CENTRE FOR DISTANCE AND ONLINE EDUCATION

BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620 024.

M.Sc. BOTANY

CHOICE BASED CREDIT SYSTEM

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted from the academic year 2026-27 onwards offered through CDOE)

Sem.	Courses	Title	Credit	Exam. Hrs.	Marks		Total
					Int.	Ext.	
I	Core Course I (CC)	Plant Diversity – I	5	3	25	75	100
	Core Course II (CC)	Plant Diversity – II	5	3	25	75	100
	Core Course III (CC)	Plant Biotechnology and Genetic Engineering	5	3	25	75	100
	Core Practical I (CP)	Plant Diversity – I & Plant diversity - II	4	-	40	60	100
	Elective Course I (EC)	Horticulture and Landscape Gardening	3	3	25	75	100
		Total	**22**	**-**	**-**	**-**	**500**
II	Core Course IV (CC)	Anatomy Embryology and Morphogenesis	5	3	25	75	100
	Core Course V (CC)	Taxonomy and Economic Botany	5	3	25	75	100
	Core Course VI (CC)	Biofertilizers and Biopesticides	5	3	25	75	100
	Core Practical II (CP)	Anatomy Embryology and Morphogenesis & Taxonomy and Economic Botany	4	-	40	60	100
	Elective Course II (EC)	Green House Technology	3	3	25	75	100
	Non-Major Elective Course I		2	3	25	75	100
		Total	**24**				**600**

SUMMARY OF CURRICULUM STRUCTURE OF PG PROGRAMMES

Sl. No.	Types of the Course	No. of Courses	No. of Credits	Marks
1.	Core Courses	11	55	1100
2.	Core Practical	3	12	300
3.	Elective Courses	3	9	300
4.	Project	1	10	100
5.	Non-Major Elective	2	4	200
		20	**90**	**2000**

PROGRAMME OUTCOME:

The students will be able to:

Establish (i). A fundamental/systematic comprehension of the breadth and guiding principles of academic plant biology, especially as it relates to the plant kingdom, as well as its various applications and connections to other disciplinary fields; (ii). Procedural expertise that produces various plant biological professionals, including research and development, educators, and technicians in the public, non-public, and private sectors; (iii). Understanding of student's area of specialty concerning its subfields and recent advancements. (iv). Botany curricula are meant to provide students with subject domain knowledge as well as technical skills related to plants in a holistic manner. (v). According to CBCS, it seeks to teach students in all areas of plant sciences through a unique blend of core and optional papers with major interdisciplinary components. (vi). Students are exposed to cutting-edge technology employed in the topic today. They are educated on social and environmental concerns, the importance of plants, and their importance to the national economy.

- Learn about plant diversity and its significance in terms of structure and function for ecological balance.
- Students will understand plant morphology and anatomy, plant identification, and vegetation analysis technological advancements in the field as well as in the laboratory.
- Employ their knowledge of basic plant and biological sciences and their principles.
- Utilize contemporary techniques and tools for biochemical estimation, molecular biology, biotechnology, plant tissue culture experiments, cellular and physiological investigations of plants, and a comprehension of their relevance in human life.
- Use the knowledge acquired from the research to benefit society by tackling health, environmental challenges, malnutrition, etc.,
- Raise public awareness among students about the socioeconomic elements of the country's infrastructure.
- Develop the skills for employment or entrepreneurship opportunities and promotes appropriate oral/written communication as well as observation skills.
- Capable of working effectively in future agricultural, biotechnology, health sciences, environmental management, educational, and research careers.

PROGRAMME OUTCOMES:

- Critical assessment of ideas and arguments via the collection of pertinent information about plants to recognize their place in categorization systems and at the evolutionary level.
- Students can search basic literature, determine works appropriate to a certain topic, and evaluate the scientific merit of these works.
- Students will be able to identify the different properties of many plant groupings, including algae, fungi, bryophytes, pteridophytes, gymnosperms, and angiosperms.
- The Programme will be able to demonstrate how the theory of natural selection is the sole scientific explanation for the unity and variety of life on Earth using data from comparative biology.
- Students can describe the way of working at the genome editing and tissue culture levels in plants.
- They can link environmental physical aspects to the structure of populations, communities, and ecosystems.
- Creates the concept of artificial plant propagation using vegetative methods and makes a living by developing small plant greenhouses.
- Must have a current understanding of scientific tools and methodologies.

