KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE – 641 029

DEPARTMENT OF BOTANY (UG)

CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(2020 – 2021 and onwards)

KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE – 641 029

Vision:

Developing the total personality of every student in a holistic way by adhering to the principles of **Swami Vivekananda** and **Mahatma Gandhi.**

Mission:

- Imparting holistic and man-making education with emphasis on character, culture and value - moral and ethical.
- Designing the curriculum and offering courses that transform its students into value added skilled human resources.
- Constantly updating academic and management practices towards total quality management and promotion of quality in all spheres.
- Extending the best student support services by making them comprehensive and by evolving a curriculum relevant to student community and society at large.
- Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.
- Moulding the teachers in such a way that they become the role models in promoting Higher Education.

DEPARTMENT OF BOTANY

Vision:

- Disseminate the knowledge on plants and their utility to the society.
- To develop feasible strategies in plant sciences for obtaining sustainable benefits from them.

Mission:

- Designing the curriculum by frequently updating the syllabi according to the present need.
- Preparing the students with more aptitude, skill and leadership quality by educating them.
- Make the students as entrepreneurs in the plant based industries.
- Identification and encouragement to turn the students into eminent Scientists/ Laurels.

PROGRAMME OUTCOMES (PO)

PO1

- Botany has immense carrier potential in areas such as Taxonomy, Genetics, Biotechnology, Pharmaceuticals, Agriculture and Environment.

PO2

- Students get an excellent opportunity to enrich scientific knowledge on botanical and ecological dimension of many plants and to study the species richness of the plant kingdom

PO3

- Knowledge on conservation of natural bioresources and various other hotspots augment students to explore their therapeutic values economically, culturally and aesthetically.

PO4

- Gain introductory experience on various biochemical pathways and their role in living systems

PO5

- Apply contextual knowledge on the importance of ethical environmental principles, norms and consequent responsibilities relevant to biodiversity conservation practice and sustainable use of plants.

PO6

- Address the socioeconomic challenges related to plant sciences and to disseminate knowledge on various aspects of medicinal plants and appropriate considerations on human health problems.

PO7

- Knowledge on conservation of natural bioresources and various other hotspots augment students to explore their therapeutic values economically, culturally and aesthetically

PO8

- Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1

- Through taxonomy, students were aware about the local and scientific names, economic importance including the uses and variations among the different species of Angiosperms.

PSO2

- Students can able to apply and associate the knowledge acquired from the allied subjects viz. Zoology and Chemistry, to solve and arrive at conclusion through the interdisciplinary approach.

PSO3

- Plant physiology aids the students to enhance knowledge on pathways of metabolisms, transport and translocation of water and solutes together with a better understanding of regulation of growth, development and influence of environment.

PSO4

- Students will be able to acquire vast intellectual knowledge on the biology of fossils and living plants along with their relationships with their environment.

PSO5

- Study of floriculture and landscaping techniques aids the students to implement knowledge on the process of construction of gardens, lawn designs, topiary and on the frame work of their infrastructure facilities.

UBO1

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

Course Name: B.Sc., Botany

Curriculum and Scheme of Examination under CBCS

(Applicable to the students admitted during the Academic Year 2020-2021)

Semester	Part	Subject code	Title of the Paper	Instruction Hours / Cycle	Exam. Marks			Duration of Exam.(hours)	Credit
					CIA	ESE	Total		
I	I	**20TML101**	**Part-I -Lang. -Tamil-I** /Hindi-I/French -I / Malayalam-I/ Sanskrit-I	6	25	75	100	3	3
	II	**20ENG101**	**Part - II** - English - I	6	25	75	100	3	3
	III	**20UBO101**	**C.P.1-** Biodiversity - I	7	25	75	100	3	5
		20UZO1A1	**Allied-1** Zoology - I	5	20	55	75	3	4
			C.Pr.1 - Biodiversity - I	2	-	-	-	-	-
			AlliedPr. Zoology - I	2	-	-	-	-	-
	IV	**20EVS101**	Environmental studies**	2	-	50	50	3	2
			Total	**30**	-	-	**425**	-	**17**
II	I	**20TML202**	**Part - I- Tamil-II** /Hindi-II /French-II / Malayalam-II / Sanskrit - II	6	25	75	100	3	3
	II	**20ENG202**	**Part- II-** English - II	6	25	75	100	3	3
	III	**20UBO202**	**C.P.2** - Plant Diversity - II	7	25	75	100	3	5
		20UZO2A2	**Allied- 2** Zoology - II	5	20	55	75	3	4
		20UBO2CL	**C.Pr.1** – Biodiversity - I & Plant Diversity II	2	40	60	100	3	2
		20UZO2AL	**Allied. Pr.** Zoology - I & II	2	20	30	50	3	2
	IV	**20VED201**	Value Education - Moral and Ethics**	2	-	50	50	3	2
			Total	**30**	-	-	**575**	-	**21**
III	I	**20TML303**	**Part-I-Tamil-III** /Hindi- III / French- III / Malayalam- III / Sanskrit - III	6	25	75	100	3	3
	II	**20ENG303**	**Part - II -Lang.** - English - III	6	25	75	100	3	3
	III	**20UBO303**	**C.P. 3 –** Anatomy and Embryology of Angiosperms	5	25	75	100	3	4
		20UCH3A3	**Allied- 3** - Chemistry – 1	5	20	55	75	3	4
			C. Pr. 2. – Anatomy and Embryology of Angiosperms	2	-	-	-	-	-
			Allied- Pr. – Chemistry	2	-	-	-	-	-
	IV	**20UGA3S1**	Skill based subject -I General awareness	2	25	75	100	3	3
		20TBT301/ 20TAT301/ 20UHR3N1	Basic Tamil* / Advanced Tamil**/ Non Major Elective - I**	2	-	75	75	3	2
			Total	**30**	-	-	**550**	-	**19**
IV	I	**20TML404**	**Part-I-Tamil-IV** / Hindi-IV / French - IV/ Malayalam - IV / Sanskrit - IV	6	25	75	100	3	3
	II	**20ENG404**	**Part-- II -Lang** - English IV	6	25	75	100	3	3
	III	**20UBO404**	**C.P.4**- Biophysics and Biostatistics	5	25	75	100	3	4
		20UCH4A4	**Allied4** - Chemistry - 2	5	20	55	75	3	4

		20UBO4CM	**C. Pr.2.-** Anatomy and Embryology of Angiosperms & Biophysics and Biostatistics	2	40	60	100	3	2
		20UCH4AL	**Allied Pr.** Chemistry	2	20	30	50	3	2
	IV	**20UBO4S2**	Skill based subject-II Applied Microbiology	2	25	75	100	3	3
		20TBT401/ 20TAT402 20UWR4N2	Basic Tamil*/ Advanced Tamil**/ Non Major Elective-II **	2	-	75	75	3	2
			Total	**30**	-	-	**700**	-	**23**
V	III	**20UBO505**	**C.P. 5 -** Fundamentals of Computer and Bioinformatics	4	25	75	100	3	4
		20UBO506	**C.P. 6** - Taxonomy of Angiosperms and Economic Botany	4	25	75	100	3	5
		20UBO507	**C.P.7** - Cytology, Genetics and Plant Breeding	4	25	75	100	3	5
		20UBO508	**C.P. 8** - Plant Ecology, Phytogeography and Resource Conservation	4	25	75	100	3	5
		20UBO5E1	**Elective - I**	4	25	75	100	3	5
		20UBO5CN	**C.Pr.3** – Fundamentals of Computer and Bioinformatics	2	40	60	100	3	2
			C.Pr. 4 - Taxonomy of Angiosperms, Economic Botany, , Cytology, Genetics and Plant Breeding, Plant Ecology, Phytogeography and Resource Conservation	4	-	-	-	-	-
	IV	-	EDC - Extra Departmental course	2	25	75	100	3	3
	-	**20UBO5IT**	Internship Training	**Grade******					
			Total	**30**	-	-	**700**	-	**29**
VI	III	**20UBO609**	**C.P.9** – Biochemistry and Bioinstrumentation	6	25	75	100	3	4
		20UBO610	**C.P.10** - Plant Physiology	6	25	75	100	3	5
		20UBO611	**C.P.11-** Horticulture	6	25	75	100	3	4
		20UBO6CO	**C.Pr. 4-** Taxonomy of Angiosperms, Economic Botany , Cytology, Genetics and Plant Breeding & Plant Ecology, Plant Phytogeography and Resource Conservation	-	40	60	100	3	2
		20UBO6CP	**C. Pr. 5** – Biochemistry, Bioinstrumentation, Plant physiology & Horticulture	4	40	60	100	3	2
		20UBO6E2	**Elective- II**	4	25	75	100	3	5
		20BO6Z1	Project***	2	20	80	100	-	5
	IV	**20UBO6S3**	Skilled Based Subject III- Cultivation and Marketing of Medicinal Plants	2	25	75	100	3	3
			Total	**30**	-	-	**800**	-	**30**
	V	**20NCC/NSS/ YRC /PYE/ECC/ RCC/WEC1 01#**	Extension activity *	-	50	-	50	-	1
			Grand Total	-	-	-	**3800**	-	**140**

