

SHREE GOVIND GURU UNIVERSITY, VINZOL,GODHARA
BOTANY (SEM-5)
SYLLABUS(NEP)2025

Semester	No	Paper	Title	Unit wise topic	Credit Points
5	1	BS23MJ5BO1	Cryptogamic Botany	1. Algae 2. Bacteria and fungi 3. Bryophytes 4. Pteridophytes	04
	2	BS23MJ5BO2	Plants in Ancient India: Ethnobotany and Beyond	1. Gymnosperms 2. Paleobotany 3. Systematic botany 4. Angiosperm taxonomy	04
	3	BS23MJ5BO3	Practical Botany	As per Theory	04
	4	BS23MN5BO1	Taxonomic Botany	1. Gymnosperm 2. Systematic Botany 3. Angiosperms 4. Ethnobotany	04
	5	BS23MN5BO2	Taxonomic Practical Botany	As per Theory	04
	6	BS23SE503	Medicinal Botany	1. Indigenous Medicinal Sciences 2. Conservation of Endangered and Endemic Medicinal Plants	02

SHREE GOVIND GURU UNIVERSITY, VINZOL, GODHARA
BOTANY (SEM-5)
MAJOR COURSE (THEORY)
BS23MJ5BO1
(Cryptogamic Botany)

Learning Objectives:

- To analyse the diversity, structure, and reproduction of algae.
- Classify bacteria and fungi and explain their ecological roles.
- To compare the characteristics and life cycles of bryophytes.
- To describe the evolution and adaptations of pteridophytes.

Learning Outcomes:

Students will be able to describe the diversity, structure, and reproduction of algae and they will be able to classify the bacteria and fungi with explanations of their ecological roles in nature. Furthermore the students will be able to compare the characteristics and life cycles of bryophytes with algae and pteridophytes. The students will be able to explain the evolution and adaptations of pteridophytes very easily.

Unit-1 Algae

- General characters and classification (G.M.Smith)
- Range of Thallus in Algae
- Origin and Evolution in Algae.
- Range of life cycle patterns in Algae.
- Role of Algae in Human Welfare [Industries, Utilization and Pollution indicators]
- General accounts of Diatoms.
- Life history of Volvox, Chara. Ectocarpus, Polysiphonia,

Unit-2 Bacteria and Fungi

- Types of Bacteria (on the base of shape and flagella);
- Ultra structure of Bacteria;
- Application of Bacteria in Agriculture, Industries, Medicine and in control of Soil,
- General characters, classification of Fungi [G.C. Ainsworth, 1971]
- Heterothallism in Fungi.
- General account of Mushroom cultivation
- Life History of Fungi: Pythium, Pezzia, Yeast and Agaricus

Unit-3 Bryophyta

- General characters and classification
- Origin and Evolution in Bryophytes
- Resemblances of Bryophytes with Algae.
- Resemblances of Bryophytes with Pteridophytes.
- Vegetative reproduction in Bryophytes
- Life History of the following:[Developmental details not to be included] Peltia, Anthoceros and Sphagnum.

Unit-4 Pteridophyta

- General characters and classification.
- Origin and Evolution in Pteridophytes.
- Stellar evolution in Pteridophytes
- Evolution of Sporophytes in Pteridophytes (Telome Theory; Merits and demerits)
- Abnormalities in the life cycle: Apospory and Apogamy.
- Diversity of Pteridophytes in Gujarat.
- Life History of the following: [Developmental details not to be included] Azolla, Marsilea, Equisetum.

SHREE GOVIND GURU UNIVERSITY, VINZOL, GODHARA
BOTANY (SEM-5)
MAJOR COURSE (THEORY)
BS23MJ5BO2

Plants in Ancient India : Ethnobotany and Beyond

Learning Objectives:

- To Describe Indian gymnosperms and their characteristics. and to compare gymnosperms and angiosperms. To outline Ginkgo and Gnetum reproduction.
- To summarize ancient Indian flora and key fossil groups. To explain fossilization and related concepts. Interpret the geological time scale. Explain ethnobotanical uses of selected plants.
- To understand plant taxonomy and classification systems, to describe chemotaxonomy and herbarium techniques.
- To recognize culturally significant Indian plants, to identify leaf morphology, to describe key features of listed Angiosperm families.

