

Deccan Education Society's

**Kirti M. Doongursee College of Arts, Science
and Commerce (AUTONOMOUS)
Dadar (W), Mumbai -28**



Affiliated to
UNIVERSITY OF MUMBAI

Bachelors of Science

- A-** U.G. Certificate in Botany
- B-** U.G. Diploma in Botany
- C-** **B.Sc (Botany)**

Syllabus for

Semester – Sem I & II

**Ref: GR dated 20th April, 2023 for Credit Structure of UG
(With effect from the academic year 2026-27 Progressively)**

The Semester-wise and Broad Course Category-wise Distribution of credits of the Undergraduate Programme: **SCIENCE 2024-25**

LEVEL	Semester	MAJOR SUBJECT 1	MAJOR SUBJECT 2	Minor	OE	VSC SEC	AEC VEC IKS	OJT FP CEP, CC, RP	CC/SEM
4.5	I	2 + 2 = 4	2 + 2 = 4	-----	2	2 + 2 VSC 2 SEC 2	2 + 2 + 2 VEC EVS 2 IKS 2 AEC L1 1 AEC L2 1	CC 2	22
	II	2 + 2 = 4	2 + 2 = 4	-----	2 + 2	2 + 2 VSC 2 SEC 2	2 + 2 VEC EVS 2 AEC L1 1 AEC L2 1	CC 2	22
5.0	III	2 + 2 + 4 = 8	-----	2 + 2 = 4	2	VSC 2	AEC L1 1 AEC L2 1	FP 2 CC 2	22
	IV	2 + 2 + 4 = 8	-----	2 + 2 = 4	2	SEC 2	AEC L1 1 AEC L2 1	FP 2 CC 2	22

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in Science Program will be able to	
PO1	Disciplinary Knowledge: Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate Program. Execute strong theoretical and practical understanding generated from the specific graduate Program in the area of work.
PO2	Critical Thinking and Problem solving: Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.
PO3	Social competence: Display the understanding, behavioral skills needed for successful social adaptation, work in groups, exhibits thoughts and ideas effectively in writing and orally.
PO4	Research-related skills and Scientific temper: Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research.
PO5	Trans-disciplinary knowledge: Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	Personal and professional competence: Performing dependently and collaboratively as a part of team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	Effective Citizenship and Ethics: Demonstrate empathetic social concern and equity centered national development and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	Environment and Sustainability: Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

PROGRAM SPECIFIC OUTCOMES

PSO	Description
A student completing Bachelor's Degree in Science Program will be able to	
PSO 1	Identify and classify major non-vascular and vascular plant groups , with an emphasis on understanding their evolutionary relationships.
PSO 2	Gain insights into plant evolution by studying phylogenetic relationships and examining different classification systems.
PSO 3	Investigate the structural, developmental, and economic aspects of algae, fungi, bryophytes, pteridophytes, gymnosperms, and angiosperms, including their morphology, anatomy, and embryology.
PSO 4	Comprehend key physiological mechanisms in plants , along with their adaptations to diverse environmental conditions.
PSO 5	Understand the impact of environmental elements and natural resources , highlighting their relevance to ecological balance and sustainable development.
PSO 6	Develop the ability to analyze plant extract for their phytochemical and explore the therapeutic uses of biologically active compounds derived from plants.
PSO 7	Acquire skills to work with various microbes , focusing on their industrial applications and roles in solving environmental problems.
PSO 8	Explore the foundation of modern medicine in traditional plant knowledge and understand ethno-medicinal approaches to healing and healthcare.
PSO 9	Learn about genetic inheritance and variation at individual, species, and population levels, and apply genetic principles to enhance plant productivity and quality.
PSO 10	Utilize statistical methods to interpret biological data , enabling comparison and understanding of variations across different datasets.
PSO 11	Stay in tune with the current advancements in molecular biology , including recombinant DNA technology, plant tissue culture, and bioinformatics, and understand their practical applications in plant science and biotechnology.
PSO 12	To develop entrepreneurial skills by applying botanical knowledge for the creation of sustainable, plant-based products and innovations, fostering start-up initiatives.



Deccan Education Society's
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Science and Commerce
(AUTONOMOUS)

Sr. No.	Heading	Particulars	
1	Title of program O: _____A	A	U.G. Certificate in _____
	O: _____B	B	U.G. Diploma in _____
	O: _____C	C	B.Sc. (BOTANY)
2	Eligibility O: _____A	A	HSC (Science) OR Passed Equivalent Academic Level 4.0
	O: _____B	B	Under Graduate Certificate in Botany OR Passed Equivalent Academic Level 4.5
	O: _____C	C	Under Graduate Diploma in Botany OR Passed Equivalent Academic Level 5.0
3	Duration of program R: _____	A	One Year
		B	Two Years
		C	Three Years
4	Intake Capacity R: _____	120	

Sign of the HOD &
Coordinator
BOS in _____

Sign of the NEP Coordinator,
DES's Kirti M. Doongursee
College

Sign of Principal
DES's Kirti M. Doongursee
College, Mumbai 28.

Preamble

1) Introduction

The National Education Policy 2020 emphasizes upon quality education for development, self- learning aptitude, scientific temper moral values and social responsibilities in students. The FYBSc syllabus has been designed as per the objectives and guidelines of National Education Policy 2020.

2) Aims and Objectives

The syllabus aims in imparting knowledge related to Plant Sciences, Current trends and advanced developments in the field of Plant Sciences and its interdisciplinary branches. The objectives of the syllabus are to enable learners to understand the basic concepts of Botany.

