M. G. Science Institute, Ahmedabad

Autonomous | Affiliated to Gujarat University, Ahmedabad

(Managed by The Ahmedabad Education Society)

Department of Botany

Bachelor of Science (Hons.) in Botany

(Effective from Academic Year 2026-27)

Annexure 3: **Semester- V**

Botany Major	**BOM-351**	**Cryptogams, Archegoniate plants, Seed bearing plants and Plant resources**

COs with cognitive Abilities:

COs	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	**REMEMBERING**	Differentiate Algal Group Identify and compare the key morphological and physiological features that distinguish green algae (Chlorophyceae) and brown algae (Phaeophyceae).
CO2	**REMEMBERING**	Understand Cryptogamic Diversity Demonstrate knowledge of the systematic classification, thallus organization, reproductive strategies, and life cycles of cryptogams, including algae, bryophytes, and pteridophytes.
CO3	**UNDERSTANDING**	Explore Phanerogamic Plant Structure Comprehend the systematic position, growth habits, habitats, and both vegetative and reproductive structures of phanerogams (gymnosperms and angiosperms).
CO4	**APPLYING**	Taxonomic Identification Skills Classify and describe the key diagnostic features of selected plant families,
CO5	**ANALYZING**	Appreciate the Economic Importance of Plants Analyse the botanical, ecological, and economic significance of plant resources, including timber species, firewood plants, medicinal (drug) plants, and toxic (poisonous) species.

COs / POs	PO1	PO2	PO3	PO4
CO1	3	2	1	1
CO2	3	2	1	2
CO3	3	2	1	3
CO4	3	3	2	3
CO5	2	3	2	3

Unit No.	Title of Unit and Contents	No. of hours
I	**Cryptogams -Algae and Fungi** **Algae:** Classification as per smith, Occurrence, Distribution, Structure, Reproduction (excluding development) and life cycle of ***Ulva*** and ***Sargassum*** **Fungi:** Classification as per Ainsworth, Occurrence, Distribution, Structure, Reproduction (excluding development) and life cycle of ***Peziza*** and ***Cercospora***	**15**
II	**Archegoniate plants –Bryophytes and Pteridophytes** **Bryophytes:** Classification as per Rothmaler, occurrence, Distribution, Structure, Reproduction (excluding development) and life cycle of ***Polytrichum*** and ***Anthoceros*** **Pteridophytes:** Classification as per Riemer, occurrence, Distribution, Structure, Reproduction (excluding development) and life cycle of ***Isoetes*** and ***Psilotum***	**15**
III	**Seed bearing plants- Gymnosperm, Taxonomy and Angiosperm** **Gymnosperm:** Classification as per Chamberlin, occurrence, Distribution, Structure, Reproduction (excluding development) and life cycle of ***Ginkgo*** and ***Ephedra*** **Taxonomy of Angiosperm:** Hutchinson's system of classification – Outline, Merits and Demerits. Study of general characters of families (As per Benthum and Hooker syetem): Papillionaceae (Fabaceae), Combretaceae, Asclepiadaceae, Bignoniaceae, Polygonaceae, Cyperaceae.	**15**

IV	**Plant resources** **Timber wood species:** Habit, Habitat, Botanical name, Family, timber wood characteristics and uses of following plants *Tectona* (Teak), *Azadirechta* (Neem) & *Holoptelia* (Kanji) **Fire wood species:** Habit, Habitat, Botanical name, Family, Fire wood characteristics and uses of following plants *Ziziphus* (Bor), *Prosopisjuliflora* (Gando Baval) & *Acacia nilotica* (Desi Baval) **Drug plants:** Habit, Habitat, Botanical name, Family, Chemical components and uses of following plants: *Andrographis* (Kariyatu), *Terminalia arjuna* (Arjunsadad) and *Plantago ovata* (Isaphgul). **Toxic/ Poisonous plants:** Habit, Habitat, Botanical name, Family, Chemical components, precaution and uses of following plants *Calotropis* (Akado), *Alstonia* (Saptparni) and *Abrus* (Chanothi).	**15**

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1. Pandey, S.N., Trivedi, P.S. and Misra, S. P. 2005. A Textbook of Botany Vol. I and II, Vikas Publishing House Pvt. Ltd.
2. Gangulee, H.C , Das, K. S. & Dutta ,C.. College Botany Vol. I, New Central book Agency.
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4. Vashishta, B.R.1983. Botany for degree student- Pteridophyta, S. Chand pub, New Delhi.
5. Parihar, N.S. 1991. Pteridophyta. Central Book Depot, Allahabad.
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12. Bierhost, D.W. 1971. Morphology of vascular plants. McMillan, New York.
13. Raghavan, V. 1999. Developmental Biology of flowering plant. Springer- Verlag, New York.
14. Singh, G. 1999. Plant Systematics- Theory nad Practice. Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.
15. Sutaria, R.N. A textbook of Systematic Botany. Khadayata book depot.Tata McGraw- Hill Publishing Co. Ltd. New Delhi.
16. Naik, V.N. 1984. Taxonomy of angiosperms. Tata McGraw- Hill Publishing Co. Ltd. New Delhi.
17. Verma B.K. 2011. Introduction to Taxonomy of angiosperms. PHI Learning Pvt. Ltd. New Delhi.
18. Economic Botany: A Textbook of Useful Plants and Plant Products. By Albert Frederick Hill, McGraw-Hill, 1952
19. Bendre and Kumar- Economic Botany