Learning Outcomes:

Upon completion, students will be able to; describe Indian gymnosperms, compare gymnosperms and angiosperms, outline Ginkgo and Gnetum reproduction, summarize ancient Indian flora and fossils, explain fossilization concepts, interpret geological time scale. Further explain ethnobotanical plant uses, understand plant taxonomy and classification, describe chemotaxonomy and herbarium techniques, recognize Culturally significant plants, identify Leaf morphology, describe key Angiosperm family features.

Unit – 1: Gymnosperms

- Gymnosperms of India and their distribution and economic importance.
- General characters and classification.
- Resemblances and differences between Gymnosperms and Angiosperms.
- Life history of Ginkgo and Gnetum. [Developmental details not to be included].

Unit – 2: Paleobotany

- Ancient Flora of India: A Paleobotanical Journey; Cycadales: General characters LYGINOPTERIS, Bennettitales: General characters CYCADEOIDEA, Cordaitales: General characters CORDAITES.
- Types of Fossils.
- Fossilization and Nomenclature of fossils.
- Factors affecting Fossilization.
- Some useful techniques for Fossil study.
- Geological Time Scale.

Unit – 3 : Systematic Botany

- Significance of Specific Plants in Ethnobotanical Practices; *Madhuca indica* (Mahua), *Vitex negundo* (Nirgundi), *Gloriosa superba* (Kalihari), *Tribulus terrestris* (Gokhru).
- Principles of Taxonomy.
- Merits and demerits of various system of classification, Bentham & Hooker, Engler and Prantl, Hutchinson, Bessey,
- Chemotaxonomy.
- Herbarium techniques: Plant Collection and Preparation of herbarium.
- Some important Herbaria in India.

Unit –4: Angiosperm Taxonomy

- Plants in Religious Beliefs in India; *Aegle marmelos* (Bili/Bilva), *Cynodon dactylon* (Dharo/Doob grass), *Ocimum tenuiflorum* (Tulsi), *Ficus benghalensis* (Vad/Banyan), *Prosopis cineraria* (Khijdo/Khejri), *Ficus religiosa* (Piplo/Peepal), *Azadirachta indica* (Limdo/Neem), *Butea monosperma* (Kesudo/Flame of the Forest), *Santalum album* (Chandan/Sandalwood), *Commiphora wightii* (Gugal), *Cocos nucifera* (Nariyal).
- Types of Leaf shape,
- Types of Leaf incision
- Study of following Angiosperm Families:
Polypetalae: Annonaceae, Combretaceae, Cucurbitaceae, Mimosaceae,
Gamopetalae: Apocynaceae, Convolvulaceae, Acanthaceae, Rubiaceae, Apetalae
(Monochlamydeae): Polygonaceae, Moraceae
Monocots: Cannaceae, Commelinac

SHREE GOVIND GURU UNIVERSITY, VINZOL, GODHARA
BOTANY (SEM-5)
MAJOR PRACTICAL
BS23MJ5BO3

1. To Study the types of Bacteria (on the bases of shape & flagella) through Model/ Chart.
2. Staining of Bacteria through Gram Staining
3. Identify and Classify following types: Morphology, Internal structure and Reproductive organs through Mounting
 - (A) Study of Algae
 - Volvox,
 - Chara,
 - Ectocarpus,
 - Polysiphonia,
 - (B) Study of Fungi
 - Pythium,
 - Peziza,
 - Yeast,
 - Agaricus
 - (C) Study of Bryophytic Plants (Thallus morphology, internal (V.T.S.) structure, Sexual reproductive organs & Sporophyte)
 - Peltia,
 - Anthoceros
 - Sphagnum.
 - (D) Study of Pteridophytes Plants: Morphology & Internal Structure
 - Azolla (Root, Stem, Leaf T.S., Structure of Micro & Mega sporocarps).
 - Marsilea (Rhizome, Petiole T.S., Structure of Sporocarps).
 - Equisetum (Rhizome, Aerial Shoot T.S. & Cone)
4. Study of Gymnosperm Plants External and Internal structure of Leaf / Needle, Male & Female cones; Anatomy of Root & Stem, through P.S of the following:
 - Ginkgo:
 - Anatomy of Root & Stem; Male and Female Cone; L.S. of Ovule
 - Gnetum:
 - Anatomy of Root & Stem; Male and Female Cone; L.S. of Ovule
5. Types of Leaf shape:
(Acicular, Linear, Lanceolate, Oblong, Elliptical or Oval, Ovate, Cordate, Reniform, Spathulate, Sagittate, Hastate, Orbicular, Lyrate, Oblique, Cuneate etc.)
6. Study of following Gymnosperm Fossils:
 - Lepidodendrales – LEPIDOCARPON [Seed]
 - Bennettitales: CYCADEOIDEA Stem T.S., Flower Bud
 - Cordaitales: CORDAITES Root T.S., Stem T.S., Leaf impression/T.S
7. Types of Leaf incision:
 - Pinnate: Pinnatifid, Pinnatipartite, Pinnatisect.
 - Palmate: Palmatifid, Palmatipartite, Palmatisect

