rhizobia – *Rhizobium*	1 P
12	To demonstrate the post-harvest techniques w.r.t. preparation of amlacandy and alepak (Zinger wadi)	1 P
13	To study the vertical farming structures for its application in urbanagriculture or vertical gardening.	1 P
14	Demonstration of Hydroponics and aeroponics.	1 P
15	Visit to the nursery for the exploration of exotic ornamental plants and preparation of visit report for their application in in-door gardening practices.	1 P
16	Visit to the plant-based industry for exploring the products and byproducts of the industry and its importance in the economics.	1 P
17	Case study on ecological restoration of the any environmental site available in nearby locality.	1 P

Course Outcomes:

1. Students will develop hands-on expertise in using essential laboratory instruments and equipment.
2. Students will gain practical knowledge in demonstrating and evaluating genetically modified crops and evaluate the agronomic performance, environmental impact, and socio-economic benefits of these genetically modified crops.
3. Students will acquire the ability to estimate soil organic carbon using methods like Walkley-Black or similar wet oxidation techniques and interpret the significance of

these measurements in soil health and sustainable agriculture.

4. Students will demonstrate the ability to compost kitchen waste and convert it into biofertilizer, highlighting the principles of organic waste management and sustainable recycling.
5. Students will study the effect of Mycorrhiza on crop plant growth attributes and understand the role of various plant-associated microbes, such as Rhizobia, Mycorrhizal fungi, PGPR, endophytic fungi, and nitrogen-fixing cyanobacteria, in improving plant health and productivity.
6. Students will demonstrate post-harvest techniques, including the preparation, value addition and preservation of agricultural products.
7. Students will visit nurseries and plant-based industries to explore exotic ornamental plants and industry products and by-products, preparing visit reports to understand their applications in indoor gardening and economic importance.

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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
Sem.I	SEC-153-BOT-P	SEC	Plant Propagation Techniques	Practical	02	60

Course Objectives:

1. Enable students to identify and demonstrate the use and maintenance of various tools and equipment essential for plant propagation, ensuring a thorough understanding of their applications in horticulture.
2. Introduce students to the concepts and operational details of various plant propagation units. Utilize ICT tools to demonstrate the various climatic controls and their effects on plant growth, preparing students for modern horticultural practices.
3. Equip students with the knowledge to identify and describe various types of ornamental plants enhancing their understanding of botanical diversity and aesthetic applications.
4. Teach students the practical aspects of nursery management which are crucial skills for nursery operation.
5. Provide practical exposure to natural and artificial vegetative propagation methods to understand the biological and environmental factors that influence successful plant propagation.
6. Demonstrate various nursery management practices including different types of irrigation systems, fertilizer applications, and weed control methods. This will

enable students to manage nurseries effectively and sustainably.

7. Introduce students to advanced horticultural practices to provide modern approaches and creative solutions in urban horticulture.

Unit	Title and Contents	No. of lectures in Clock Hours
1	Demonstration of Tools and Equipment's used for plant propagation	01 P
2	Demonstration of Glass house, Green House, Net House and Poly house using ICT tools	01 P
3	Study of plants in ornamental gardens – Climbers, Creepers, Palms, Ferns, Grasses (Cacti) and Succulents.	01 P
4	Demonstration of planting materials and various types of containers used in nursery.	01 P
5	Preparation of nursery beds for raising of seedlings.	01 P
6	To study the natural vegetative methods of plant propagation.	02 P
7	To study the artificial vegetative methods of plant propagation – cutting and grafting	02 P
8	To study the artificial vegetative methods of plant propagation – budding and layering	02 P
9	To study the potting and repotting of ornamental plant.	01 P
10	Demonstration of different types of irrigation systems, fertilizer applications and weed practices in nursery management.	01 P
11	Demonstration of Bonsai techniques, Terrace, Vertical, and Indoor Garden with the help of ICT tools.	01 P
12	Study of soil w.r.t. water holding capacity and pH	01P
13	Visit to crop/Ornamental /Forest nursery and submission of visit report.	01 P
		13 P

Course Outcomes:

1. Students will gain hands-on experience and proficiency in the use and maintenance of various tools and equipment used in plant propagation, enabling effective and efficient handling of nursery operations.
2. Students will be able to operate and manage different types of controlled environments for plant propagation.
3. Students will develop skills in identifying, categorizing, and cultivating different types of ornamental plants for enhancing their ability to design and maintain aesthetic garden spaces.
4. Students will acquire the ability to prepare nursery beds, select appropriate planting materials and containers, and effectively raise seedlings, applying their knowledge to the establishment and management of a successful nursery.
5. Students will master both natural and artificial vegetative propagation methods with diverse methods to propagate various plant species.
6. Students will demonstrate knowledge and practical skills in different types of irrigation systems, fertilizer applications, and weed control strategies, contributing

to sustainable nursery and garden management.

7. Students will learn and apply advanced horticultural practices using modern tools and techniques, showcasing their capability in specialized gardening methods.

Assessment and Evaluation Methodology:

1. **Examination Pattern (For each Semester):** The examinations will be conducted semester wise for both Theory as well as Practical courses.

2. **Theory Paper of 02 Credits -**

   - Internal Exam (15 M) + Theory HVDC Exam (35 M) = Total 50 M
   - Duration: For Internal exam = 40 Min. and For HVDC Exam = 02 hours.
   - Practical Paper of 2 Credits -
   - Internal Exam (15 M) + HVDC Practical Exam (35 M) = Total 50 M
   - Duration: For Internal exam = 40 Min. and For HVDC Exam = More than 04 hours.

3. **Award of Class/Grade:** The class / grade for the courses of each semester will be followed as per the norms and conditions laid down by HVDC, Pune.

4. **ATKT Rules:** As per the norms given by HVDC, Pune.

5. **Important Note:**

   a. There shall be at least a short tour/field visit/industrial visit (1-2 days) per year for all UG students. Tours are the part of curriculum and obligatory to each student, failing which they will not be considered eligible to appear for the practical examination. Under unavoidable circumstances, if the student fails to attend the tour, he/she have to produce justifiable evidence for not attending the tour. However, in lieu of tour the candidate will have to complete the work assigned by the Department.

   c. The documents to be produced by each student at the time of practical examination (at the end of each Semester) are:

   - Submission of practical records (Journals).
   - Submission of a Tour / Visit report duly signed by the concerned practical In-charge and Head of the Department.
   - Any submissions / assignments, etc. based on the practical course.

Question paper pattern for Theory (2 Credit courses)

A student will have to solve the question paper of 35 marks. The paper setter should set thepaper on entire syllabus for total 61 marks, including optional questions. As the course is of 2 Credits (30 clock hour lectures), paper setter should allot 2.03 marks per lecture and accordingly, questions should be set for 30 lectures, 61 marks on entire syllabus.

Note: All questions compulsory.Time: 2 Hours

Que. 1) Answer any five of the following in one sentence 05 Marks

- Six questions
- Each for 1 mark

Que. 2a) Write any one of the following 06
Marksi.
ii.

Que. 2b) Write any one of the following 04
Marksi.
ii.

Que. 3a) Solve any one of the following 06
Marksi.
ii.

Que. 3b) Solve any one of the following 04
Marksi.
ii.

Que. 4) Write notes on (Any four) 10 Marks

a.
b.
c.
d.
e.
f.

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