First Year **CORE COURSE I** **Semester I**

PLANT DIVERSITY – I

(Theory)

ALGAE, FUNGI, LICHENS AND BRYOPHYTES

COURSE OBJECTIVES:

- To compare the diversity and classification of non-flowering plant groups.
- To apply the Knowledge on Ecology of Algae
- To illustrate fungi classification.
- To apply the practical knowledge in Understanding the structural and functional diversity Lichens.
- To create opportunities for survey and identification of lower group of plants from various environment.

LEARNING OUTCOME:

- Acquire wide knowledge on morphological classification of Algae, Fungi, Bryophytes and Lichens
- Describe the diversity of various plant traits
- Stating the importance of morphological traits in evolution of plant forms
- Employing ecological and economic importance of Algae, Fungi, lichen and bryophytes
- Comparing structural/organization of gametophytes and sporophytes in different classes of bryophytes.

UNIT– I INTRODUCTION:

Ultrastructure of Prokaryotic and Eukaryotic algal cells and their components. Algal classification (Smith, 1955), Molecular identification of algae. Range of thallus structure, origin and evolution of sex in algae, phylogeny and interrelationships of algae. Lifecycle patterns in algae and alternation of generations. Economic importance of algae.

UNIT –II ALGAE:

Ecology of Algae: Freshwater algae, marine algae, soil algae, symbiotic algae and parasitic algae. Algae as pollution indicators, algal blooms and algicides. Salient features of major classes: *Prochlorophyceae - Prochloron, Chlorophyceae – Caulerpa, Charophyceae – Chara, Xanthophyceae - Botrydium, Bacillariophyceae – Diatom, Phaeophyceae – Sargassum* and *Rhodophyceae – Gracillaria.*

UNIT – III FUNGI:

General features, occurrence and distribution. Mode of nutrition in fungi. Classification of fungi (Alexopoulos and Mims, 1979). General characters of major classes: Mastigomycotina (*Albugo*), Zygomycotina (*Mucor*), Ascomycotina (*Aspergillus*), Basidiomycotina (*Agaricus*) and Deuteromycotina (*Alternaria*). Thallus organization, cell structure and fruit bodies. Economic importance of

fungi. Homothallism and Heterothallism in fungi. Homokaryon and Heterokaryon. Reproduction, life cycle types, parasexual cycles and reduction in sexuality in fungi.

UNIT – IV LICHENS:

Lichens - General features, classification (Miller, 1984), Distribution, thallus organization, vegetative and sexual reproduction, lichens as indicators of pollution and economic importance of lichens.

UNIT – V BRYOPHYTES

Bryophytes: General features, distribution and classification of Bryophytes (Retailer, 1951), General characters of major groups. *Marchantiales - Marchantia, Jungermaniales - Porella, Anthocerotales - Anthoceros, Sphagnales - Sphagnum, Funariales – Funaria* and *Polytrichales - Polytrichum*. Range of vegetative structure, Evolution of gametophytes and sporophytes. Reproduction - Vegetative and sexual, spore dispersal mechanisms and spore germination patterns in Bryophytes. Ecological and economic importance of bryophytes.

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Current developments related to the plant diversity-1: algae, fungi, lichens and bryophytes during the Semester concerned to be kept abreast of continuously and cumulatively through collection, discussion and evaluation from news and events over the world collected through multiple reliable informative sources- Research articles, Review materials, Print, Internet, Interaction, Social Media, Webinars and so on.