8. Angiosperm Families:

- Polypetalae: Annonaceae, Combretaceae, Cucurbitaceae, Mimosaceae,
- Gamopetalae: Apocynaceae, Convolvulaceae, , Acanthaceae, Rubiaceae,
- Apetalae (Monochlamydeae): Polygonaceae, Moraceae
- Monocots: Cannaceae, Commelinaceae

9. Ethnobotany and Folk Medicine:

- To study plants specimen as per theory syllabus

Note:

- Students are expected to submit Project/Submission regarding any one topic/s as mentioned in the theory paper.
- Students are expected to describe the total morphology of given Angiospermic plants to perform as an exercise in examination for this paper.
- Study Tour / Fieldtrips, Its report & preparation of Herbarium sheets are mandatory

SUGGESTED READING : REFERENCE BOOKS / TEXTBOOKS

Teacher may suggest revised or latest published books etc. to the students

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.
3. Gangulee H.C., and Kar, A.K. College Botany Vol. III, New Central book Agency.
4. Vashishta, B.R. 1983. Botany for degree students- Pteridophyta, S. Chand pub, New Delhi.
5. Parihar, N.S. 1991. Pteridophyta. Central Book Depot, Allahabad.
6. Sporne, K.K.. The Morphology of Pteridophytes. B.I. Publishing Pvt. Ltd. Bombay.
7. Bhatnagar, S.P. and Moitra, A., Gymnosperms. New Age International Pvt. Ltd., New Delhi.
8. Vashishta, P.C. Botany for degree student- Gymnosperms, S. Chand Publications, New Delhi.
9. Chopra, G.L. Gymnosperms. S. Nagin & Co., Jalandhar.
10. Coulter, J.M. & Chamberlain, C.J. 1978. Morphology of Gymnosperms. Central Book Depot, Allahabad.
11. Foster, A.S. and Gifford, F.M. 1967. Comparative Morphology of Vascular plants. Freeman Publishers, San Francisco.
12. Bierhorst, D.W. 1971. Morphology of vascular plants. McMillan, New York.
13. Raghavan, V. 1999. Developmental Biology of flowering plants. Springer- Verlag, New York.
14. Singh, G. 1999. Plant Systematics- Theory and 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. Takhtajan 1997, Diversity and Classification of Flowering Plants. Columbia University Press, New York.
19. Sundararajan, S. College Botany Vol. I to IV. Himalaya Publishing House.
20. Ashok Kumar, Botany in Forestry and Environment, Khanna bandhu.
21. Economic Botany, Rashtra Vardhna, Sarup Book Publishers, New Delhi.
22. Indigenous Herbal Medicines, tribal formulations and traditional herbal practices; Deepa kaharya and Anshu Srivastava; Avishkar publication, India.
23. Glossary of Indian medicinal plants, R.N. Chopra, S.L. Nayar, and I.C. Chopra, 1956. C.S.I.R., New Delhi.
24. Medicinal plants: Ethnobotanical approach, Trivedi P.C. 2006. Agrobios, India.
25. Medicinal plant cultivation: A scientific approach, 2nd ed. Purohit and Vyas, 2008. Agrobios.