Note:

CBCS – Choice Based Credit system
CIA – Continuous Internal Assessment
ESE – End of Semester Examinations

@ Hindi/Malayalam/ French/ Sanskrit - 20HIN/MLM/FRN/SAN101 - 202

***** - No End-of-Semester Examinations. Only Continuous Internal Assessment (CIA)

******- No Continuous Internal Assessment (CIA). Only End-of-Semester Examinations (ESE)

***- Project Report - 60 marks; Viva-voce - 20 marks; Internal - 20 marks

****-The students shall undergo an Internship training/field work for a minimum period of 2 weeks at the end of the fourth semester during summer vacation and submit the report in the fifth semester. The report will be evaluated for 100 marks along with the internal viva voce by the respective Faculty. According to their marks, the grades will be awarded as given below.

Marks %	Grade
85-100	O
70-84	D
60-69	A
50-59	B
40-49	C
<40	U (Reappear)

Major Elective Papers

(2 papers are to be chosen from the following 6 papers)

1. **Forestry**
2. **Biotechnology**
3. **Food Science**
4. **Seed Biology**
5. **Pharmacognosy**
6. **Mushroom Cultivation Technology**

Non-Major Elective Papers

1. **Human Rights**
2. **Women's Rights**
3. **Consumer Affairs**

Sub code & Title of the Extra Departmental Course (EDC)

20UBO5X1 - Medicinal Botany and Human Welfare

 # List of Extension Activities:

1. National Cade Corps (NCC)
2. National Service Scheme (NSS)
3. Youth Red Cross (YRC)
4. Physical Education (PYE)
5. Eco Club (ECC)
6. Red Ribbon Club (RRC)
7. Women Empowerment Cell (WEC)

Note: In core/allied subjects, no. of papers both theory and practical are included wherever applicable. However, the total credits and marks for core/allied subjects remain the same as stated below.

Tally Table:

S. No.	Part	Subject	Marks	Credits
1.	I	Language - Tamil/Hindi/Malayalam/ French/ Sanskrit	400	12
2.	II	English	400	12
3.	III	Core - Theory/Practical	1600	60
		Allied	400	20
		Elective/Project	300	15
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major electives	150	4
		Skill Based subject	300	9
		Extension Activities	50	1
		Value Education	50	2
5.	V	Extra Departmental Course (EDC)	100	3
		Environmental Studies	50	2
		Total	**3800**	**140**

- 25 % CIA is applicable to all subjects except JOC, COP and SWAYAM courses which are considered as extra credit courses.

- The students are advised to complete a **SWAYAM-MOOC** before the completion of the 5th semester and the course completed certificate should be submitted to the HOD. Two credits will be given to the candidates who have successfully completed.

- A **Field Trip** preferably relevant to the course should be undertaken every year.

UBO5

Certificate Course

- **Bonsai**

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
	20CCB101	**C.P.1- Introduction to Bonsai Principles and Techniques**	2	25	75	**100**	3	**2**
	20CCB102	**C.P.2- Ethics, Values and Marketing of Bonsai**	2	25	75	**100**	3	**2**
	20CCB1CL	**C.Pr.1. Bonsai Techniques**	2	40	60	**100**	3	**2**
	20PDB2Z1	**Project**	2	20	80	**100**	3	**2**
		Grand Total	**8**	**-**	**-**	**400**	**-**	**8**

Components of Continuous Internal Assessment (CIA)

Components		Marks	Total
Theory			
CIA I	75	(75+75 = 150/10) 15	25
CIA II	75		
Assignment		5	
Attendance		5	
Practical			40
CIA Practical		25	
Observation Notebook		10	
Attendance		5	
Project			
Review		15	20
Regularity		5	

UBO6

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1 - Remembering; **K2 -** Understanding; **K3 -** Applying; **K4 -** Analyzing; **K5 -** Evaluating

+

1. **Theory Examination - Part I, II & III**

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 – K2 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K2 – K4 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K2 - K4 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

(ii) CIA I & II and ESE: 55 Marks

Knowledge Level	Section	Marks	Description	Total
K1 – K2 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 – K4 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K2 - K4 Q16 to 20	C (Either or pattern)	5 x 6 = 30	Descriptive / Detailed	

2. Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments & Record Work	50	60
K4		10	
K5			

3. Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report & Viva voce	60	80
K4		20	
K5			

20UBO101

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO101		**Core Paper: 1 - BIODIVERSITY – I (Bacteria, Virus, Algae, Fungi, Lichens and Plant Pathology)**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**7**	**105**	**5**

COURSE OBJECTIVES

- To acquire knowledge on evolution of Microbes and Thallophytes and to know about the diversity patterns of lower life forms on earth.
- To understand the distribution, structure, reproduction and life cycle patterns of lower life forms like bacteria, virus, algae, fungi and lichens.
- To know the economic value of lower organisms.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Differentiate, identify and classify the algal species using algal pigments.
K2	CO2	To know the primitive plants of the earth. Know about the distribution and mode of nutrition of algal, fungal species.
K3	CO3	To study the pathogenic microorganisms causing various plant diseases. Gain thorough knowledge on the symbiotic nature of fungi associated with tree species and improves soil fertility.
K3	CO4	Apply their knowledge on the involvement of lichen as the indicators of pollution.

UNIT I **(21 HOURS)**

Microbiology – **Bacteria** – Outline Classification (Bergy's Manuals), Morphology, Ultrastructure and Economic importance - **Virus** - Morphology and general characteristics of plant viruses.

UNIT II **(21 HOURS)**

Algae - General characters of Algae. Outline classification (Fritsch, 1945). Detailed study of occurrence, thallus structure, reproduction and life cycle of Cyanophyceae – *Nostoc,* Chlorophyceae – *Volvox, Caulerpa*.

UNIT III **(21 HOURS)**

Occurrence thallus structure and reproduction of Bacilleriophyceae – Diatoms. Occurrence, thallus structure, reproduction and life cycle of Phaeophyceae - Sargassum, Rhodophyceae – Polysiphonia. ***Economic importance of Algae.**

UNIT IV **(21 HOURS)**

Fungi -General characters of the fungi. Outline classification (Alexopoulos and Mims, 1979) Detailed study of occurrence, structure, reproduction and life cycle of Albugo, Rhizopus, Saccharomyces, Penicillium and Lycoperdon. Economic importance of fungi.

20UBO101

UNIT V **(21 HOURS)**

Lichens: Phycobionts and mycobionts. Morphology, anatomy of thallus and reproduction of Ascolichen. Economic importance of Lichen. **Pathology –** Introduction, definition and classification of diseases. Symptoms, Causative organisms and Control measures of Tobacco Mosaic Virus diseases, Tikka disease of groundnut and Citrus canker.

*** Self study**

Teaching Methods

Smart Class Room/Powerpoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Gangulee, Das & Kar. 2001. College Botany Vol. II. New central Book agency Pvt. Ltd., Calcutta.
2. Sharma, O.P. 2002.Text book of Fungi. Tata McGraw-Hill Publications, New Delhi.
3. Michael. J. Pelczar, J.R, E.C.S. Chan, Noel R. Krieg and Merna Foss Pelczar Microbiology 1993.Tata McGraw–Hill Publishing Company Limited. New Delhi.