REFERENCES:

ALGAE:

1. Bold, H.C. and Wyne, M.J. (1978). Introduction of Algae - Structure and Reproduction.Prentice Hall, New Jersey.
2. Chapman, C.J. and Chapman, D.J. (1981). The Algae (2nded.). Macmillan, London. Darley,
3. W.M. (1982). Algal Biology: A Physiological Approach. Blackwell Scientific
4. Publications. Oxford, London.
5. Fritsch, F. E. (1976). Structure and Reproduction of the Algae. Vol. I & II. Cambridge University Press, London.
6. Ian Morris (1967). An Introduction to the Algae. Hutchinson University Library, London.
7. Kumar, H. D. (1989). Introductory Phycology. East-West Press, Madras.
8. Kumar, H. D. and Singh, H. N. (1982). A Textbook of Algae. East-West Press, Madras.
9. Round, F. E. (1981).The Ecology of Algae. Cambridge University Press, London.
10. Sharma, O. P. (1986). Textbook of Algae. Tata McGraw Hill, New Delhi.
11. Smith, G. M. (1976). Cryptogamic Botany. Vol. I. Algae and Fungi. Tata McGraw Hill, New Delhi.

12. Vashishta, B. R. *et al*. (2008). Botany for Degree Students - Algae. S. Chand and Co. Ltd., New Delhi.
13. Venkataraman *et al*. (1974). Algal Form and Function. Today and Tomorrow Publishers, New Delhi.
14. https://www.kngac.ac.in/elearningportal/ec/admin/contents/2_18KP1BO1_20201204033332 39.pdf
15. https://uou.ac.in/sites/default/files/slm/MSCBOT-502.pdf
16. https://ncert.nic.in/textbook/pdf/kebo103.pdf

FUNGI

1. Alexopoulus, C. J. and Mims, C. W. (1979). Introductory Mycology. Wiley Eastern Ltd., New York.
2. Bessey, E. A. (1979). Morphology and Taxonomy of Fungi. Vikas Publishing House Pvt. Ltd., New Delhi.
3. Bold, H. C. *et al.* (1980). Morphology of Plants and Fungi. Harper and Row Publishing Inc., New York.
4. Burnet, J. H. (1971). The Fundamentals of Mycology. ELBS Publications,
5. London.Mehrotra, R. S and Aneja, K. R. (1990).An Introduction of Mycology. Wiley Eastern Ltd., New Delhi.
6. Sharma, P. D. (1987). The Fungi. Rastogi and Co., Meerut.
7. Vashishta, B. R. and Sinha, A. K. (2007).Botany for Degree Students - Fungi. S.

LICHENS

Hale, M. E. Jr. (1983). Biology of Lichens. Edward Arnold, Maryland.

BRYOPHYTES

1. Cavers, F. (1911).The Interrelationship of Bryophytes. Cambridge University Press,London.
2. Ingold, C. T. (1939). Spore Discharge in Land Plants. Oxford, UK.
3. Kashyap, S.R. (1972). The Liverworts of Western Himalayas and Punjab. Plains I & II.
4. Parihar, N. S. (1972). An Introduction to Embryophyta-I: Bryophyta. Central Book Depot, Allahabad.
5. Prem Puri (1973). Bryophytes: A Broad Perspective. Atma Ram and Sons, New Delhi.
6. Smith, G. M. (1971). Cryptogamic Botany. Vol. II. Bryophytes and Pteridophytes. Tata McGraw Hill, New Delhi.
7. Vashishta, B. R. *et al*. (2008). Botany for Degree Students: Bryophyta. S. Chand and Co.Ltd., New Delhi.
8. Watson, E. V. (1971). The Structure and Life of Bryophytes.B.I. Publications, New Delhi.

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First Year **CORE COURSE II** **Semester I**

PLANT DIVERSITY – II

(Theory)

PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

COURSE OBJECTIVES:

- To explain diversity and classification and terrestrial plant forms.
- To differentiate comparative characteristics of steles
- To compare eusporangiate and leptosporangiate
- To knowledge about morphology, anatomy and reproduction of selected Gymnosperms.
- To understand the significance of extinct fossil forms.

COURSE OUTCOMES:

- Know about diversity and classification of terrestrial plant forms.
- Compare the various characteristic of steles.
- Differentiate Eusporangiate from Leptosporangiate.
- Discuss about Morphology, Anatomy and reproduction of selected pteridophytes and gymnosperms.
- Classify the types of fossil and illustrate the geological time scale.