SHREE GOVIND GURU UNIVERSITY, VINZOL, GODHARA
BOTANY (SEM-5)
MINOR COURSE (THEORY)
BS23MN5BO1
Taxonomic Botany

Learning Objectives:

- To describe taxonomy principles, explain herbarium techniques, and compare classification systems.
- To identify leaf morphology and classify angiosperm families.
- To study the Ethnobotany and Folk Medicines

Learning Outcomes:

Students will be able to describe the principles of taxonomy, explain herbarium techniques and be able to compare different classification systems. Further they will be able to identify leaf shapes and incisions and classify angiosperm families. Furthermore students can be able to learn about the uses of different plants in their daily life.

Unit – 1: Gymnosperms

- General characters and classification.
- Resemblances and differences between Gymnosperms and Pteridophytes.
- Resemblances and differences between Gymnosperms and Angiosperms.
- Gymnosperms of India and their distribution and economic importance.
- Life history of Ginkgo and Gnetum [Developmental details not to be included].

Unit – 2 : Systematic Botany

- Principles of Taxonomy.
- Herbarium techniques: Plant Collection and Preparation of herbarium.
- Some important Herbaria in India.
- Merits and demerits of various systems of classification, Bentham & Hooker, Engler and Prantl.

Unit –3: Angiosperm Taxonomy

- Types of Leaf shape,
- Types of Leaf incision
- Study of following Angiosperm Families:
- Polypetalae: Cucurbitaceae, Mimosaceae,
- Gamopetalae: Convolvulaceae, Rubiaceae,
- Apetalae (Monochlamydeae): Polygonaceae, Moraceae
- Monocots: Cannaceae, Commelinaceae

Unit – 4: Ethnobotany and Folk Medicines

- Medico-ethnobotanical sources in India; Significance of the following plants in ethnobotanical practices (along with their habitat and morphology) *Madhuca indica*, *vitex negundo*, *Gloriosa superba*, *Tribulus terrestris*, *Pongamia pinnata*, *Cassia fistula*, *Diospyros melanoxylon*.
- Plants in religious belief: bili, Dhara, tulsi, vad, khijdo, piplo, rukhdo, nariyal, limdo, kesudo, chandan, sevan, gugal, salai gugal, pilu.etc...

SHREE GOVIND GURU UNIVERSITY, VINZOL, GODHARA
BOTANY (SEM-5)
MINOR COURSE (PRACTICAL)
BS23MN5BO2
Taxonomic Practical Botany

1. Study of Gymnosperm Plants External and Internal structure of Leaf/ Needle, Male & Female cones; Anatomy of Root & Stem, through P.S of the following:

- Ginkgo: Anatomy of Root & Stem; Male and Female Cone; L.S. of Ovule
- Gnetum: Anatomy of Root & Stem; Male and Female Cone; L.S. of Ovule

2. To study the types of Leaf shape:

(Acicular, Linear, Lanceolate, Oblong, Elliptical or Oval, Ovate, Cordate, Reniform, Spathulate, Sagittate, Hastate, Orbicular, Lyrate, Oblique, Cuneate)

3. To study the types of Leaf incision:

- Pinnate: Pinnatifid, Pinnatipartite, Pinnatisect.
- Palmate: Palmatifid, Palmatipartite, Palmatisect

4. To study the Angiosperm Families:

- Polypetalae: Cucurbitaceae, Mimosaceae,
- Gamopetalae: Convolvulaceae, Rubiaceae,
- Apetalae (Monochlamydeae): Polygonaceae, Moraceae
- Monocots: Cannaceae, Commelinaceae

5. Ethnobotany and Folk Medicine:

- To study plants specimen as per theory syllabus

Note:

- Students are expected to submit Project/ Submission regarding any one topic/s as mentioned in the theory paper.
- Students are expected to describe the total morphology of given Angiospermic plants to perform as an exercise in examination for this paper.
- Study Tour/ Field trips, Its report & preparation of Herbarium sheets are mandatory

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3. Gangulee H.C., and Kar, A.K. College Botany Vol. III, New Central Book Agency.