REFERENCES

1. Smith, G.M. 1955. Cryptogamic Botany. Alage and Fungi Vol. I M. Vadamalai media Pvt. Ltd. Bangalore
2. Alexopoulos C.J & Mims – 1979. Introductory Mycology.
3. Vashishta, B.R. 1998. Fungi. S. Chand & Co., New Delhi.
4. Vashishta, B.R. 1998. The Algae. S. Chand & Co., New Delhi.
5. Chopra, C.L. 1982. Algae. S. Nagin & Co., New Delhi.
6. Fritsch, F.E- 1972. The structure and reproduction of Algae Vol. I & II.
7. Watson.1974. Structure and life cycle of Bryophytes. B.I. Publications, New Delhi.
8. Sharma, O.P. 1986. Text book of Algae. Tata Mc Graw – Hill Publications, New Delhi

MAPPING

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	M
CO2	H	M	S	H	S
CO3	H	H	M	S	H
CO4	S	M	H	S	M

S - Strong **H** - High **M** - Medium **L** - Low

UBO9

20EVS101

SEMESTER I

PART IV - ENVIRONMENTAL STUDIES

Total Credits: 2 **Total Hours: 30**

Objectives:

- To inculcate knowledge and create awareness about ecological and environmental concepts, issues and solutions to environmental problems.
- To shape students into good "ecocitizens" thereby catering to global environmental needs.

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT **(6 hours)**

Definition: scope and importance - Need for public awareness - Natural resources - Types of resources - Forest Resources - Water Resources - Mineral Resources - Food Resources - Energy Resources - Land Resources.

UNIT II ECOSYSTEMS **(6 hours)**

Concept of an ecosystem - Structure and functions of an ecosystem - Procedures, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food web and ecological pyramids - Structure and function of the following ecosystem - Forest Ecosystem -Grassland Ecosystem - Desert Ecosystem - Aquatic Ecosystem.

UNIT III BIODIVERSITY AND ITS CONSERVATION **(6 hours)**

Introduction - Definition - Genetic - Species and ecosystem diversity- Bio geographical classification of India - Value of biodiversity - Biodiversity at global, national and local levels - India as a mega - diversity Nation - Hot spot of biodiversity - Threats to biodiversity - Endangered and endemic species of India - Conservation of Biodiversity - insitu Conservation of Biodiversity - exsitu Conservation of Biodiversity

UNIT IV ENVIRONMENTAL POLLUTION **(6 hours)**

Definition - Causes, effects and control measures of : Air Pollution - Water Pollution - Soil Pollution - Marine Pollution - Noise Pollution - Thermal Pollution - Nuclear Pollution - Solid Waste Management: Causes, effects, control measures of urban and industrial wastes - Role of individual in prevention of pollution - Pollution case studies - domestic waste water, effluent from paper mill and dyeing, cement pollution - Disaster Management - Food, Drought, Earthquake, Tsunami, Cyclone and Landslide.

20EVS101

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT **(6 hours)**

Sustainable Development - Urban problems related to energy - Water Conservation: Rain Water Harvesting and Watershed Management - Resettlement and rehabilitation of people, its problems and concerns, case studies Narmatha Valley Project - Environmental ethics, issues and possible solutions - Climate change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies - Hiroshima and Nagasaki, Chernobyl - Consumerism and waste products - Environmental Protection Act - Air Pollution Act (Prevention and Control) - Water Pollution Act (Prevention and control) - Wild Life Protection Act - Forest Conservation Act - Issues involved in enforcement of environmental legislation - Public awareness - Human Population and the environment - Population Growth and Distribution - Population Explosion - Family Welfare Programme - Environment and Human Health - Human Rights - Value Education - HIV/ AIDS - Women and Child Welfare - Role of Information Technology in Environment and Human Health -.

***Self Study** (Questions may be asked from these topics also)

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. P. Arul, A Text Book of Environmental Studies, Environmental Agency, No 27, Nattar street, Velacherry main road, Velacheery, Chennai - 42, First Edition, Nov.2004.

REFERENCES

1. Purohit Shammi Agarwal, A text Book of Environmental Sciences, Publisher Mrs. Saraswati Prohit, Student Education, Behind Naswan Cinema Chopansi Road, Jodhpur.

2. Dr. Suresh and K. Dhameja, Environmental Sciences and Engineering, Publisher S.K.Kataria & Sons, 424/6, Guru Nanak Street, Vaisarak, Delhi -110 006.

3. J. Glynn Henry and Gary W Heinke, Environmental Science and Engineering, Prentice Hall of India Private Ltd., New Delhi - 110 001.

UBO11

Question Paper Pattern
(External only)

Duration: 3 hours Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

UBO12

20UBO202

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO202		**Core Paper: 2 - PLANT DIVERSITY - II**		
Batch 2020-2021	**Semester II**	**Hours / Week 7**	**Total Hours 105**	**Credits 5**

COURSE OBJECTIVES

- To know about the diversity of Cryptogams and Phanerogams.
- To understand the life cycle pattern of Bryophytes, Pteridophytes and Gymnosperms.
- To study the fossil remains of plants belonging to various eras of Palaeobotany.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on diversity among Bryophytes, Pteridophytes and Gymnosperms.
K2	CO2	Understand the internal structure and reproduction of Cryptogams and Phanerogams
K3	CO3	Apply the medicinal and economic knowledge of Bryophytes, Pteridophytes and Gymnosperms for the benefit of human welfare.
K3	CO4	Implement the knowledge on past evidences of fossils for the identification and also to determine the age of the fossil plants through radiocarbon dating.

SYLLABUS

UNIT I **(21 HOURS)**

Bryophytes: Introduction and general characters of Bryophytes. Classification of Bryophytes (K.R. Sporne).Occurrence, structure, reproduction and life cycle of *Marchantia#*, *Anthoceros#* and *Funaria#*. Economic importance of Bryophytes.

UNIT II **(21 HOURS)**

Pteriodophytes: Introduction and general characters of Pteridophytes. Classification of Pteriodophytes (Riemer, 1954). Occurrence, structure, reproduction and life cycle of *Lycopodium#*, *Selaginella#* and *Equisetum#*.

UNIT III **(21 HOURS)**

Occurrence, structure, reproduction and life cycle of *Ophioglossum#* and *Adiantum#*. Vascular organization and Stelar evolution in Pteridophytes. Apogamy and apospory. Economic importance of Pteridophytes*.

UNIT IV **(21 HOURS)**

Gymnosperms: Introduction and general characters of Gymnosperms. Classification of Gymnosperms (Coulter & Chamberlain 1956). Detailed study of the structure and reproduction of *Cycas#* and *Gnetum#*. Economic importance of Gymnosperms.

20UBO202

UNIT V **(21 HOURS)**

Palaeobotany: Geological time scale, fossilization and types. Radiocarbon dating. Study of the following fossils – *Rhynia*, *Lepidodendron*, *Lepidocarpon* and *Williamsonia*.

[#] (Developmental studies are excluded)

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Gangulee, Das &Kar. (2001). College Botany Vol II. New central Book agency Pvt. Ltd. Calcutta.
2. Vashista, P.C. (1992). Pteriodophyta. Chand & Co., New Delhi.
3. Pandey, B.P. (1981). Gymnosperms. Chand & Co., New Delhi.
4. Vashista, P.C., Sinha and Anil Kumar. (2008). Text book of Bryophytes. Chand &Co., New Delhi.
5. Shukla and Mishra. (1982). Essentials of Paleobotany. Vikas Publishing House, Pvt Ltd., New Delhi.

REFERENCES

1. Pandey, B.P. (1994). A Text book of Botany - Pteridophyta. Chand & Co. New Delhi.
2. Rashid. (1995). An introduction to Pteridophytes. Vikas Publishing House, Pvt. Ltd., New Delhi.
3. Sporne, K.R. (1980). Morphology of Petridophytes -B.I. Publications, New Delhi
4. Smith, G.M. (1955). Cryptogamic Botany Vol. II. Tata McGraw Hill Publications, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	S	M
CO2	S	M	H	H	M
CO3	H	H	S	M	H
CO4	S	H	M	H	M

S - Strong **H** - High **M** - Medium **L** – Low

UBO14

20UBO2CL

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO2CL		**Core Practical: 1 – BIODIVERSITY I & PLANT DIVERSITY - II**		
Batch **2020-2021**	**Semester** **II**	**Hours / Week** **2**	**Total Hours** **30**	**Credits** **2**

COURSE OBJECTIVES

- To enable students to know about diversity of lower organisms.
- To understand the life cycle pattern of Bacteria, Virus, Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Paleaobotany.
- To study the fossil remains of plants in the division of Palaeobotany.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Explain the primitive and advanced Microbes and Thallophytes.
K4	CO2	Analyze the internal organization of Cryptogams and Phanerogams.
K5	CO3	Examine the Mycorrhizal association in the roots of higher plants. To analyse the pathogenic microorganisms causing various plant diseases

Core Practical: 2 –BIODIVERSITY I & PLANT DIVERSITY II

I. BIODIVERSITY I

1. **Bacteria:** Staining – Gram positive and Gram negative
2. **Algae:** Internal and reproductive structures of the following:-
   Nostoc
   Volvox
   Caulerpa
   Diatoms
   Sargassum
   Polysiphonia.
3. **Fungi:** Structure and reproduction of the following:-
   Albugo
   Rhizopus
   Saccharomyces
   Penicillium
   Lycoperdon
4. **Lichen:** Structure and reproduction of the *Usnea*.
5. **Pathology**: Symptoms, causative organisms and control measures of
   TMV disease
   Tikka disease of Groundnut and
   Citrus canker

20UBO2CL

II. PLANT DIVERSITY - II

Structure and reproductive characters of the following:-

Bryophytes

Marchantia
Anthoceros
Funaria

Pteridophytes

Lycopodium
Selaginella
Equisetum
Ophioglossum
Adiantum

Gymnosperms

Cycas
Gnetum

Palaeobotany

Rhynia
Lepidodendron
Lepidocarpon
Williamsonia

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	H	S	H	H	M
CO3	S	H	M	S	S

S - Strong **H** - High **M** - Medium **L** - Low

UBO16

20UBO2CL

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

UG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2020-21 onwards)

Time: 3 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 2 - BIODIVERSITY I & PLANT DIVERSITY II

I. Micro-preparation	**- 20 Marks**
II. Gram Staining	**- 4 Marks**
II. Spotters (6 x 3)	**- 18 Marks**
III. Plant systematic position	**- 04 Marks**
IV. Plant pathology	**- 04 Marks**
Submission of record	**- 10 Marks**
TOTAL	**- 60 Marks**

UBO17

20VED201

SEMESTER – II

PART – IV VALUE EDUCATION: MORAL AND ETHICS

Total Hours: 30 **Total Credits: 2**

OBJECTIVES:

- ➢ To impart Value Education in every walk of life.
- ➢ To help the students to reach excellence and reap success.
- ➢ To impart the right attitude by practicing self introspection.
- ➢ To portray the life and messages of Great Leaders.
- ➢ To insist the need for universal brotherhood, patience and tolerance.
- ➢ To help the students to keep them fit.
- ➢ To educate the importance of Yoga and Meditation.

UNIT I: **4 Hours**

Moral and Ethics: Introduction – Meaning of Moral and Ethics – Social Ethics – Ethics and Culture – Aim of Education.

UNIT II: **6 Hours**

Life and Teachings of Swami Vivekananda: Birth and Childhood days of Swami Vivekananda – At the Parliament of Religions – Teachings of Swami Vivekananda

UNIT III: **4 Hours**

Warriors of our Nation: Subhas Chandra Bose – Sardhar Vallabhbhai Patel – Udham Singh – V. O. Chidambaram Pillai – Bhagat Singh – Tiruppur Kumaran – Dheeran Chinnamalai – Thillaiaadi Valliammai – Velu Nachiyar – Vanchinathan

UNIT IV: **8 Hours**

Physical Fitness and Mental Harmony: Simplified Physical Exercise – Hand Exercises – Leg Exercises – Neuro Muscular Breathing Exercises – Eye Exercises – Kabalabathi – Maharasana A & B – Massage - Acupressure – Relaxation – Kayakalpa Yogam - LifeForce – Aim & Objectives – Principle – Methods. Introspection – Analysis of Thoughts – Moralization of Desires – Neutralization of Anger – Eradication of Worries

UNIT V: **8 Hours**

Yoga and Meditation – **The Asset of India**: Yogasanam – Rules & Regulations – Surya Namaskar – Asanas –Sitting – Stanging – Prone - Supine - Pranayama – Naadi Sudhi –

Ujjayi – Seethali – Sithkari - Benefits. Meditation – Thanduvasudhi - Agna – Shanthi – Thuriyam – Benefits.

Text Book:

Value Based Education – Moral and Ethics – Published by Kongunadu Arts and Science College (Autonomous), First Edition (2020).

Reference Books:

1. Swami Vivekananda – A Biography, Swami Nikhilananda, Advaita Ashrama, India, 24th Reprint Edition (2010).
2. Gandhi, Nehru, Tagore and other eminent personalities of Modern India, Kalpana Rajaram, Spectrum Books Pvt. Ltd., revised and enlarged edition (2004).
3. Freedom Fighters of India, Lion M.G. Agrawal, Isha Books Publisher, First Edition (2008).
4. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication (2000).
5. Yoga Practices - 1 – The World Community Service Centre – Vethathiri Publications, Sixth Edition (2017), Erode.
6. Yoga Practices - 2 – The World Community Service Centre – Vethathiri Publications – Eighth Edition (2017), Erode.

Question paper pattern

(External only)

Duration: 3 hrs **Total Marks: 50**

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

UBO19

20UBO303

Programme Code : 05		**Title: B.Sc., BOTANY**		
Course code : 20UBO303		**Core Paper: 3 – ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS**		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2020-2021	**III**	**5**	**75**	**4**

COURSE OBJECTIVES

1. To inculcate knowledge on the basics of tissues and anatomical features of plants.
2. To understand the key aspects of reproductive systems of flowering plants.

COURSE OUTCOME

On successful completion of the course, the students will be able to

K1	CO1	Know about the various developmental aspects of the plants.
K2	CO2	Compare and identify the structural differences existing among the vascular plants.
K3	CO3	Imply the embryological and anatomical knowledge to differentiate the plant taxa.

SYLLABUS

Unit I **(15 HOURS)**

Scope and significance of plant anatomy; Apical organization: Origin and structure of primary meristem (Angiosperm), theories of apical organization, Structure and function of simple tissues.

Unit II **(15 HOURS)**

Epidermal tissue system : Stomata - types and functions; Trichomes - Types and functions, structure and functions of secretory trichomes in *Drocera* and *Nepenthes*, salt gland, collectors, floral and extrafloral nectarines, resin duct, oil glands and lacticiferous (articulated and non-articulated).

Unit III **(15 HOURS)**

Vascular cambium and cork cambium: Structure and function. Secondary xylem and phloem: Structure and functions. Anomalous secondary growth: *Acyranthus* and *Nyctanthus* (Dicot), Monocot - *Dracaenea*. Wood: Porous, non-porous, patterns and distribution, physical, chemical and mechanical properties. Plant fibres - Distribution, structure and commercial importance of coir, jute and cotton.

Unit IV **(15 HOURS)**

Angiosperm life cycle*. Microsporangium**:** Structure and development of anther, wall of microsporangium, Tapetum - structure, types and functions, Pollen morphology - NPC formula, pollen wall features, pollen kit. Megasporangium**:** Structure, types of ovule, ultrastructure of mature Embryosac (*Polygonum*).

20UBO303

Unit V **(15 HOURS)**

Fertilization: Double fertilization. Endosperm**:** Nuclear, Cellular, Helobial and Ruminate types, haustorial behavior of endosperm and function. Embryo**:** Embryogeny in Dicotyledons (Crucifer type) and Monocotyledons (Caryophyllad type). Polyembryony & Parthenocarpy**:** Classification, types and applications. Apomixis**:** types and significance.

*** Self study**

TEACHING METHODS

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Fahn, A. (1982). Plant Anatomy. (3rd edition). Pergamon Press, Oxford.
2. Pandey, B.P.1978. Plant Anatomy. Chand and Co, New Delhi.
3. Esau.K. (1985) - Anatomy of Seed Plants -John Willey
4. Singh, Pandey and Jain, (2007). Anatomy of Seed plants, Rastogi Publications. New Delhi.
5. S. S. Bhojwani, S. P. Bhatnagar, (1985). Embryology of Angiosperms, Vikas Publishing House, Noida.
6. Maheswari, P. (1950). Introduction to the embryology of Angiosperms. Vikas Publishing House, New Delhi.
7. Raghavan, V. (1997). Molecular Embryology of Flowering Plants. Cambridge University Press, Cambridge.

8. Prathibha Saxena and Susheela M. Das. (2012) Text book of Plant Anatomy

REFERENCES

1. De Roberties. (1989). Cell and Molecular Biology. Mc Graw Hill, New Delhi.
2. Annie Regland. (2000). Developmental Botany -Saras Publication, Kanyakumari
3. Fahn, A (1985). Plant Anatomy. Pergamon Press, Great Britain.
4. Esau, K. (1991). Plant Anatomy. Wiley Eastern Ltd. New Delhi. 7th Edition

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	H
CO2	H	H	M	S	M
CO3	S	H	S	H	H
CO4	H	S	H	M	M

S - Strong **H** - High **M** - Medium **L** - Low

20UGA3S1

PART IV - III SEMESTER
SKILL BASED SUBJECT 1 - GENERAL AWARENESS (ONLINE)

Total Credits: 3 **Total Hours: 30**

Objectives

1. To acquire knowledge in relation to various competitive examinations.
2. To create awareness about an online examination which is being followed in competitive examinations.

UNIT I **(6 HOURS)**

1. **Tamil and other Literatures**

   Tamil, English, Christian and Muslim Literatures - Ancient Literature - Bakthi Literature - Epics - Medieval Literature - Modern Literature (Novel, Dramas, Short Stories, Modern Poetry).

2. **Economics and Commerce**

   Basic Economics - Auditing - Management - Capital Market - Foreign Trade - Companies - Banking.

3. **Social studies**

   Indian History - Inventions - Indian Poetry - Constitution - Judiciary - Languages - Literacy - Indian Geography - Lithosphere - Climate - Soil - Agriculture - Population.

UNIT II **(6 HOURS)**

4. **Numerical Aptitude**

   Objective Arithmetic : Number systems - probability - HCF and LCM of numbers* - decimal fractions - simplification - squareroots and cuberoots - average - percentage - profit and loss - ratio and proportion - time and work - simple interest - area, volume and surface area*.

5. **Verbal Aptitude**

   Spot the odd one out - correct form of verb - preposition - find out the rightly spelt word - choose the correct meaning of idioms - synonyms and antonyms.

6. **Abstract Reasoning**

   Logic Reasoning : Logic - statement - arguments - statement assumptions - Statement course of action - theme detection - deriving conclusion from passages.

   Non - verbal Reasoning : Series - analogy - classification - analytical reasoning - mirror images - water images - paper folding - paper cutting - rule detection - grouping of identical figures.

20UGA3S1

UNIT III **(6 HOURS)**

7. General Science and Technology

SCIENCE - Basic principles and concepts in Physics, Chemistry, Botany and Zoology.

TECHNOLOGY - Metallurgy, instrumentation, discoveries and inventions of techniques.

8. Computer Science

Historical evolution of computers - Computer applications - Data processing concepts - Computer codes and arithmetic - Hardware components - Data Structures.

9. Education

Development process of the learner - Principles of development (physical, social, emotional and intellectual) - Learning process - Teaching and teacher behaviour - Interaction analysis - Microteaching - Teacher as a leader - Motivation - Personality dimension - concept of mental health - Counselling.

UNIT IV **(6 HOURS)**

10. Library and Information Science

Library and Information Science - Basics, Computer, Library Network and others like Research, Reprography etc.

11. Sports and Games

Athletics - Track Events - Field Events - Games - Indoor Games - Outdoor Games - General knowledge - Sport and Olympics - First Aid.

12. Current Affairs

State, Central and International affairs: Budgets - Politics - Sports - Education - Commerce and Industry - Inventions - Science and Technology - Currency - Agriculture - Movies - Guinness records - Awards - IT Industry - Space Research - Defence etc.

UNIT V **(6 HOURS)**

13. National Cadet Corps (NCC)

Introduction to the Armed Forces (Army, Navy, Air Force) - Dril - Weapon Training - Map Reading - Civil Defence.

14. National Service Scheme (NSS)

History of NSS - History of Motto, Symbol, Badge - Aims and Objectives - Duties and Total Hours - Organisational and Administrational setup - History of voluntary organization - Regular activities - Special camp activities - Special programmes - awards - Important days.

15. Youth Red Cross (YRC)

History of International Red Cross - History of Indian Red Cross - History of Youth Red Cross - Main objectives of YRC - Emblem - Fundamental principles of Red Cross - Organizational Setup - Activities of Youth Red Cross - Role of different functionaries - Training programmes for YRC Program Officers - Training programme for YRC

Volunteers - YRC Song - Working Hours - General orientation - Special orientation - Program skill learning.

*** Self Study (Questions may be asked from these topics also)**

TEXT BOOKS

1. VBC 1 - General Awareness, Question Bank, Kongunadu Arts and Science College, Coimbatore - 29, 2006.

Question Paper Pattern

Max. Marks 100

End of Semester Examination (ESE) - On-Line Examination 75 Marks

1. 150 questions are to be given. Each question carries ½ mark.
2. In each unit, 30 questions are to be given, covering all the 5 units.

Continuous Internal Assessment (CIA) (through On-Line) 25 Marks

a) Two Exams.	15 Marks
b) Assignment**	5 Marks
c) Attendance	5 Marks

** Each student has to submit an assignment in the topic Current Affairs area.

20UBO404

Programme Code: 05		Title: B.Sc., BOTANY		
Course Code: 20UBO404		Core Paper: 4 - BIOPHYSICS AND BIOSTATISTICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**IV**	**5**	**75**	**4**

COURSE OBJECTIVES

- To understand the nature, pathways and application of light energy.
- To learn the basic principles of biostatistics.
- To impart knowledge to solve the biological problems.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize the dual nature of the light and its reactions with the matter with reference to plants.
K2	CO2	Understand the basic concepts of thermodynamics.
K3	CO3	Impart knowledge on radioactivity and their effects on biological tissues.
K3	CO4	Apply the biostatistical formulae to solve the biological related problems.

SYLLABUS

UNIT I **(15 HOURS)**

Biophysics: Introduction, scope and importance. Electromagnetic radiation and absorption. Excitation and de-excitation. Thermodynamic laws (enthalpy, entropy, free energy).

UNIT II **(15 HOURS)**

Radioactivity and biological traces: alpha, beta and gamma radiations. Radioactive isotopes and half-life period. Ionization and detection - biological effects of ionizing radiation - uses of biological traces in metabolic studies. Autoradiography, Geiger- Muller and Scintillation counter.

UNIT III **(15 HOURS)**

Biostatistics: - Definition, steps in statistics, data collection methods - sampling - census and sampling method, law of statistical regularities, law of inertia of large numbers. Essential of sampling and methods of sampling - probability of sampling - simple, random sampling, stratified random sampling, cluster sampling, non-probability sampling - judgment sampling, quota sampling and convenient sampling (theory only). Primary and secondary data.

20UBO404

UNIT IV **(15 HOURS)**

Classification of data and Frequency distribution-Simple, Discrete and Continuous series. Tabulation, graphical representation-Time series graph, Histogram and diagrammatic representation of data - Line, Bar and Pie diagram. Cartogram and Pictogram*.

UNIT V **(15 HOURS)**

Measures of central tendency - Mean [Arithmetic only] median and mode. Rounding off figures. Precision, accuracy and error. Dispersion or deviation-range, average deviation, variance, standard deviation and standard error. Test of significance- Chi-square test and t- test.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Palanichamy, S. (1986). Principles of biophysics. Paramount Publication, Palani.
2. Palanichamy, S & M. Manoharan. (1994). Statistical methods for biologists. Paramount Publication, Palani.
3. Arumugam, N. (2003). Basic concepts of Biostatistics. Saras Publications, Nagarcoil.
4. S.P. Gupta, S.P. (2001). Statistical methods. Sultan Chand & Sons, Educational Publishers, New Delhi.

REFERENCES

1. Salil Bose. (1981). Elementary biophysics - Part 1. Vija Printers, Madurai.
2. Khan, I.D. and A. Khanum. (1994). Fundamentals of Biostatistics. Mc Graw Hill, New Delhi.
3. Vasantha Pattabhi & N. Gautham. (2004). Bistatistics. Narosa Publishing House, Chennai.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	H	S	S	H	S
CO3	S	H	H	M	H
CO4	H	M	H	S	H

S - Strong **H** - High **M** - Medium **L** - Low

20UBO4CM

Programme Code : 05		**Title : B.Sc., Botany**		
Course code : 20UBO4CM		**Core Practical: 2 – Anatomy and Embryology of Angiosperms & Biophysics and Biostatistics**		
Batch	**Semester**	**Hours/Week**	**Total Hours**	**Credits**
2020 - 2021	**IV**	**2**	**30**	**2**

COURSE OBJECTIVES

- To learn about the special structures associated with the plants.
- To understand role of light in photosynthesis and solve the biological related problems.
- To know the role of fixatives and slide preparation techniques

COURSE OUTCOME

K3	CO1	Analyze various structures of the internal and external structures of the plants.
K4	CO2	Dissect different stages of embryos of *Tridax* plant.
K5	CO3	Evaluate the normal distribution pattern of a given population.

