



**VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)**

**DEPARTMENT OF BOTANY
Three/Four- Years UG Programme
Department/Subject Specific Core or Major (DSC)**

**Curriculum, Teaching and
Evaluation Structure**

for

B.Sc.-II Botany

Semester-III & IV

(Implemented from academic year 2024-25 onwards)



VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Department of Botany

Program Outcomes (POs):

PO1: Disciplinary Knowledge: Graduates will gain in-depth understanding in their specific major or discipline, mastering the foundational principles and theories, as well as advanced concepts. Execute strong theoretical and practical understanding developed from the specific programme in the area of work.

PO2: Problem-Solving Skills: Graduates will learn to use their knowledge to identify, analyze, and solve problems related to their field of study.

PO3: Analytical Skills: Graduates will gain the ability to collect, analyze, interpret, and apply data in a variety of contexts. They might also learn to use specialized software or equipment.

PO4: Research Skills and Scientific temper: Depending on the field, graduates might learn how to design and conduct experiments or studies, analyze results, and draw conclusions. They might also learn to review and understand academic literature.

PO5: Communication Skills: Many programs emphasize the ability to communicate effectively, both orally and in writing. Graduates may learn to present complex information clearly and succinctly, write detailed reports, and collaborate effectively with others.

PO6: Ethics and Professionalism: Graduates may learn about the ethical and professional standards in their field, and how to apply them in real-world situations.

B.Sc. in Botany

Program Specific Outcomes (PSOs):

PSO1: The aims of this programme is to enable the student to reach current understanding of botany and practical skills in an expanding field of employment.

PSO2: Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences and a depth of knowledge/expertise in the field of Plant identification.

PSO3: Students will be able to access the literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.



VIVEKANAND COLLEGE, KOLHAPUR (EMPOWERED AUTONOMOUS)

Department of Botany

Departmental Teaching and Evaluation scheme

Second Year Semester-III & IV

Sr. No.	Course Abbr.	Course code	Course Name	Teaching Scheme Hours/week		Examination Scheme and Marks				Course Credits
				TH	PR	ESE	CIE	PR	Marks	
Semester-III										
1	DSC-V	DSC03BOT31	Diversity of Cryptogams	2	-	40	10	-	50	2
2	DSC-VI	DSC03BOT32	Diversity of Phanerogams	2	-	40	10	-	50	2
3	MIN-V	MIN03BOT31	Diversity in non-flowering plants	2	-	40	10	-	50	2
4.	MIN-VI	MIN03BOT32	Plant Taxonomy	2	-	40	10	-	50	2
5	VSC-PR-II	VSC03BOT39	Bonsai and Terrarium	-	4	-	-	25	25	2
6	DSC-PR-III	DSC03BOT39	DSC- Botany Lab-3	-	8	-	-	50	50	4
7	MIN-PR-III	MIN03BOT39	MIN- Botany Lab-3	-	4	-	-	25	25	2
Semester –III Total				8	16	160	40	100	300	16
Semester-IV										
1	DSC-VII	DSC03BOT41	Resource Botany	2	-	40	10	-	50	2
2	DSC-VIII	DSC03BOT42	Industrial Botany	2	-	40	10	-	50	2
3	MIN-VII	MIN03BOT41	Diversity of flowering plants	2	-	40	10	-	50	2
4	MIN-VIII	MIN03BOT42	Commercial Botany	2	-	40	10	-	50	2
5	VSC-PR-III	VSC03BOT49	Herbal Technology	-	4	-	-	25	25	2
6	DSC-PR-IV	DSC03BOT49	DSC- Botany Lab-4	-	8	-	-	50	50	4
7	MIN-PR-IV	MIN03BOT49	MIN- Botany Lab-4	-	4	-	-	25	25	2
Semester –IV Total				8	16	160	40	100	300	16



B. Sc. Part – II Semester -III BOTANY

DSC-V: DSC03BOT31: Diversity of Cryptogams

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Provide a foundational understanding of several plant groups.

CO2: Enhance consciousness about the diversity seen in lower plant groups.

CO3: Disseminate information about how lower plant groups reproduce.

