

As Per NEP 2020

University of Mumbai



Title of the program

- A- U.G. Certificate in **Botany**
- B- U.G. Diploma in **Botany**
- C- B.Sc. (**Botany**)
- D- B.Sc. (Hons.) in **Botany**
- E- B.Sc. (Hons. with Research) in **Botany**

Syllabus for

Semester – Sem I & II

Ref: GR dated 20thApril, 2023 for Credit Structure of UG

(With effect from the academic year 2024-25
Progressively)

University of Mumbai



(As per NEP 2020)

Sr. No.	Heading	Particulars	
1	Title of program O: _____ A	A	U.G. Certificate in Botany
	O: _____ B	B	U.G. Diploma in Botany
	O: _____ C	C	B.Sc. (Botany)
	O: _____ D	D	B.Sc. (Hons.) in Botany
	O: _____ E	E	B.Sc. (Hons. with Research) in Botany
2	Eligibility O: _____ A	A	H. Sc. Science OR Passed Equivalent Academic Level 4.0
	O: _____ B	B	Under Graduate Certificate in Botany & Allied Academic Level OR Passed Equivalent Academic Level 4.5
	O: _____ C	C	Under Graduate Diploma in Botany OR Passed Equivalent Academic Level 5.0
	O: _____ D	D	Bachelors of Botany with minimum CGPA of 7.5 OR Passed Equivalent Academic Level 5.5
	O: _____ E	E	Bachelors of Botany with minimum CGPA of 7.5 OR Passed Equivalent Academic Level 5.5
3	Duration of program R: _____	A	One Year
		B	Two Years
		C	Three Years
		D	Four Years
		E	Four Years
4	Intake Capacity R: _____	120/division	

5	Scheme of Examination R: _____	NEP 40% Internal 60% External, Semester End Examination Individual Passing in Internal and External Examination	
6	R: _____ Standards of Passing	40%	
7	Credit Structure Sem. I - R: _____ A Sem. II - R: _____ B	Attached herewith	
	Credit Structure Sem. III - R: _____ C Sem. IV - R: _____ D		
	Credit Structure Sem. V - R: _____ E Sem. VI - R: _____ F		
8	Semesters	A	Sem I & II
		B	Sem III & IV
		C	Sem V & VI
		D	Sem VII & VIII
		E	Sem VII & VIII
9	Program Academic Level	A	4.5
		B	5.0
		C	5.5
		D	6.0
		E	6.0
10	Pattern	Semester	
11	Status	New	
12	To be implemented from Academic Year Progressively	From Academic Year: 2024-25	

This syllabus is applicable to the IDOL students as well, w.e.f. 2025-26

Sign of the BOS
Chairman
Dr. Vasant P. Mali
BOS in Botany

Sign of the Offg. Associate
Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology

Sign of the
Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology

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 (if any)

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

5) Credit Structure of the Program (Sem I, II, III, IV, V & VI)

Undergraduate Certificate in Botany

Credit Structure (Sem. I & II)

R: _____ A											
Level	Semester	Major		Minor	OE	VSC,SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr. / Sem.	Degree/Cum. Cr.	
		Mandatory	Electives								
4.5	I	6	Plant Diversity and Human Welfare I (2) Forms and Functions in Plant Science I (2) Practical 1 (2)	-	2+2	VSC:2, SEC:2 VSC: Any One Entrepreneurial Botany (2) Indoor Gardening (2) Gardening and Management (2) Ayurvedic Aahar (2)	AEC:2, VEC:2, IKS:2	CC:2	22	UG Certificate 44	
	R: _____ B										
	II	6	Plant Diversity and Human Welfare II (2) Forms and Functions in Plant Science II (2) Practical 2 (2)	2			VSC:2, SEC:2 Flower Arrangement (2) Bonsai Art (2) Plant Propagation practices (2) Marine Botany (2)	AEC:2, VEC:2	CC:2		22
	Cum Cr.	12	-	2	8	4+4	4+4+2	4	44		

Exit option : Award of UG Certificate in Major with 40-44 credits and an additional 4 credit score NSQF course / Internship OR Continue with Major and Minor

Undergraduate Diploma in Botany

Credit Structure (Sem. III & IV)

R: _____ C										
Level	Semester	Major		Minor	OE	VSC,SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, R P	Cum. Cr. / Sem.	Degree / Cum.Cr.
		Mandatory	Electives							
5.0	III Plant Diversity and Human Welfare III (2)	8		4	2	VSC:2, Any One Food Preservation (Drying) (2) Food Preservation (Sugar concentrates) (2) Flowers & Floral Remedies (2) Garden Designing (2)	AEC:2	FP: 2CC:2	22	UG Diploma88
	Forms and Functions in Plant Science III (2)									
	Practical 3 (2)									
	Practical 4 (2)									
R: _____ D										
	IV Plant Diversity and Human Welfare IV (2)	8		4	2	SEC	AEC:2	CEP: 2CC:2	22	UG Diploma88
	Forms and Functions in Plant Science IV (2)									
	Practical 5 (2)									
	Practical 6 (2)									
		28		10	12	6+6	8+4+2	8+4	88	
Exit option: Award of UG Diploma in Major and Minor with 80-88 credits and an additional 4 credit score NSQF course / Internship OR Continue with Major and Minor										

B.Sc. (Botany)

Credit Structure (Sem. V & VI)

R: _____ E										
Level	Semester	Major		Minor	OE	VSC,SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr. / Sem.	Degree/ Cum. Cr.
		Mandatory	Electives							
5.5	V	10	4	4		VSC:2 VSC: Any One		FP/CEP:2	22	UG Degree 132
	Recent Advances in Botany I (2)					Tree Identification and Vegetation Mapping (2)				
	Applied Botany I (2)					Scientific Writing in Plant Sciences (2)				
	IKS- Ethnobotany /Ayurveda (2)					Forensic Botany (2)				
	Practical 7 (2) Practical 8 (2)					Clinical Research: A Botanical Perspective (2)				
R: _____ F										
		10	4	4				OJT:4	22	
	Recent Advances in Botany II (2)									
	Applied Botany II (2)									
	Biostatistic, Economic Botany, and Phytogeography (2)									
	Practical 9 (2)									
	Practical 10 (2)									
	Cum Cr.	48	8	18	12	8+6	8+4+2	8+6+4	132	
Exit option : Award of UG Degree in Major with 132 credits OR Continue with Major and Minor										

