



THIRUVALLUVAR UNIVERSITY

SERKKADU, VELLORE-632115

B.Sc. BOTANY

SEMESTER - II

SYLLABUS

FROM THE ACADEMIC YEAR

2023 - 2024

S.No.	Part	Study Components		Ins. Hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER II									
1.	I	Language	Paper-2	6	3	Tamil/Other Languages	25	75	100
2.	II	English	Paper-2	4	3	English	25	75	100
3.	II	NMSDC: Language Proficiency for Employability	Paper-1	2	2	Overview of English Communication	25	75	100
4.	III	Core Course –CC III	Paper-2	5	5	Plant Diversity II – Fungi, Bacteria, Viruses, Plant pathology and Lichens	25	75	100
5.	III	Core Course –CC IV	Practical-2	5	5	Plant Diversity II - Fungi, Bacteria, Viruses, pathology and Lichens – Practical II	25	75	100
6.	III	Elective II Generic/ Discipline Specific	Elective II	4	2	Zoology– II	25	75	100
				2	1	Zoology Practical - II	25	75	100
7.	IV	Skill Enhancement Course SEC-2	Paper2	2	2	1. Mushroom cultivation 2. Herbal Medicine 3. Global Climate change	25	75	100
8.	IV	Skill Enhancement Course SEC-3 (Discipline Specific)	Paper 1	2	2	Botanical garden and landscaping	25	75	100
		Sem. Total		32	25		225	675	900

**CORE-III PLANT DIVERSITY II FUNGI, BACTERIA, VIRUSES,
PLANT PATHOLOGY AND LICHENS**

Title of the Course		PLANT DIVERSITY – II: FUNGI, BACTERIA, VIRUSES, PLANT PATHOLOGY AND LICHENS					
Paper Number		CORE III					
Category	Core III	Year	I	Credits	5	Course Code	
		Semester	II				
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		3	2		--	5	
Pre-requisite		Students should be familiar with the basics of fungi, bacteria, viruses and lichens.					
Learning Objectives							
C1		To describe the common characteristics of fungi as being heterotrophic, unicellular/multicellular.					
C2		To understand the biology of fungi and to discuss the importance of fungi in various ecological roles					
C3		To understand lichen structure, function, identification, and ecology; Comprehend the events of symbiosis and lichenization and to demonstrate the use of lichens as bioindicator species.					
C4		To identify the main groups of plant pathogens, their symptoms.					
C5		To understand the various types of plant diseases.					
Course outcomes: On completion of this course, the students will be able to: CO						Programme outcomes	
1. Recognize the general characteristics of microbes, fungi and lichens and disease symptoms.						K1	
2. Develop an understanding of microbes, fungi and lichens and appreciate their adaptive strategies based on structural organization.						K2	
3. Identify the common plant diseases, according to geographical locations and device control measures.						K3	
4. Analyze the emerging trends in fungal biotechnology with special reference to agricultural and pharmaceutical applications.						K4	
5. Determine the economic importance of microbes, fungi and lichens.						K5	
UNIT	EXPERIMENTS						
I	FUNGI Classification of fungi - (Alexopoulos and Mims, 1979), criteria for classification, Characteristic features, thallus organization, mode of nutrition, structure, reproduction and life-history of classes, each with one suitable example: Zygomycotina (<i>Pilobolus</i> , <i>Mucor</i> , <i>Rhizopus</i>), Ascomycotina (<i>Aspergillus</i> , <i>Saccharomyces</i> <i>Peziza</i>),						

	Basidiomycotina (<i>Agaricus</i> , <i>Pleurotus</i> , <i>Puccinia</i>) and Deuteromycotina (<i>Cercospora</i> , <i>Alternaria</i>). (Examples may be changed according to the availability of the specimens). Importance of mycorrhizal association.	
II	ECONOMIC IMPORTANCE OF FUNGI: Cultivation of mushroom – <i>Pleurotus</i> (food). Fungi in agriculture application (biofertilizers): Mycotoxins (biopesticides), Production of industrially important products from fungi- alcohol (ethanol), organic acids (citric acid), enzymes (protease). Vitamins (Vitamin B-complex and Vitamin B-12), applications of fungi in pharmaceutical products (Penicillin). Importance of VAM fungi. Harmful effects of Fungi. Agriculture (Biofertilizers); Mycotoxins	
III	BACTERIA, VIRUS: Classification (Bergey's, 1994), structure and reproduction of bacteria, Mycoplasma, Virology -Viruses general characters, structure and reproduction.	
IV	PLANT PATHOLOGY: General symptoms of plant diseases; Geographical distribution of diseases; Etiology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of the following plant diseases. General characters of Bacteria and Viruses. Bacterial diseases – Citrus canker and Bacterial wilt of Banana Viral diseases – Tobacco Mosaic and Vein clearing of Papaya Fungal diseases – Blast disease in rice and Tikka disease	
V	LICHEN: Classification (Hale, 1969). Habitat, nature of association, Structure, Nature of Mycobionts and Phycobionts, Study of growth forms of lichens (crustose, foliose and fruticose), types, distribution, thallus organization, reproduction and ecological significance of lichens with special reference to <i>Usnea</i> . Economic importance of Lichens: food, fodder and nutrition, flavor, tanning and dyeing, cosmetics and perfumes, Brewing and distillation, minerals, Natural products, medicine (Ayurvedic, Siddha), pharmaceutical products, biodegradation agent, air pollution and biomonitoring, soil formation, nitrogen fixation, Harmful aspects, poison from lichens,	
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper).		Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour).
Skills acquired from this course.	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional communication and Transferrable Skill	
Recommended Texts		
<ol style="list-style-type: none"> 1. Pandey, B.P. 1997. College Botany. Vol. I Fungi & Pathology. 2. Mehrotra, R.S and Aneja, K.R. 2003. An introduction to mycology. New age International (P) Ltd, Publishers, New Delhi. 3. Poonam Singh and Ashok Pandey. 2009. Biotechnology for agro-Industrial residues utilization. Springer. 4. Satyanarayana T and Johri B.N. 2005. Microbial diversity, Current Perspectives and Potential Applications, IK International. 5. Nair, L.N. 2007. Topics in Mycology and Pathology, New Central Book agency, Kolkata. 6. Sharma, P.D. 2011. Plant Pathology, Rastogi Publication, Meerut, India. 7. Mahendra Rai. 2009. Advances in Fungal Biotechnology. I.K. International Publishing House, New Delhi. 		

Reference Books

1. Alexopoulos, C.J., Mims, C.W., Blackwell, M. 1996. Introductory Mycology. 4th edition. John Wiley & Sons (Asia) Singapore.
2. Webster, J and Weber, R. 2007. Introduction to Fungi. 3rd edition. Cambridge University Press, Cambridge.
3. Sharma, O.P. 2011. Fungi and allied microbes The McGraw –Hill companies, New Delhi.
4. Burnett, J.H. 1971. The fundamentals of Mycology. ELBS Publication, London.
5. Bessey, E.A. 1979. Morphology and Taxonomy of fungi, Vikas publishing House Pvt. Ltd, New Delhi.
6. Dharani Dhar Awasthi. 2000. A Handbook of Lichens Vedams eBooks (P) Ltd. New Delhi.
7. Pelzer, M.J., Chan, E.C.S and Krieg, N.R. 1983. Microbiology , Tata MaGraw Hill Publishing House, New Delhi.
8. Pandey, P.B. 2014. College Botany- 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi.
9. Mishra, A. and Agarwal, R.P. 1978. Lichens – A Preliminary Text. Oxford and IBH.
10. Pandey, B.P. 2005. College Botany I: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S Chand & Company

Web Resources

1. <https://www.amazon.in/Fungi-Sarah-C-Watkinson-ebook/dp/B0199YFDDE>
2. <http://www.freebookcentre.net/biology-books-download/A-text-book-of-mycology-and-plant-pathology.html>
3. <http://www.freebookcentre.net/Biology/Mycology-Books.html>
4. <https://www.kobo.com/us/en/ebook/introduction-to-fungi>
5. <http://www.freebookcentre.net/biology-books-download/Introductory-Mycology.html>
6. [http://www.freebookcentre.net/biology-books-download/Fungi-\(PDF-15P\).html](http://www.freebookcentre.net/biology-books-download/Fungi-(PDF-15P).html)

Mapping with Programme Outcomes:

COs	COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	3	2	1	2	2	2	2
CO 2	3	3	2	2	3	3	2	1	2	1
CO 3	2	2	3	3	1	2	1	3	1	3
CO 4	3	3	3	3	3	2	3	3	3	3
CO 5	3	3	2	3	2	3	3	3	3	3

S-Strong (3)**M-Medium (2)****L-Low(1)**

**CORE-IV PLANT DIVERSITY II FUNGI, BACTERIA, VIRUSES,
PATHOLOGY AND LICHENS - PRACTICAL-II**

Title of the Course		PLANT DIVERSITY – I: FUNGI, BACTERIA, VIRUSES, PLANT PATHOLOGY AND LICHENS –Practical II					
Paper Number		CORE IV					
Category	Core	Year	I	Credits	5	Course Code	
		Semester	II				
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total		
		1	-	3	4		
Pre-requisite		Students should be familiar with the basics of fungi and lichens.					
Learning Objectives							
C1	To enable students to identify microscopic and macroscopic fungi.						
C2	To prepare microslides of fungi and lichens.						
C3	To know the presence of pathogen inside the plant tissues through microscopic sections.						
C4	To identify the bryophytes based on the morphology, and microslides.						
C5	To know the economic importance of the microbes studied.						
Course outcomes						Programme Outcomes	
On completion of this course, the students will be able to: CO							
1. Identify microbes, fungi and lichens using key identifying characters						K1	
2. Develop practical skills for culturing and cultivation of fungi.						K2	
3. Identify and select suitable control measures for the common plant diseases.						K3	
4. Analyze the characteristics of microbes, fungi and plant pathogens						K4	
5. Access the useful role of fungi in agriculture and pharmaceutical industry.						K5	
EXPERIMENTS							
<ol style="list-style-type: none"> Microscopic observation of vegetative and reproductive structures of types prescribed in the syllabus through temporary preparations and permanent slides. Identifying the micro slides relevant to the syllabus. Herbarium specimens of bacterial diseases/photograph. Protocol for mushroom cultivation. Inoculation techniques for fungal culture (Demonstration only). Study of economically important products obtained from fungi: Fungal biofertilizers, biopesticides, biofungicide (<i>Trichoderma</i>), edible mushroom/Yeast, organic acids (citric acid) enzymes (protease), antibiotics and vitamins. Mycorrhiza: ecto-mycorrhiza and endo-mycorrhiza (Photographs) Visit to fungal biotechnology laboratories. Ultra structure of bacteria. Structure of bacteriophage. Micro-preparation of <i>Usnea</i> to study vegetative and reproductive structures. Identifying the micro slides relevant to the syllabus. 							

12. Study of thallus and reproductive structures (apothecium) through permanent slides.
13. Economic importance of Lichens - Dye and perfume.

Recommended Texts:

1. Chmielewski, J.G and Kravesky, D. 2013. General Botany laboratory Manual. AuthorHouse, Bloomington, USA.
2. Das, S and Saha, R. 2020. Microbiology Practical Manual. CBS Publishers and Distributors (P) Ltd., New Delhi, India.
3. Webster, J and Weber, R. 2007. Introduction to Fungi, 3rd Ed. Cambridge University Press, Cambridge.
4. Nair, L.N. 2007. Topics in Mycology and Pathology, New Central Book agency, Kolkata.
5. Nair, L.N. 2007. Topics in Mycology and Pathology, New Central Book agency, Kolkata.

Reference Books:

1. Alexopoulos, J and Mims, W. 1985. Introductory Mycology, Wiley Eastern Limited New Delhi.
2. Bendre, M. Ashok and Ashok Kumar, A. 2020. Text Book of Practical Botany 1 (10th ed). Rastogi Publications, Meerut.
3. Singh, R and U.C. Singh 2020. Modern mushroom cultivation, 3d Edition Agrobios (India), Jodhpur.
4. Poonam Singh and Ashok Pandey. 2009. Biotechnology for agro-Industrial residues utilization. Springer.
5. Satyanarayana T and Johri B.N. 2005. Microbial diversity, Current Perspectives and Potential Applications, IK International.

Web resources:

1. <https://www.amazon.in/Practical-Manual-Fungi-Fungicides/dp/B0025AEFP4>
2. https://books.google.co.in/books/about/Practical_Mycology.html?id=5ycJAQAAMAAJ&redir_esc=y
3. <https://www.flipkart.com/colour-handbook-practical-plant-pathology/p/itmefsn6dyhfh9b>
4. https://books.google.co.in/books/about/Practical_Botany.html?id=T5narQEACAAJ&redir_esc=y
5. <https://www.kobo.com/us/en/ebook/introduction-to-fungi>

Mapping with Programme Outcomes:

COs	COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	3	2	1	2	2	2	1
CO 2	2	3	2	2	3	3	2	3	3	3
CO 3	2	2	3	3	1	2	1	3	1	2
CO 4	3	3	3	3	3	2	3	3	3	2
CO 5	3	3	2	3	2	3	3	3	2	3

S-Strong (3)

M-Medium (2)

L-Low(1)

SKILL ENHANCEMENT COURSES SEC 2

1. MUSHROOM CULTIVATION

Title of the Course	MUSHROOM CULTIVATION					
Paper Number	Non-Major Elective-II					
Category	Elective	Year	I	Credits	1	CourseCode
		Semester	II			
Instructional Hours per week	Lecture	Tutorial		Lab Practice	Total	
	2	-		-	2	
Pre-requisite	Basic knowledge on structure and function of various groups of mushrooms.					
Course Objectives						
C1	To learn and develop skills in mushroom cultivation.					
C2	To understand and appreciate the role of mushrooms in Nutrition, Medicine and health.					
C3	To cultivate mushroom cultivation in small scale industry.					
C4	To learn about diseases and post harvest technology.					
C5	To study new methods and strategies to contribute to mushroom production.					
Course outcomes: On completion of this course, the students will be able to: CO					Programme Outcomes	
1. Recall various types and categories of mushroom.					K1	
2. Explain about various types of food technologies associated with mushroom industry.					K2	
3. Apply techniques studied for cultivation of various types of mushroom.					K3	
4. Analyze and decipher the environmental factors and economic value associated with mushroom cultivation					K4	
5. Develop new methods and strategies to contribute to mushroom production.					K5 &K6	
UNIT	CONTENTS					
I	Introduction: Morphology, Types of Mushroom, identification of edible and poisonous mushroom, Nutritive values, life cycle of common edible mushrooms.					
II	Mushroom cultivation, prospects and scope of Mushroom cultivation in small scale Industry.					
III	Life cycle of <i>Pleurotus spp</i> and <i>Agaricus spp</i> .					
IV	Spawn production, growth media, spawn running and harvesting of mushrooms and marketing.					
V	Diseases and post harvest technology, Insect pests, nematodes, mites, viruses, fungal competitors and other important diseases.					

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper).	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour).
Skills acquired from this course.	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill.
Recommended Texts 1. Handbook of Mushroom Cultivation. 1999. TNAU publication. 2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R. 1991. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore. 3. Swaminathan, M. 1990. Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018. 4. Sing. 2005. Modern Mushroom Cultivation, International Book Distributors, Dehradun. 5. Verma, 2013. Mushroom: edible and medicinal: cultivation conservation, strain improvement with their marketing. Daya Publishing House.	
Reference Books 1. Handbook of Mushroom Cultivation. 1999. TNAU publication. 2. Marimuthu, T., Krishnamoorthy, A.S., Sivaprakasam, K. and Jayarajan. R. 1991. Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore. 3. Swaminathan, M. 1990. Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018. 4. Nita Bahl. 2002. Handbook on Mushroom 4 th edition Vijayprimalani for oxford & IBH publishing co., Pvt., Ltd., New Delhi. Dr.C. Sebastian Rajesekaran Reader in Botany Bishop Heber College, Trichy – 17. 5. Suman. 2005. Mushroom Cultivation Processing and Uses, M/s. IBD Publishers and Distributors, New Delhi.	
Web Resources 1. https://www.amazon.in/Mushroom-Cultivation-India-B-C/dp/817035479X 2. http://nrcmushroom.org/book-cultivation-merged.pdf 3. http://agricoop.nic.in/sites/default/files/ICAR_8.pdf 4. http://www.agrimoon.com/mushroom-culture-horticulture-icar-pdf-book/ 5. https://books.google.co.in/books/about/Mushroom_Cultivation_in_India.html?id=6AJx99OGTKEC&redir_esc=y	

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	S			S	M	L	M	M
CO 2	S			M		S	M	S
CO 3	M			S		M		S
CO 4	S	S	S	S		M		S
CO 5	S	S	M				S	S

S-Strong (3)

M-Medium (2)

L-Low(1)

2. HERBAL MEDICINE

Title of the Course		HERBAL MEDICINE				
Paper Number		Non-Major Elective-II				
Category	Elective	Year	I	Credits	1	CourseCode
		Semester	II			
Instructional Hours per week		Lecture		Tutorial	Lab Practice	Total
		2		-	-	2
Pre-requisite		To understand the importance of herbal medicine.				
Learning Objectives						
C1	To understand the nuances of medicinal plants and their phytoconstituents of commercial value					
C2	To design and develop medicinal garden.					
C3	To apply the knowledge to cultivate medical plants.					
C4	To know the pharmacological importance of medicinal plants.					
C5	To enlist phytochemicals and secondary metabolites of market and commercial value.					
Course outcomes: On completion of this course, the students will be able to: CO						Programme Outcomes
1. Define and describe the principle of cultivation of herbal products.						K1
2. Explain about the phytochemistry of economically important medicinal herbs						K2
3. Apply techniques for evaluation of drug adulteration through biological testing.						K3
4. Formulate the value added processing / storage / quality control for the better use of herbal medicine.						K4
5. Develop the skills for cultivation of plants and their value added processing/storage/quality control.						K5 & K6
UNIT	CONTENTS					
I	Importance and Relevance of Herbal drugs in Indian System of Medicine, Pharmacognosy – Aim and scope.					
II	Medicinal gardening – Gardens in the Hills and plains; House gardens; plants for gardening – Poisonous plants – Types of plant poison; action of poisons; treatment for poisons, some poisonous plants; their toxicity and action.					
III	Adulteration of crude drugs and its detection – methods of adulteration; types of adulteration. Medicinal plants of export values; rejuvenating herbs; Medicinal uses of Non-flowering plants.					
IV	Botanical description and active principles of Root drugs; Rhizomes woods and bark drugs (Two examples for each plant organs).					
V	Botanical description and active principles of leaves; Flowers; Fruits seed and entire plants as drugs. Taxonomic study of some selected herbals (Two examples for each plant organs).					

Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper).	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour).
Skills acquired from this course.	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	
<ol style="list-style-type: none"> 1. Somasundaram, S. 1997. Medicinal botany (Maruthuvar Thavaraviyal) – (Tamil Medium Book). 2. Wallis, T.E. 1967. Text Books of Pharmacognosy. J. & A. Churchill Ltd., London, 3. Jains, S.K.. 1996. Medicinal Plants. Deep Publications, New Delhi. 4. Srivastava, A.K. 2006, Medicinal Plants, International Book Distributors, Dehradun. 5. Agarwal, O.P. 1985, Vol. II, Chemistry of organic – natural products. S Chand & Company, New Delhi. 6. Gamble, J.S. and Fisher, 1921, CEC I, II, III Flora of the Presidency, Madras Volumes. 7. Mathew K.M., 1988, Flora of the Tamilnadu and Carnatic. 	
Reference Books	
<ol style="list-style-type: none"> 1. Nair, N.C and Henry, A.N. 1983, Flora of Tamil Nadu, India, Botanical Survey of India. 2. Chopra, R.N., Nagar S.L., and Chopra, I.C. 1956, Glossary of Indian Medicinal Plants. 3. Chopra, R.N., Chopra, I.C., Handa, K.L., and Kapur L.D., 1994, Indigenous drugs of India. 4. Chopra, R.N., Badhuvar R.L and Gosh, G. 1965. Poisonous plants in India. 5. Miller, L and Miller, B. 2017. Ayurveda & Aromatherapy: The Earth Essential Guide to Ancient Wisdom and Modern Healing. <i>Motilal Banarsidass, Fourth edition.</i> 6. Patri, F and Silano, V. 2002. Plants in cosmetics: Plants and plant preparations used as ingredients for cosmetic products - Volume 1. ISBN 978-92-871-8474-0, pp 218. 	
Web Resources	
<ol style="list-style-type: none"> 1. https://www.barnesandnoble.com/b/free-ebooks/nook-books/alternative-medicine-natural-healing/herbal-medicine/_/N-ry0Z8qaZ11iu 2. https://www.springer.com/gp/book/9783540791157 3. https://www.gpatonline.com/gpat/book-reference-pharmacognosy 4. https://www.researchgate.net/publication/334670695_Book_review-_Herbal_Drug_Technology 5. http://www.eurekaselect.com/node/173492/herbal-medicine-back-to-the-future 	

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	1	2	1	3	2	1
CO 2	3	3	2	1	1	2	2	2	2	2
CO 3	2	2	1	3	1	2	1	3	2	1
CO 4	3	2	1	2	1	2	3	3	2	3
CO 5	3	3	2	2	1	1	3	3	1	3

S-Strong (3)

M-Medium (2)

L-Low(1)

3. GLOBAL CLIMATE CHANGE

Title of the Course		GLOBAL CLIMATE CHANGE				
Paper Number		Non-Major Elective-II				
Category	Elective	Year	I	Credits	1	CourseCode
		Semester	II			
Instructional Hours per week		Lecture	Tutorial	Lab Practice	Total	
		2	-	-	2	
Pre-requisite		To understand the implications of carbon and ecological footprint.				
Learning Objectives						
C1	To gain insights on the impact of greenhouse effect on global climate change and mitigation measures.					
C2	To understand the implications of carbon and ecological footprint.					
C3	To apply the knowledge to green house effects.					
C4	To know the rain and its effects on plants.					
C5	To know about Global Environmental change issues.					
Course outcomes: On completion of this course, the students will be able to:CO					Programme Outcomes	
1. Relate to the anthropogenic pressure on the environment and carbon footprint.					K1	
2. Explain about the physical basis of natural green gas house effect on man and materials.					K2	
3. Evaluate human influenced driver of our climate system and its applications					K3	
4. Analyze the causes and effects of depletion of the stratospheric ozone layer.					K4	
5. Develop new strategies to mitigate issues of global environmental change.					K5 & K6	
UNIT	CONTENTS					
I	Global Environmental change issues. UNFCCC, IPCC, Koyoto protocol, CDM, Carbon footprint and ecological footprint.					
II	Stratospheric ozone layer: Evolution of ozone layer; Causes of depletion and consequences; Effects of enhanced UV-B on plants, microbes, animals, human health and materials; Global efforts for mitigation ozone layer depletion.					
III	Climate change: Green house effects; causes; Green house gases and their sources; Consequences of climate, oceans, agriculture, natural vegetation and humans; International efforts on climate change issues.					
IV	Atmospheric deposition: Past and present scenario; Causes and consequences of excessive atmospheric deposition of nutrients and trace elements; Eutrophication.					
V	Acid rain and its effects on plants, animals, microbes and ecosystems.					
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper).			Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)			

Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Texts	
<ol style="list-style-type: none"> 1. Adger, N. Brown, K and Conway, D. 2012. Global Environmental Change: Understanding the Human Dimensions. The National Academic Press. 2. Turekian. K. K. 1996. Global Environmental Change-Past, Present, and Future. Prentice-Hall. 3. Eugene Odum, 2017. Fundamentals of Ecology 5th Ed. Cengage, Bengaluru. 4. Sharma P.D. 2019. Plant ecology and phytogeography, Rastogi Publications, Meerut. 5. Neeraj Nachiketa. 2018 Environmental & Ecology A Dynamic approach. 2nd Edition GKP Access Publishing. 	
Reference Books	
<ol style="list-style-type: none"> 1. Matthew. R.A. 2009. Jon Barnett, Bryan McDonald. Global Environmental Change and Human Security. MIT Press., USA. 2. Hester, R.E and Harrison, R.M. 2002. Global Environmental Change. Royal Society of Chemistry. 3. Keddy, P.A. 2017. Plant Ecology: Origins, processes, consequences. 2nd ed. Cambridge University Press. ISBN. 978-1107114234. 1. Krishnamurthy, K.V. 2004. An Advanced Text Book of Biodiversity- Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi. 2. Kormondy, E.J. 2017. Concepts of Ecology. Prentice Hall, U.S.A. 4th edition. 	
Web Resources	
<ol style="list-style-type: none"> 1. https://www.ebooks.com/en-us/subjects/the-environment-climate-change-ebooks/2074/ 2. http://www.ebooks-for-all.com/bookmarks/detail/Climate-Change/onecat/Electronic-books+Environment-and-nature/0/all_items.html 3. https://www.smashwords.com/books/category/4727/newest/0/free/any 4. https://www.free-ebooks.net/environmental-studies-academic/Global-Warming 5. https://www.nap.edu/catalog/14673/climate-change-evidence-impacts-and-choices-pdf-booklet 	

Mapping with Programme Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	1	2	2	1	3
CO 2	3	2	1	2	3	3	2	3	1	2
CO 3	2	2	3	1	1	2	3	2	3	1
CO 4	3	3	3	2	1	1	3	2	3	2
CO 5	3	2	2	3	2	3	1	2	2	3

S-Strong (3) M-Medium (2) L-Low(1)

SKILL ENHANCEMENT COURSE 3

BOTANICAL GARDEN AND LANDSCAPING

Title of the Course	BOTANICAL GARDEN AND LANDSCAPING						
Paper Number	Skill Enhancement-3						
Category	Elective	Year	I	Credits	1	Course Code	
		Semester	II				
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		2	-		-	2	
Pre-requisite		Students should know about the fundamental concepts of gardening and landscaping.					
Learning Objectives							
C1	To know about the fundamental concepts of gardening and landscaping.						
C2	To provide an overview of various gardening styles and its scope in recreation and bio-aesthetic planning.						
C3	To illustrate the significance of garden adornments and propagation structures.						
C4	To inculcate entrepreneurial skills in students for creative landscaping design using CAD software.						
C5	To create the design outdoor and indoor gardens and inculcate entrepreneurial skills for landscaping.						
Course outcomes:						Programme Outcomes	
On completion of this course, the students will be able to:							
CO							
1. Recognize fundamental concepts of gardening and landscaping.						K1	
2. Explain about significance of garden adornments and propagation structures.						K2	
3. Apply techniques of landscaping for aesthetic purposes and gardening for recreation.						K3& K6	
4. Distinguish between formal, informal and free style gardens and their applications.						K4	
5. Develop and design outdoor and indoor gardens and inculcate entrepreneurial skills for landscaping.						K5 & K6	
UNIT	CONTENTS						
I	Principles of gardening, garden components, adornments, lawn making, methods of designing rockery, water garden, etc. Special types of gardens, their walk-paths, bridges, constructed features. Greenhouse. Special types of gardens, trees, their design, values in landscaping, propagation, planting shrubs and herbaceous perennials. Importance, design values, propagation, plating, climbers and creepers, palms, ferns,						

	grasses and cacti succulents.	
II	Flower arrangement: importance, production EXPERIMENTS and cultural operations, constraints, postharvest practices. Bioaesthetic planning, definition, need, round country planning, urban planning and planting avenues, schools, villages, beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, planting material for play grounds.	
III	Vertical gardens, roof gardens. Culture of bonsai, art of making bonsai. Parks and public gardens. Landscape designs, Styles of garden, formal, informal and free style gardens, types of gardens, Urban landscaping, Landscaping for specific situations, institutions, industries, residents, hospitals, roadsides, traffic islands, damsites, IT parks, corporate.	
IV	Establishment and maintenance, special types of gardens, Bio-aesthetic planning, ecotourism, theme parks, indoor gardening, therapeutic gardening, non-plant components, water scaping, xeriscaping, hardscaping.	
V	Computer Aided Designing (CAD) for outdoor and indoorscaping Exposure to CAD (Computer Aided Designing).	
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	
Recommended Texts		
<ol style="list-style-type: none"> 1. Acquaah, J. 2009. Horticulture – principles and practices, 4th edition, PHI learning Pvt. Ltd. 2. Rao Manibhushan K. 1991. Textbook of horticulture. MaC Millan India Ltd. 3. Gangulee H. C. and Kar A. K. 2004. College Botany Vol II, New Central Book Agency 4. Sharma V. K. 1999. Encyclopaedia of Practical Horticulture, Vol I –IV, Deep And Deep Publ. Pvt. Ltd. 5. Singh, J. 2018. Fundamentals of Horticulture. Kalyani Publishers. 		
Reference Books		
<ol style="list-style-type: none"> 1. Berry, F. and Kress, J. 1991. Heliconia: An Identification Guide . Smithsonian Books. 2. Butts, E. and Stensson, K. 2012. Sheridan Nurseries: One hundred years of People, Plans, and Plants. Dundurn Group Ltd. 3. Russell, T. 2012. Nature Guide: Trees: The world in your hands(Nature Guides). 4. Acquaah, J. 2009. Horticulture – principles and practices, 4th edition, PHI learning Pvt. Ltd. 		

5. Edment Senn Andrews. 1994. Fundamentals of Horticulture. Tata. McGraw Hill Publishing Co., Ltd., Delhi.

Web resources

1. https://www.amazon.in/Gardening-Landscape-Design-and-Botanical-Garden/s?rh=n%3A1318122031%2Cp_27%3Aand+Botanical+Garden
2. <https://www.overdrive.com/subjects/gardening>
3. <https://www.scribd.com/book/530538456/Opportunities-in-Landscape-Architecture-Botanical-Gardens-and-Arboreta-Careers>
4. <https://www.scribd.com/book/305542619/Botanic-Gardens>
5. <https://www.overdrive.com/subjects/gardening>

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CO 4	3	3	2	3	1	2	3	3	3	2
CO 5	3	3	2	3	2	3	1	3	3	2

S-Strong (3)

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