Core Practical: 2 – Anatomy and Embryology of Angiosperms & Biophysics and Biostatistics

I. PLANT ANATOMY

1. To study the stomatal index and different types of stomata
2. Localization of lacticiferous cells of any Apocynaceae and Asclepiadaceae members
3. Secretory trichomes in *Drocera* and *Nepenthes*
4. Plant fibres - Cotton
5. Anomalous secondary thickening - Dicot - *Nyctanthus, Achyranthes.* Monocot - *Dracaena*

II. EMBRYOLOGY OF ANGIOSPERMS

1. Dissection and display of any two stages of embryo in *Tridax*
2. Identification using permanent slides
   - i. T.S. of anther
   - ii. Morphology of pollen grains
   - iii. Types of ovules
   - iv. Ultrastructure of embryosac
   - v. Endosperm types
   - vi. Types of embryos
   - vii. Polyembryony

I11. BIOPHYSICS

1. Nature of EMR and Spectrum.
2. Diagrams of fluorescence, Phosphorescence, Delayed light emission, Autoradiography, Geiger-Muller counter and Scintillation counter.

V. BIOSTATISTICS

Simple problems in biostatistics:

i. Mean
ii. Median
iii. Mode
iv. Standard Deviation
v. Standard Error
vi. Chi-Square Test.
vii. t- test

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	H
CO2	H	M	H	S	M
CO3	S	H	M	H	H

S - Strong **H** - High **M** - Medium **L** - Low

UBO28

20UBO4CM

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

UG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2020-21 onwards)

Time: 3 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 2 – Anatomy, Embryology of Angiosperms, Microtechniques, Biophysics and Biostatistics

I. Anatomy section (A & B)		**- 24 Marks**
II. Embryo dissection (C)		**- 06 Marks**
III. Biostatistics (D & E)		**- 10 Marks**
IV. Spotters		**- 10 Marks**
Record		**- 10 Marks**
	TOTAL	**- 60 Marks**

UBO29

20UBO4S2

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code:20UBO4S2		**Skill Based Subject: II – APPLIED MICROBIOLOGY**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**IV**	**2**	**30**	**3**

COURSE OBJECTIVES

- To provide the basic knowledge of microbes
- To introduce the techniques involved in microbiology.
- To assess the role of microorganisms in human welfare.

.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on the fundamental techniques in microbiology.
K2	CO2	Understand the use of microbes in industries for the welfare of mankind.
K3	CO3	Impart knowledge on preservation of food and vegetables using suitable techniques for the commercial uses throughout the year.
K3	CO4	Apply knowledge on distribution of microbes in environment and prevent their harmful effects.

SYLLABUS

UNIT I **(6 HOURS)**

Fundamentals of Microbiology: Scope of microbiology - Cultivation of bacteria: Pure culture techniques - Culture media and preparation: solid and liquid - Preservation of cultures - aerobic and anaerobic culture techniques - Sterilization: principles, methods of sterilization, physical methods, dry heat, moist heat and radiation.

UNIT II **(6 HOURS)**

Industrial Microbiology: Fermentors - production of microbial products - alcohol - vinegar - lactic acid- citric acid - penicillin - streptomycin- L-lysine- L-glutamic acid - protease - lipase - pectinase and riboflavin.

UNIT III **(6 HOURS)**

Food Microbiology: Microbial spoilage of food and food borne diseases – Botulism – Mycotoxins – food preservation methods – microbiology of milk and milk products – fermented fruits and vegetables – single cell protein (*Spirulina* and *Chlorella*).

UNIT IV **(6 HOURS)**

Environmental Microbiology: Microbes in water, air and soil environment - - interactions among soil microorganisms - interactions between microbes and plants: rhizosphere, phyllosphere, mycorrhizae–biodegradation of pesticides and pollutants in soil. Role of microorganisms in sewage treatment – processing of solid waste.

UNIT V **(6 HOURS)**

Medical Microbiology: Distribution and significance of normal human microbial flora. Infections- sources of infections - Epidemiology of infectious diseases - microbial pathogens: Bacterial –*Salmonella typhi*, *Mycobacterium tuberculosis*; Viral - HIV, Dengue, Hepatitis, flu; Fungal-*Candida*, *Aspergillus*

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Michael J. Pelczar, E.C.S. Chan and Noel R. Krieg (2008), 'Microbiology' 5th edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
2. Dubey, R.C. and D.K. Maheshari (2005), A Text Book of Microbiology' S. Chand and Company Limited, New Delhi.
3. Prescott, L.M., Harley, J.P. and Klien, D.A. 1996. Microbiology (3rd ed.), Brown W.C. Publishers, Boston, USA.

REFERENCES

1. Sullia, S.B. and Shantharam, S. 1998. General Microbiology, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Nduka Okafor, Benedict C. Okeke. 2017. Modern Industrial Microbiology and Biotechnology, CRC Press, New Delhi.
3. Apurba S. Sastry and Sandhya Bhat, 2019. Essentials of Medical Microbiolgy. Jaypee Brothers Medical Publishers (P) Ltd. New Delhi.
4. Sanjai Saxena. 2015. Applied Microbiology, Springer, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	S	H	M
CO2	S	H	M	H	H
CO3	H	S	H	M	S
CO4	S	H	M	H	M

S - Strong **H** - High **M** - Medium **L** - Low

20UBO505

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code : 20UBO505		**Core Paper: 5 - FUNDAMENTALS OF COMPUTER AND BIOINFORMATICS**		
Batch 2020-2021	**Semester V**	**Hours / Week 4**	**Total Hours 60**	**Credits 4**

COURSE OBJECTIVES

- To acquire basic knowledge about the computers.
- To know how to create the databases.
- To impart knowledge on biological informations available in the databases.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Inherit computer knowledge and internet usage.
K2	CO2	Understand the components of computer and usage of biological databases.
K3	CO3	Applying the technical skills to know the sequences of nucleic acids and amino acids in genes and protein molecules.
K3	CO4	Identify the structures of various biomolecules using biomolecular visualization techniques.

SYLLABUS

UNIT I **(12 HOURS)**

Introduction to computer - applications, types, generations, capabilities - components of computer - hardware - CPU, input and output devices, memory units, auxiliary storage devices.

UNIT II **(12 HOURS)**

Computer architecture, number system, Software - classification of software. Language - machine language - high level language - compilers, translators. Operating systems / DOS / windows. Internet - www, E-mail, browser and search engines*.

UNIT III **(12 HOURS)**

Windows- 2010 an overview. MS-Excel- preparation of workbook and charts, MS-Power Point - features and slide presentation. MS-ACCESS- Creating and querying a database. Database languages, database independence and database administrator. Data warehousing and data mining. Basic concept of Photoshop.

20UBO505

UNIT IV **(12 HOURS)**

Introduction to Bioinformatics. Regulation of gene expression in Prokaryotes and Eukaryotes. Protein Structure - Primary, secondary, tertiary and quaternary (Outline only). Biological databases, importance and classification (Outline only). Gene finding methods.

UNIT V **(12 HOURS)**

Sequence alignment, evolutionary basis of sequence alignment, global Vs local alignment, searching for similarities using scoring matrices and gap penalty. Biomolecular visualization, phylogenetic analysis and computer aided drug designing.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Mani, K and N. Vijayaraj. (2002). Bioinformatics for beginners. Kalaikathir Achakam, Coimbatore.
2. David W. Mount. (2001). Bioinformatics -Sequence and Genome analysis. Cold Spring Harbor Laboratory Press.
3. Rajaraman, V. (2004). Fundamentals of computer. Prentice Hall of India Pvt Ltd.

REFERENCES

1. A.D. Baxevanis and B.J.Francis (Eds.). (1998). Bio-informatics - A practical guide to the analyzing of gene protein. John Wiley and sons.
2. Stuart M. Brown. (2000). Bioinformatics- A biologists guide to bio computing and the internet. Eaton Publishing Co.
3. Arthor M. Lesk. (2002). Introduction to Bioinformatics. Oxford University Press, UK. T.K. Attwood and Parry-Smith (2007).
4. Introduction to bioinformatics. Samiron Phukan Dorling Kinders India, Pvt., Ltd.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	S	S	S	H	M
CO3	H	H	S	M	S
CO4	S	H	H	S	M

S - Strong **H** - High **M** - Medium **L** - Low

20UBO506

Programme Code: 05		Title: B.Sc., BOTANY		
Course Code: 20UBO506		Core Paper: 6 - TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY		
Batch 2020-2021	Semester V	Hours / Week 4	Total Hours 75	Credits 5

COURSE OBJECTIVES

- To recognize the plant families of major flowering plants and their diagnostic features.
- To acquire basic knowledge on the principles of phylogeny and biosystematics.
- To familiarize knowledge on plants with immense economic values.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire better knowledge on plant identification.
K2	CO2	Understand nomenclature principles of flowering plants.
K3	CO3	Gain hands on experience on herbarium preparation techniques.
K3	CO4	Familarize immense knowledge on economic importance of higher plants.