[Abbreviation - OE – Open Electives, VSC – Vocational Skill Course, SEC – Skill Enhancement Course, (VSEC), AEC – Ability Enhancement Course, VEC – Value Education Course, IKS – Indian Knowledge System, OJT – on Job Training, FP – Field Project, CEP – Continuing Education Program, CC – Co-Curricular, RP – Research Project]

F.Y. B.Sc. Botany (USBT) Course Structure Semester I

Ladder	Course Type	Title	Credits	Hours	Marks
Major 1	Theory	Plant Diversity and Human Welfare I	2	30	50
Major 2	Theory	Forms and Functions in Plant Science I	2	30	50
Major 3	Practical	Practical	2	60	50
VSC	Practical	Entrepreneurial Botany	2	60	50
OR					
VSC	Practical	Indoor Gardening	2	60	50
OR					
VSC	Practical	Gardening and Management	2	60	50
OR					
VSC	Practical	Ayurvedic Aahar	2	60	50

Semester II

Ladder	Course Type	Title	Credits	Hours	Marks
Major 1	Theory	Plant Diversity and Human Welfare II	2	30	50
Major 2	Theory	Forms and Functions in Plant Science II	2	30	50
Major 3	Practical	Practical	2	60	50
VSC	Practical	Flower Arrangement	2	60	50
OR					
VSC	Practical	Bonsai Art	2	60	50
OR					
VSC	Practical	Plant Propagation Practices	2	60	50
OR					
VSC	Practical	Marine Botany	2	60	50

Sem. - I

Syllabus

B.Sc. (Botany)

(Sem.- I)

Course Objectives (CO):

- CO 1.: To enable the students, identify the major groups of organisms amongst plants.
- CO 2.: To enable the students, classify the major groups of organisms amongst plants.
- CO 3.: To enable the students, compare and distinguish the characteristics Cryptogams and Phanerogams.

Course Outcomes (OC): The learner will be able to

- OC 1.: Students will be able to identify the major groups of organisms amongst plants.
- OC 2.: Students will be able to classify the major groups of organisms amongst plants.
- OC 3.: Students will be able to compare and distinguish the characteristics of Cryptogams and Phanerogams that differentiate them from each other.

Course I (Mandatory)

Name of the Course: Plant Diversity & Human Welfare I

Module 1: Plant Diversity I	15 Lectures
<p>1. Microbiology</p> <ul style="list-style-type: none">i) General characteristics of bacteriaii) Cell structureiii) Nutritioniv) Reproduction- vegetative, asexual and sexual <p>Examples: Photosynthetic bacteria / Symbiotic bacteria etc. (4 Lectures)</p> <p>2. Algae</p> <ul style="list-style-type: none">i) General characteristics of Chlorophyta and Classification (as per G. M. Smith, 1955)ii) Systematic position and life cycle (excluding developmental stages of sex organs) of <i>Zygnema</i>. (4 Lectures) <p>3. Fungi</p> <ul style="list-style-type: none">i) General characters of Phycomycetae and Classification (as per G. M. Smith, 1955)ii) Systematic position and life cycle (excluding developmental stages of sex organs) of <i>Rhizopus</i> (4 Lectures) <p>4. Bryophyta</p> <ul style="list-style-type: none">i) General characters of Hepaticae and Classification (as per G. M. Smith, 1955)ii) Systematic position, structure, and life cycle, (excluding developmental stages of sex organs) of <i>Riccia</i> (3 Lectures)	
Module 2: Human Welfare I	15 Lectures
<p>1. Applied Microbiology: Utilization of microbes in Industry, Agriculture, Food and Pharmaceuticals, and Environment management citing one example for each (4 Lectures)</p> <p>2. Applied Phycology: Utilization of Algae in Biofuel Industry, Agriculture, Pharmaceuticals, Food/Space Food and role in Environment management, Seaweeds citing one example for each. (4 Lectures)</p> <p>3. Applied Mycology: Utilization of Fungi in Industry, Agriculture, Food and Pharmaceuticals, Environment management citing one example for each (4 Lectures)</p> <p>4. Applied Bryology: Utilization of Bryophytes, Uses of Sphagnum and the peat, Medicinal uses, Use as pollution indicators & Soil conservation citing one example for each (3 Lectures)</p>	

Course II (Mandatory)

Name of the Course: Forms and Functions I

Course Objectives (CO):

- CO 1. To enable the students, identify the structure and functions of the Cell and cell organelles in plants.
- CO 2. To enable the students, understand the Cell cycle and cell division in plants.
- CO 3. To enable the students, apply the biostatistical concepts.
- CO 4. To enable the students, comprehend the ecology and environment conservation.
- CO 5. To enable the students, carry out a thorough study of the active constituents of medicinal plants

Course Outcomes (OC): The Learner will be able to

- OC 1. Identify the structure and functions of the Cell and cell organelles in plants.
- OC 2. Understand the Cell cycle and cell division in plants.
- OC 3. Comprehend the biostatistical application.
- OC 4. Apply the biostatistical concepts.
- OC 5. Carry out a thorough study of the active constituents of medicinal plants with an emphasis on the use of plant based food as medicine.

Name of the Course: Forms and Functions I (Mandatory)

Module 1: Cytogenetics and Biostatistics	15 Lectures
<ol style="list-style-type: none">1. Ultrastructure and functions of Cell wall, Plasma membrane (2 Lectures)2. Ultrastructure and functions of the cell organelles – Chloroplast, Endoplasmic reticulum, Mitochondrion (2 Lectures)3. Cell cycle, Mitosis in Plant Cells and its significance (2 Lectures)4. Multiple alleles and Multiple genes (2 Lectures)5. Gene Interaction – Introduction and definition, Concept of epistatic and non-epistatic interactions. (3 Lectures)6. Biostatistics – Concept of biostatistics, Applications and limitations, Common Statistical Terms, types of data. (2 Lectures)7. Measures of central tendency: Mean, Median, Mode, and Measures of dispersion: Range, Standard deviation. (2 Lectures)	
Module 2: Ecology and Environment conservation	15 Lectures
<ol style="list-style-type: none">1. Introduction to Ecology: Concept, need and Scope. (1 Lectures)2. Ecosystem - Types of ecosystems (Terrestrial & Aquatic), functions of ecosystem. (2 Lectures)3. Environmental problems and its Impact - Natural & artificial ecological imbalance, climate change (ozone depletion, greenhouse effect). (3 Lectures)4. Environment Health and its management: Waste disposal, water, sanitation & recycling of wastes, Nuclear hazards and human health risks. (3 Lectures)5. Conservation - Introduction, Definition & importance of Conservation, in situ and ex situ conservation. (6 Lectures)<ul style="list-style-type: none">• Ex-situ conservation: botanical gardens and zoological parks, seed bank, gene bank.• In-situ conservation: Wildlife sanctuaries, National parks, Biosphere reserves.• Ecotourism.	