CO4: Describe the characteristics and groupings of lower cryptogams.

Unit -1: Algae

(07 Lectures.)

Cryptogams: Introduction, General Characters.

Algae- Introduction, Range of Thallus organization,

Methods of reproduction, Algae Classification (G. M. Smith),

Study of example with reference to occurrence, plant body and life cycle of *Spirogyra*, and *Sargassum*.

Economic importance of Algae.

Unit -2: Fungi:

(07 Lectures.)

Fungi- Introduction, Habit (Types of mycelium), Mode of Nutrition.

Methods of reproduction,

Outline of Classification according to Alexopoulos and Mims (1979),

Study of example with reference to occurrence, plant body and life cycle of *Rhizopus* and *Puccinia*.

Economic importance of Fungi.

Unit -3: Bryophyta:

(08 Lectures.)

Introduction, Distribution in India, Range of Thallus organization, Methods of reproduction,

Outline classification according to Parihar (1965),

Study of example with reference to occurrence, plant body and life cycle of *Riccia* and *Anthoceros*.

Unit-4: Pteridophyta:

(08 Lectures.)

Introduction, Distribution in India, Methods of reproduction,

Outline of Classification according to Smith (1955), Heterospory,

Study of example with reference to occurrence, plant body, and life cycle of *Selaginella* and *Azolla*.

Reference Books:

- Vashista B. R., Sinha A. K. and Singh V. P. (2005), Botany for degree students Algae, S. Chand and Company Ltd., New Delhi.
- Gangulee H. C. and Das K. S. (1959), College Botany-Vol. I., New Central Book Agency (P), Limited, Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2016), Botany for degree students Fungi, S. Chand and Company Ltd., New Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2010), Botany for degree students Bryophytes, S. Chand and Company Ltd., New Delhi.



B. Sc. Part – II Semester -III BOTANY
DSC-VI: DSC03BOT32: Diversity of Phanerogams
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Introduce pupils to the fundamentals of diversity of phanerogams.

CO2: Convey concepts on lower phanerogams.

CO3: Identify various plant forms according to their distinct groups using distinguishing characteristics along with examples.

CO4: Determine each group's life cycle pattern.

Unit-1: Phanerogams: (03 Lectures)

Introduction, Distinguishing characters of Gymnosperms and Angiosperms.

Unit-2: Gymnosperms: (09 Lectures)

Introduction, Distribution of Gymnosperms in India, Methods of Reproduction, Outline of classification system According to Sporne (1965), Study of example with reference to occurrence, plant body and life cycle of *Pinus* and *Gnetum*.

Unit- 3: Angiosperms: (09 Lectures)

Introduction, Habit and Habitat diversity, Methods of reproduction, Evolutionary history, Taxonomic hierarchy, Bentham and Hooker System of Classification (Merit and Demerit), Difference between Dicot and Monocot plant, Study of Sunflower and Maize root and stem.

Unit-4: Taxonomic Importance: (09 Lectures)

Morphology, Anatomy, Chemotaxonomy and Palynology, Brief introduction to Cytotaxonomy, Chemotaxonomy, Numerical taxonomy, Molecular taxonomy and DNA Barcoding of plants. Herbaria, Herbarium technique and Digital herbaria.

Reference books:

- Singh, Pande and Jain (2013), A Textbook of Botany Angiosperms, Rastogi Publications, Meerut, India.
- Vashishta P.C., Sinha A. K. and Kumar A. (2010), Gymnosperms , S. Chand and Company, Ltd, Ramnagar, New Delhi, India.
- Pandey B. P (2010), College Botany Vol II., S. Chand and Company Ltd., New Delhi, India
- Sporne K. P. (1965), The Morphology of Gymnosperms, Hutchinson, London, Hillary house, New York.



B. Sc. Part – II Semester -III BOTANY
MIN-V: MIN03BOT31: Diversity in non-flowering plant
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Provide a foundational understanding of several plant groups.

CO2: Enhance consciousness about the diversity seen in lower plant groups.

CO3: Disseminate information about how lower plant groups reproduce.