3) Learning Outcomes

The Semester I and II will culminate in students acquiring the following skills:

- a. Identify the major groups of organisms amongst plants and be able to classify them.
- b. Compare and contrast the characteristics of plants.
- c. Understand ecological interconnectedness and genetics.
- d. Apply the ayurvedic knowledge gained for common ailments.
- e. Demonstrate proficiency in the experimental techniques.

4) Any other point

The present syllabus also aims to develop Entrepreneur skills and Research aptitude in the learners.

**Deccan Education Society's
Kirti M. Doongursee College (Autonomous)
Proposed Curriculum as per NEP 2020 Year
of implementation- 2026-27
Name of the Department:
BOTANY
Class- F.Y.B.Sc.**

Semester	Course Code	Course Title	Vertical	Credit
I	26BOTMJ111	Plant Diversity-Form and Function-I	Major	2
	26BOTMJP11	Practical: Plant Diversity - Form and Function-I	Major Practical	2
	26BOTOE131	Systems of medicine	OE	2
	26BOTVC141	Practical: Morphology Based Identification of plants.	VSC Practical	2
	26BOTSE151	Practical: Organic Farming	SEC Practical	2
II	26BOTMJ211	Plant Diversity-Form and Function-II	Major	2
	26BOTMJP21	Practical: Plant Diversity - Form and Function-II	Major Practical	2
	26BOTVC241	Practical: Floriculture and Hydroponics industries	VSC Practical	2
	26BOTSE251	Practical: Preservation techniques of fruits and vegetables	SEC Practical	2

Course Code	SEM – I: BOTANY- MAJOR	Credits	Lectures/Week
26BOTMJ111	Plant Diversity-Form and Function-I	2	2
Course Objectives (CO): The student should be able to CO 1: Recall and recognize the structure, systematic position and economic importance of algae, fungi, bryophyte, along with key ideas in cell biology, genetics and ecology. CO 2: Build a clear understanding of morphological organization, classification, cellular structures and functions, genetic principles, ecosystem components and plant interactions with environmental factors. CO 3: Apply taxonomic knowledge, genetic laws such as Mendelian inheritance and ecological principles to explain biological and environmental phenomena. CO 4: Develop analytical competence, allowing learners to distinguish between plant groups, evaluate cellular and genetic mechanisms, also interpret ecosystem dynamics and energy flow.			
Course Outcomes (OC): After successful completion of this course, students would be able to OC 1: Identify and list structural features, classification, and economic importance of <i>Spirogyra</i>, <i>Aspergillus</i>, and <i>Riccia</i>, along with essential terminologies in cell biology, genetics, and ecology. OC 2: Describe and interpret morphological characteristics, economic relevance, organelle functions, genetic laws, and the structure and functioning of ecosystems. OC 3: Apply knowledge in practical and problem-solving contexts, including interpretation of genetic crosses, application of Mendelian principles and explanation of plant responses to environmental factors such as light, water, temperature. OC 4: Critically examine and compare plant groups, cellular structures, genetic patterns, and different ecosystem types, including assessment of energy flow and ecological interactions.			
Unit	Topics	No of Lectures	
I	ALGAE, FUNGI and BRYOPHYTA: 1. Structure and systematic position of: 1. Algae :- <i>Spirogyra</i>. 2. Fungi :- <i>Aspergillus</i> 3. Bryophyta :- <i>Riccia</i> 2. Economic importance of - Algae - Fungi - Bryophyta related to Horticulture.	15	

II	CELL BIOLOGY, GENETICS and ECOLOGY: 1. Ultra-structure and functions of the following cell organelles: Endoplasmic reticulum, and cell wall. 2. General structure of Nucleic acids, Genetic terminologies, Mendelian laws, back cross and Test cross. 3. Ecosystem (concept, components and functions) and Types of Ecosystems (aquatic and terrestrial), Energy flow models. plant interaction with factors -Light, Water and Temperature.	15
References: 1. College Botany Volume I and II Gangulee, Das and Dutta latest edition. Central Education enterprises 2. Cryptogamic Botany Volume I and II by G M Smith, McGraw Hill publication. 3. Book for Degree Students- Algae by B R Vasistha, A.K.Sinha, S Chand Publication. 4. Book for Degree Students- Fungi by B R Vasistha, A.K.Sinha, S Chand Publication. 5. Book for Degree Students- Bryophytes by B R Vasistha, A.K.Sinha, S Chand Publication. 6. Cell and Molecular Biology by De Robertis. Publisher- Walters Kluwer. 7. Genetics by Russel. Wesley Longman inc. publishers. (5th edition) 8. An introduction to Genetics by A. M. Winchester, Publication-Barnes and Noble. 9. A Textbook of Cell Biology and Genetics by Veer Bala Rastogi. 10. Cytology, Genetics and Evolution by P. K. Gupta 11. Fundamentals of Ecology by E P Odum and G W Barrett. Thompson Asia Pvt. Ltd. Singapore. 12. Ecology by P. D. Sharma. 13. Environmental Studies by Erach Bharucha 14. Environmental Science by S. C. Santra		

Course Code	SEM I: Botany –Major Practical	Credit s	Lectures /Week	Total HRS.
26BOTMJP11	Practical: Plant Diversity – Form and Function-I	2	4	60

Course Objectives (CO): The student should be able to

- CO 1:** Develop the ability to recall and recognize structural features, economic importance, cytological aspects, ecological adaptations also basic statistical concepts related to algae, fungi, bryophytes, and environmental studies.
- CO 2:** Enabled to comprehend morphological organization, life processes, economic uses of organisms, stages of mitosis, cell organelles, ecological adaptations and principles of ecological instruments, statistical measures.
- CO 3:** Apply knowledge in microscopic observation, specimen identification, preparation of agar-based products, moss sticks, use of ecological instruments, environmental assessment and statistical calculations.
- CO 4:** Analyze and differentiate among plant groups, cellular structures, ecological adaptations, karyotypes, and to interpret ecological and statistical data.