Name of the Course: Practicals (Mandatory)

Credits: 2

Semester I

1. Study of vegetative and reproductive structures of *Zygnema*.
2. Study of vegetative and reproductive structures of *Rhizopus*.
3. Study of vegetative and reproductive structures of *Riccia*.
4. Gram staining of Bacteria.
5. Aseptic techniques, preparation of media (PDA, NA), preparation of plates and slants. (Demonstration)
6. Identification and Economic importance of marine algae, fungi, bryophytes. (any 4)
7. Study of Mushroom cultivation (Demonstration).
8. Identification of parts of cell and cell organelles with the help of permanent slides / photomicrographs/ Virtual Laboratory: Chloroplast, Endoplasmic reticulum, Mitochondrion, Cell wall, Plasma membrane.
9. Study of various stages of mitosis in root tip cells (*Allium*).
10. To perform karyotyping on root tip cells of *Allium cepa* to observe and analyse chromosome morphology.
11. Problems based on Epistatic and non-epistatic interactions.
12. Calculation of mean, median and mode, standard deviation.
13. Graphical representation of data: Frequency polygon, Histogram, Ogive, Bar diagram, Pie-charts. (Using Excel Sheet)
14. Morphological Adaptations of plants. (Mesophytes, Xerophytes). (Identification)
15. Morphological Adaptations of plants. (Hydrophytes, Halophytes). (Identification)

Field Visit: Exploration of In-Situ / Ex-Situ Conservation Methods in Botany (Visit)

Reference Books

1. College Botany Volume I and II Gangulee, Das and Dutta (latest edition).
2. Cryptogamic Botany Volume I and II by G M Smith McGraw Hill.
3. Genetics by Russel. Wesley Longman Inc. publishers.
4. Plant Physiology by Taiz and Zeiger Sinauer Associates Inc. Publishers
5. Fundamentals of Ecology by E P Odum and G W Barrett. Thompson Asia Pvt Ltd. Singapore.
6. Cell Biology by De Robertis
7. Biostatistics and Biometry by Parihar and Parihar
8. Introduction to Biostatistics by Pranab Kumar Banerjee

Vocational Skill Courses

Name of the Course: Entrepreneurial Botany 60 Hours Credits:02

Course Objectives (CO):

- CO 1. To enable the students, learn the different algal and fungal cultivation practices.
- CO 2. To enable the students, develop the skills of designing and carving of natural material.
- CO 3. To enable the students, understand the making of aroma candles and incense sticks.
- CO 4. To enable the students, comprehend the process of preparing herbal teas, natural dyes, organic pesticides, and composting.
- CO 5. To enable the students, prepare business plan, marketing strategies and branding products.

Course Outcomes (OC): Learner will be able to

- OC 1. Practice the different algal and fungal cultivation practices.
- OC 2. Develop the skills of designing and carving of natural material.
- OC 3. Understand the making of aroma candles and incense sticks.
- OC4. Comprehend the process of preparing herbal teas, natural dyes, organic pesticides, and composting.
- OC 5. Prepare business plan, marketing strategies and branding products.

List of Practicals:

1. To study the process of Mushroom Cultivation.
2. To study the techniques of Spirulina Farming.
3. Designing of jewellery using natural material. (Bio jewellery)
4. Vegetable and Fruit Carving techniques.
5. Preparation of Jam, Jelly, Squash.
6. Preparation of ketchup, Pickles, Candies.
7. To study the technique of Resin Art using plant material.
8. Making of Aroma candles.
9. Making of incense sticks.
10. Making of eco-friendly articles.
11. To study the technique of growing Microgreens.
12. Preparation of Herbal teas.
13. Preparation of Natural Dyes.
14. Preparation of organic pesticides.
15. To study the process of Composting.
16. Preparation of Business Plan.
17. Drafting of Marketing strategies.
18. Product Branding.

Reference Books

1. Post-harvest management of horticultural crops, -Saraswathy S.- Agrobios Publication
2. Bhutani RC. 2003. Fruit and Vegetable Preservation. Biotech Books.
3. Ranganna S. 1997. Hand Book of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw-Hill.
4. Fruit and Vegetable Preservation: Principles and Practices” –Dr.R.P. Shrivastava and Dr. Sanjeev Kumar, IBDC, New Delhi.
5. A Hand book on Post Harvest Management of fruits and vegetables: P. Jacob John: Day publishing House Delhi.
6. Post harvest Technology of Fruits and Vegetables Handling, Processing, Fermentation and Waste management Vol.1&2 L.R.Verma and V.K.Joshi. Indus publishing company, New Delhi.
7. Handbook of Mushrooms: Nita Bahl.

8. Borkar, S, G, and Patil N.M. 2016. Mushroom, A nutritive food and its cultivation. Astral International Pvt. Ltd, New Delhi.
9. Biswas S., Datta M. and Ngachan S.V. (2012) Mushrooms: A Manual for Cultivation, PHI.
10. Selvendran D. (2015) Large Scale Algal Biomass (Spirulina) Production in India. In: D. Das (Ed.) Algal Biorefinery: An Integrated Approach, Springer.
11. Zadrzil F. and Grabbe K. (1983) Edible Mushroom, Biotechnology Vol. 3, Weinheim: Verlag Chemie, Berlin.
12. Mushroom Production and Processing Technology, Pathak Yadav Gour (2010). Published by Agrobios (India).
13. Pandey R.K, S. K Ghosh (1996). A Hand Book on Mushroom Cultivation. Emkey Publications.
14. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.
15. Paul Stamets, J.S. and Chilton, J.S. (2004). Mushroom cultivation A practical guide to growing mushrooms at home, Agarikon Press.
16. Fundamentals of Horticulture (Practical Manual): S.K. Pandey C.S. Pandey: Published by: Dean, College of Agriculture, Jabalpur Jawaharlal Nehru Krishi Vishwavidyalaya Jabalpur, Madhya Pradesh 482004 Tele-fax: 0761- 2681236; web: www.jnkvv.org

Vocational Skill Courses

Name of the Course: Indoor Gardening

60 Hours

Credits:02

Course Objectives (CO):

- CO 1. To enable students, identify indoor plants, suitable containers, soils and growth media to grow them.
- CO 2. To enable students, learn different methods and techniques of potting, repotting of indoor plants.
- CO 3. To train students, in care and maintenance of indoor plants.
- CO 4. To enable students, control and manage the insect pests affecting indoor plants.
- CO 5. To enable students, prepare different types of indoor gardens.