CO4: Describe the characteristics and groupings of lower cryptogams.

Unit -1: Algae (07 Lectures.)

Cryptogams: Introduction, General Characters.

Algae- Introduction, Range of Thallus organization,

Methods of reproduction, Algae Classification (G. M. Smith),

Study of example with reference to occurrence, plant body and life cycle of *Spirogyra*, and *Sargassum*.

Economic importance of Algae.

Unit -2: Fungi: (07 Lectures.)

Fungi- Introduction, Habit (Types of mycelium), Mode of Nutrition.

Methods of reproduction,

Outline of Classification according to Alexopoulous and Mims (1979),

Study of example with reference to occurrence, plant body and life cycle of *Rhizopus* and *Puccinia*.

Economic importance of Fungi.

Unit -3: Bryophyta: (08 Lectures.)

Introduction, Distribution in India, Range of Thallus organization, Methods of reproduction,

Outline classification according to Parihar (1965),

Study of example with reference to occurrence, plant body and life cycle of *Riccia* and *Anthoceros*.

Unit-4: Pteridophyta: (08 Lectures.)

Introduction, Distribution in India, Methods of reproduction,

Outline of Classification according to Smith (1955), Heterospory,

Study of example with reference to occurrence, plant body, and life cycle of *Selaginella* and *Azolla*.

Reference Books:

- Vashista B. R., Sinha A. K. and Singh V. P. (2005), Botany for degree students Algae, S. Chand and Company Ltd., New Delhi.
- Gangulee H. C. and Das K. S. (1959), College Botany-Vol. I., New Central Book Agency (P), Limited , Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2016), Botany for degree students Fungi, S. Chand and Company Ltd., New Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2010), Botany for degree students Bryophytes, S. Chand and Company Ltd., New Delhi.



B. Sc. Part – II Semester -III BOTANY

MIN –VI: MIN03BOT32: Plant Taxonomy

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Expose the student to the basic principles and methods of plant taxonomy.

CO2: Recognize the different facts of plant classification and nomenclature.

CO3: Explain the ICN and ICBN in terms of their guiding concepts and regulations.

CO4: Develop an appreciation of the scientific and aesthetic values of plants in students mind.

Unit-1: Introductory Taxonomy:

(06 Lectures.)

Introduction, Importance of Taxonomy, Functions of Taxonomy - Identification, Nomenclature, Classification, Ranks, Categories and Taxonomic groups.

Unit-2: Botanical Nomenclature:

(08 Lectures.)

Principles and rules (ICN), Salient features of International Code of Botanical Nomenclature (ICBN), Rules and regulations of Binomial nomenclature System, Systems of Classification-Natural, Artificial and Phylogenetic, Bentham and Hooter's system of Classification (Up to series).

Unit-3 : Tools For Taxonomic Studies:

(08 Lectures.)

Herbarium - Introduction, Roles and Significance, Botanical gardens -Introduction, Roles and Significance, Sir. J. C. Bose Botanical Garden, Calcutta., Kew Botanical Garden, Kew, Lead Botanical Garden, Shivaji University, Kolhapur.

Unit-4: Taxonomic Literature:

(08 Lectures.)

Flora, Manuals, Monographs, eflora, Revisions, Journals, Periodicals, Reference Books, Research paper, Websites and Catalogues.

Plant Families: Morphological, floral, distinguishing characters and economic importance of following families. 1. Malvaceae 2. Amaryllidaceae.

Reference Books:

- Lawrence G. M. H. (1951), Taxonomy of vascular plant, Macmillan, London.
- Naik V. N. (1984), Taxonomy of Angiosperms, Tata Mc. Graw-Hill Publication, New Delhi.
- Singh V. and Jain D. K. (2004), Taxonomy of Angiosperms, Rastogi Publications, Meerut.
- Lawrence G. M. H. (1951), Taxonomy of vascular plant, Macmillan, London.