4. Vashishta, B.R. 1983. Botany for degree students-Pteridophyta, S.Chandpub, New Delhi.
5. Sutaria, R.N. A text book of Systematic Botany. Khadayata bookdepot. Tata McGraw- Hill Publishing Co. Ltd. New Delhi.
6. Naik, V.N. 1984. Taxonomy of angiosperms. Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
7. Verma B.K. 2011. Introduction to Taxonomy of angiosperms. PHI Learning Pvt. Ltd. New Delhi.
8. Sundararajan, S. College Botany Vol. I to IV. Himalaya Publishing House.
9. Bhatnagar, S.P. and Moitra, A., Gymnosperms. New Age International Pvt. Ltd., New Delhi.
10. Vashishta, P.C. Botany for degree student-Gymnosperms, S.Chand Publications, New Delhi.

SHREE GOVIND GURU UNIVERSITY, VINZOL, GODHARA
BOTANY (SEM-5)
SEC-BOTANY
BS23SE503
Medicinal Botany

Learning Objectives:

- To Describe Ayurveda, Siddha, Unani, identify key Indian medicinal figures, and outline uses of selected medicinal plants/drugs.
- To explain the need for medicinal plant conservation, differentiate endemic and endangered species, describe in-situ and ex-situ conservation, and explain cryopreservation in conservation.

Learning Outcomes:

Upon completion of this unit, students will be able to, describe the basic principles of Ayurveda, Siddha, and Unani medicine, recognize the contributions of prominent Indian scholars in medicine, summarize the key uses of selected medicinal plants and raw drugs, conservation of Endangered and Endemic Medicinal Plants.

Further explain the importance of conserving medicinal plant resources, distinguish between endemic and endangered medicinal plants, describe different strategies for in-situ and ex-situ conservation, and explain the role of cryopreservation in plant conservation.

Unit-1 Indigenous Medicinal Sciences

- Introduction of Ayurveda, Siddha System of Medicine, Unani Medicine
- Introduction of Indigenous Medicinal Guru and Scientists- Charaka, Sushruta, Nagarjuna, Vagbhatta, Bhava Misra, Patanjali,
- Study of few commercial /raw drugs/ medicinal plants - *Usnea*; *Pinus*; *Vincarosea*; *Rauwolfia serpentina*; *Withania somnifera*; *Adhatoda vasaka*; *Embllica officinalis*; *Saraca asoca*; *Aloe vera*; *Commiphora mukul*,

Unit -2 Conservation of Endangered and Endemic Medicinal Plants

- Introduction, Why conservation is needed?
- Endemic and Endangered medicinal plants
- In-situ conservation
- Ex-situ Conservation
- Conservation through cryopreservation

SUGGESTED READINGS

1. Economic Botany, Rashtia Vardhna, Sarup Book Publishers, New Delhi.
2. Indigenous Herbal Medicines, tribal formulations and traditional herbal practices; Deepak Aharya And Anshu Srivastava; Avishkar publication, India.
3. Glossary of Indian medicinal plants, R.N. Chopra, S.L. Nayar, and I.C. Chopra, 1956. C.S.I.R., New Delhi.
4. Medicinal plants: Ethnobotanical approach, Trivedi P.C. 2006. Agrobios, India.
5. Medicinal plant cultivation: A scientific approach, 2nd ed. Purohit and Vyas, 2008. Agrobios,

Shree Govind Guru University, Vinzol (Godhara)

BOTANY (SEM-6)

SYLLABUS (NEP) 2025

Semester	No	Paper	Title	Unit wise topic	Credit
6	1	BS23MJ6BO1	Traditional Indian Knowledge of Plant Resources Anatomy & Embryology	1. Anatomy 2. Embryology 3. Economic Botany 4. Forestry	4
	2	BS23MJ6BO2	PLANT SCIENCE	1.Cell Biology 2.Plant physiology 3. Moll. Biology 4. Plant Ecology	4
	3	BS23MJ6BO3	Practical Botany	As per Theory	4
	4	BS23MN6BO1	ANATOMY , ECOLOGY & ECONOMIC BOTANY	1.ANATOMY 2.ECOLOGY	2
	5	BS23MN6BO2	Practical Botany	As per Theory	2
	6	BS23SE603			4

BS23MJ6BO1- MAJOR PAPER 1

[Traditional Indian Knowledge of Plant Resources Anatomy & Embryology]

Learning Objectives:

- To learn the anatomical structure and functions of different tissues.
- To study the internal arrangement and patterns of tissues in some plants.
- To learn the Economic importance of plants.
- To learn the forest pattern of India, and its importance.