Course Outcomes (OC): Learner will be able to

- OC 1. Identify indoor plants, suitable containers, soils and growth media to grow them.
- OC 2. Perform different methods and techniques of potting, repotting of indoor plants.
- OC 3. Take care and maintain the indoor plants.
- OC 4. Control and manage the insect pests affecting indoor plants.
- OC 5. Prepare different types of indoor gardens.

List of Practicals:

1. To Study of different Indoor plants: Foliage and flowering plants.
2. To Study of different types of containers and equipments used in indoor gardening.
3. Selection of soil and media for indoor plants.
4. To Study different methods of application of plant growth regulators.
5. Types of accessories used in indoor gardening.
6. Methods of growing indoor plants: Potting.
7. Technique of Repotting of indoor plants.
8. Care and Maintenance of Indoor plants.
9. Insect pest and their control.
10. Preparation of Terrarium/ Bottle Garden.
11. Preparation of Dish Garden.
12. Preparation of kokidama.
13. Techniques of Growing indoor plants in Different Medias. (Soil, Sand, Sphagnum moss etc.)

Reference Books

1. Complete Gardening in India – Gopal Swamiengar
2. Complete Home Gardening – Dey, S.C.
3. Floriculture and Landscaping – Bose, T.K.
4. Floriculture and Landscaping – Deshraj
5. Floriculture in India – Randhawa and Mukhopadhyay
6. Introduction to Landscaping, Designing, Construction and Maintenance – Ronald J. Biondo and Charles B. Schroder
7. Landscape Gardening & Design with Plants – Supriya Kumar Bhattacharjee 8)
Landscaping principles and practices – Jack E. Ingels
8. The Art of Home Landscaping. Eckbo, G. 1956.

Vocational Skill Courses

Name of the Course: Gardening and Management

60 Hours

Credits:02

Course Objectives (CO):

- CO 1. To enable the students, recognise and use the Horticulture and gardening tools.
- CO 2. To enable students, understand the making and caring of Lawns.
- CO 3. To enable students, identify suitable horticulture plants for plantation in different seasons, and locations.
- CO 4. To enable students, learn different vegetative propagation techniques, irrigation methods, pruning practices and garden management techniques.
- CO 5. To enable students, know the common diseases and pests of horticulture plants and use of organic and biopesticides to control them.

Course Outcomes (OC): Learner will be able to

- OC 1. Recognise and use the Horticulture and gardening tools.
- OC 2. Understand the making and caring of Lawns.
- OC 3. Identify suitable horticulture plants for plantation in different seasons, and locations.
- OC 4. Perform different vegetative propagation techniques, irrigation methods, pruning practices and garden management techniques.
- OC 5. Know the common diseases and pests of horticulture plants and use of organic and biopesticides to control them.

List of Practicals:

1. Introduction to Horticulture and Garden tools.
2. Study of Lawn making and its care (suitable soil for lawns and drainage systems, types of grasses).
3. Identification of suitable horticulture plants for plantation in different seasons (Flowering annuals, vines and climbers, ornamental trees)
4. Identification of suitable horticulture plants for plantation bulbous and foliage plants, cacti and succulents).
5. Identification of suitable horticulture plants for plantation locations (Outdoor, roof-top, balcony, rock gardens, hanging basket).
6. Study of Vegetable Garden (Sowing, raising seedlings, transplantation methods; choosing the right vegetables for the season).
7. Garden management (Weeding, manuring)
8. Irrigation methods used in lawns, parks, and vegetable gardens.
9. Submission of Horticulture plants or hanging basket.
10. Vegetative Propagation techniques by layering.
11. Vegetative Propagation techniques by cutting.
12. Vegetative Propagation techniques by grafting & budding.
13. Pruning Practices: pruning roses, shrubs, and trees.
14. Common diseases and pests of horticulture plants
15. Study of Seed germination, viability tests and storage.
16. Use of organic and biopesticides to control diseases and pests.
17. Field visit to any garden/ park/organisation (Landscape Design) and submission of report.
18. Report writing - Some selected gardens of India.

Reference Books

1. Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana
2. Bimaldas Chowdhury and Balai Lal Jana. 2014. Flowering Garden trees. Pointer publishers, Jaipur. India.
3. Bose, Chowdhury and Sharma. 1991. Tropical Garden Plants in colour. Horticulture and allied publishers, 3D Madhab
4. Chatterjee street Kolkata. Bose, T.K. Mukherjee, D. 2004. Gardening in India. Oxford & IBH Publishers.
5. Chadha, K.L. and Chaudhary, B. 1986. Ornamental Horticulture in India. Publication and Information division. ICAR, New Delhi.
6. K.V. Peter. 2009. Ornamental plants. New India publishing agency, Pitampura, New Delhi.
7. Randhawa, G.S. Amitabha Mukhopadhyay, 2004. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi. Richard Bird. 2002.
8. Flowering trees and shrubs. Printed in Singapore by Star Standard Industries Pvt. Ltd.
9. Adriance, G.W. and F.R. Brison, 1000. Propagation of Horticultural Plants. Biotech Books, New Delhi.
10. Chadha, K.L., P.N. Ravindran and Leela Sahijran (Eds) 1000. Biotechnology in Horticulture and Plantation crops. Malhotra Publishing House, New Delhi.
11. Hartmann, H.T. and D.E. Kester, 1975. Plant Propagation: Principles and Practices. Prentice. Hall, New Delhi.
12. Singh, S.P. 1989. Mist Propagation. Metropolitan Book Co., New Delhi.
13. Wright, R C M. 1974. Simple Plant Propagation. Ward Lock, London.
14. Ropwatika sangpoanp: Dr Aba Patil.
15. Ropwatika: Ravindra Katole. Godwa Publication.