B. Sc. Part – II Semester -III BOTANY
VSC-PR-II: VSC03BOT31: Bonsai and Terrarium
Practical: 60 hrs.
Marks- 25 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

- CO1: Impart basic principles of bonsai technique.
- CO2: Recognize the abilities required to sustain and care for a bonsai plant.
- CO3: Emphasize the fundamentals of terrarium construction.
- CO4: Apply knowledge on Bonsai cultivation, terrarium construction for marketing.

Practical:

- 1) Study of Bonsai technique.
- 2) Study of tools and containers used in bonsai technique.
- 3) Study of wiring and preparation of bonsai media.
- 4) Study of different designing and styles of bonsai.
- 5 to 7) Study of bonsai preparation.
- 8) Study of training and pruning techniques in bonsai.
- 9) Study of irrigation, pest and disease management in bonsai.
- 10) Study of terrarium.
- 11) Study of containers, preparation of media used in terrarium technique.
- 12 to 13) Study of terrarium preparation.
- 14) Designing of terrarium.
- 15) Bonsai / Terrarium submission.

Reference books:

- Acquaaah G. (2019), Horticulture: Principles and Practices (4th edition) India, Pearson India Education Services Pvt. Ltd., India.
- Lancaster S. P., Base T. K. and Mukherjee D. (1997), Gardening in India, Oxford and IBH publishing Co, Calcutta.
- Zingare A. K. (2013), A manual of Gardening, Satyam Publishers and Distributors, Jaipur.
- Rao, P. S. (2016), Vegetable Crops Production, Sonali Publications, New Delhi.
- Singh D. B. and Wazin Poonm (2002), Bonsai : An Art, Scientific Publishers, Jodhpur.



B. Sc. Part – II Semester -III BOTANY

DSC- PR-III: DSC03BOT39: DSC- BOTANY LAB-3

Practical: Four lectures of 60 minutes per week per batch

Marks: 50 (Credits 04)

PRACTICAL

(Based on Paper DSC03BOT31 and Paper DSC03BOT32)

- 1 to 2) Study of vegetative and reproductive characters of *Spirogyra* and *Sargassum*.
- 3 to 4) Study of vegetative and reproductive characters of *Rhizopus* and *Puccinia*.
- 5 to 6) Study of vegetative and reproductive characters of *Riccia* and *Anthoceros*.
- 7 to 8) Study of vegetative and reproductive characters of *Azolla* and *Selaginella*.
- 9) Study of habit and habitat diversity in angiosperms with suitable example.
- 10) Study of morphology of dicot plant with reference to vegetative and reproductive structure.
- 11) Study of morphology of monocot plant with reference to vegetative and reproductive structure.
- 12 to 13) Study of anatomy of *Sunflower* root and stem.
- 12 to 15) Study of anatomy of *Maize* root and stem.
- 16) Study of different types of pollen grains.

Reference Books:

- Vashista B. R., Sinha A. K. and Singh V. P. (2005), Botany for degree students Algae, S. Chand and Company Ltd., New Delhi.
- Gangulee H. C. and Das K. S. (1959), College Botany-Vol. I., New Central Book Agency (P), Limited , Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2016), Botany for degree students Fungi, S. Chand and Company Ltd., New Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2010), Botany for degree students Bryophytes, S. Chand and Company Ltd., New Delhi.



B. Sc. Part – II Semester -III BOTANY
MIN- PR-III: MIN03BOT39: MIN- BOTANY LAB-3
Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

PRACTICAL

(Based on Paper MIN03BOT31 and Paper MIN03BOT32)

- 1 to 2) Study of vegetative and reproductive characters of *Spirogyra* and *Sargassum*.
- 3 to 4) Study of vegetative and reproductive characters of *Rhizopus* and *Puccinia*.
- 5 to 6) Study of vegetative and reproductive characters of *Riccia* and *Anthoceros*.
- 7 to 8) Study of vegetative and reproductive characters of *Azolla* and *Selaginella*.
- 9) Extraction of algal pigments and their separation by paper chromatography.
- 10) Study of different asexual methods of reproduction in nonflowering plants.
- 11) Study of different types of bacteria.
- 12) Study of herbarium and its preparation.
- 13) Study of Taxonomic literature with reference to theory syllabus.
- 14 to 15) Study of plant family - Malvaceae , Amaryllidaceae.
- 16) Visit to Botanical garden.

Reference Books:

- Vashista B. R., Sinha A. K. and Singh V. P. (2005), Botany for degree students Algae, S. Chand and Company Ltd., New Delhi.
- Gangulee H. C. and Das K. S. (1959), College Botany-Vol. I., New Central Book Agency (P), Limited , Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2016), Botany for degree students Fungi, S. Chand and Company Ltd., New Delhi.
- Vashista B. R., Sinha A. K. and Singh V. P. (2010), Botany for degree students Bryophytes, S. Chand and Company Ltd., New Delhi.



B.Sc. Part – II Semester -IV BOTANY
DSC –VII: DSC03BOT41: Resource Botany
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Identification, extraction, and use of plants with economic significance.

CO2: Impart the knowledge of the role of plants in human welfare.

CO3: Update the students about plant dependent industries.

CO4: Encourage students to think about entrepreneurship and start-ups.

Unit-1: Forest as Potential Resource : (06 Lectures.)

Introduction and Scope, Major forest produce and their uses- Gum, Resin, Tannin and Pigments.

Unit-2: Plant resources used in cosmetics, aromatics and pharmaceuticals : (10 Lectures.)

Introduction and scope, Herbal preparations, Methods of extraction- Maceration, Digestion, Decoction aromatic waste, extracts and tinctures.

Study of *Aloe*, Heena, Lemon grass, Rose, Jasmine, Turmeric, Ginger, Neem, Holy basil, Amla.

Unit-3: Floricultural Industry: (07 Lectures.)

Introduction to floriculture, Cultivation practices, Harvesting and marketing of Rose, and Gerbera.

Unit-4: Bio- fuel Technology: (07 Lectures.)

Introduction and advantages, Concept of Bio-fuel and its need, Plants used for Bio-fuel production, Biodiesel production from Castor.

Reference books:

- Kochhar, S. L. (1998), Economic Botany in Tropics, Macmillan, New Delhi, India.
- Satya Prakash Krishan Pal Singh (2023), Fundamentals of Floriculture, Write and Print publications, New Delhi.
- Sanjay Sahay (2021), Handbook of Biofuels, Academic Press, London.
- Donald L. Grebner, Jacek P. Siry, Pete Bettinger, Kevin Boston (2021), Introduction to Forestry and Natural Resources 2nd Edition, Academic Press, London.
- Dr. Bhansaheb Auti, Dr. D. N. Khairnar, Deepak Mahajan (2011), Plant Resources Management Utilization- I, Vision Publications, Pune.



B. Sc. Part – II Semester -IV BOTANY
DSC –VIII: DSC03BOT42: Industrial Botany
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Acquire knowledge of different plant species and the components that are employed in industry.

CO2: Acquire an understanding procedures that are used to turn raw materials into finished goods.

CO3: Get knowledge about various sectors and products that are derived from plants and their components.

CO4: Highlight the potential of these studies to become an entrepreneur.

Unit-1: Physical characteristics of Indian Woods : (12 Lectures.)

Methods of seasoning and chemical treatment of specialized use, Fire proofing of the wood,

Industrial manufacturing of packing material and plywood, the Classification of plywoods according to their use. Some important commercial woods - *Dalbergia sp.*, *Shorea robusta* *Tectona grandis*, *Cedrus deodara*, Bamboo - the "Green Gold of India."

Manufacturing of paper and board from raw plant material Manufacturing of crude and high quality paper, recycled paper

Unit-2: Extraction of sugar from sugar cane: (09 Lectures.)

Flow diagram of the process with a critical study of the steps involved, problems faced by the sugar industry in India By products of sugar industry, distillation of alcohol and other products with special reference to distilleries in Maharashtra.

Unit-3: Sources of natural dyes in India and their extraction methods, merits and limitations of plant based dyes. (04 Lectures.)

Unit-4: Importance of Seed Industry: (05 Lectures.)

Seed production, seed processing and marketing, major seed industries and corporation of India.

Reference books:

- Pandey B. P. (1999), Economic Botany, S. Chand and Company Ltd., New Delhi.
- Hugh Trotter (1929), The Common Commercial Timbers of India and Their Uses, Government of India Central Publication, New Delhi.
- Kochhar S. L. (1998), Economic botany in the Tropics - Macmillan India Limited, Delhi.
- Ambasta S. P. (1994), The Useful Plants of India (3rd Ed), Publications and Information Directorate, CSIR, New Delhi.



B. Sc. Part – II Semester -IV BOTANY
MIN-VII: MIN03BOT41: Diversity of flowering plant

Theory: 30 hrs.

Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Identify various plant forms according to their distinct groups using distinguishing characteristics along with examples.

CO2: Determine each group's life cycle pattern.

CO3: Convey concepts on lower phanerogams.

CO4: Introduce pupils to the fundamentals of diversity of phanerogams.

Unit-1: Phanerogams: (03 Lectures.)

Introduction, Distinguishing characters of Gymnosperms and Angiosperms.

Unit-2: Gymnosperms: (09 Lectures.)

Introduction, Distribution of Gymnosperms in India, Methods of reproduction,

Outline of classification system According to Sporne (1965),

Study of example with reference to occurrence, plant body and life cycle of *Pinus* and *Gnetum*.

Unit- 3: Angiosperms: (09 Lectures.)

Introduction, Habit and Habitat diversity, Methods of reproduction,

Evolutionary history, Taxonomic hierarchy,

Bentham and Hooker System of Classification (Merit and Demerit),

Difference between Dicot and Monocot plant,

Study of Sunflower and Maize root and stem.

Unit-4: Taxonomic Importance: (09 Lectures.)

Morphology, Anatomy, Chemotaxonomy and Palynology,

Brief introduction to Cytotaxonomy, Chemotaxonomy, Numerical taxonomy,

Molecular taxonomy and DNA Barcoding of plants.

Herbaria, Herbarium technique and Digital herbaria.

Reference books:

- Singh, Pande and Jain (2013), A Textbook of Botany Angiosperms, Rastogi Publications, Meerut, India.
- Vashishta P.C., Sinha A. K. and Kumar A. (2010), Gymnosperms , S. Chand and Company, Ltd, Ramnagar, New Delhi, India.
- Pandey B. P (2010), College Botany Vol II., S. Chand and, Company Ltd., New Delhi, India
- Sporne K. P. (1965), The Morphology of Gymnosperms, Hutchinson, London, Hillary house, New York.



B. Sc. Part – II Semester -IV BOTANY
MIN-VIII: MIN03BOT42: Commercial Botany
Theory: 30 hrs.
Marks-50 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

CO1: Know about the commercial products produced from algae, fungi, bryophytes and pteridophytes.

CO2: Learn about the chemistry of plants and its commercial products.

CO3: Gain knowledge about developing commercial enterprise of microbial products.

CO4: Understand the role of higher plants in our society and how they can be used for more applied aspects.

Unit-1: Algae : (06 Lectures.)

Introduction, Potential algae, Products, Processing and applications of algae.(Future prospectus)

Sargassum, Nostoc, Spirulina, Chlorella, Prophyra.

Unit-2: Fungi : (06 Lectures.)

Introduction, Potential fungi, Products, Processing and applications of fungi.(Future prospectus)

Trichoderma, Metarhizium, Beauveria, Penicillium, Aspergillus, Yeast, Ganoderma, Agaricus.

Unit- 3: Bryophytes and Pteridophytes : (09 Lectures.)

Introduction, Potential member, Products, Processing and applications of organisms.

(Future prospectus)

Bryophytes - Moss, *Marchantia, Riccia*

Pteridophytes - *Adiantum, Nephrolepis, Dryopteris, Polypodium, Lycopodium*

Unit-4: Higher Plants : (09 Lectures.)

Introduction, Potential member, Products, Processing and applications of organisms.

(Future prospectus)

Gymnosperm - *Cycas, Pinus, Ginkgo, Taxus*

Angiosperm - *Aswahagandha, Ashoka, Atropa, Plumbago, Costus*

Reference books:

- Sivarajan V. V. and Balachandran I (1994), Ayuverdic drugs and their plant source, Oxford IBH Publishing Co.Pvt. Ltd., New Delhi., India.
- Smith, R. H. (2000), Plant Tissue Culture and Experiments, 2nd edition, Academic Press, USA.
- Levetin, F., McMahon, K. (2016), Plants and Society, 7th Edition, McGraw Hill, New York.
- Sharma , O. P. (1992), Text book of Thallophyta, McGraw Hill Publishing Co. New Delhi.



B. Sc. Part – II Semester -IV BOTANY
VSC- PR- III: VSC03BOT49: Herbal Technology
Practical: 60 hrs.
Marks- 25 (Credits: 02)

Course Outcomes: After the completion of the course the student will be able to:

- CO1: A comprehension of the value of the holistic approach to therapy employed in Indian traditional medical systems, as well as the significance of medicinal plants to both traditional and modern medicine.
- CO2: Acquire understanding regarding the limitations in the marketing and promotion of medicinal plants.
- CO3: Transforming knowledge into skills for advancing traditional medicine.
- CO4: Acquiring entrepreneurial skills to create goods with added value, extracts from plants, and the separation of bioactive ingredients.

Practical:

- 1- 4) Study of herbal medicinal plants with reference to common name, botanical name, family, parts used, botanical description, chemical constituents and medicinal uses of Shikakai, Alovera, Turmeric, Neem, Guduchi, Tulsi, Bael and Amla.
- 5) Study of classification of crude drugs.
- 6) Study of different steps of herbal drug production.
- 7) Study of phytochemical analysis of hair care plants. (Reetha, Shikakai)
- 8) Study of phytochemical analysis of skin care plants. (Alovera, Turmeric)
- 9) Study of phytochemical analysis of antidiabetic plants. (Guduchi, Neem, Jamun)
- 10) Study of phytochemical analysis of plants used in respiratory disorders. (Adulsa, Jeshthamadh, Tulsi, Ginger).
- 11) Study of phytochemical analysis of plants used in digestive disorders. (Bael, Ajwain)
- 12) Study of phytochemical analysis of plants used in anti aging. (Amla, Basil, Clove, Lemon)
- 13) Visit to herbal drug industries.
- 14) Study of herbal garden.
- 15) Project report (Phytochemical analysis of any two plants).

Reference Books:

- Shah and Quadry's ,(2005), Pharmacognosy, B. S. Shah prakashan, India.
- Sivarajan V. V. and Balachandran I., (1994), Ayurvedic drugs and their plant source, Oxford IBH Publishing Co. New Delhi.
- Kokate C. K., (2002), Pharmacognosy, Nirali Prakashan, Pune.
- Miller L. and Miller B. (1998), Ayurveda and Aromatherapy, Banarsidas, Delhi.



DSC- PR-IV: DSC03BOT49: DSC- BOTANY LAB-4

Practical: Four lectures of 60 minutes per week per batch

Marks: 50 (Credits 04)

PRACTICAL

(Based on Paper DSC03BOT41 and Paper DSC03BOT42)

- 1) Study of major forest products like Gum, Resin and Tannin.
- 2) Study of methods of extraction- Maceration, Digestion and Decoction.
- 3 to 5) Study of cosmetic, aromatic plants with reference to botanical name, family, source, botanical description and uses of Heena, Lemon grass, Rose, Jasmine.
- 6) Study of cultivation practices, origin, variety, harvesting and marketing of Rose and Gerbera.
- 7) Study of biodiesel plant - Caster.
- 8) Study of some important commercial wood yielding plants like *Tectona grandis*, Bamboo.
- 9) Study of sugar production in sugar factory.
- 10) Study of fermentation technique by using sugarcane juice.
- 11) Study of dye yielding plants like *Bixa*, Turmeric.
- 12) Study of different steps of seed industry.
- 13) Preparing the list of seed industries.
- 14) Collect the information regarding different variety of crops.

Reference books:

- Kochhar, S. L. (1998), Economic Botany in Tropics, Macmillan, New Delhi, India.
- Satya Prakash Krishan Pal Singh (2023), Fundamentals of Floriculture, Write and Print publications, New Delhi.
- Pandey B. P. (1999), Economic Botany, S. Chand and Company Ltd., New Delhi.
- Hugh Trotter (1929), The Common Commercial Timbers of India and Their Uses, Government of India Central Publication, New Delhi.



MIN- PR-IV: MIN03BOT49: MIN- BOTANY LAB-4
Practical: Four lectures of 60 minutes per week per batch
Marks: 25 (Credits 02)

PRACTICAL

(Based on Paper MIN03BOT41 and MIN03BOT42)

- 1) Study of *Pinus*.
- 2) Study of *Gnetum*.
- 3) Study of different types of plant habits. (Herb, Shrub, Climbers, Epiphytes, Parasites with suitable example)
- 4) Study of different types of plant habitats. (Xerophytes, Hydrophytes, Mesophytes with suitable examples)
- 5 to 7) Study of dicot and monocot plants with reference to morphological and reproductive characters.
- 8) Study of sunflower root and stem anatomy.
- 9) Study of maize root and stem anatomy.
- 10) Study of herbarium preparation.
- 11) Study of sea weed extract/algal fertilizers.
- 12) Making of tablets.
- 13) Making of *Spirulina* culture.
- 14) Study of biocontrol agents/*Trichoderma* culture.
- 15) Study of bryophytes.
- 16) Production of *Azolla*.
- 17) Study of flowering plants.
- 18) Study of oil extraction technique.
- 19) Study of insect repellent plants and its products.(Neem, *Ocimum*, *Pongamia*, Lemon grass.)

Reference books:

- Singh, Pande and Jain (2013), A Textbook of Botany Angiosperms, Rastogi Publications, Meerut, India.
- Levetin, F., McMahan, K. (2016), Plants and Society, 7th Edition, McGraw Hill, New York.
- Sharma , O. P. (1992), Text book of Thallophyta, McGraw Hill Publishing Co. New Delhi.
- Vashishta P.C., Sinha A. K. and Kumar A. (2010), Gymnosperms , S. Chand and Company, Ltd, Ramnagar, New Delhi, India.



B. Sc. Part – II Semester -III & IV BOTANY
Semester End Examination
Structure of Question Paper

Total Marks: 40

Time : 2 hours

Question No.	Question Pattern	Marks
Q.1	Choose and rewrite the correct alternative (One mark each):	08
Q.2	Attempt any TWO (Eight marks each):	16
Q.3	Attempt any FOUR (Four marks each):	16
	Total	40

B. Sc. Part – I Semester -I & II BOTANY
Continuous Internal Evaluation (CIE)

Evaluation Type	Marks
Home Assignment/ Book Review/ Student Project/ Test/ PPT Presentation	10



Seat No.	
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Ques. paper code	
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**VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)**

B.Sc. Part- II (Botany) (Semester-III) Examination.....
Course Code and Name: DSC03BOT31: Diversity of Cryptogams

Day:

Time: 2 hours

Date: --/--/----

Marks : 40

Instructions:

- 1) All the questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw neat labelled diagrams wherever necessary.

Q. 1. Choose and rewrite the correct alternative (One mark each):

[08 Mks]

- i) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----
- ii) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----
- iii) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----
- iv) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----
- v) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----
- vi) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----
- vii) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----
- viii) Xyzabcdefghijklmnop -----
a) ----- b) ----- c) ----- d) -----

Q.2. Attempt any TWO (Eight marks each):

[16 Mks]

- i) Xyzabcdefghijklmnop.
- ii) Xyzabcdefghijklmnop.
- iii) Xyzabcdefghijklmnop
- iv)

Q.3. Attempt any FOUR (Four marks each):

[16 Mks]

- i) Xyzabcdefghijklmnop.
- ii) Xyzabcdefghijklmnop.
- iii) Xyzabcdefghijklmnop.
- iv) Xyzabcdefghijklmnop.
- v) Xyzabcdefghijklmnop.
- vi) Xyzabcdefghijklmnop.