UNIT – I PTERIDOPHYTES:

General features and origin of Pteridophytes classification, (Reimer, 1956), Range of morphology, structure, reproduction and evolution of gametophytes and sporophytes of the following orders: *Rhyniales, (Rhynia) Psilotales, (Psilotum) Lycopodiales (Lycopodium), Selaginellales (Selaginella)* and *Equisetales (Equisetum)*.

UNIT – II PTERIDOPHYTES:

Range of morphology, structure, reproduction and evolution of gametophytes and sporophytes of the following orders: *Filicales (Pteris)* and *Salviniales (Marselia)*. Stelar evolution in pteridophytes, Heterospory and origin of seed habit. Economic importance of Pteridophytes.

UNIT – III GYMNOSPERMS:

A general account of the characteristic features of Gymnosperms. Origin of Gymnosperms. Classification of Gymnosperms (Sporne, 1965). General structure and interrelationships of *Pteridospermales (Lyginopteris), Pentoxylales* (*Pentoxylon*) and *Bennetittales (Williamsonia).*

UNIT – IV GYMNOSPERMS:

A general account on the distribution, morphology, anatomy, reproduction and phylogeny of *Cycadales (Cycas), Coniferales (Pinus)* and *Gnetales (Gnetum)*. Economic importance of Gymnosperms.

UNIT – V PALEOBOTANY:

Concepts of Paleobotany, a general account on Geological Time Scale. Techniques for paleobotanical study. Fossil types and methods of Fossilization. Compressions, incrustation, casts, molds, petrifactions, coal balls and compactions. Age determination and carbon dating.

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Current developments related to the Pteridophytes, Gymnosperms and Paleobotany during the semester concerned to be kept abreast of continuously and cumulatively through collection, discussion and evaluation from news and events over the world collected through multiple reliable informative sources – Research articles, review materials, print, Internet, Interaction, Social media, Webinars and so on.

REFERENCES:

1. Parihar, N.S. (1985). The Biology and Morphology of Pteridophytes. Central BookDepot, Allahabad.
2. Rashid, A. (1986). An Introduction to Pteridophyta.Vani Educational Books, NewDelhi.
3. Sharma, O.P. (1990). Textbook of Pteridophyta.Macmillan India Ltd., India.
4. Smith, G.M. (1971). Cryptogamic Botany Vol. II Bryophytes and Pteridophytes. Tata McGraw Hill, New Delhi.
5. Sporne, K.R. (1972). The Morphology of Pteridophytes. B. I. Publications, Madras.
6. Sundararajan, S. (2007). Introduction to Pteridophyta. New Age International Publishers, NewDelhi.
7. Vashishta, P.C. et al. (2008). Botany for Degree Students: Pteridophytes.S. Chand &Co. Ltd., New Delhi.
8. Maheswari, P. and Vasil, V. 1960. Gnetum: A Monograph. CSIR Publications, New Delhi Sporne, K. R. (1974). The Morphology of Gymnosperms. B. I. Publications, New Delhi.
9. Vasishta, P.C. et al. (2006). Botany for Degree Students: Gymnosperms. S. Chand &Co. Ltd., New Delhi.
10. Nikias,K.J. (1981).Paleobotany, Paleoecology and Evolution. Raeger Publishers,USA.
11. Seward, A.C. (1919). Fossil Plants Vols. I–IV. Cambridge University Press,London.
12. Seward,A.C. (1931).Plant Life through the Ages. Cambridge University Press,London.
13. Shukla, A.C. and Mishra, S.P. (1982). Essentials of Paleobotany (2nded.). Vikas Publishing House Pvt.Ltd., NewDelhi.
14. https://gurukpo.com/Content/B.SC/Pteridophytes_Gymnosperms_&_Palaeobotany.pdf
15. https://www.easybiologyclass.com/pteriophytes-free-online-study-materials-tutorials-lecturenotes-ppts-mcqs/
16. https://www.pteridoportal.org/portal/index.php
17. https://www.conifers.org/
18. https://courses.lumenlearning.com/boundless-