Vocational Skill Courses

Name of the Course: Ayurvedic Aahar

60 Hours Credits:02

Course Objectives (CO):

- CO 1. To enable students, understand the concept of Tridosha and aahar.
- CO 2. To enable students, identify the foods with relation to rutuchakra, taste and composition.
- CO 3. To enable students, prepare immunity boosting, iron rich nutritious food.
- CO 4. To enable students, estimate proteins and vitamins in foods.
- CO 5. To enable students, gain knowledge of managing diseases with ayurvedic aahar.

Course Outcomes (OC): Learner will be able to

- OC 1. Understand the concept of Tridosha and aahar.
- OC 2. Identify the foods with relation to rutuchakra, taste and composition.
- OC 3. Prepare immunity boosting, iron rich nutritious food.
- OC 4. Estimate proteins and vitamins in foods.
- OC 5. Manage diseases with ayurvedic aahar.

List of Practicals:

1. Study of Tridosha concept (Prakriti nidaan)
2. Study of Ahar According to Different Prakriti.
3. Study of sattvic, tamasic and Rajasic foods (any two examples of each)
4. Identification of foods as per rutuchakra
5. Study of food based on six taste (Rasa) (two examples of each).
6. Preparation of Iron rich ayurvedic aahar (Nachani satva, aliv laddu)
7. Preparation of immunity boosting dish (amala palak, amala candy)
8. Making a diet plan to manage diseases (diabetes, constipation) with ayurvedic aahar.
9. Study of Examples of incompatibility / antagonistic (*Viruddha-Aahara*)
10. Estimation of Proteins from plant resources used in ayurvedic aahar (Lowry's method)
11. Estimation of vitamin **C** from fruits. (Amla, Citrus)
12. Study (identification) of Fiber rich vegetables (carrot, sweet potato), leafy vegetables (spinach, fenugreek) and dalia.

13. Preparation of medicated mattha, nachani satva, ambil.
14. Preparation of medicated soup
15. Preparation of nutritious foods (methi ladu, dink ladu, dry fruit ladu, urad daal ladu).
16. Preparation of ayurvedic energy drink.

Reference Books

1. Mukund Sabnis (2012). Viruddha Ahara: A critical view. AYU | Jul-Sep 2012 | Vol 33 | Issue 3.
2. Chetan Ram Meghwal, Vikram singh, Mamta kumara meena, Ashok Kumar Sharma, K. L. Sharma, Rekhraj meena, Ayushi Nigam. (2023). A Review Study of Food According to Prakriti and Doshas. International Research Journal of Ayurveda & Yoga Vol. 6 (1),56-59.
3. Pradeep Kumar Suryawanshi. Ahara (Ancient Secret of Diet in Ayurveda & Yoga), Chaukhamba Surbharati Prakashan
4. P.H. Kulkarni. Ayurvedic Aahar: The Scientific Diet. Sri Satguru Publications
5. Dr. Ganesh Karajkhede. Ayurvediya Ahar Vimarsh. N M Publications.
6. Rastogi S {2014) Ayurvedic Science of Food and Nutrition. ASIN: BOOHWMV094, Springer: ISBN-13:978-1461496274
7. Rastogi S (2010) Building bridges between Ayurveda and modern science. Int J Ayurveda Res. 1(1):41-46.
8. FSSAI regulations on Ayurveda Aahar Regulations 2022. Gazette of India CG-DL-E-07052022-235642. New Delhi, Friday, May 6, 2022/ Vaisakha 16, 1944.
9. Frawley D (2012) Ayurvedic healing: A comprehensive guide. Lotus Press, India. <https://iksindia.org/>: Indian Knowledge Systems

Sem. – II

**Syllabus
B.Sc. (Botany)
(Sem.- II)**

Course I

Name of the Course: Plant Diversity & Human Welfare II (Mandatory)

Course Objectives (CO):

CO 1. To enable the students, classify the major groups of organisms amongst plants.

CO 2. To enable the students, understand systematic position of the major groups of organisms amongst plants.

CO 3. To enable the students, compare and contrast the characteristics of plants.

Course Outcomes (OC): The Learner will be able to

OC 1. Classify the major groups of organisms amongst plants.

OC 2. Understand systematic position of the major groups of organisms amongst plants.

OC 3. Compare and contrast the characteristics of plants.

Module 1: Plant Diversity II	15 Lectures
1. Pteridophytes	
i. General characters of Pterophyta and Classification as per G.M. Smith (1955)	
ii. Systematic position, and life cycle (excluding developmental stages of sex organs) of <i>Adiantum</i> . (4 Lectures)	
1. Gymnosperms	
i. General characters of Cycadophyta and Classification as per Chamberlain (1934)	
ii. Systematic position, and life cycle (excluding developmental stages of sex organs) of <i>Cycas</i> (5 Lectures)	

3. Angiosperms

- iii. Study of flower- Terminology, Parts of typical flower, floral whorls – a) Calyx with their modifications and types of aestivations b) Corolla- Forms – Cruciform, Papilionaceous, Infundibuliform and bilabiate, c) Perianth, d) Androecium- Parts of stamen, cohesion and adhesion, e) Gynoecium- Parts of carpel, Apocarpous and Syncarpous, f) types of placentation. **(6 Lectures)**

Module 2: Human Welfare II

15 Lectures

1. **Applications of Pteridophytes:** Utilization of Pteridophytes as food, pharmaceuticals, ornamental and environment management (source, parts used, uses citing two examples of each) **(4 Lectures)**.
2. **Applications of Gymnosperms:** Utilization of Gymnosperms as timber, turpentine, and pharmaceuticals (source, parts used, uses citing two examples of each) **(4 Lectures)**.
3. **Applications of Angiosperms:** Utilization of Angiosperms as food, fibres, spices, condiments, and essential oils (source, parts used, uses citing two examples of each) **(7 Lectures)**

Course II

Name of the Course: Forms and functions (Mandatory)

Course Objectives (CO):

CO 1. To enable the students, correlate anatomy, taxonomy, physiology, and ecology.

CO 2. To enable the students, understand the plant tissue system and their functions.