Learning Outcomes:

Students will be able to describe the structure and functions of different tissues of plant parts and they will be able to study the anomalous secondary growth in different plant species, moreover they can learn about the pattern of stele and lenticel.

Furthermore the students will be able to study the embryology with special references of pollen grain anatomy, mechanism and its development. The students will be able to identify the different plants of the local area, and explain their economic importance and local uses. They can also understand the importance of social forestry and different conservation strategies of endangered plants.

Unit – 1: Anatomy [Lectures 12]

- Epidermal Tissue System
- Secretory Tissue System
- Anomalous Secondary growth in following:
 - *Salvadora* stem,
 - *Achyranthes* stem,
 - *Tinospora* root,
 - *Carrot* root.
- Types of Stele.
- Periderm [origin, structure, functions]
- Lenticel
- Leaf fall

Unit – 2: Embryology [Lectures 12]

- Pollen wall features, Exine-ornamentation, concept of palynogram,
- Apertures of pollen wall, NPC- system,
- Scope of Palynology.
- Applications of Palynology in Taxonomy, coal, oil exploration & forensic science,
- Germination of pollen tube and factors affecting pollen germination

Unit –3: Economic Botany [Lectures 12]

- Botanical name, family, part used, morphology and uses of following:
 - *Cereals*: Sorghum, Wheat
 - Millets - Pearl millet (Bajra), Finger millet (Ragi/ Nagli)
 - *Pulses*: Cluster bean (guar), Green gram (mung)
 - Oil yielding plants - mustard, sesame
 - Beverages *crops*: Tea, Coffee
 - Dye yielding plants - *Bixa orellana* (Annato), *Indigofera tinctoria* (Indigo), *Lawsonia inermis* (Henna), *Butea monosperma* (Kesuda)
 - *Narcotics plants* : Opium, Cannabis.
 - *Condiments and spices plants*: Cardamom, Chillies.
 - Timber yielding plants - *Dalbergia latifolia* (Rosewood), *Shorea robusta* (Sal), *Tectona grandis* (Teak), *Gmelina arborea*, *Anogeissus latifolia*, *Terminalia arjuna*

Unit –4: Forestry [Lectures 12]

- Forest types of India & its conservation
- Plant indicators,
- Carbon footprint.
- Ecological and Economic important of forest,
- Social forestry.
- Wood: Physical properties, structural features, wood identification,
- Endangered plants.

BS23MJ6BO2 PLANT SCIENCE (MAJOR PAPER - 2)

Learning Objectives:

- To learn the Ultrastructure and functions of different plant cell organelles.
- To study the different physiological processes of plant and its cells.
- To learn the general account and different techniques molecular biology.
- To learn the aims, objectives, impacts of plant Ecology.

Learning Outcomes:

Students will be able to describe the ultra-structure and functions of different cell organelles with references to cell cycle, and they will be able to study the general account and techniques of plant molecules, like DNA and RNA, moreover the can learn about the pattern and process of different physiological processes. Furthermore the students will be able to know the importance of different minor and major minerals in plants. The students will be able to explain the impacts and importance of plant Ecology; they can learn the methods and techniques in plant ecological study.

Unit – 1: Cell Biology [Lectures 12]

- Prokaryotic and Eukaryotic cells- structure and ultra-structural details.
- Ultra structure and functions of Plasma-membrane,
- Models of plasma-membrane
- Biogenesis and Functions Chloroplast and Mitochondria
- Programe Cell Death (PCD)
- Importance and Molecular basis of cell cycle
- Cytoskeleton and Microtubules

Unit –2: Plant Physiology [Lectures 12]

- Colloidal system, Properties of colloidal system.
- Protoplasm as a colloidal system
- Plant movements,
- Water as a plant constituent (functions in plants, Physical & chemical properties).
- Imbibition and its importance

- Osmosis and its importance
- Water potential (general account, methods for measurement of water potential).
- Growth indices
- Mineral nutrition: Importance of micro and macro elements in plants.