biology/chapter/gymnosperms/ https://palaeobotany.org/
19. https://www.nhbs.com/a-textbook-of-bryophytes-pteridophytes-gymnosperms-and-paleobotany-book
20. https://www.amazon.in/Textbook-Bryophytes-Pteridophytes-Gymnosperms-Paleobotany/dp/8188237450
21. https://www.amazon.in/Textbook-Bryophytes-Pteridophytes-Gymnosperms-Paleobotany-ebook/dp/B01H4UAI5U
22. https://www.wileyindia.com/a-textbook-of-bryophytes-pteridophytes-gymnosperms-and-paleobotany.html
23. https://www.uou.ac.in/sites/default/files/slm/BSCBO-103.pdf
24. https://www.ikbooks.com/books/book/life-sciences/botany/a-textbook-bryophytes-pteridophytes-gymnosperms-paleobotany/9788188237456/
25. https://www.saraspublication.com/books/pteridophytes-gymnosperms-and-palaeobotany/
26. https://www.goodreads.com/book/show/30858016-a-textbook-of-bryophytes-pteridophytes-gymnosperms-and-paleobotany

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First Year **CORE COURSE III** **Semester I**

PLANT BIOTECHNOLOGY AND GENETIC ENGINEERING

(Theory)

COURSE OBJECTIVES:

- To employ knowledge on plant tissue culture and its application commercially.
- To expertize the skills on plant tissue culture techniques.
- To state the significance of Recombinant DNA Technology in crop improvement.
- Recognize vectors and gene manipulation techniques in plant biotechnology.
- To devise research in the cutting-edge areas of genetic manipulation and production of transgenic plants.

LEARNING OUTCOMES:

On the successful completion of the course, student will be able to:

- Recall or remember the basic concepts and the various techniques of plant tissue culture.
- Developed skill on plant tissue culture techniques.
- Describe the significance of recombinant DNA technology in application to plant biotechnology.
- Explain the significance of Recombinant DNA technology in crop improvement.
- Analyze the vectors and gene manipulation technology and develop the production of transgenic plant.

UNIT – I PLANT BIOTECHNOLOGY:

Biotechnology – scope and potentialities. Plant tissue culture – totipotency – organization of a tissue culture laboratory. Sterilization methods – plant tissue culture media (MS) and plant growth regulators – surface sterilization, callus induction, sub culture, suspension culture. Micropropagation. Organogenesis – Applications of plant tissue culture in agriculture and crop improvement.

UNIT – II PLANT BIOTECHNOLOGY:

Somatic embryogenesis – production of synthetic seeds. Production of haploid plants through anther culture – Protoplast isolation, culture and regeneration, methods of protoplast fusion, somatic hybridization, somatic hybrids and cybrids. Production of plant secondary metabolites. Somaclonal variation. Germplasm storage-Cryopreservation.

UNIT – III GENETIC ENGINEERING:

Genetic engineering – enzymes – nucleases, polymerases, ligases, alkaline phosphatases, reverse transcriptase – SI nucleases. Vectors - use of plasmids, cosmids, phage and transposons as vectors. Gene cloning – cloning in eukaryotes. Amplification of genes by PCR. cDNA synthesis; joining DNA molecules; transfer of rDNA molecules into bacteria. Southern and Western blotting.

UNIT - IV GENETIC ENGINEERING:

Recombinant DNA technology – gene transfer in plants – aims, strategies for development of transgenic plants – organization of Ti and Ri plasmids, *Agrobacterium*

tumifaciens mediated gene transfer. DNA transfer by particle bombardment, micro and macro injection methods – lipofection and electroporation.

UNIT - V GENETIC ENGINEERING:

Pest resistant (Bt-cotton); herbicide-resistant plants (Round Up Ready soybean); Transgenic crops with improved quality traits (Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation; edible vaccines; Industrial enzymes, Protease); Biosafety concerns. Gene silencing.

UNIT - VI CURRENT CONTOURS (For Continuous Internal Assessment Only):

Current developments related to the Plant biotechnology and Genetic engineering during the semester concerned to be kept abreast of continuously and cumulatively through collection, discussion and evaluation from news and events over the world collected through multiple reliable informative sources – Research articles, review materials, print, Internet, Interaction, Social media, Webinars and so on.

REFERENCES:

1. Dubey, R.C. (2013). A Textbook of Biotechnology. S. Chand & Company Ltd., New Delhi.
2. Gupta, P.K. (1994). Elements of Biotechnology. Rastogi Publications, Meerut.
3. Kalyan Kumar De. (1997). Plant Tissue culture. New central Book Agency, Calcutta.
4. Ignacimuthu, S. (1997). Plant Biotechnology. Oxford & IBM Publishing Co., New Delhi.
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6. Parihar, P. (2014). A Textbook of Biotechnology. Argobios Publications, Jodhpur
7. Purohit, S.S. (2003). Agricultural Biotechnology. Agrobios Publications, Jodhpur.
8. Trevan, M.D., Boffey, S., Goulding, K.H. and Stanbury, P. (1988). Biotechnology – The Biological Principles. Tata Mc Graw Hill Publishing Co., New Delhi.
9. Smith, R.H. (2008), Plant Tissue Culture – techniques and experiments, Academic press, New York.
10. Suresh Kumar Gahlawat, Raj kumar Salar, Priyanka Siwach, Joginder Sing Duhan, Suresh Kumar, Pawan Kaur, (2017), Plant Biotechnology, Recent Advancements and Developments, Springer Publications.
11. Satyanarayana, U. 92008), Biotechnology, Books and Allied Publishers Ltd., Kolkatta.
12. C.M.Govil, Ashok Aggarwal and Jitender Sharma, (2017), Plant Biotechnology and Genetic Engineering, PHI, Learing Pvt. Ltd.
13. https://nptel.ac.in/courses/102/103/102103013/
14. https://nptel.ac.in/courses/102/103/102103074/
15. https://www.agrimoon.com/principles-of-plant-biotechnology-icar-ecourse-pdf/
16. https://cnx.org/resources/f523305248cf1c5a5e6a320b70d907ff2c73cb4b/PlantBioI-INTRODUCTION.pdf
17. .http://www.unice.fr/EB/USTH%202013/BP04_introduction_biotechnology_part_1.pdf

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First Year **CORE PRACTICAL I** **Semester I**

PLANT DIVERSITY – I & PLANT DIVERSITY – II
(ALGAE, FUNGI, LICHENS AND BRYOPHYTES & PTERIDOPHYTES,GYMNOSPERMS AND PALEOBOTANY)

COURSE OBJECTIVES:

- To Microscopic observation of identification of algae, fungi, bryophytes, pteridophytes and gymnosperm.
- To learn about the fossil types.
- To know about the life history, structure and economic importance of Gymnosperms.
- To study the methods of fossilization and fossil plants.
- To gain a knowledge of slide preparation.

LEARNING OUTCOMES:

- Gain knowledge on slide preparation and staining techniques.
- Understand the history and structure of algae, fungi, lichens and bryophytes.
- Learn about the fossilization and fossil plants.
- Understand the morphology, structure and importance of the various organisms.
- Gain knowledge on characterize features of pteridophytes, Gymnosperms and paleobotany.

ALGAE:

Prochlorophyceae : *Prochloron*
Chlorophyceae : *Caulerpa*
Charophyceae : *Chara*
Xanthophyceae : *Botrydium*
Bacillariophyceae : *Diatom*
Phaeophyceae : *Sargassum*
Rhodophyceae **:** *Gracillaria*

FUNGI:

Mastigomycotina : *Albugo*
Zygomycotina : *Mucor*
Ascomycotina : *Aspergillus*
Basidiomycotina : *Agaricus*
Deuteromycotina : *Alternaria*

BRYOPHYTES:

Marchantiales : *Marchantia*
Jungermaniales : *Porella*
Anthoceratales : *Anthoceros*
Sphagnales : *Sphagnum*

Funariales : *Funaria*
Polytrichales : *Polytrichum*

PTERIDOPHYTES:

Lycopodium - Stem and cone
Selaginella - Stem and Cone
Equisetum - Stem and cone
Marsilea - Rhizome and sporocarp

GYMNOSPERMS:

Cycas – Rachis and Leaflet – T.S; Coralloid root, male cone. Megasporophyll and Microsporophyll. Pinus Needle –T.S. Young stem – T.S; Male and Female cone. Stem – *Gnetum* - T.S, Male and Female Strobilus – Demonstration only.

PALEOBOTANY:

Slides - *Lepidodendron, Lepidocarpon* and *Williamsonia*
Fossils; Impression, Compression and petrification.

REFERENCES:

1. Agashe, S. N. (1995). Paleobotany, Oxford and IBH Publ. Co. Pvt. Ltd, New Delhi.
2. Hoek, C. van den, Mann, D. G. and Jahns, H. M. (1995). Algae: An introduction to Phycology, Cambridge University Press, UK.
3. Sharma, O.P. (1990). Textbook of Pteridophyta. Macmillan India Ltd., Delhi.
4. Surange, K.R. (1966). Indian fossil Pteridophytes Council of Scientific and Industrial research. New Delhi.
5. https://uou.ac.in/sites/default/files/slm/MSCBOT-502.pdf
6. https://www.aisectuniversityjharkhand.ac.in/PDFDoc/StudyNotes/B.SC%20BOTANY/B.Sc%20Botany%20(Sem%20I)/Sem%20I%20(Bio-diversity%20of%20Cryptogams).pdf
7. https://www.srcollege.edu.in/temp/lms/Manuals/Practical-I.pdf

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First Year **ELECTIVE COURSE I** **Semester I**

HORTICULTURE AND LANDSCAPE GARDENING

(Theory)

COURSE OBJECTIVES:

- To state the fundamentals of horticulture.
- To learn the techniques of propagation methods and growth regulators in horticulture.
- To get familiarized with common ornamental and flowering plants.
- To understand the basic principles of landscape gardening.
- To get employed with common ornamental gardens and lawns.

LEARNING OUTCOMES:

At the end of the course, students will be able to Course Outcomes:

- Understand the importance and divisions of horticulture
- Learn the various methods of plant propagation
- Know the art of indoor gardening
- Acquire knowledge on floriculture
- Study the types and components of gardens

UNIT – I FUNDAMENTALS OF HORTICULTURE:

Importance, scope and divisions of horticulture. Soil types, physical and chemical composition of soil, soil fertility and its maintenance. Manures and fertilizers. Irrigation - surface, sub and special irrigation methods. Pest and disease control of horticultural plants – integrated pest management.

UNIT – II PLANT PROPAGATION METHODS:

Cutting, layering, budding and grafting. Stock-scion relationship in important horticultural crops. Use of plant growth regulators in horticulture: Induction of rooting, flowering, fruit set, fruit development and control of fruit drops.

UNIT – III COMMERCIAL HORTICULTURE:

Cultivation, harvesting and pro-harvesting of important fruit crops (banana and citrus), Flowers (rose and jasmine) and vegetable crops (tomato and drumstick). New avenues for self-employment in horticulture sector. Nursery management, export of horticultural crops, requirements, methodology, packing and logistics. Processing of vegetables and fruits for grading, value addition and preservation.

UNIT – IV LANDSCAPE DESIGNING:

Landscaping principles-planning designs for house gardens, institutional and industrial gardens, avenue planting - trees, shrubs, climbers, herbs and ground

covers suited for different situations their culture, training and pruning-tree transplantation.

UNIT – V ORNAMENTAL GARDENS AND LAWNS:

Establishment of garden, Different grasses, maintenance of lawns and turf in play grounds, gardens and golf courses; special types of gardens: traffic islands, roof /terrace garden, vertical garden, bog garden, water garden, planning parks and public garden.

UNIT - VI CURRENT CONTOURS (For continuous internal assessment only):

Current developments related to the Horticulture and Landscape gardening during the semester concerned to be kept abreast of continuously and cumulatively through collection, discussion and evaluation from news and events over the world collected through multiple reliable informative sources – Research articles, review materials, print, Internet, Interaction, Social media, Webinars and so on.

REFERENCES:

1. Manibushan Rao K. 1991. Text book of horticulture. Mac Millan Publishing Co., New York.
2. Edmond JB et al., 1977. Fundamentals of horticulture. Tata McGraw HillLtd., New Delhi.
3. Rao KM. 2000. Text Book of Horticulture, MacMillan India Ltd., NewDelhi.
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