CO 3. To enable the students, apply the knowledge of medicinal botany to daily life.

Course Outcomes (OC): The Learners will be able to

OC 1. Correlate anatomy, taxonomy, physiology, and ecology.

OC 2. Understand the plant tissue system and their functions.

OC 3. Apply the knowledge of medicinal botany to daily life.

Module 1: Plant Anatomy	15 Lectures
1. Introduction, and scope of Anatomy in relation to Taxonomy, Physiology and Ecology. (3 Lectures)	
2. Functional Tissue System: (3 Lectures) <ul style="list-style-type: none">○ Storage tissues - Parenchyma,○ Mechanical Tissues - Collenchyma, Sclerenchyma○ Conducting tissues - Xylem and Phloem.	
3. Adaptive and protective Epidermal Tissue System: (2 Lectures) <ul style="list-style-type: none">○ Epidermal Tissue System- Functions of epidermis,○ Epidermal appendages - A) Hair-Root hair, Unicellular hair, and Multicellular hair B) Scales C) Colleters D) Water vesicles/Bladders.	
4. Internal Primary architecture of dicot and monocot root, stem, and leaf. (3 Lectures)	
5. Types of stomata: Diacytic, Paracytic, Anomocytic, Anisocytic and Gramineous (1 Lecture)	
6. Types of vascular bundles (1 Lecture)	
7. Cell Inclusions – Starch, protein, Calcium oxalate and calcium carbonate crystals (2 Lectures)	
Module 2: Botanicals and its applications	15 Lectures
1. Medicinal Botany - Plant resources used in cosmetics, aromatics and pharmaceuticals <ul style="list-style-type: none">○ Introduction and scope (1 Lecture)○ Herbal preparations - Emulsion making technique for Mask, Lotion, Gel (2 Lectures)	

- Methods of extraction – Maceration, digestion, decoction, aromatic waste, leachates and tinctures **(3 Lectures)**
2. Explain with reference to Botanical name, family, part used, products and uses: **(4 Lectures)**
- Cosmetics - Aloe, Henna,
 - Aromatics - Lemon grass and Rose
 - Pharmaceuticals - Turmeric and Amla
 - Beverages - Non-alcoholic - Tea, Coffee, Cocoa
3. Ethnobotany **(3 Lectures)**
- Definition, Application of Ethnobotany
 - Plants used in Ethnobotany: *Tinospora cordifolia*, *Coleus aromaticus*, *Aegle marmelos*
4. Grandma's Pouch: Botanical name, common name, family, constituents, biological source and uses of: Tulsi, Ginger, Adulsa, Clove **(2 Lectures)**

List of Practicals:

1. Study of vegetative and reproductive structures of *Adiantum*.
2. Study of vegetative and reproductive structures of *Cycas*.
3. Morphology of Non essential whorls. (As per theory).
4. Morphology of Essential whorls. Androecium and Gynoecium. (As per theory).
5. Study of Pteridophytes in human welfare: medicinal, ornamental, food (As per theory).
6. Study of Gymnosperms in human welfare: food, timber, turpentine and pharmaceutical sources (As per theory).
7. Study of Angiosperms in human welfare: plants: food, fiber, spices, condiments, medicinal, ornamental (As per theory).
8. Study of essential oils of *Citronella* by TLC.
9. Primary structure of dicot and monocot root.
10. Primary structure of dicot and monocot stem.
11. Study of vascular bundles from suitable plant material.
12. Study of Diacytic, Paracytic, Anomocytic, Anisocytic and Gramineous stomata.
13. Epidermal outgrowths: with the help of mountings
 - a. Unicellular: *Gossypium*/Radish
 - b. Multicellular: *Lantana*/Sunflower
 - c. Glandular: *Drosera* and Stinging: *Urtica* – only identification with the help of permanent slides.
 - d. Peltate: *Thespesia*
 - e. Stellate: *Erythrina* / *Sida acuta* / *Solanum* / *Helecteris*
 - f. T-shaped: *Avicennia*
14. Cell Inclusion - Mounting of
 - a. Starch grains (potato and rice) aleurone layer (Maize).
 - b. Raphides (*Pistia* / Money plant / *Eichhornia*), Sphaeraphides
 - c. (*Opuntia*), Cystoliths (Indian rubber tree).
15. Extraction of botanicals using: Decoction, Cold Maceration.
16. Prepare Face mask, Gel, Lotion using botanicals.
17. Identification and uses of Ethnobotanical plants:

Tinospora cordifolia, Coleus aromaticus, Aegle marmelos

18. Grandma's Pouch: Botanical name, common name, family, constituents,
biological source and uses of: Tulsi, Ginger, Adulsa, Clove

Reference Books

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.
3. Plant Anatomy by B. P. Pandey
4. Plant Anatomy by A. Fahn
5. Taxonomy of Angiosperms by A.V.S.S. Sambamurty
6. Taxonomy of Angiosperms – Taxonomy, Systematic Botany, Economic Botany, Ethnobotany, Saras Publication
7. A Text Book of Botany: Angiosperms by B.P. Pandey
8. Manual of Ethnobotany by S. K. Jain (latest edition)
9. An introduction to Ethnobotany by S. K. Jain and Ashok K. Jain, deep Publications.
10. Herbal Remedies by Urjita Jain.

Vocational Skill Courses

Name of the Course: Flower Arrangement

60 Hours

Credits:02

Course Objectives (CO):

- CO 1. To enable students, identify the foliage and cut flowers used in different occasions.
- CO 2. To enable students, learn the basic styles and shapes in flower arrangement.
- CO 3. To enable students, prepare different flower arrangements.
- CO 4. To enable students, study methods of Drying and preservation of flowers.
- Co 5. To enable students, select the suitable types of containers and accessories for flower arrangement.

Course Outcomes (OC): Learner will be able to

- OC 1. Identify the foliage and cut flowers used in different occasions.
- OC 2. Understand the basic styles and shapes in flower arrangement.
- OC 3. Prepare different flower arrangements.
- OC 4. Perform Drying and preservation of flowers.
- OC 5. Select the suitable types of containers and accessories for flower arrangement.