20. "Economic Botany: A Comprehensive Study": This is a widely referenced textbook by S.L. Kochhar, published by Cambridge University Press.

Botany Major	BOM-352	Advanced Plant Physiology, Cell Biology and Molecular Biology, Plant Anatomy and Plant Ecology

COs with cognitive Abilities:

COs	COGNITIVE ABILITIES	COURSE OUTCOMES
C01	REMEMBERING	Differentiate the roles of mitosis and meiosis in plants, emphasizing their functions in growth, tissue repair, asexual reproduction, and genetic variation through sexual reproduction
CO2	UNDERSTANDING	Identify and classify plant secretory structures (e.g., glandular trichomes, resin ducts) and explain their ecological and physiological roles.
CO3	UNDERSTANDING	Demonstrate a comprehensive knowledge of plant hormones, their biosynthesis, transport, and functions, and explain their roles in regulating plant growth, development, and senescence.
CO4	APPLYING	Apply principles of phyto-sociological methods to assess plant community composition, structure, and interactions in specific habitats.
CO5	EVALUATING	Evaluate the mechanism of abscission as a plant adaptation for water conservation, removal of senescent organs, and preparation for seasonal changes.
CO6	ANALYZING	Illustrate and analyze the transition in vascular tissue arrangement from the root (radial) to the stem (conjoint, collateral, bicollateral, etc.) and correlate it to functional adaptations.

COs / POs	PO1	PO2	PO3	PO4
CO1	3	2	1	2
CO2	3	3	1	2
CO3	3	2	1	2
CO4	3	3	2	3
CO5	2	3	1	2
CO6	3	3	1	3

Unit No.	Title of Unit and Contents	No. of hours
I	**Advance Plant physiology** **Seed Dormancy:** Types: exogenous and endogenous Mechanisms and ecological significance Methods of breaking dormancy: scarification, stratification, chemical treatments **Seed Germination:** Phases of germination, Role of enzyme an mobilization of stored food Environmental factors affecting seed germination **Plant Growth and Development:** Biosynthesis, Translocation and functions of Auxin, Cytokinins, Gibberellins, Abscisic acid and Ethylene. Development: Stages of Plant development Senescence: Types, theories, Importance and factors affecting senescence. **Stress Physiology:** General Introduction, Types – Abiotic & Biotic, Adaptation of plants in extreme condition of environmental factor – Temperature.	**15**
II	**Cell Biology and Molecular Biology** Cell cycle, Mitosis, Meiosis, Gene mapping, DNA Sequencing and DNA Fingerprinting.	**15**
III	**Plant Anatomy** Secretory Tissue system, Abscission (Leaf fall), Root Stem Transition Anomalous secondary growth in *Salvadora* stem, *Bougainvillea* stem, *Dracena* stem and *Raphanus* root	**15**
IV	**Plant Ecology** **Types of Halophytes and Ecological adaptations:** *Avicennia and Rhizophora* **Plant community:** Methods of studying Plant community, Analytical and synthetic characters of Plant community, Ecological niche. **Plant succession:** Concepts, Mechanism, Types: Hydrosere & Xerosere	**15**

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2. Sundararjan, S. College Botany Vol. I to IV. Himalaya Publishing House.
3. Witham, F.H., Delvin, R.M. 1983. Plant Physiology. Willard Grant. Boston, MA.
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5. Kumar, A. & Purohit, S.S.2001. Plant Physiology Fundamentals & Application 2 nd edition.
6. S. C. Rastogi, Cell and Molecular Biology, Rastogi Publication
7. P. S. Verma, V. K. Agrawal, Cell Biology, Genetics, Evolution and Ecology
8. C. B. Power, Cell Biology
9. P. D Sharma- Elements of Botany, Rastogi Publication
10. P. D. Sharm Ecology and Environment (8 th edition), Rastogi Publication
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12. A Text Book of Practical Botany 1&2 by Dr. Ashok Bendre& Ashok Kumar 2018, Rastogi Publication
13. S.K. Sinha; A textbook of Plant Physiology. Centrum press
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Major Practical	BOM-353	Practical based on BOM 351 and BOM 352

Syllabus: DSC-C-BOT- 353 (Practical -A) (Major)