Course Outcomes (OC)

After successful completion of this course, students would be able to

- OC 1:** Identify and list structures of selected algae, fungi, bryophytes, cell organelles, mitotic stages, karyotypes, ecological instruments and plant adaptations.
- OC 2:** To explain and interpret morphological features, economic importance of organisms, ecological adaptations and the functioning of ecological instruments and statistical concepts.
- OC 3:** Apply their knowledge in practical contexts, including slide observation, specimen identification, preparation of agar-based products, moss sticks, use of ecological tools, and computation of mean, median, mode.
- OC 4:** Analyze and compare plant groups, stages of mitosis, karyotypes, and ecological adaptations, and interpret environmental and statistical data effectively.

Sr. No.	Experiment	
1	Study of structure of <i>Spirogyra</i> from fresh/ preserved material and permanent slides.	60
2	Study of structure of <i>Aspergillus</i> from fresh/ preserved material and permanent slides.	
3	Economic importance of algae: <i>Ulva</i> (Biofuel), <i>Spirulina</i> (Nutraceutical), <i>Gelidium</i> (Agar) and Preparation of Jelly/ Pudding / Custard using Agar-Agar.	
4	Economic importance of Fungi: Agaricus, Ganoderma and Yeast.	
5	Study of structure of <i>Riccia</i> from fresh/preserved material and permanent slides.	
6	Economic importance of Bryophytes in Horticultural practices: Demonstration practical - Preparation of Moss sticks.	
7	Study of various stages of mitosis in root tip cells (<i>Allium</i>)	
8	Identification of cell organelles with the help of photomicrograph Mitochondrion, Chloroplast and Endoplasmic Reticulum.	
9	Study of Human Karyotypes: Normal male and female.	
10	Identification of plants adapted to different environmental conditions: Hydrophytes: Floating: Free floating (<i>Pistia/Eichhornia</i>); Rooted floating (<i>Nymphaea</i>); Submerged (<i>Hydrilla</i>)	

11	Xerophytes: Succulent (<i>Opuntia</i>); Woody Xerophyte (<i>Nerium</i>); Halophyte (<i>Avicennia</i> pneumatophore) No sections in ecology, only identification and description of specimens. Morphological adaptations only
12	Study of Ecotypes: <i>Portulaca oleracea</i>
13	Ecological instruments: Lux meter, Rain gauge, Soil thermometer and Study of Dust load from roadside leaves.
14	Determination of mean, median and mode.
15	Field visit

Course Code	SEM – I: BOTANY-Open Elective (OE)	Credits	Lecture s/Week
26BOTOE131	Systems of Medicine	2	2
Course Objectives (CO): The student should be able to CO 1: Recall and recognize the historical development and fundamental concepts of various systems of medicine, including traditional and modern approaches. CO 2: Understand the principles, philosophies, and treatment approaches in Ayurveda, Unani, Homeopathy, Allopathy, and various alternative therapies, along with the basics of infectious diseases. CO 3: Apply their knowledge of medical systems and therapeutic methods in contexts related to health care, disease prevention, and overall well-being. CO 4: Critically analyze and distinguish between diverse medical systems, treatment modalities, and patterns of infectious and contagious diseases.			
Course Outcomes (OC) After successful completion of this course, students would be able to OC 1: Identify and enumerate major systems of medicine, their historical background, important texts, and common infectious and contagious diseases. OC 2: Demonstrate understanding by describing and interpreting the concepts, principles, and therapeutic approaches associated with different systems of medicine. OC 3: Apply learned concepts to recognize symptoms, suggest preventive measures, and relate appropriate therapeutic practices for maintaining health. OC 4: Compare and evaluate various medical systems and treatment methods, while interpreting the causes, spread, and prevention of infectious diseases.			
Unit	Topics	No of Lectures	
I	SYSTEMS OF MEDICINE 1: 1. Introduction and history of medicine 2. Ayurveda - Sushrut Samhita, Charak Samhita, Philosophy 3. Unani -Introduction History, Principle and concept 4. Homeopathy - Principle and concept	15	
II	SYSTEMS OF MEDICINE 2: 1. Allopathy- Pharmaceutical medicine, Psychotherapy, Surgery, radiation therapy, Physical rehab 2. Alternative therapy – Acupuncture, Acupressure, Massage therapy, Yoga, Reiki, Tai chi and aromatherapy 3. Infectious and contagious disease -Symptoms and prevention	15	

References:

1. The practical guide to Healthy Living, Danny Cavanagh and Carol Willis, Ayurveda UK publication
2. Ayurvedic Healing by Dr. David Frawley and O.M.D, Motilal Banarasi das Publishers 1989.
3. Unani: The system of Medicine, Prof. Rais-Ur-Rahman; Advisor, Department of Ayush, Ministry of Health and Family Welfare, Govt of India.
4. Homeopathic Principles and Practice of Medicine, Dr. V.K. Chauhan, B. Jain Publishers.
5. Aromatherapeutic Blending, Jennifer Peace Rhind, Singing Dragon Publishers.
6. Physical Rehabilitation, 5th Edition, Susan B. O'Sullivan, F.A. Davis Company, USA
7. Book on Ancient Wisdom Modern concept, Indus Valley ayurvedic Centre, Mysore Karnataka.
8. Charak Samhita – 4 volumes, P.V. Sharma, Chaukhambha; Orientalia Publisher
9. Acupuncture from ancient art to modern medicine by Alexander Macdonald, Geroge Allen, Unwin London, 1982.
10. Hand Book of Aromatic Plants by Prof. Supriya Kumar Bhattacharjee, Pointer Publishers, 2000.