List of Practicals:

1. Identification of cut flowers: flowers on special occasions.
2. Study of different foliage used in flower arrangement.
3. Different types of containers and accessories for flower arrangement.
4. To study basic styles and shapes in flower arrangement.
5. Preparation of various type of garlands, Gajra, Venni etc.
6. Preparation of Rangoli by using various types of flowers.
7. Preparation of various types of bouquets.
8. Japanese style of flower arrangement: Ikebana, Moribana.
9. To study methods of Drying and preservation of flowers.
10. Dry flower arrangement.
11. Preparation of pot pourrie.
12. Preparation of Greeting card /Book mark using dry flower arrangement.
13. Arrangement of flower for different areas and occasions.
14. Visit to nearby florist / Flower market.

15. Visit / Organise exhibition of cut flowers and floral arrangement.

Reference Books

1. Jean Taylor Creative Flower Arrangements. Random House UK; New edition (27 November 1993)
2. Purnima Shah. Silence Speaks - A book about Japanese flower arrangements (Ikebana). Buddha Bamboo; 1ST edition (2016)
3. Stella Coe. Art of Japanese Flower Arrangement.
4. Fiona Barnett. Flower Arranging: A Complete Guide to Creative Floral Arrangements. South water publisher
5. Charlene Tarbox. Creative Haven Beautiful Flower Arrangements Colouring Book. Dover Publications Inc.; Clr Csm edition

Vocational Skill Courses

Name of the Course: Bonsai Art

60 Hours Credits:02

Course Objectives (CO):

- CO 1. To enable the students, know different types of containers, tools and accessories used in bonsai.
- CO 2. To enable the students, identify suitable plants, soil and media for Bonsai.
- CO 3. To enable the students, learn Bonsai management practices and their care techniques.
- CO 4. To enable the students, prepare different styles of Bonsai.
- CO 5. To enable the students, gain knowledge about Insect pest and diseases and their control.

Course Outcomes (OC): Learner will be able to

- OC 1. Select different types of containers, tools and accessories used in bonsai.
- OC 2. Identify suitable plants, soil and media for Bonsai.
- OC 3. Perform bonsai management practices and their care techniques.
- OC 4. Prepare different styles of Bonsai.
- OC 5. Deal with Insect pest and diseases and their control.

List of Practicals:

1. Study of Different types of containers used in bonsai.
2. Study of tools and accessories used in Bonsai making.
3. Study of best suitable plants for Bonsai.
4. Selection of soil and media for bonsai
5. Bonsai management practices: Media Potting, Re-Potting and watering.
6. Bonsai care techniques: Pruning, pinching and defoliation.
7. Study of upright (formal styles) in Bonsai.
8. Study of Upright (Informal style) in Bonsai.
9. Preparation of Bonsai: Cascade, Semi-cascade.
10. Preparation of Bonsai: Forest style.
11. Insect pest and diseases and their control.
12. Visit to Bonsai exhibition/Nursery.

Reference Books

1. Dr. N. Mangadevi, Bonsai-Emesco Books publisher
2. Dey.S.C.- Bosnai : An art of miniature plant culture- Ankur publisher
3. Paul Lesniewicz., 1994. Bonsai in your home. Sterling publishing Co, New York.
4. A.B. Patil – Bonsai.
5. Bonsai Vaman vriksha kala- Malti Nagarkar and Vijay Nakgarkar. Continental Publisher.
6. Intermediate Bonsai- Thomas Zane

Vocational Skill Courses

Name of the Course: Plant Propagation Practices

60 Hours Credits:02

Course Objectives (CO):

- CO 1. To enable the students, identify garden implements and suitable potting mixture.
- CO 2. To train the students, in potting, repotting techniques, and preparation of nursery beds.
- CO 3. To enable the students, learn methods of seed treatment and application of growth hormones.
- CO 4. To enable the students, in the skills of plant propagation.

Course Outcomes (OC): Learner will be able to

- OC 1. Identify garden implements and suitable potting mixture.
- OC 2. Perform potting, repotting and preparation of nursery beds.
- OC 3. Apply methods of seed treatment and application of growth hormones for Plant Propagation.
- OC 4. Perform plant propagation practices.

List of Practicals:

1. Study of Garden implements.
2. Preparation of Potting Mixture.
3. Potting & Repotting techniques.
4. Preparation of nursery beds.
5. Methods of Seed Treatment.
6. Application & methods of plant growth regulators.
7. Perform various methods of cutting.
8. Perform various methods of layering.
9. Perform various methods of grafting.
10. Perform various methods of budding.
11. Perform propagation by specialized structure- rhizome, suckers, runners, offset, bulb, corm, tuber, etc.
12. Visit to Plant nursery.

Reference Books

1. Adriance, G.W. and F.R. Brison, 1000. Propagation of Horticultural Plants. Biotech Books, New Delhi.
2. Chadha, K.L., P.N. Ravindran and Leela Sahijran (Eds) 1000. Biotechnology in Horticulture and Plantation crops. Malhotra Publishing House, New Delhi.
3. Hartmann, H.T. and D.E. Kester, 1975. Plant Propagation: Principles and Practices. Prentice. Hall, New Delhi.
4. Singh, S.P. 1989. Mist Propagation. Metropolitan Book Co., New Delhi.
5. Wright, R C M. 1974. Simple Plant Propagation. Ward Lock, London.
6. Ropwatika sangpoanp Dr Aba Patil,
7. Ropwatika: Ravindra Katole. Godwa Publication

Vocational Skill Courses

Name of the Course: Marine Botany

60 Hours

Credits:02

Course Objectives (CO):

- CO 1. To enable students, understand the characteristics features of the marine phytoplanktons and marine fungi.
- CO 2. To enable students, study the value-added products and medicinal uses of marine algae.
- CO 3. To enable students, identify mangrove plants.
- CO 4. To enable students, comprehend the characteristic features of Mangroves, mangrove associates and sea grasses.
- CO 5. To enable students, realise the ecological importance and medicinal uses of mangroves.

Course Outcomes (OC): Learner will be able to

- OC 1. Understand the characteristics features of the marine phytoplanktons and marine fungi.
- OC 2. Study the value-added products and medicinal uses of marine algae.
- OC 3. Identify mangrove plants.
- OC 4. Comprehend the characteristic features of Mangroves, mangrove associates and sea grasses.
- OC 5. Realise the ecological importance and medicinal uses of mangroves.