SYLLABUS

UNIT I **(15 HOURS)**

Aims and objectives of taxonomy. Systems of classification - Natural (Bentham and Hooker), Phylogenetic (Engler & Prantl) and Modern (Takhtajan). Merits and Demerits, Guidelines for the identification of plant specimen.

UNIT II **(15 HOURS)**

Herbarium techniques and uses. National herbarium - CNH - Regional herbarium - MH. Botanical Survey of India. Nomenclature - ICN, Binomial - principles. Typification, Author citations, Effective and valid publication. Retention and rejection of names.

UNIT III **(15 HOURS)**

Detailed study of the following families with reference to the Morphology, Taxonomy and their economic importance. Annonaceae, Capparidaceae, Rutaceae, Anacardiaceae, Caesalpiniaceae, Mimosaceae, Myrtaceae, Curcurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Sapotaceae and Apocynaceae.

UNIT IV **(15 HOURS)**

Detailed study of the following families with reference to the Morphology, Taxonomy and their economic importance. Solanaceae, Acanthaceae, Verbenaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Hydrocharitaceae, Zingiberaceae, Liliaceae, Arecaceae and Poaceae.

20UBO506

UNIT V **(15 HOURS)**

Economic Botany- study of botany, cultivation and utilization of the following: Fiber yielding plants (cotton), sugar yielding plant (sugarcane) and food crops - (cereals - paddy and pulses - soybean). Spices and condiments (pepper and turmeric)*.

*** Self Study**

TEACHING METHODS

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Sharma, O.P. (1986). Modern taxonomy. Rastogi Publications, New Delhi.
2. Subramanyam, N.S. (1987). Modern Plant Taxonomy, Vikas Publishing House, New Delhi.
3. Sambamoorthy A.V and N.S. Subramanyam. (1989). A text book of Economic Botany. Wilay Easters, New Delhi.
4. Verma, V. (2006). A textbook of Economic Botany. Emky Publication, New Delhi.

REFERENCES

1. Singh, V. and D.K. Jain. (1997). Taxonomy of Angiosperms. Rastogi Publications, New Delhi.
2. Pandey, B.P.(1997). Taxonomy of Angiosperms. Chand & Co., New Delhi.
3. Jain, S.K. and R.R. Rao. (1977). A. Handbook of Field and Herbarium methods. Today and Tomorrow Publishers, New Delhi.
4. Henry, A.N. and Chandrabose. (1982). An aid to the international code of botanical nomenclature. BSI Calcutta.
5. Gurucharan Singh (2004). Plant systematic-theory and practices. Oxford and IBH publishers, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	M	H
CO2	S	M	H	S	S
CO3	H	H	M	H	S
CO4	S	H	S	M	H

S - Strong **H** - High **M** - Medium **L** - Low

20UBO507

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO507		**Core Paper: 7 - CYTOLOGY, GENETICS & PLANT BREEDING**		
Batch 2020-2021	**Semester V**	**Hours / Week 4**	**Total Hours 60**	**Credits 5**

COURSE OBJECTIVES

- To learn the cellular details, cell organelles and their functions.
- To acquire knowledge on genes and their interactions.
- To gain knowledge on plant breeding methods and crop improvement programmes.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Familiarize structural organizations of cells and cellular mechanisms.
K2	CO2	Understand and explain scientific principles behind nature and function of genes and their process of inheritance.
K3	CO3	Apply the acquired knowledge on character exchanges among the individuals due to crossing over.
K3	CO4	Implement the plant breeding techniques for crop improvement.

SYLLABUS

UNIT I **(12 HOURS)**

Ultra structure of plant cell*, Structure, chemical composition and functions of cell wall, Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi apparatus, Chloroplast, Ribosome, Nucleus and Chromosomes.

UNIT II **(12 HOURS)**

DNA as a genetic material, structure, properties, replication of DNA (Conservative, semi-conservative and dispersive methods) and functions. RNA - types and functions. Cell division - Cell cycle, Amitosis, Mitosis & Meiosis and their significances.

UNIT III **(12 HOURS)**

Genetics - field of genetics, Mendel's experiments, Mendel's laws of inheritance, monohybrid and dihybrid cross. Gene Interaction - Incomplete dominance, Codominance, Collaborator genes, Epistasis, Complementary genes, Duplicate genes and Lethal genes.

20UBO507

UNIT IV **(12 HOURS)**

Multiple alleles. Linkage - Complete and incomplete, Crossing over - mechanism, kinds & controlling factors, Cytoplasmic inheritance in plants - male sterility in maize.

UNIT V **(12 HOURS)**

Introduction and Objectives of Plant breeding, breeding methods - pureline selection, mass selection and clonal selection, Hybridization, Heterosis, National and international organizations for crop improvement, Achievements in crop improvement - Sugarcane and Cotton.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Veerbala Rastogi. (1994). Text book of Genetics. National Press, Meerut.
2. Verma, P.S. & Agarwal V.K. (1983). Cytology. Chand & Co. New Delhi.
3. Gupta, P.K. & M.S. Swaminathan. (2000). Cytology, genetics and Evolution. Rastogi Publication, Meerut.
4. Arumugam, D.N. (1999). Cell Biology. Saras Publication, Nagarcoil.
5. Singh, B.D. (2000). Plant Breeding-Principles and Methods. Kalyani Publishers, New Delhi.

REFERENCES

1. De Roberties. (1989). Cell Biology. McGraw Hill Publication, New Delhi.
2. Chaudhari, H.K. (2005). Elementary principles of plant breeding (25th Ed.). Oxford & IBH Publishing Co. (P) Ltd., New Delhi.
3. Allard. (1960). Principles of plant breeding. John Wiley & Sons, New York.
4. Gardner, E.J., P. Snustad & D. Dobzzonsky, (1995). Principles of Genetics.TATA Mc Graw Hill Company Ltd. New Delhi.
5. Gupta, P.K. (2004). Elements of genetics. FNA 2nd Edition.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	M	H
CO2	S	H	H	H	M
CO3	H	S	M	S	H
CO4	S	H	H	H	M

S - Strong **H** - High **M** - Medium **L** - Low

20UBO508

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO508		**Core Paper: 8 - PLANT ECOLOGY, PHYTOGEOGRAPHY AND RESOURCE CONSERVATION**		
Batch 2020-2021	**Semester V**	**Hours / Week 4**	**Total Hours 75**	**Credits 5**

COURSE OBJECTIVES

- To understand the principles of ecosystem.
- To acquire basic knowledge about community succession
- To ensure knowledge on resource conservation.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Pertain knowledge on principle factors controlling the environment.
K2	CO2	Understand the distribution of plant species across the country.
K3	CO3	Assess the natural vegetational structures of the given geographical locations.
K3	CO4	Explore knowledge on natural resources available for the benefit of mankind.

SYLLABUS

UNIT I **(15 HOURS)**

Principles of Ecology. Climatic factors - role and importance of light, temperature, wind and rainfall on the growth of plants. Edaphic factors, Biotic factors - Communities -Characters and methods of studying plant communities (quadrat and transect methods alone).

UNIT II **(15 HOURS)**

Community succession - Kinds and causes. Structural and functional changes in communities (Hydrosere and Xerosere-Lithosere). Climax concept. Morphological and anatomical adaptations of Hydrophytes, Xerophytes, Halophytes and Epiphytes.

UNIT III **(15 HOURS)**

Ecosystem - Basic structure and functions: Pollution - causes and possible control measures of air, water, soil, noise and radioactive pollutions. Plants - indicator of pollution. Disaster Management.

20UBO508

UNIT IV **(15 HOURS)**

Phytogeographical realms of world. Origin of cultivated plants. Botanical regions of India. Continental drift. Age and area hypothesis, theory of Island biogeography, endemism, plant distribution, migration and barriers.