Course Code	Vocational Skill Course (VSC) – Practical	Credits	Lectures/ Week	Total HRS.
26BOTVC141	Field Practices in botany	2	4	60
Course Objectives (CO): The student should be able to CO1: Identify and recall field tools, plant morphological features, types of plant associations, and key elements of organic farming and soil parameters. CO2: Build a clear understanding of the use of field study tools and advanced devices, structural organization of plants (root, stem, leaf, flower, inflorescence), and principles underlying organic farming and soil testing. CO3: Apply knowledge and skills in field-based activities such as plant identification using apps, seed collection and viability testing, use of GPS/GIS tools, and assessment of soil pH. CO4: Develop analytical understanding to compare plant morphological features, distinguish types of plant associations and inflorescences, and interpret field observations along with agricultural practices.				
Course Outcomes (OC) After successful completion of this course, students would be able to OC 1: Identifying and listing field tools, plant types (herbs, shrubs, climbers, trees), root and leaf forms, floral parts, inflorescence types, and components of organic farming. OC 2: Explain and describe the functioning of field equipment, plant identification techniques, morphological characteristics, plant associations, and the role of biofertilizers, biopesticides, and soil parameters. OC 3: Apply their knowledge in practical situations, and use plant identification apps, GPS/GIS tools, seed viability testing, soil pH analysis, and identification of plant morphological features in the field. OC 4: Compare and interpret variations in plant morphology, types of inflorescences and associations, and evaluate field data related to organic farming practices and soil conditions.				
Sr. No.	Experiment			
1	Study of useful tools for field visits – Books, Magnifying glass, Catalogues, Herbaria and Cooks flora.	60		
2	Application of advance devices for field study: Plant identifications Apps- GIS and GPS			
3	Contemporary trends in field study- Digital cameras for Photographs and Reels.			
4	Study of seed collection method and Testing of seed viability.			
5	Study of pant morphology related to Habit- Herbs, Shrubs, Climbers and Trees,			
6	Study of Root morphology – Tap root and Fibrous root system			
7	Study of Leaf morphology – Simple and Compound leaf, and leaf Venation.			
8	Study of Flower morphology – Parts of flower calyx, Corolla, Androecium, Gynoecium and Perianth.			

9	Study of Flower morphology- Types of flowers - Pedicellate, sessile, unisexual, bisexual, superior, inferior and flower symmetry.
10	Study of Inflorescence morphology – Racemose and Cymose.
11	Association of plants- Epiphytic (Vanda) and Parasitic (Cuscuta).
12	Organic farming – Green manure (Sunhemp - <i>Crotalaria juncea</i> ; Dhaincha- <i>Sesbania aculeate</i> ; <i>Gliricidia maculata</i>), FYM and Compost
13	Biofertilizers (Nostoc, Anabaena and Rhizobium in root nodule) and Biopesticides,
14	Testing of soil parameters – Soil pH
15	Field report.
References: 1. College Botany Vol I, II and III by Gangulee Das and Dutta Central Education enterprises. Ecology by Santra 2. Ecology by Kumar 3. Leaf based Identification for Trees of Sanhydri by Shrikant Ingahalikar 2021, Corolla Publication.	

Course Code	SEM-I: Skill Enhancement Course (SEC) – Practical	Credits	Lectures/Week	Total hrs.
26BOTSE151	Organic Farming and Urban gardening	2	4	60

Course Objectives (CO): The student should be able to

- CO 1:** Identify organic farming and urban gardening inputs such as mulching materials, green manures, organic manures, biofertilizers, biopesticides, and plant propagation methods.
- CO 2:** Understand the principles and practices of organic farming, including composting, vermicomposting, urban gardening techniques, plant protection strategies, and soil and water quality parameters.
- CO 3:** Apply organic farming techniques in practical contexts such as preparation of compost, plant health promoters, propagation methods, soil and water testing, and urban gardening models.
- CO 4:** Evaluate different organic inputs, bio-control methods, propagation techniques, and certification processes in relation to sustainable agriculture.

Course Outcomes (OC)

After successful completion of this course, students would be able to

- OC 1:** list and recognize various organic materials, green manures, biofertilizers, biopesticides, propagation methods, and components of urban gardening and soil testing.
- OC 2:** Understand the role and functioning of organic farming practices, composting methods, plant health promoters, and bio-control agents in sustainable agriculture.
- OC 3:** Apply their knowledge in practical situations, such as preparation of compost and vermicompost, execution of propagation techniques, development of urban gardens, and testing of soil and water parameters.
- OC 4:** Develop the ability to compare and interpret different organic farming practices, evaluate the effectiveness of biofertilizers and biopesticides, and assess soil, water quality, and certification procedures.

Sr. No.	Experiment	
1	Application of organic materials for mulching- E.g. Coconut husk, Sugarcane bagasse and leaf litter.	60
2	Study of concept and examples of friends of farmers- E.g. Earthworm, <i>Trichogramma parasitoids</i> Wasp (egg parasite) for preventing insects and Green lacewing for controlling Aphid and other pests.	
3	Study of Green Manures. E.g. Sun hemp (<i>Crotalaria juncea</i>), Cowpea (<i>Vigna sinensis</i>), Green gram (<i>Vigna radiate</i>) & Dhaincha (<i>Sesbania aculeate</i>).	
4	Study of Organic Manures and their uses. E.g. Farm Yard Manure and Oil cakes	
5	Process of Composting and Vermicomposting.	
6	Study of Materials and Methodology for Urban Gardening - Bottle Garden, Vertical Garden and Open terrarium (Dish Garden)	
7	Propagation practices – Stem Cutting, Leaf cutting and Layering	
8	Demonstration practical – Bonsai preparation.	
9	Study of Bio-pesticides and Bio-control agents - E.g. <i>Zygogramma bicolorata</i> for control of Congress Grass; <i>Beauveria bassiana</i> fungus for insect management; <i>Trichoderma harzianum</i> fungus for control of phytopathogens and Predaceous fungi for control of nematodes which cause root knot disease.	

10	Study of Bio-fertilizers and their uses-E.g. Nostoc, Anabaena and Rhizobium in root nodule.	
11	Testing of Soil parameters- pH and Organic matter content.	
12	Testing of Water quality parameters- pH.	
13	Preparation of Plant Health Promoters-E.g. Amrutpani. Panchgavya, Jeevamrut and Beejamrut.	
14	Process of Organic Certification.	
15	Field study- Report.	
References:		
4. Manual of City farming Published by Marathi Vidnyan Parishad		
5. “Shahari Sheti” Hand book of Organic farming By Arun K. Sharma, Agrobios India, 2001.		
6. Organic Farming for Business by Dr. T. Natrajan, Swastik Publications Delhi, 2011.		
7. A handbook of city trees and urban planting by S.G. Neginhal.		
8. Plant propagation by M. K. Sadhu		
9. Plant Propagation and Nursery Management, M. Kumar et al. Narendra Publishing House		
10.College Botany Volume II & III, B. P. Pandey, S. Chand Publishing		
11.Basic Bonsai-The Indian Way, Mangala Rao-Nilangekar.		
12.Wonderworld of Bonsai and Saikei, Jyoti Nikunj Parekh.		

Course Code	SEM – II: BOTANY-MAJOR	Credits	Lecture s/Week
26BOTMJ211	Plant Diversity-Form and Function-II	2	2
Course Objectives (CO): The student should be able to CO 1: Recall and recognize the structure and systematic position of pteridophytes, characteristics of selected angiosperm families, types of fruits, basic horticultural concepts, plant anatomy, and traditional medicinal plants. CO 2: Develop a clear understanding of floral modifications, family characteristics, branches of horticulture, fruit processing, anatomical organization of plant organs, medicinal applications, and principles of chromatography. CO 3: Apply their knowledge in identifying plant families and fruit types, relating anatomical features to function, utilizing medicinal plants for common ailments, and applying chromatographic techniques in basic analysis. CO 4: Build analytical abilities, allowing learners to compare plant groups, evaluate anatomical differences between monocots and dicots, interpret horticultural practices, and analyze chromatographic outcomes and medicinal applications.			
Course Outcomes (OC) After successful completion of this course, students would be able to OC 1: Identify and list features of <i>Nephrolepis</i> , angiosperm families, types of fruits, plant anatomical structures, and examples of medicinal plants and chromatographic methods. OC 2: Explain and interpret floral modifications, family characteristics, horticultural branches, fruit processing methods, plant anatomy, medicinal uses, and the principles of chromatography. OC 3: Apply acquired knowledge in identification of plant families and fruit types, relating structure to function in plant organs, use of medicinal plants for common conditions, and basic application of chromatography. OC 4: Compare and evaluate plant structures, distinguish between monocot and dicot anatomy, assess horticultural practices, and interpret chromatographic data and medicinal applications.			
Unit	Topics	No of Lectures	
I	PTERIDOPHYTES, ANGIOSPERMS and HORTICULTURE 1. Structure and systematic position of <i>Nephrolepis</i> . Economic importance of Pteridophytes 2. Study of Modification of floral whorls. Study of families: Amaryllidaceae and Magnoliaceae. 3. Introduction to the concept of horticulture, Branches of horticulture, Olericulture and pomology in detail. 4. Processing of vegetables and fruits. Type of fruits – Simple, aggregate, Composite and accessory.	15	

II	ANATOMY and APPLICATIONS OF PLANT SCIENCE: 1. Primary structure of dicot and monocot Root, leaf and Stomata. 2. Traditional medicinal practices for various ailments: (a) Cough and Cold - <i>Occimum sanctum</i> (Tulsi) and <i>Adathoda vasaka</i> (Adulsa). (b) Gastrointestinal- <i>Cuminum cymium</i> (Jeera) and <i>Ferula narthex</i> (Hing). 3. Introduction to chromatography, Types of Chromatography, factors affecting Rf value, Application of Chromatography.	15
References: 1. Book for degree students, Pteridophyta – By P. C. Vashistha, S. Chand publications 2. College Botany volume I, II and III Gangulee, Das and Dutta, Central education enterprise 3. Plant Anatomy by B.P. Pandey, S. Chand Publications 4. Plant Anatomy, K. V. Krishnamurthy, Tata McGraw-Hill Education 5. Plant Anatomy, Easu, K. 1983, Wiley Eastern Limited 6. Plant Anatomy and Embryology, V. Singh, Pande and Jain, Rastogi Publications 7. Plant Morphology, Dr. K. N. Dhumal, Dr. Sayyed Iliyas, Nirali Prakashan 8. A Textbook of Morphology and Anatomy, S. M. Karande and A. Abhang. 9. Botany for Degree Students, B. R. Vashishta, S. Chand Publications 10. Plant Systematics: Theory and Practice, Gurucharan Singh. CBS Publishers and Distributors 11. Plant Ecology and Taxonomy, B. P. Pandey. S. Chand Publications 12. A handbook of Ethnobotany by S. K. Jain and v. Mudgal 13. Dictionary of Indian Folk medicine and Ethnobotany by S.K. Jain, Deep publications 14. Fundamentals of Horticulture – 4th edition by Edmand, Senn, Andrew and Halfacre, Tata McGraw Hill publication 15. Principals of horticulture – E.L. Denisen, Macmillan Publications 16. Complete Herbalist, Volume I and II, O. Phelps Brown, Logos Press new Delhi 2009 17. Chromatography by H. Kaur. Pragati Prakashan 18. Basic Principles of Chromatography & HPLC, Arunadevi S. Birajdar; Pharma Med Press 19. Chromatography for Degree, Honors, Post-Graduate, B. K. Sharma, Goel Publishing House		

Course Code	SEM II: Botany-Major practical	Credits	Lectures /Week	Total HRS.
26BOTMJP21	Plant Diversity- Form and Function-II	2	4	60
Course Objectives (CO): The student should be able to CO 1: Recognize key specimens and concepts, enabling recognition of <i>Nephrolepis</i> , angiosperm families, fruit types, plant anatomical features, and examples of medicinal plants. CO 2: Grasp structural details and relationships, including floral modifications, internal organization of stems, stomatal types, epidermal outgrowths, horticultural practices, and the basis of chromatography and natural indicators. CO 3: Carry out laboratory and field-based tasks, applying knowledge such as specimen identification, microscopic examination, classification of fruits, use of medicinal plants, and execution of techniques like paper chromatography and pH indication. CO 4: Examine and differentiate, helping students distinguish floral variations, anatomical differences (monocot vs dicot), types of trichomes and stomata, and interpret chromatographic separation and indicator responses.				
Course Outcomes (OC) After successful completion of this course, students would be able to OC 1: Identify and label specimens including <i>Nephrolepis</i> , members of Amaryllidaceae and Magnoliaceae, fruit types, stem structures, stomata, trichomes, and commonly used medicinal plants. OC 2: Explain observed features such as floral modifications, anatomical organization of stems, diversity of epidermal outgrowths, horticultural applications, and the principles behind chromatography and natural pH indicators. OC 3: Perform essential practical skills, including microscopic study of plant sections, classification of fruits, identification of medicinal plant materials, and laboratory exercises like circular paper chromatography and anthocyanin-based pH testing. OC 4: Differentiate and interpret observations, comparing monocot and dicot structures, analyzing floral modifications, evaluating plant-based remedies, and drawing conclusions from chromatographic and indicator experiments.				
Sr. No.	Experiment	60		
1	Study of structure of <i>Nephrolepis</i> .			
2	Economic importance of Pteridophyta: Ornamental, Medicine and Agriculture			
3	Flower morphology : Modification of Calyx and Corolla			
4	Flower morphology : Modification of Androecium and Gynoecium			
5	Angiosperms: Family Amaryllidaceae and Magnoliaceae			
6	Morphology of fruits – Simple (Drupe), Aggregate (custard apple) Composite (Pineapple) and Accessory (Pome)			
7	Branch of horticulture with respect to PHT-Preservation-drying Vegetable (Methi), Fruit (Chiku), Medicinal (Turmeric).			
8	Primary structure of Dicot stem.			

9	Primary structure of Monocot stem.	
10	Epidermal Outgrowths –Trichomes eg. <i>Lantana</i> stem, Unicellular hair eg. <i>Gossypium</i> , Multicellular hairs – e.g. <i>Sida</i> (Stellate hair) and <i>Thespesia</i> (Peltate hair)	
11	Study of Dicot and Monocot stomata.	
12	Identification of plants or plant parts for Traditional medicinal practices for various ailments; Cough and Cold - Tulsi and Adulsa; Gastrointestinal- Jeera and Hing.	
13	Separation of amino acids by Circular Paper Chromatography.	
14	Study of Anthocyanin as a pH indicator (Black grapes/Purple cabbage)	
15	Field visit	

Course Code	SEM-II: Vocational Skill Course (VSC) - Practical	Credits	Lectures/ Week	Total HRS.
26BOTVC241	Hydroponics and Floriculture Industries	2	4	60
Course Objectives (CO): The student should be able to CO 1: Be familiar with various floriculture practices and concepts, enabling recognition of greenhouse types, ornamental plants, foliage plants, fillers, and hydroponic systems. CO 2: Develop a clear grasp of flower cultivation methods (poly-house and open field), drying techniques, floral uses, and the principles underlying hydroponics and nutrient management. CO 3: Perform essential tasks, including flower cultivation practices, preparation of floral arrangements, drying of flowers, and monitoring hydroponic systems through EC and pH determination. CO 4: Evaluate and differentiate cultivation techniques, plant selection for specific purposes (butterfly gardens, fillers, foliage), drying methods, and efficiency of hydroponic setups.				
Course Outcomes (OC) After successful completion of this course, students would be able to OC 1: Identify and list different greenhouse types, flower crops, ornamental and foliage plants, fillers, drying methods, and hydroponic systems. OC 2: Explain the concepts and processes involved in flower cultivation, drying techniques, floral applications, and functioning of hydroponic nutrient systems. OC 3: Carry out practical activities, including preparation of floral arrangements, drying of flowers, use of cut flowers, and measurement of EC and pH in hydroponic setups. OC 4: Compare and interpret different cultivation practices, evaluate plant suitability for various garden types, assess drying techniques, and analyze hydroponic system parameters.				
Sr. No.	Experiment			
1	Study of various types of Greenhouses for the cultivation of flowers.	60		
2	Process of cultivation of flowers in Poly-house-Gerbera, Orchid, Carnation, Lily and Anthurium.			
3	Method of open field cultivation of Gladiolus and Heliconias.			
4	Study of small ornamental plants- (Related to the concept)			
5	Study of plants for Butterfly Garden- (Related to the concept)			
6	Study of Foliage plants- E.g. Tulsi, Cycas, Pandanus, Kunti (Kamini) and Money plant.			
7	Study of plants for fillers-E.g. Golden rods, Gypsophila, Daisies, Candy tuft and Pimpinella.			
8	Methods of drying of flowers- Air drying, Sun drying, Pressing and Oven drying.			

9	Study of dry flower arrangements and Potpourri	
10	Use of cut flowers for flower arrangements.	
11	Use of flowers for- Flower arrangement, Floral rangoli, Floral jewelry, Flower remedies (essential oils) and Floral cuisine.	
12	Introduction to materials and methods of Hydroponics.	
13	Study of different types of Hydroponics Units/Setups.	
14	Determination of EC and pH of Hydroponic nutrient system.	
15	Field Visit	

References:

1. Roy A.L. (1992) Introduction to Floriculture, 2nd Edition
2. Gurcharan Singh, Randhawa and Amitabha Mukhopadhyay, Floriculture in India, Allied Publishers
3. Adams, C. R., Principles of Horticulture, Elsevier Publication, 4th edition, 2004.
4. Debashish Sengupta and Raj Kamal, Floriculture Marketing in India, (Excel Books).
5. Sudheer, K. P. and Indira V, Post -Harvest Technology of Horticultural Crops, New Delhi Publications.
6. Introduction to Floriculture Second Edition by Roy A. Larson, Academic Press Elsevier, 2014.
7. Floriculture Fundamentals & Practices by Alex Lauric, Victor H. Ries, Agrobios India, 2001.
8. Ornamental Plants for Gardening by V. L. Chopra and Markanday Singh, Scientific Publishers, 2012.
9. Green House Management for Horticultural Crops, Agrobios India.
10. Greenhouse Technology: Fundamentals, Design, Modelling and Applications, G. N. Tiwari, R. K. Goyal (2001), Narosa Publishing House

Course Code	SEM-II: Skill Enhancement Course (SEC) - Practical	Credits	Lectures/Week	Total HRS
26BOTSE251	Preservation Techniques of Fruits and Vegetables.	2	4	60

Course Objectives (CO): The student should be able to

- CO 1:** Remember key concepts and materials used in food processing, enabling familiarity with types of preservatives, processing equipment, product categories, and quality assessment methods.
- CO 2:** Develop insight into the principles of food preservation, working of processing equipment, methods of hygiene control, and the role of quality evaluation and regulatory requirements in food industries.
- CO 3:** Build competence in carrying out food processing techniques such as preparation of pickles, sugar-based products, sauces, dry products, and the use of tools like refractometer and acidity
- CO 4:** Do critical evaluation and comparison of preservation methods, product quality, processing techniques, and commercial aspects including legal and regulatory frameworks.

Course Outcomes (OC)

After successful completion of this course, students would be able to

- OC 1:** Recall and identify different organic and chemical preservatives, food processing equipment, product types, and tools used in quality assessment and packaging.
- OC 2:** Describe and interpret the functions of preservatives, processing methods, hygiene practices, and the importance of quality control, legal permissions, and product standardization.
- OC 3:** Carry out practical tasks independently, including preparation of processed food products (pickles, jam, jelly, sauces, dry items), use of instruments like refractometer, and implementation of sterilization techniques.
- OC 4:** Examine and assess the quality of prepared products through organoleptic evaluation, compare preservation techniques, and interpret commercial and regulatory requirements for food processing ventures.

Sr. No.	Experiment	
1	Study of organic preservatives- Sugar, Jaggery, Salt, Oil and Citric acid.	60
2	Study of chemical preservatives- Sodium benzoate, Potassium meta bisulphide and Acetic acid (Vinegar).	
3	Study of Equipment for drying – Solar dryer, Oven, Micro wave and Electrical dryer.	
4	Study of equipment for Canning, Sealing and other related techniques- Drying trays, Bottle sealer, Electric packet sealing, Mixer, Grinder, Weighing balance and Containers (bottles, cans, boxes, plastic bags and packaging materials).	
5	Study and preparation of types of Pickles- Sweet, Sour and Pungent.	
6	Study and preparation of Sugar Concentrates - Jam. Jelly, and Fruit leather.	
7	Preparation of Squash	
8	Study of Dry preparation- Chutney and Mouth freshener.	
9	Study and preparation of Ready to cook vegetables.	

10	Preparation of Sauce and Ketchup.	
11	Methods of Hygiene Control-Sterilization.	
12	Tools and techniques for the selection of fruits-Refractometer and Acidity titration.	
13	Study of commercial aspects and technical details- Preparation of project report, Necessary permissions and Laws (Rules and Regulations) related to food processing, Quality control and Patent for processing of products-form fill.	
14	Organoleptic Examinations of products made by students	
References: 1. Post-harvest an Introduction to the physiology and handling of fruits, vegetables and ornamentals. By R.B.H. Wills, W.B. McGlasson & et.al Univ. of New South Wahs Press, 2007. 2. Post-Harvest Technology by Verma and Joshi, Indus Publication. 3. Horticulture Marketing and post-harvest management By R. K. Meena and J. S. Yadav, Pointers Publishers, 2012. 4. Fruit Preservation by Daru Jagtiani 1993. Tarang Paperbacks, Vikas Publishing House Pvt. Ltd - New Delhi. 5. Food Science by B. Shrilakshmi 1997, New age international, Pvt. Ltd New Delhi.		

Evaluation Scheme for First Year (UG) under NEP (2 credits)

❖ For Major (Theory and practical)

❖ For VSC and SEC (Practical)

I. Theory Exam

Total :- 50 marks

(A) Internal Evaluation for Theory Courses –

20 Marks

- Continuous Internal Assessment (CIA-1) Assignment - 10 marks
- Continuous Internal Assessment (CIA-2) ONLINE Unit Test – 10 marks

(B) External Examination for Theory Courses –

30 Marks

Duration: 1 Hours

Theory question paper pattern: All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	15
Q.2	Unit II	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

II. Practical Examination:

Total:- 50 marks

(A) Internal Examination

20 marks

Sr. No.	Particulars	Marks
1	Experimental work	10
2	Field visit/Industrial visit/Organoleptic sheet/ Attendance/Active participation	5
3	Journal	5

(B) External Examination (semester end practical exam)

30 marks

Sr. No.	Particulars	Marks
1	Practical work	25
2	Viva	5

- Duration: 2 and ½ Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam.

Practical Question Paper Pattern: All questions are compulsory.

Question No.	Topic	Marks
1.	Experiment No.1	8
2.	Experiment No.2	6
3.	Experiment No.3	5
4	Experiment No. 4/ Identification practical	6
5	Viva	5

PASSING STANDARD NEP First Year :

- The learners /students shall obtain minimum of 40% marks in the Internal Assessment and External Assessment (Semester End Examination) COMBINED, to pass the course in a particular semester. A learner / student will be said to have passed the course if He/She passes the Internal Assessment + Semester End Examination COMBINED.
- To pass the examination attendance is compulsory in both internal and external (theory plus practical) examination.

Note:

Short field excursions for habitat studies are compulsory, if inclusive of syllabus. Field work of not less than eight hours duration is equivalent to one period per week for a batch of 15 students.

A candidate will be allowed to appear for the practical examinations only if he/she submits a certified journal of FYBSC or a certificate from the Head of the department / Institute to the effect that the candidate has completed the practical course of FYBSC as per the minimum requirements. In case of loss of journal, a candidate must produce a certificate from the Head of the department/Institute that the practical for the academic year were completed.

NOTE: To pass the examination, attendance is compulsory in both Internal & External Theory Examinations.

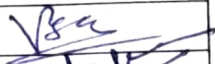
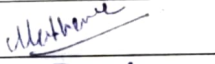
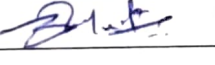
Letter Grades and Grade Points:

Semester GPA/ Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign/ Letter Grade Result	Grading Point
9.00 - 10.00	90.0 – 100	O (Outstanding)	10
8.00 - < 9.00	80.0 - < 90.0	A+ (Excellent)	9
7.00 - < 8.00	70.0 - < 80.0	A (Very Good)	8
6.00 - < 7.00	60.0 - < 70.0	B+ (Good)	7
5.50 - < 6.00	55.0 - < 60.0	B (Above Average)	6
5.00 - < 5.50	50.0 - < 55.0	C (Average)	5
4.00 - < 5.00	40.0 - < 50.0	P (Pass)	4
Below 4.00	Below 40.0	F (Fail)	0
Ab (Absent)	-	Ab (Absent)	0

Justification for Bachelors in BOTANY

1.	Necessity for starting the course:	.
2.	Whether the UGC has recommended the course:	Yes
3.	Whether all the courses have commenced from the academic year 2023-24.	The course has already commenced in the university and in the academic year 2023-24 it is restructured under NEP 2020
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?:	This course is aided / self-financed based on the sanction given by University of Mumbai to affiliated colleges time to time.
5.	To give details regarding the duration of the Course and is it possible to compress the course?:	The duration of the program is three years (6 semesters). It is not possible to compress the course.
6.	The intake capacity of each course and no. of admissions given in the current academic year:	120 per division
7.	Opportunities of Employability / Employment available after undertaking these courses:	

Signatures of Members of BOS

SR. No.	Name	Designation	Position	Signature
1.	Dr. V.P Sathe	Associate professor	Chairperson	
2.	Dr. Mamata Bodele	Associate professor	Secretary	
3.	Dr. Urmila Sarkar	Assistant Professor	Faculty and Member	
4.	Mr. Suyash Singh	Assistant Professor	Faculty and Member	
5.	Prof. Dr. Shankar L. Laware	Principal, KJ's Educational Institute. Trinity College of Arts, Commerce and Science, Kondhva.	Member	
6.	Dr. Ahire Subhash Vitthal	Vice principal, Nowrosjee Wadia College, Pune	Member	
7.	Prof. Dr. Labhane Nitin	HOD, Bhavans college	Member	
8.	Mr. Mukul Bandiwadekar	Landscape designer	Member	
9	Mr. Sachin Mandle	Tata motors, Project manager (Service and soft skill training)	Member	