List of Practicals:

- 1. Study of marine phytoplanktons.
- 2. Study of characteristic features (Morphological, Photosynthetic pigments, reserve food material) of Chlorophyta (*Enteromorpha, Chaetomorpha, Ulva, Caulerpa*- any two).
- 3. Study of characteristic features (Morphological, Photosynthetic pigments, reserve food material) of Phaeophyta (*Padina, Dictyota, Sargassum*- any two)
- 4. Study of characteristic features (Morphological, Photosynthetic pigments, reserve food material) of Rhodophyta (*Gracilaria, Gelidium, Hypnea*- any two).
- 5. Study of marine fungi.

6. Identification of value-added products from marine algae.
7. Medicinal uses of seaweeds.
8. Identification of mangrove plants.
9. Study of Morphological characteristic features of Mangroves and mangrove associates.
10. Study of characteristic features of sea grasses.
11. Study of sand dune plants (*Ipomea, Suaeda, Derris, Sesuvium*).
12. Study of anatomical features of mangrove plants (Salt gland & pneumatophore).
13. Ecological significances and Medicinal uses of mangroves.
14. Study of pH of soil from mangrove vegetation.

Reference Books

1. Chapman VJ (1976). Coastal Vegetation. 2nd edition. Pergamon Press. New York.
2. Desikachary, T.V. (1975). Marine Plants. N.C.E.R.T. New Delhi.
3. Kumar H.D. Introduction to Phycology.
4. Kumar H. D. and Singh H.N. (1990). Algae Affiliated East West Press Pvt. Ltd. Publ. New Delhi.
5. McConnaughey, B.H. (1974). Introduction to Marine Biology.
6. Ranade, D.R. and Gadre, R.V. (1988). Microbial Aspects of Anaerobic Digestion. Laboratory Manual. M.A.C.S. Pune.
7. Sambamurthy, A.V.S.S. (2005). A Text Book of Algae.
8. Santhanam, R.; Ramnathan, N.; Venkataramanjan, K. and Jegathanam, G. (1987). Phytoplankton of Indian Seas, and Aspects of Marine Botany. Daya Publication Home. Delhi.
9. Sen Neera and Kumudranjan Naskar, (2003). Algal Flora of Sunderbans.
10. Sharma O. P. (1986) A Text Book of Algae Tata McGraw Hill Publication Publications
11. Stein, J.R. (1973). Handbook of Phycological Methods. Cambridge University Press.
12. Trainor, F.R. Introductory Phycology.
13. Vashishta, B.R. (1995). Algae. S. Chand and Co. Ltd. New Delhi
14. B.D. Borse et al. Fresh water and Marine Fungi of India. Lambert Publication.
15. B.D. Borse. Marine fungi of India (Monograph). Broadway Publishing House.

QUESTION PAPER PATTERN (External and Internal)

Format of Question Paper: External Theory (Mandatory)			30 marks
			Time:- 01 hr 30 min
Q. No.	Descriptor	Module	Marks
Q 1	Answer the following: (any 2)	1	10
A			
B			
C			
D			
Q 2	Answer the following: (any 2)	2	10
A			
B			
C			
D			
Q3	Write Short Notes on: (any 2)	1 and 2	10
A			
B			
C			
D			

Internal Theory (Mandatory)

20 marks

Continuous Evaluation through:	Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc. (at least 3)
---------------------------------------	--

Practical Internal (Mandatory)		20 MARKS
Continuous Evaluation through:	Project / Survey / Field Visit / Industrial Visit etc. - 10 marks Report of the same: 5 marks Viva: 5 marks	

Practical External (Mandatory)
Time:- 3 hr 30 min

	Format of Practical Question Paper:	30 MARKS
Q1		10 MARKS
Q2		10 MARKS
Q3	Identification (Two Spots)	05 MARKS
Q3	Journal	05 MARKS

Note: - PRACTICAL BOOK/JOURNAL

The students are required to perform 75% of the Practical for the journal to be duly certified. The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

Practical External (VSC)

Time:- 03 hrs

	Format of Practical Question Paper:	30 MARKS
Q1		10 MARKS
Q2		10 MARKS
Q3	Identification (Two Spots)	05 MARKS
Q3	Journal	05 MARKS

Practical Internal (VSC) 20 Marks

Continuous Evaluation through:	Visit report /Skill development Report	05 MARKS
	Project / Product Prototype Submission	10 MARKS
	Viva-voce	05 MARKS

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

Signature of the Team

S. No	Name	Mobile Number	Signature
1.	Dr. Vasant P. Mali	9321463140	
2.	Dr. Uttam L. Dethé	9422963964	
3.	Dr. D. Meena S. Rao	9324176760	
4.	Dr. Laxmishree S. Chengala	9320089389	
5.	Dr. Mandakini R. Ingle	9821961060	
6.	Dr. Suraj Gajbhiye	9821331987	
7.	Dr. Vijay Chavan	9421168396	
8.	Dr. Rohan Gavankar	9860086081	
9.	Dr. Smita Jadhav	9892340319	
10.	Mrs. Neha Sawant	9987397516	
11.	Dr. Rafi Ahmed	9757129168	
12.	Dr. Devangi Chachad	9820326157	
13.	Dr. Mona Kejriwal	9702040004	
14.	Dr. Nivas Joshi	8310911526	
15.	Dr. Lakshmi Girish	9594955608	
16.	Dr. Deepa Verma	9766663740	
17.	Dr. Janhavi Arekar	7874182182	
18.	Dr. Vinit Vaidya	9869458006	
19.	Dr. Mahavir Gosavi	9869049369	

Justification for B.Sc. (Botany)

1.	Necessity for starting the course:	Botany is the foundation of life. It is interdisciplinary and practical based. It enables students to address the future prospects with scientific mindset.
2.	Whether the UGC has recommended the course:	Yes
3.	Whether all the courses have commenced from the academic year 2024-25	The course has already commenced at the University and for academic year 2024-25 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 from time to time.
5.	To give details regarding the duration of the Course and is it possible to compress the course?:	1 year Not Possible to Compress
6.	The intake capacity of each course and no. of admissions given in the current academic year:	The intake capacity is variable from College to College based on the sanctions received from the University of Mumbai.
7.	Opportunities of Employability / Employment available after undertaking these courses:	Employability, Self employment

**Sign of the BOS
Chairman
Dr. Vasant P. Mali
BOS in Botany**

**Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology**

**Sign of the
Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology**