

DEBRAJ ROY COLLEGE (AUTONOMOUS)
FOUR YEARS UNDER GRADUATE PROGRAM
(F.Y.U.G.P.)

SYLLABUS
OF
BOTANY
Choice Based Credit System (C.B.C.S.)



Department of Botany
Debraj Roy College
(An Autonomous College under Dibrugarh University)
Circuit House Road, Golaghat- 785621 (Assam)

FOUR YEAR UNDER-GRADUATE PROGRAMME (FYUGP) IN BOTANY (MAJOR),
DEBRAJ ROY COLLEGE (AUTONOMOUS)
W.E.F 2024-25 SESSION

The Preamble:

Present day plant science is a fusion of the traditional components with the modern aspects of biochemistry, molecular biology and biotechnology. Over the years, plant science (Botany) has shown enormous gain in information and applications owing to tremendous inputs from research in all its aspects. With the global need for conservation, field plant biologists have contributed significantly in assessing and exploring newer dimensions for plant diversity. New insights have been gained in functional and structural aspects of plant development by utilizing modern tools and techniques for botanical research. Challenging areas of teaching and research have emerged in ecology and reproductive biology. Concern for ever increasing pollution and climate change is at its highest than ever before. Keeping the above mentioned advancements and rich plant resources in North East India in view, a revised curriculum is offered by Debraj Roy College (Autonomous) at the undergraduate level as per the National Education Policy-2020 so that the undergraduate Botany students of Debraj Roy College (Autonomous) shall have the benefit of a balanced, carefully-crafted course structure taking care of different aspects of plant science, namely plant diversity, physiology, biochemistry, molecular biology, reproduction, anatomy, taxonomy, ecology, economic botany and the impact of environment on the growth and development of plants. All these aspects have been given due weightage over the eight semesters. It is essential for the undergraduate students to acquaint themselves with various tools and techniques for exploring the world of plants up to the sub- cellular level. Keeping view of employment entrepreneurship, applied courses have also been introduced. These courses shall provide the botany students hands on experience and professional inputs. On the whole, the curriculum is a source of lot of information and is supported by rich resource materials. It is hoped that a student graduating in Botany with the new curriculum will be able to explore the rich plant diversity of North East India.

Introduction:

UG syllabus of Botany is designed as per the guidelines of National Education Policy-2020. This Four Year Under Graduate Programme (FYUGP) in Botany consists of Major (Core) disciplines, Minor disciplines, Multi Disciplinary Generic Elective Courses (GE), Ability Enhancement Courses (AEC), Value Added Courses (VAC), Skill Enhancement

Courses (SEC), Environmental Education (EE), YOGA, Community Engagement like NCC/NSS, Digital and Technological solutions, Internship, Field Studies, Research Ethics, Research Projects and Discipline Specific electives (DSE) to acquaint the students with balanced knowledge on the plant resources, environment, contemporary issues and entrepreneurship. The Bachelor of Science in Botany of Debraj Roy College (Autonomous) under NEP-2020 is a programme with multiple exit options. UG certificate, UG Diploma, UG Degree and UG Degree (Honours with Research) in Botany will be awarded to students after successful completion of one, two, three and four years respectively as per UGC guidelines. It is expected that, on successful completion of this four year programme students will be skilled in multidisciplinary aspects for exploration and sustainable utilization of plant/natural resources of India.

Aims of Four Year Under-Graduate Programme (FYUGP) in Botany:

1. To introduce the students with the rich biodiversity of North east India.
2. To enable the students to explore the potential of plant resources for human welfare and their use in a sustainable way.
3. To develop capabilities of students for critical evaluation of contemporary issues related to environment and nature.
4. To generate skilled human resource for biological entrepreneurship.

Graduate Attributes of the FYUGP in Botany:

Disciplinary Knowledge

The graduates should have the ability to demonstrate comprehensive knowledge and understanding of both the theoretical and applied components of plant science and allied areas of study in a multidisciplinary context.

Students should have the ability to connect relevant disciplines, and recent trends in biological and contemporary issues.

Communication Skills

The graduates in Botany should have the ability to present and express information, thoughts, experiments and results clearly and concisely for effective communication of any issues related to plant and nature.

Moral and Ethical Awareness/Reasoning

Ability to recognise ethical issues that are pertinent to one's work and pledge not to engage in unethical behaviour such as plagiarism, copyright and infringement of intellectual property rights; ability to appreciate recent developments in various fields and one's research with honesty and integrity in all aspects.

Multicultural Competence

Ability to correlate and compare recent developments in various branches of plant science worldwide; ability to collaborate research in various fields of biology with other researchers from allied organisations; acquisition of knowledge on traditional practices of different ethnic communities.

Information/Digital Literacy

The graduates of Botany should have the ability to utilize Information and Communications Technology (ICT) tools, biological databases and computer and softwares in solving biological problems.

Reflective Thinking and Problem Solving:

After completion of graduation in Botany the students will be able to understand the value of plant resources, need for conservation of plant resources, bio-prospecting and sustainable utilization of plant resources for human welfare.

Critical Thinking

The graduates of Botany should be competent for critical analysis of problems related to plant and nature, sustainable uses of biological resources and their conservation strategies.

Programme Learning Outcome

By the end of the program the students will be able to:

PO.1: Skill development for the proper description using botanical terms, identification, naming and classification of life forms especially Cryptogams.

PO.2: Acquisition of knowledge on structure, life cycle and life processes that exist among lower and vascular Cryptogams plant.

- PO.3: Ability to explain the diversity and evolution based on the empirical evidences in morphology, anatomy, embryology, fossils and life history.
- PO.4: Skill development for the collection, preservation and recording of information after observation and analysis- from simple illustration to cell and molecular databases.
- PO.5: Making aware of the scientific and technological advancements- Information and Communication in Cell and Molecular Biology and plant Biochemistry for further learning and research in all branches of Botany.
- P.O.6.: Knowledge on diversity of plant resources, their importance and strategies for conservation.
- P.O. 7.: Scientific approach to address problems in plant science and use of plant based products for human welfare.
- P.O. 8.: Application of knowledge and skills in entrepreneurship.
- P.O. 9.: Develop new techniques/methods for solving the problems of the allied disciplines.
- PO 10.: To enable the graduates to prepare for national as well as international level competitive examinations like UGC-CSIR, UPSC, KPSC etc.
- PO.11.: To enable the students for practicing the best teaching pedagogy as a biology teacher including the latest digital modules.
- PO. 12.: The graduates should be knowledgeable and competent enough to appropriately deliver on aspects of global importance like climate change, SDGs, green technologies etc at the right opportunity.
- PO. 13: The graduate should be able to demonstrate sufficient proficiency in the hands-on experimental techniques for their area of specialization within biology during research and in the professional career

Teaching Learning Process

The programme allows to use varied pedagogical methods and techniques both within classroom and beyond.

1. Lecture
2. Practical
3. Tutorial
4. Documentary on related topic
5. Project Work/Dissertation
6. Group Discussion
7. Seminars/workshops/conferences
8. Field visits and Report/Excursions
9. Mentor/Mentee

Formative and Summative Assessment (60% End Semester + 40% IA) through :

1. Home assignment
2. Project Report
3. Class Presentation/seminar: Oral/Poster/Power point
4. Group Discussions
5. Quizzes
6. Departmental activity based assessment
5. In semester examinations
6. Laboratory based work.
7. End Semester examinations

Program Articulation Matrix:

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately.

Semester	Title / Name Of the course	Program outcomes that the course addresses (not more than 3 per course)	Pre-requisite course(s)	Pedagogy#	Assessment##
I	Algae, Fungi, Bryophyte & Pteridophyte	PO 1 & PO 2			
II	Morphology and Reproduction of Spermatophytes	PO 3	BOTM101		
III	Cell Biology	PO 4 & PO 5	BOTM201		
	Plant Biochemistry & Molecular Biology	PO 4 & PO 5	BOTM301 BOTM302		

Pedagogy for student engagement is predominantly lectures. However, other pedagogies enhancing better student engagement to be recommended for each course. The list includes active learning/ course projects/ problem or project based learning/ case studies/self-study like seminar, term paper

##Every course needs to include assessment for higher order thinking skills (Applying/ Analyzing/ Evaluating/ Creating). However, this column may contain alternate assessment methods that help formative assessment (i.e. assessment for learning).

Debraj Roy College (Autonomous), Golaghat

Department of Botany

FYUGP Structure as per UGC Credit Framework w.e.f 1st semester 2024

Year	Semester	Course Code	Title of the Course	End Sem Marks	IA Marks	Total Marks	Total Credit	
1	I	BOTM101T	Algae, Fungi, Bryophyte & Pteridophyte	45	30	75	3	
		BOTM101P	Algae, Fungi, Bryophyte & Pteridophyte	15	10	25	1	
		BOTMIN101T	Algae, Fungi, Bryophyte & Pteridophyte	45	30	75	3	
		BOTMIN101P	Algae, Fungi, Bryophyte & Pteridophyte	15	10	25	1	
		BOTSEC101T	Vermicomposting Techniques	30	20	50	2	
		BOTSEC101P	Vermicomposting Techniques	15	10	25	1	
		BOTGEC101	Natural Resource Management	45	30	75	3	
		AEC101	MIL	60	40	100	4	
		VAC101	Understanding India	30	20	50	2	
	Total				300	200	500	20
	II	BOTM201T	Morphology and Reproduction of Spermatophytes	45	30	75	3	
		BOTM201P	Morphology and Reproduction of Spermatophytes	15	10	25	1	
		BOTMIN201T	Morphology and Reproduction of Spermatophytes	45	30	75	3	
		BOTMIN201P	Morphology and Reproduction of Spermatophytes	15	10	25	1	
		BOTSEC201T	Nursery and Gardening	30	20	50	2	
		BOTSEC201P	Nursery and Gardening	15	10	25	1	
		BOTGEC201	Plant Diversity and Human Welfare	45	30	75	3	
		AEC201	English Language and Communication Skills	60	40	100	4	
		VAC201	Environmental Science	30	20	50	2	
Total				300	200	500	20	
2	III	BOT M301T	Cell Biology	45	30	75	3	
		BOT M301P	Cell Biology	15	10	25	1	
		BOT M302T	Plant Biochemistry & Molecular Biology	45	30	75	3	
		BOT M302P	Plant Biochemistry & Molecular Biology	15	10	25	1	
		BOT MIN301T	Plant Physiology & Metabolism	45	30	75	3	
		BOT MIN301P	Plant Physiology & Metabolism	15	10	25	1	
		BOT SEC301T	Medicinal Botany	30	20	50	2	
		BOT SEC301P	Medicinal Botany	15	10	25	1	
		BOT GEC301	Ethnobotany	45	30	75	3	
	VAC201	Yoga Education	30	20	50	2		
Total t				300	200	500	20	

• AEC and VAC as per regulations

DETAILED SYLLABUS OF 1st SEMESTER

Title of the Course : Algae, Fungi, Bryophyte & Pteridophyte
Course Code : BOTM101T
Nature of the Course : MAJOR
Total Credits : 4 (3T + 1P)
Distribution of Marks : 60 (End Sem) (45T+15P) + 40 (In-Sem)

UNITS	CONTENTS	L	T	P	TotalHrs
I 12 Marks	<p>Introduction to Algae : Classification system of Fritsch, and Basic concept of evolutionary classification viz. Lee; General characteristics; range of thallus organization; cell structure; pigment system, reserve food, methods of reproduction. Role of algae in the environment, agriculture, biotechnology and industry.</p> <p>Study of major divisions of Algae: Comparative study of Characteristics; Occurrence; Mode of reproduction; Morphology and life cycles of <i>Nostoc</i>, <i>Oedogonium</i>, <i>Chara</i>, <i>Ectocarpus</i> and <i>Polysiphonia</i>. Diatoms and its importance.</p>	11	2	-	13
II 12 Marks	<p>Introduction to fungi Salient features; Classification; Thallus organization; Cell wall composition; Nutrition; Classification. Mycorrhiza (Ectomycorrhiza, Endomycorrhiza and their significance); Lichen: Classification & Economic Importance.</p> <p>Study of major divisions of fungi: General characteristics of Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota, Oomycota: asexual and sexual fruiting bodies; Life cycle of <i>Phytophthora</i>, <i>Penicillium</i>, <i>Puccinia</i>, <i>Peziza</i>, <i>Agaricus</i>. Economic importance of fungi.</p>	11	2	-	13

III 11 Marks	Bryophytes : General features; classification; thallus organization; morphology, anatomy and reproduction of <i>Marchantia</i> , <i>Anthoceros</i> , <i>Sphagnum</i> , <i>Polytrichum</i> ; Reproduction and evolutionary trends in bryophytes. Ecological and economic importance of bryophytes.	09	1		10
IV 10 Marks	Pteridophytes: Classification, morphology, anatomy and reproduction of <i>Psilotum</i> , <i>Selaginella</i> , <i>Equisetum</i> and <i>Ophioglossum</i> , <i>Marselia</i> . Heterospory, stelar evolution; Ecological and economic importance.	08	1		09
	Total	39	06		45

Where, **L: Lectures** **T: Tutorials**

Title of the Course : **Algae, Fungi, Bryophyte &Pteridophyte**
Course Code : **BOTM101P**
Nature of the Course : **MAJOR**
Credits : **1**

UNITS	CONTENTS	L	T	P	TotalHrs
Practical (15 marks)	1. Study of vegetative and reproductive structures of <i>Nostoc</i> , <i>Oedogonium</i> , <i>Chara</i> , <i>Vaucheria</i> , <i>Ectocarpus</i> , <i>Fucus</i> and <i>Polysiphonia</i> , through electron micrographs/ temporary preparations and permanent slides. 2. Study of vegetative and reproductive structures of <i>Phytophthora</i> , <i>Puccinia</i> , <i>Albugo</i> , <i>Aspergillus</i> , <i>Penicillium</i> , <i>Alternaria</i> , and <i>Peziza</i> . 3. Study of vegetative and reproductive structures of <i>Marchantia</i> , <i>Anthoceros</i> , <i>Sphagnum</i> , <i>Funaria</i> and <i>Polytrichum</i> 4. . Study of vegetative and reproductive structures of <i>Selaginella</i> , <i>Equisetum</i> and <i>Ophioglossium</i> , <i>Marselia</i>			30	30
	Total			20	20

LEARNING OUTCOMES:

- (1) Know the classification, morphology, reproduction and economic and ecological importance of cryptogams.
- (2) Handling and observation of algae, fungi, bryophytes and pteridophytes.

SUGGESTED READINGS:

1. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
2. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
3. Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. AravaliInternational, New Delhi.
4. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition
5. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
6. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition
7. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, MacmillanPublishers India Ltd.
8. Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central BookDepot. Allahabad.
9. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.
10. Vanderpoorten, A. & Goffinet, B. (2009) Introduction to Bryophytes. Cambridge University Press
11. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.

Title of the Course : **Algae, Fungi, Bryophyte & Pteridophyte**
Course Code : **BOTMIN101T**
Nature of the Course : **MINOR**
Total Credits : **4 (3T + 1P)**
Distribution of Marks : **60 (End Sem) (45T+15P) + 40 (In-Sem)**

UNITS	CONTENTS	L	T	P	Total Hours
I 12marks	<p>Introduction to Algae : Classification system of Fritsch, and Basic concept of evolutionary classification viz. Lee; General characteristics; range of thallus organization; cell structure; pigment system, reserve food, methods of reproduction. Role of algae in the environment, agriculture, biotechnology and industry.</p> <p>Study of major divisions of Algae: Comparative study of Characteristics; Occurrence; Mode of reproduction; Morphology and life cycles of <i>Nostoc</i>, <i>Oedogonium</i>, <i>Chara</i>, <i>Ectocarpus</i> and <i>Polysiphonia</i>. Diatoms and its importance.</p>	11	2	-	13
II 12 marks	<p>Introduction to fungi Salient features; Classification; Thallus organization; Cell wall composition; Nutrition; Classification. Mycorrhiza (Ectomycorrhiza, Endomycorrhiza and their significance); Lichen: Classification & Economic Importance.</p> <p>Study of major divisions of fungi: General characteristics of Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota, Oomycota: asexual and sexual fruiting bodies; Life cycle of <i>Phytophthora</i>, <i>Penicillium</i>, <i>Puccinia</i>, <i>Peziza</i>, <i>Agaricus</i>. Economic importance of fungi.</p>	11	2	-	13
III 11 marks	<p>Bryophytes : General features; classification; thallus organization; morphology, anatomy and reproduction of <i>Marchantia</i>, <i>Anthoceros</i>, <i>Sphagnum</i>, <i>Polytrichum</i>; Reproduction and evolutionary trends in bryophytes. Ecological and economic importance of bryophytes.</p>	09	1		10

IV 10 marks	Pteridophytes: Classification, morphology, anatomy and reproduction of <i>Psilotum</i> , <i>Selaginella</i> , <i>Equisetum</i> and <i>Ophioglossum</i> , <i>Marselia</i> . Heterospory, stelar evolution; Ecological and economic importance.	08	1		09
	Total	39	06	0	45

Where,

L: Lectures

T: Tutorials

Title of the Course : Algae, Fungi, Bryophyte & Pteridophyte
Course Code : BOTMIN101P
Nature of the Course : MINOR
Credits : 1

UNITS	CONTENTS	L	T	P	Total Hours
Practical (15 marks)	1. Study of vegetative and reproductive structures of <i>Nostoc</i> , <i>Oedogonium</i> , <i>Chara</i> , <i>Vaucheria</i> , <i>Ectocarpus</i> , <i>Fucus</i> and <i>Polysiphonia</i> , through electron micrographs/ temporary preparations and permanent slides. 2. Study of vegetative and reproductive structures of <i>Phytophthora</i> , <i>Albugo</i> , <i>Aspergillus</i> , <i>Penicillium</i> , <i>Alternaria</i> , <i>Puccinia</i> and <i>Peziza</i> . 3. Study of vegetative and reproductive structures of <i>Riccia</i> , <i>Marchantia</i> , <i>Anthoceros</i> , <i>Sphagnum</i> , <i>Funaria</i> and <i>Polytrichum</i> 4. . Study of vegetative and reproductive structures of <i>Selaginella</i> , <i>Equisetum</i> and <i>Ophioglossium</i> , <i>Marselia</i>			20	20
	Total			20	20

LEARNING OUTCOMES:

- (1) Know the classification, morphology, reproduction and economic and ecological importance of cryptogams.
- (2) Handling and observation of algae, fungi, bryophytes and pteridophytes.

SUGGESTED READINGS:

12. Lee, R.E. (2008). Phycology, Cambridge University Press, Cambridge. 4th edition.
13. Kumar, H.D. (1999). Introductory Phycology. Affiliated East-West Press, Delhi.
14. Sahoo, D. (2000). Farming the ocean: seaweeds cultivation and utilization. AravaliInternational, New Delhi.
15. Campbell, N.A., Reece J.B., Urry L.A., Cain M.L., Wasserman S.A. Minorsky P.V., Jackson R.B. (2008). Biology, Pearson Benjamin Cummings, USA. 8th edition
16. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
17. Webster, J. and Weber, R. (2007). Introduction to Fungi, Cambridge University Press, Cambridge. 3rd edition
18. Sethi, I.K. and Walia, S.K. (2011). Text book of Fungi and Their Allies, MacmillanPublishers India Ltd.
19. Parihar, N.S. (1991). An introduction to Embryophyta: Vol. I. Bryophyta. Central BookDepot. Allahabad.
20. Raven, P.H., Johnson, G.B., Losos, J.B., Singer, S.R. (2005). Biology. Tata McGraw Hill, Delhi.
21. Vanderpoorten, A. & Goffinet, B. (2009) Introduction to Bryophytes. Cambridge University Press
22. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010). Pteridophyta. S. Chand. Delhi, India.

Title of the Course : Vermicomposting Techniques
Course Code : BOTSEC101T
Nature of the Course : Skill Enhancement Course
Total Credits :3 (2T + 1P)
Distribution of Marks : 45 (End Sem) (30T+15P) + 30 (In-Sem)

UNITS	CONTENTS
UNIT I 10 MARKS	BASICS OF VERMICULTURE Introduction to vermiculture: Definition, meaning, history, economic importance, their value in maintenance of soil structure, role as four R's of Recycling - Reduce, Reuse, Recycle, Restore. Choosing the right worm. Useful species of Earthworms - Local and Exotic species. Complementary activities of Auto evaluation. The matter and humus cycle. Transformation process of organic matter.
UNIT – II 10 MARKS	Eisenia fetida- Biology Taxonomy, morphology and Physiology of Eisenia fetida. Vital cycle of Eisenia fetida: alimentation, fecundity, annual reproducer potential and limit factors (gases, diet, humidity, temperature, PH, light, and climatic factors. Eudrilus eugineae- Biology Taxonomy, morphology and Physiology of Eudrilus eugineae. Vital cycle of Eudrilus eugineae: alimentation, fecundity, annual reproducer potential and limit factors (gases, diet, humidity, temperature, PH, light, and climatic factors
UNIT – III 10 MARKS	VERMICOMPOST TECHNIQUES. Small Scale Earthworm farming for home gardens Earthworm compost for home gardens. Commercial scale vermicomposting, harvesting and processing. Packaging, transport and storage of Vermicomposts. Nutritional Composition of Vermicompost for plants, comparison with other fertilizer. Vermiwash collection, composition & use. Enemies of Earthworms, Sickness and worm's enemies. Frequent problems of earthworms and their remedies.

Title of the Course : Vermicomposting Techniques
Course Code : BOTSEC101P
Nature of the Course : Skill Enhancement Course
Credits : 1

UNITS	CONTENTS
Practical 15 Marks	<ul style="list-style-type: none"> • Morphology and life cycle of Eisenia fetida, Eudrilus eugineae. • Steps of Small Scale Earthworm farming • Estimation of Cost benefit of Vermicompost. • Compositions and raw materials of Vermicompost. • To estimate the efficiency of earthworm for Vermicompost

SUGGESTED READINGS

1. Khushbu, Rachna Gulati, Sushma and Komal Arya (2022). Fundamentals of Vermicomposting. AkiNik Publications

Title of the Course : **Natural Resource Management**
Course Code : **BOTGEC101**
Nature of the Course : **Generic Elective Course**
Total Credits : **3**
Distribution of Marks : **45 (End Sem) + 30 (In-Sem)**

UNITS	CONTENTS	L	T	P	Total Hours
I 10 MARKS	Natural resources: Definition and types. Natural resources of NE India.	8	1	-	9
II 12 MARKS	Sustainable utilization of land and water resources; Soil degradation and management; water resources and their management. Renewable and non-renewable sources of energy.	12	1	-	13
III 13 MARKS	Forests: Definition, Significance; Types of vegetation in India. Forest types of Assam. Forest degradation – causes and consequences. Important timber yielding plants of Assam (Sal, Segun, Titasopa, Nahor, Hollong) and their uses. Concept of JFM. Traditional knowledge on natural resources management.	10	3	-	13
IV 10 MARKS	Contemporary practices in resource management: EIA, Participatory Resource Appraisal. Concept on Carbon footprint, Resource Accounting; Waste management. National and international efforts in resource management and conservation, role of GIS, GPS, in conservation.	8	2	-	10
	Total	38	7	-	45

Where, L: Lectures T: Tutorials, P: Practicals

LEARNING OUTCOMES:

1. Know about the natural resources, its types, sustainable utilization and management practices.

SUGGESTED READINGS:

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.
3. D K Asthana (2001). Environment : Problems and Solutions, S. Chand Publishing
4. Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

DETAILED SYLLABUS OF 2ND SEMESTER

Title of the Course : Morphology and Reproduction of Spermatopythes

Course Code : BOTM201T

Nature of the Course : MAJOR

Total Credits : 4 (3T + 1P)

Distribution of Marks : 60 (End Sem) (45T+15P) + 40 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 11 MARKS	<p>Gymnosperms General characteristics, classification, morphology, anatomy and reproduction of Cycas, Pinus, Ginkgo and Gnetum; Patterns of embryo development in gymnosperms. Ecological and economic importance.</p> <p>Fossil plants: Process of fossilization; early land plants; <i>Rhynia</i>, <i>Cycadeoidea</i>, <i>Sphenophyllum</i>; Geological time scale; importance of fossil study.</p>	10	2		12
II 10MARKS	<p>Morphology of Angiosperms: Morphology and types of root, stem, and leaves; phyllotaxy and venation, hairs and trichomes, inflorescence and its types; aestivation. Arrangement and types of reproductive parts of flower, placentation and its types.</p>	9	1		10
III 12 MARKS	<p>Anther and pollen biology: Anther wall: structure and functions, microsporogenesis, callose deposition and its significance; microgametogenesis; pollen wall structure, MGU (male germ unit) structure, NPC system; palynology and scope (a brief account); pollen wall proteins; pollen morphology, viability, storage and germination.</p>	10	2		12

	Ovule: Structure and types of ovule; female gametophyte– megasporogenesis (monosporic, bisporic and tetrasporic) and megagametogenesis.				
IV 12 MARKS	Pollination, fertilization and post fertilization developments: Pollination types and significance; adaptations for pollination; Double fertilization; Structure and types; general pattern of development of dicot and monocot embryo and endosperm; suspensor: structure and functions; embryo-endosperm relationship; nutrition of embryo; polyembryony, apomixes and parthenocarpy self, incompatibility.	10	1		11
					45

Title of the Course : Morphology and Reproduction of Spermatopythes
Course Code : BOTM201P
Nature of the Course : MAJOR
Credits : 1

Practicals 15 marks	<ol style="list-style-type: none"> 1. Study of morphology and reproductive parts of <i>Cycas, Pinus, Ginkgo & Gnetum</i>. 2. Study of Fossil plants (Photographs/specimen). 3. Study of different types of roots (Morphology only). 4. Types of leaves, venation, hairs and trichomes, phyllotaxy, inflorescence and aestivation. 5. Types of placentation and ovule (Preparation of temporary slides) 6. Study of pollen morphology and pollen tube formation. 7. Study of types of embryos and endosperms (Permanent slides/ photographs) 			20 Classes	
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LEARNING OUTCOMES:

1. Know the classification, morphology, reproduction and economic and ecological importance of Spermatophytes
2. Handling and observation of Spermatophyte

SUGGESTED READINGS:

1. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
2. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
3. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
4. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
5. Johri, B.M. (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands

Title of the Course : Morphology and Reproduction of Spermatophytes

Course Code : BOTMIN201T

Nature of the Course : MINOR

Total Credits : 4 (3T + 1P)

Distribution of Marks : 60 (End Sem) (45T+15P) + 40 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 11 MARKS	Gymnosperms General characteristics, classification, morphology, anatomy and reproduction of <i>Cycas</i> , <i>Pinus</i> , <i>Ginkgo</i> and <i>Gnetum</i> ; Patterns of embryo development in gymnosperms. Ecological and economic importance. Fossil plants: Process of fossilization; early land plants; <i>Rhynia</i> , <i>Cycadeoidea</i> , <i>Sphenophyllum</i> ; Geological time scale; importance of fossil study.	10	2		12
II 10 MARKS	Morphology of Angiosperms: Morphology and types of root, stem, and leaves; phyllotaxy and venation, hairs and trichomes, inflorescence and its types; aestivation. Arrangement and types of reproductive parts of flower, placentation and its types.	9	1		10
III 12 MARKS	Anther and pollen biology: Anther wall: structure and functions, microsporogenesis, callose deposition and its significance; microgametogenesis; pollen wall structure, MGU (male germ unit) structure, NPC system; palynology and scope (a brief account); pollen wall proteins; pollen viability, storage and germination. Ovule: Structure and types of ovule; female gametophyte– megasporogenesis (monosporic,	10	2		12

	bisporic and tetrasporic) and megagametogenesis.				
IV 12 MARKS	Pollination, fertilization and post fertilization developments: Pollination types and significance; adaptations for pollination; Double fertilization; Structure and types; general pattern of development of dicot and monocot embryo and endosperm; suspensor: structure and functions; embryo-endosperm relationship; nutrition of embryo; polyembryony, apomixes and parthenocarpy self, incompatibility.	10	1		11

Title of the Course : Morphology and Reproduction of Spermatophytes

Course Code : BOTMIN201P

Nature of the Course : MINOR

Credits : 1

Practicals 15 marks	<ol style="list-style-type: none"> 1. Study of morphology and reproductive parts of <i>Cycas</i>, <i>Pinus</i>, <i>Ginkgo</i> & <i>Gnetum</i>. 2. Study of Fossil plants (Photographs/specimen). 3. Study of different types of roots (Morphology only). 4. Types of leaves, venation, hairs and trichomes, phyllotaxy, inflorescence and aestivation. 5. Types of placentation and ovule (Preparation of temporary slides) 6. Study of pollen morphology and pollen tube formation. 7. Study of types of embryos and endosperms (Permanent slides/ photographs) 			20 Classes	
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LEARNING OUTCOMES:

1. Know the classification, morphology, reproduction and economic and ecological importance of Spermatophytes
2. Handling and observation of Spermatophyte

SUGGESTED READINGS:

1. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
2. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms, Vikas Publishing House. Delhi. 5th edition.
3. Shivanna, K.R. (2003). Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt. Ltd. Delhi.
4. Raghavan, V. (2000). Developmental Biology of Flowering plants, Springer, Netherlands.
5. Johri, B.M. I (1984). Embryology of Angiosperms, Springer-Verlag, Netherlands

Title of the Course : Nursery and Gardening
Course Code : BOTSEC201T
Nature of the Course : Skill Enhancement Course
Total Credits : 3 (2T + 1P)
Distribution of Marks : 45 (End Sem) (30T+15P) + 30 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 15 MARKS	Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. Seed storage: Seed banks, factors affecting seed viability, genetic erosion- Seed production technology. Seed testing and certification; Greenhouse - mist chamber, shed root, shade house and glass house.	10			10
II 15 MARKS	Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house.	10			10
III 15 MARKS	Gardening: Different types of gardening - landscape and home gardening - parks and its components - plant materials and design. Gardening operations: soil preparation, manuring, watering, management of pests and diseases and harvesting. Sowing/raising of seeds and seedlings - Transplanting of seedlings.	10			10
Practicals 20 marks	Preparation of cuttings/seedlings of some important horticultural crops. Exposure visit to established nurseries, farms, gardens etc.,			30	30

Where, L: Lectures T: Tutorials P: Practicals

Title of the Course : Nursery and Gardening
Course Code : BOTSEC201P
Nature of the Course : Skill Enhancement Course
Credits : 1

Practicals 15 marks	Preparation of cuttings/seedlings of some important horticultural crops. Exposure visit to established nurseries, farms, gardens etc.,			20	20 classes
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LEARNING OUTCOMES:

1. Learn about the nursery development processes, requirements and, management techniques.
2. Learn about the garden development processes, requirements and, management techniques

SUGGESTED READINGS:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras
3. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
4. Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.
5. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi.
6. Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA

Title of the Course : **Plant diversity and human welfare**
Course Code : **BOTGEC201**
Nature of the Course : **Generic Elective Course**
Total Credits : **3**
Distribution of Marks : **45 (End Sem) + 30 (In-Sem)**

UNITS	CONTENTS	L	T	Total Hours
I 12 MARKS	Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agrobiodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.	10	1	11
II 13 MARKS	Loss of Biodiversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agrobiodiversity, Projected scenario for biodiversity loss, Management of Plant Biodiversity: Organizations associated with biodiversity management Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.	10	2	12
III 10 MARKS	Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity, In situ and ex situ conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.	10	1	11
IV 10 MARKS	Role of plants in relation to Human Welfare; a) Importance of forestry their utilization and commercial aspects b) Avenue trees, c) Ornamental plants of India. d) Alcoholic beverages through ages. Fruits and nuts: Important fruit crops their commercial importance. Wood and its uses.	10	1	11

Where, L: Lectures T: Tutorials

LEARNING OUTCOMES:

1. Know the scope, dimension and importance and threats to plant diversity.
2. Conservation ways of biodiversity and its Sustainable utili

SUGGESTED READINGS:

1. Krishnamurthy, K.V. (2004). An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi

DETAILED SYLLABUS OF 3rd SEMESTER

Title of the Course : Cell Biology

Course Code : BOTM301T

Nature of the Course : MAJOR

Total Credits : 4 (3T +1P)

Distribution of Marks : 60 (End Sem) (45T+15P) + 40 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 10 MARKS	The cell Cell as a unit of structure and function; cell theory, Characteristics of prokaryotic and eukaryotic cells; Origin of eukaryotic cell (Endosymbiotic theory).	8			8
II 13 MARKS	Cell wall and plasma membrane Chemistry, structure and function of Plant cell wall; Overview of fluid mosaic model; Chemical composition of membranes; membrane function. Cell organelles Nucleus; Structure-nuclear envelope, nuclear pore complex, nuclear lamina, organization of chromatin; nucleolus. Microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast; Ribosomes- types, components and function; Lysosomes, Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, Golgi Apparatus.	12	2		14
III 12 MARKS	Membrane transport and Protein sorting &targeting Membrane transport – Passive, active and facilitated transport, membrane channels, gates and pores; endocytosis and exocytosis; protein glycosylation, protein sorting and export from Golgi apparatus; protein folding& processing; Smooth endoplasmic reticulum and lipid synthesis, export of proteins and lipids.	12	2		14
IV 10 MARKS	Cell division Types of cell division, stages of mitosis and meiosis; Phases of eukaryotic cell cycle, Regulation of cell cycle-checkpoints, role of protein kinases, significance.	7	2		9
		39	6		45

Where, L: Lectures T: Tutorials P: Practicals

Title of the Course : Cell Biology
Course Code : BOTM301P
Nature of the Course : MAJOR
Total Credits : 1

Practicals 15 marks	1. Study of plant cell structure with the help of epidermal peel mount of Onion/Crinum/Rheo. 2. Demonstration of the phenomenon of protoplasmic streaming in Hydrilla leaf, Vallisneria. 3. Measurement of cell size by of micrometric method. 4. Cell counting using haemocytometer. (Yeast/pollen grains). 5. Study the phenomenon of plasmolysis and deplasmolysis. 6. Study of cell and its organelles with the help of electron micrographs (Demonstration). 7. Cytochemical staining of: DNA- Feulgen and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique. 8. Study different stages of mitosis and meiosis.			20	20 classes
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LEARNING OUTCOMES:

- (1) Know the types of biomolecules present on plant body and their functions.
- (2) Isolation and estimation of biomolecules

SUGGESTED READINGS:

- 1. Karp, G. (2010). Cell Biology, John Wiley & Sons, U.S.A. 6th edition.
- 2. Hardin, J., Becker, G., Skliensmith, L.J. (2012). Becker's World of the Cell, Pearson Education Inc. U.S.A. 8th edition.
- 3. Cooper, G.M. and Hausman, R.E. (2009) The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

Title of the Course : Plant Biochemistry & Molecular Biology

Course Code : BOTM302T

Nature of the Course : MAJOR

Total Credits : 4 (3T +1P)

Distribution of Marks : 60 (End Sem) (45T+15P) + 40 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 13 MARKS	Biomolecules: Types and significance of chemical bonds; Structure and properties of water; pH and buffers. Carbohydrates: Nomenclature and classification; Monosaccharides; Disaccharides; Oligosaccharides and polysaccharides. Lipids: Definition and major classes of storage and structural lipids; Fatty acids structure and functions; Essential fatty acids; Triacylglycerols structure, functions and properties; Phosphoglycerides. Proteins: Structure of amino acids; Levels of protein structure-primary, secondary, tertiary and quaternary; Protein denaturation and biological roles of proteins. Nucleic acids: Structure of nitrogenous bases; Structure and function of nucleotides; Types of nucleic acids; Structure of A, B, Z types of DNA; Types of RNA; Structure of tRNA.	10	1		11
II 10 MARKS	Bioenergetics: Laws of thermodynamics, concept of free energy, endergonic and exergonic reactions, coupled reactions, redox reactions. ATP: structure, its role as a energy currency molecule. Enzymes Structure of enzyme: holoenzyme, apoenzyme, cofactors, coenzymes and prosthetic group; Classification of enzymes; Features of active site, substrate specificity, mechanism of action (activation energy, lock and key hypothesis, induced - fit theory), Michaelis – Menten equation, enzyme inhibition and factors affecting enzyme activity.	10	2		12
III 12 MARKS	Genetic material and its organization : DNA as the carrier of genetic information (Griffith's, Hershey & Chase, Avery, McLeod & McCarty experiment); denaturation and renaturation of DNA.; Organization of DNA- Prokaryotes, Viruses, Eukaryotes. RNA Structure; Organelle DNA mitochondria and chloroplast DNA. Replication and Transcription of DNA General principles – bidirectional, semi-conservative and semi discontinuous replication, RNA	12	2		14

	priming; Various models of DNA replication, replication of linear ds-DNA. Transcription in prokaryotes and eukaryotes; Post Transcriptional modification of RNA Operon concept: Lac operon and its regulation.				
IV 10 MARKS	Genetic codes & Translation Genetic codes: salient features; Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNA synthetases; Various steps in protein synthesis, factors involve in initiation, elongation and termination of polypeptides; Post-translational modifications of proteins.	7	1		8
		39	6	45	45

Where, L: Lectures T: Tutorials P: Practicals

Title of the Course : Plant Biochemistry & Molecular Biology

Course Code : BOTM302P

Nature of the Course : MAJOR

Credits : 1

Practicals 15 marks	1. Qualitative tests for carbohydrates, reducing sugars, non-reducing sugars, lipids and proteins. 2. Cytochemical staining of : DNA- Feulgen and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique. 3. Estimation of plant proteins by Biuret/Lowry method. 4. Estimation of reducing and non-reducing sugars in plant samples. 5. DNA estimation by diphenylamine reagent/UV Spectrophotometry. 6. Study of DNA replication mechanisms through photographs (Rolling circle, Theta replication and semi-discontinuous replication). 7. Study of structures of prokaryotic RNA polymerase and eukaryotic RNA polymerase II through photographs. 8. Photographs establishing nucleic acid as genetic material (Messelson and Stahl's, Avery et al, Griffith's, Hershey & Chase's and Fraenkel & Conrat's experiments)			20	20 classes
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LEARNING OUTCOMES:

After the completion of this course, the learner will be able to:

1. Know the types of biomolecules present on plant body and their structure and functions.
2. Isolation and estimation of biomolecules

SUGGESTED READINGS:

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi

Title of the Course : Plant Physiology & Metabolism
Course Code : BOTMIN301T
Nature of the Course : MINOR
Total Credits : 4
Distribution of Marks : 60 (End Sem) (45T+15P) + 40 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 10 MARKS	Plant-water relations: Importance of water, water potential and its components; Ascent of sap, Transpiration and its significance; Factors affecting transpiration; Root pressure and guttation. Translocation in phloem: Composition of phloem sap, girdling experiment; Pressure flow model; Phloem loading and unloading.	10	2		12
II 10 MARKS	Mineral nutrition: Essential elements, macro and micronutrients; Criteria of essentiality of elements; Role of essential elements; Transport of ions across cell membrane, active and passive transport, carriers, channels and pumps. Biological nitrogen fixation; Nitrate and ammonia assimilation.	7	1		8
III 15 MARKS	Photosynthesis: Photosynthetic Pigments (Chl a, b, xanthophylls, carotene); Photosystem I and II, reaction center, antenna molecules; Electron transport and mechanism of ATP synthesis; C ₃ , C ₄ and CAM pathways of carbon fixation; Photorespiration. Respiration: Glycolysis, anaerobic respiration, TCA cycle; Oxidative phosphorylation, Oxidative Pentose Phosphate Pathway.	15	2		17
IV 10 MARKS	Plant growth regulators & plant responses: Physiological roles of auxins, gibberellins, cytokinins, ABA, ethylene. Plant response to light and temperature; photoperiodism and its importance.	7	1		8
		39	6	45	45

Where, L: Lectures T: Tutorials P: Practicals

Title of the Course : Plant Physiology & Metabolism
Course Code : BOTMIN301P
Nature of the Course : MINOR
Credits : 1

Practicals 15 marks	<ol style="list-style-type: none">1. Determination of osmotic potential of plant cell sap by plasmolytic and weight method.2. To study the effect of environmental factors (light and wind) on transpiration by excised twig.3. Demonstrate the activity of catalase and study the effect of pH and enzyme concentration.4. Calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.5. Demonstration of Hill reaction.6. To study the effect of light intensity and bicarbonate concentration on O₂ evolution in photosynthesis.7. Determination of rate of transpiration.
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LEARNING OUTCOMES

After the completion of this course, the learner will be able to:

1. Know the role of minerals as plant nutrition, plant water relationship and its mechanisms.
2. Production of sugar through photosynthesis, its mechanism and importance
3. Respiratory pathways, metabolic processes and role of different growth promoters and inhibitors in plant growth and development.

SUGGESTED READINGS:

1. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
2. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
3. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.
4. V.K. Jain (2017) Fundamentals Of Plant Physiology, S. Chand Publishing.

Title of the Course : Nursery and Gardening
Course Code : BOTSEC301
Nature of the Course : Skill Enhancement course
Total Credits : 3
Distribution of Marks : 45 (End Sem) (30T+15P) + 30 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 10 MARKS	Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. Seed storage: Seed banks, factors affecting seed viability, genetic erosion- Seed production technology. Seed testing and certification; Greenhouse - mist chamber, shed root, shade house and glass house.	10			10
II 10 MARKS	Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house.	10			10
III 10 MARKS	Gardening: Different types of gardening - landscape and home gardening - parks and its components - plant materials and design. Gardening operations: soil preparation, manuring, watering, management of pests and diseases and harvesting. Sowing/raising of seeds and seedlings - Transplanting of seedlings.	10			10
		30		0	30

Where, L: Lectures T: Tutorials P: Practicals

Title of the Course : Nursery and Gardening
Course Code : BOTSEC301
Nature of the Course : Skill Enhancement course
Credits : 1

Practicals 15 MARKS	Preparation of cuttings/seedlings of some important horticultural crops. Exposure visit to established nurseries, farms, gardens etc.			20	20 classes
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LEARNING OUTCOMES:

1. Learn about the nursery development processes, requirements and, management techniques.
2. Learn about the garden development processes, requirements and, management techniques

SUGGESTED READINGS:

1. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
2. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
3. Agrawal, P.K. 1993, Hand Book of Seed Technology, Dept. of Agriculture and Cooperation, National Seed Corporation Ltd., New Delhi

Title of the Course : Ethnobotany
Course Code : BOTGEC3
Nature of the Course : Generic Elective Course
Total Credits : 3
Distribution of Marks : 45 (End Sem) +30 (In-Sem)

UNITS	CONTENTS	L	T	P	Total Hours
I 12 MARKS	Ethnobotany Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of N E India, and their life styles. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.	12	1		13
II 10 MARKS	Methodology of Ethnobotanical studies a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places.	6	2		8
III 13 MARKS	Medico-ethnobotanical sources in India; Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) Azadiractha indica b) Ocimum sanctum c) Vitex negundo. d) Tribulus terrestris e) Pongamia pinnata f) Cassia auriculata. Role of ethnobotany in modern medicine with special example Rauvolfia sepentina, Trichopus zeylanicus, Artemisia, Role of ethnic groups in conservation of plant genetic resources.	14	2		16
IV 10 MARKS	Ethnobotany and legal aspects Ethnobotany as a tool to protect interests of ethnic groups. Biopiracy, Intellectual Property Rights and Traditional Knowledge.	8			8
		40	5		45

LEARNING OUTCOMES:

1. Know the scope, dimension and importance of ethnobotany.
2. Conservation ways of biodiversity and its Sustainable utilization in traditional practices.
3. Acquire knowledge of bioactive compounds available in plant resources of NE India

SUGGESTED READINGS:

1. Uttarakhand Open University (2023). Ethnobotany