No.	Practical
1.	Study of Life history of Algae- *Ulva* (Identify and Classify Types)
2.	Study of Life history of Algae- *Sargassum* (Identify and Classify Types)
3.	Study of Life history of Fungus- *Peziza* (Identify and Classify Types)
4.	Study of Life history of Fungus- *Cercospora* (Identify and Classify Types)
5.	Study of Life history of Bryophyte- *Anthoceros* (Identify and Classify Types)
6.	Study of Life history of Bryophyte- *Polytrichum* (Identify and Classify Types)
7.	Study of Life history of Pteridophyte- *Isoetes* (Identify and Classify Types)
8.	Study of Life history of Pteridophyte- *Psilotum* (Identify and Classify Types)
9.	Study of Life history of Gymnosperm- *Ginkgo* (Identify and Classify Types)
10.	Study of Life history of Gymnosperm- *Ephedra* (Identify and Classify Types)
11.	Study of Family- Papillionaceae (Fabaceae)
12.	Study of Family-Combretaceae
13.	Study of Family- Asclepiadaceae
14.	Study of Family- Bignoniaceae
15.	Study of Family- Polygonaceae
16.	Study of Family-Cyperaceae
17.	Study of Timber wood (Specimen) —As per theory
18.	Study of Fire wood (Specimen)—As per theory
19.	Study of Medicinal plants (Specimen)—As per theory
20.	Study of toxic/ poisonous plants (Specimen)—As per theory

Syllabus: DSC-C-BOT- 353 (Practical -B) (Major)

No	Practical
1.	Effect of light on seed germination
2.	Study of seed dormancy and its breaking methods (mechanical scarification, chemical treatment, chilling)
3.	Effect of auxins on root initiation in stem cuttings
4.	Effect of gibberellin on stem elongation
5.	Effect of cytokinin's on leaf senescence
6.	Effect of ethylene on fruit ripening
7.	Effect of temperature on Chlorophyll content in leaves
8.	Study of Mitosis in onion root tip by Squash method and Permanent Slides
9.	Study of Meiosis--Permanent Slides
10.	Chart of Gene mapping
11.	Chart of DNA Sequencing
12.	Chart of DNA Fingerprinting
13.	Study of Secretory tissue system- Citrus leaf, Cycas Rachis (section cutting & permanent slides)
14.	Study of Leaf fall by permanent slides/charts
15.	Study of root stem transition by permanent slides/charts
16.	Study of anomalous Secondary growth- *Salvadora* stem (section cutting & permanent slides)
17.	Study of anomalous Secondary growth- *Bougainvilliea* stem (section cutting & permanent slides)
18.	Study of anomalous Secondary growth- *Dracena* stem (section cutting & permanent slides)
19.	Study of anomalous Secondary growth- Raphanus root (section cutting & permanent slides)
20.	Nodal anatomy (Permanent slides/charts)
21.	Study of Halophytes– *Avicennia* leaf and stem - section cutting & permanent slides/charts
22.	Study of plant community through quadrates method: minimum number and size
23.	Study of quantitative characters of plant community through quadrates method: frequency, density, abundance
24.	Study of Plant succession by chart: Hydrosere and Xerosere

End Semester Examination Pattern for Practical Examination

B.Sc. Sem. – V Botany Practical

DSC-C-BOT- 353- Practical - A

Based on DSC-C-BOT- 351

(Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms and Plant Resources)

Time: 5 hours		**Maximum marks – 25**
Q.1	Identify, classify, giving reasons and draw labelled diagrams of the peculiarities observed in Specimen **A.** (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperm)	04
Q.2	Expose the reproductive structure from Specimen **B**. Make a sketch and show your preparation to the Examiner. (Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperm)	03
Q.3	Refer the Specimens **C** to their respective families. Give reasons; include floral formula and floral diagrams. Draw labelled diagrams.	04
Q.4	Identify and describe briefly the Slides / Specimens	10
	(D) Algae / Fungi / Bryophytes (E) Pteridophytes / Gymnosperm (F) Plant Resources (G) Plant Resources (H) Plant Resources	
Q.5	Journal & Submissions	04

DSC-C-BOT- 353- Practical - B
Based on DSC-C-BOT- 352

(Physiology, Anatomy, Cell Biology, Plant Ecology)

Time: 5 hours		**Maximum marks – 25**
Q.1	Prepare a double stained preparation of given Material **A**, Show your Preparation to the Examiner.	04
Q.2	Prepare a slide showing cell division from the given specimen **B**, Stain if necessary & show the slide to the Examiner. Draw labelled sketch.	04
Q.3	To determine the Frequency / Abundance / Density of any five species occurring in a given area. **OR** To determine minimum size / minimum number of quadrats in a given area.	04
Q.4	Identify and describe:	08
	1) Physiology Experiment 2) Physiology Experiment 3) Anatomy 4) Cell Biology Chart	
Q.5	Journal & Project report / Submissions	05