Unit –3: Molecular Biology [Lectures 12] 12]

- General account and techniques of Gene mapping
- Restriction Endonucleases
- Cloning vectors
- Techniques used in recombinant DNA technology
- Gene expression in Prokaryotes (Lac operon concept)
- DNA sequencing
- DNA finger printing and its importance
- DNA damage and repair

Unit –4: Plant Ecology [Lectures 12]

- Structure of plant communities,
- Methods of study in plant communities,
- Analytical and synthetic character of Plant community.
- Man and Biosphere Program (MAB),
- Climate change (CO₂, Global Warming, Sea Level Rise)
- Green House Effect.
- Ozone depletion,
- Effect of Air, Water & Soil pollution on vegetation.
- Environmental Impact Assessment (EIA).

Suggested Reading

- Mauseth, JD, 1988. Plant Anatomy. The Benjamin/ Cummings Publishers, USA.
- Eames, AJ and Mac Daniels, LH. 1981. An Introduction to Plant Anatomy, Tata McGraw Hill Publishing co. Ltd., NewDelhi.
- Bhojwani,SS.& Bhatnagar, SP. 2011. Embryology of Angiosperms, Vikas Publication House Pvt. Ltd. NewDelhi. 5th Edition.
- Bhojwani, SS.& Razdan, MK. 2006. Plant Tissue Culture: Theory & Practice, Elsevier India Pvt. Ltd.NewDelhi
- Ashokkumar, Botany in forestry & environment, 2001,Published by Kumar media (P) Ltd., Gandhinagar.Kumar, A. & Purohit, SS. 1997-98, Plant

Physiology, Agro Botanical Publishers (India), Bikaner.

- Noggle RG. & Fritz, GJ, 1989. Introductory Plant Physiology, 2nd ED. Prentice Hall of India Private Ltd. New Delhi.
- Devlin, RM. & Witham, FH, 1997. Plant Physiology, 4th Ed., CBS Publishers & Distributors, Delhi.
- Taiz, L. & Zeiger, E. 2010. Plant Physiology. Sinauer Associate Inc. USA, 5th Edition
- Hopkins, WG. & Hunter, NP. 2009. Introduction to Plant Physiology, John Wiley & Sons, USA, 4th Edition. Plant Biochemistry, Hans- Walter Heldt, 2004, Academic Press.
- Nelson, D.L. and Michael, M. Cox, 2008, Lehninger Principles of Biochemistry, 5th Ed., WH Freeman and Company, New York, NY.

BS23MJBO6BO3 - Major-BO3 Practical Botany (sem-6)

1. To study the Epidermal Tissue System
2. To study the Secretary Tissue System
3. To study the Anomalous Secondary growth in following:
 - *Salvadora* stem,
 - *Achyranthes* stem,
 - *Tinospora* root,
 - *Carrot* root.
4. To study the Types of Stele.
5. To study the Periderm
6. To study the Lenticel
7. To study the different flower Pollen wall features,
8. To study the pollen tube Germination.
9. To study the Botanical name, family, part used, morphology and uses of following:
 - a. *Cereals*: Sorghum, Wheat
 - b. *Millet*s - Pearl millet (Bajra), Finger millet (Ragi/ Nagli)
 - c. *Pulses*: Cluster bean (guar), Green gram (mung)
 - d. Oil yielding plants - mustard, sesame
 - e. *Beverages crops*: Tea, Coffee
 - f. *Dye yielding plants* - *Bixa orellana* (Annato), *Indigofera tinctoria* (Indigo), *Lawsonia inermis* (Henna), *Butea monosperma* (Kesuda)
 - g. *Narcotics plants* : Opium, Cannabis.
 - h. *Condiments and spices plants*: Cardamom, Chillies.
 - i. *Timber yielding plants* - *Dalbergia latifolia* (Rosewood), *Shorea robusta* (Sal), *Tectona grandis* (Teak), *Gmelina arborea*, *Anogeissus latifolia*, *Terminalia arjuna*
10. To study the Forest types of India & its conservation
11. To study the Endangered plants of Gujarat.
12. To study the Prokaryotic and Eukaryotic cells- (By Chart).
13. To study the Ultra structure of Plasmamembrane(By Chart).
14. To study the Chloroplast and Mitochondria (by chart)
15. To study the cell cycle (by chart)
16. To study the Cytoskeleton (by chart)
17. To study the Imbibition
18. To study the Osmosis
19. To study the Density, Frequency & Abundance of plant community by Quadrat method.
20. To determine the total Alkalinity of given water sample
21. To determine the total hardness of given water sample.

Note:

- *Students are expected to submit Project / Submission regarding the any one topic/s as mentioned in theory paper.*
- *Students are expected to perform all physiological and ecological experiments as an exercise in examination for this paper.*
- *Study Tour / Field trips, Its report with photographs are mandatory*

SHREE GOVIND GURU UNIVERSITY, GODHRA
BOTANY

SYLLABUS (NEP) 2025 SEMESTER-VI

BS23MN6BO1- MINOR (Plant Anatomy and Ecology)

Learning Objectives

The course aims to provide students with an understanding of plant anatomical structures, meristem organization, tissue systems, and patterns of normal and anomalous secondary growth. It also aims to develop knowledge of ecological principles, including plant community structure, methods of ecological analysis, climate change impacts, and major global environmental issues. Students will learn the effects of pollution on vegetation, understand programs like the Man and Biosphere (MAB), and gain foundational knowledge of Environmental Impact Assessment (EIA) for sustainable environmental management.

Learning Outcome

After completing this course, students will be able to describe the characteristics, types, and functions of meristems and compare theories of apical organization in plants. They will identify simple and complex tissues, explain epidermal outgrowths, and analyze anomalous secondary growth in selected stems and roots. Students will also understand the structure and analytical/synthetic characters of plant communities and apply different ecological study methods. They will explain major global environmental problems such as climate change, greenhouse effect, ozone depletion, and pollution, along with their impact on vegetation. Additionally, students will understand the purpose and components of Environmental Impact Assessment (EIA) and appreciate the role of the Man and Biosphere Programme in conservation.

UNIT: 1 . Plant Anatomy

[Lectures 12]

- Meristems - Characteristics of Meristems; Classification of Meristem
- Theories of Apical organization- Shoot Apex & Root Apex
- Simple and Complex Tissue system
- Epidermal outgrowths
- Anomalous Secondary growth in following:
 - *Salvadora* stem,
 - *Achyranthes* stem,
 - *Tinospora* root,
 - *Carrot* root.

Unit-2: Ecology

[Lectures 12]

- Structure of plant communities ,Methods of study in plant communities ,Analytical and synthetic character.
- Man and Biosphere Program(MAB), Climate change (CO₂,Global Warming ,Sea Level Rise)
- Green House Effect and Global Warming,
- Ozone depletion,
- Effect of Air ,Water & Soil pollution on vegetation.
- Environmental Impact Assessment (EIA).

Suggested Reading

- Mauseth, JD, 1988. Plant Anatomy. The Benjamin/ Cummings Publishers, USA.
- Eames, AJ and Mac Daniels, LH. 1981. An Introduction to Plant Anatomy, Tata McGraw Hill Publishing co. Ltd., New Delhi.
- Sharma ,P.D. Ecology and Environment(7thEd.)
- Eugene P. Odum., Fundamentals of Ecology.

SHREE GOVIND GURU UNIVERSITY, GODHRA
BOTANY
SYLLABUS (NEP) 2025
SEMESTER-VI
BS23MN6BO2-MINOR

BS23MN6BO2 MINOR Practical Botany

1. To study the Meristems
2. To study the Shoot Apex & Root Apex
3. To study the Simple and Complex Tissue system
4. To study the Epidermal Tissue System
5. To study the Anomalous Secondary growth in following:
 - *Salvadora* stem
 - *Achyranthes* stem
 - *Tinospora* root
 - *Carrot* root
6. To study Density, Frequency & Abundance.
7. To Determine the total hardness of given water sample.

Note:

- Students are expected to submit Project / Submission regarding the any one topic/s as mentioned in theory paper
- Study Tour / Field trips, Its report.