UNIT V **(15 HOURS)**

Resource conservation - types of resources, conservation of soil, water, agriculture resources, range, forest and freshwater bodies. Case study* - Project Tiger and Biosphere reserves - Nilgiri Biosphere Reserve (NBR).

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Sharma, P.D. (2000). Ecology and Environment. Rastogi Publications, New Delhi
2. Shukla. R.S. and P. S. Chandal. (2000). Plant Ecology and soil science. Chand & Co. Ltd., New Delhi.
3. Vasishta, P.C. (1993). Plant Ecology. II Edition. Vishal Publications.
4. Verma and Agarwal. (1998). Principles of Ecology, Chand & Co. Ltd., New Delhi.

REFERENCES

1. Ambasht R.S. (1992). Text book of Plant Ecology, Students and Friends & Co. Varanashi.
2. Schimper, A.F. (1960). Plant geography. Lubrecht & Cramer Ltd., New York.
3. Richard, S. Ostfeld and William H. Schlesinger. (2011). The year in Ecology and conservation Biology, Willey - Blackwell Publications.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	S
CO2	H	H	S	M	H
CO3	S	M	H	H	M
CO4	H	H	H	M	S

S - Strong **H** - High **M** - Medium **L** - Low

20UBO5CN

Programme Code: 05		Title : B.Sc., BOTANY		
Course code : 20UBO5CN		Core Practical: 3 - FUNDAMENTALS OF COMPUTER AND BIOINFORMATICS		
Batch 2020-2021	**Semester V**	**Hours/Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To insist basic knowledge on the components of the computer.
- To create a document, table, chart and database using MS Office.
- To learn sequence and structure of genes and protein molecules.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Apply knowledge to create biological databases.
K4	CO2	Analyze secondary structure predictions of any protein molecules using appropriate biological softwares.
K5	CO3	Examine macromolecular structures through visualization tools.

Core Practical: 3 - FUNDAMENTALS OF COMPUTER AND BIOINFORMATICS

I. FUNDAMENTALS OF COMPUTER

1. Creating, editing and printing a document using MS-Word
2. Creating, editing and printing a table using MS-word
3. Data entry and chart preparation using MS-Excel
4. Creating a presentation using MS-PowerPoint
5. Creating and querying the database using MS-ACCESS

II. BIOINFORMATICS

1. Similarity search using BLASTS
2. Protein structure prediction using GOR-IV
3. Protein structure prediction using SOPMA
4. Phylogenetic analysis using Clustal-X
5. Bio-Molecular Visualization using RASMOL

UBO40

20UBO5CN

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	M	H
CO2	S	M	S	M	H
CO3	H	S	S	H	M

S - Strong **H** - High **M** - Medium **L** - Low

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029
UG MODEL QUESTION PAPER (PRACTICALS)

End Semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2018-19 onwards)

Time: 3 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 3 - FUNDAMENTALS OF COMPUTER AND BIOINFORMATICS

I. Write Algorithms for A & B (15 + 15) **- 30 Marks**

II. Results for A & B (05 + 05) **- 10 Marks**

III. Viva-voce for A & B (05 + 05) **- 10 Marks**

Record **- 10 Marks**

TOTAL **- 60 Marks**

20UBO609

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO609		**Core Paper: 9 – BIOCHEMISTRY AND BIOINSTRUMENTATION**		
Batch 2020-2021	**Semester VI**	**Hours / Week 6**	**Total Hours 90**	**Credits 4**

COURSE OBJECTIVES

- To study the structure of atom and chemical bonds
- To learn the metabolism of chemical reactions in a cell
- To seed the basic knowledge about instruments
- To make students understand the applications of instruments and to train the students handle and maintain the instruments

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Gain knowledge on chemical bonds, atoms and molecules.
K2	CO2	Understand the chemical structure of macro molecules.
K3	CO3	Direct applications and benefits of instruments are discussed with hands-on training to students
K3	CO4	Critical steps and important calculations are taught and asked the students to analyze the same

SYLLABUS

UNIT I **(18 Hours)**

Basic concepts of atoms and molecules, types of bonding: primary chemical bonds-covalent, hydrogen bonds, isotopes and isomerism. Acids, base, solutions, colloids, pH and buffer systems.

UNIT II **(18 Hours)**

Carbohydrates - classification, monosaccharaides-structure (glucose), open chain and cyclic (or) ring structure. Biological functions. Oligosaccharides (sucrose) - glycosidic linkages and biological functions. Polysaccharides (cellulose). **Lipids**- classification, structure, properties and functions. Fatty acids - saturated and unsaturated.

UNIT III **(18 Hours)**

Amino acids and proteins: Amino acids - classification, structure, properties and biosynthesis. Proteins - classification, structure - primary, secondary, tertiary and quaternary structures. Enzymes: definition, structure, properties, mode of action and factors affecting enzyme activity.

UNIT IV **(18 Hours)**

Principle, working mechanism, types and applications: pH meter, Microscopy - light and electron, Centrifugation, Autoclave and Laminar air flow chamber. Principle, working mechanism and applications: Colorimetry and UV-visible spectrophotometry.

20UBO609

UNIT V **(18 Hours)**

Principle, working mechanism and applications: Paper chromatography*, Thin layer chromatography (TLC), Column chromatography, Ion exchange chromatography, Ion exchange chromatography, affinity chromatography and Lyophilization.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. H. S. Srivastava, (1993). Elements of Biochemistry. Rastogi Publications, Meerut.
2. Jain, J.L. (2002). Fundamentals of Biochemistry. S. Chand & Co. New Delhi
3. Narayanan L.M., Dulsy Fathima, K.Nallasingam, R.P. Meyyan Pillai, N.Arumugam, S.Prasanna Kumar. (2010). Biochemistry. Saras Publication
4. Veerakumari, L. 2009. Bioinstrumentation. MJP Publishers, New Delhi, India
5. Sharma, B.K. 2005. Instrumental Methods of Chemical analysis. 24th Revised Edition, Goel Publishing House, Meerut.

REFERENCES

1. Weel, J.H. (1990). General Biochemistry. Wiley Eastern Ltd.
2. Skoog and Leary. (1992). Principles of Instrumental analysis, 4th Edition. Saunder's College Publishing, New York
3. Holme and Peck. (1998). Analytical Biochemistry, 3rd Edition, Pearson Education Ltd, Essex, England
4. Wilson, K. and Walker, J. (2000). Principles and Techniques of Practical Biochemistry, 5th edition, Cambridge University Press, Cambridge.
5. Albert L. Lehninger. (2002). Principles of Biochemistry. ICAR, Delhi.
6. Satyanarayana, V. (2005). Essentials of Biochemistry. Arunabha Sen & Allied Pvt., Ltd

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	M	H
CO2	S	H	M	H	S
CO3	H	H	S	M	H
CO4	S	M	H	H	M

S - Strong **H** - High **M** - Medium **L** - Low

20UBO610

Programme Code: 05		Title : B.Sc., BOTANY		
Course code : 20UBO610		Core Paper: 10 - PLANT PHYSIOLOGY		
Batch 2020-2021	Semester VI	Hours/Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To study the structure of atoms and chemical bonds.
- To know the secondary metabolites in plants.
- To study about water potential and its components.

COURSE OUTCOME

On successful completion of the course, the students will be able to

K1	CO1	Gain the knowledge on the relationship of complementary metabolic process in energy acquisition.
K2	CO2	Understand the water potential and its effects on cellular functions.
K3	CO3	Apply the knowledge on physiological mechanisms of growth regulators in plants.
K3	CO4	Demonstrate detailed understanding of the physiological mechanisms involved in the uptake and transport of water.

SYLLABUS

UNIT I **(18 HOURS)**

Plant - water relationship - structure, properties and biological significance of water, water potential and its components, physical forces involved in absorption of water - diffusion, osmosis, imbibition. Absorption of water - mechanism and affecting factors. Absorption of minerals - mechanism (Active and Passive).

UNIT II **(18 HOURS)**

Ascent of sap - path and mechanism; Translocation of organic solutes - directions, path, mechanism, assimilates partitioning and controlling factors. Transpiration - kinds, mechanism of stomatal transpiration, significance and factors affecting stomatal movement and Guttation.

UNIT III **(18 HOURS)**

Photosynthesis – pigment types, pigment system (PS-I & II), Mechanism - Light reaction, Dark reaction - Calvin cycle, Hatch and Slack pathway and CAM pathway, Photorespiration and Factors controlling photosynthesis. **Respiration-** Glycolysis, Anaerobic (Fermentation) and aerobic (Krebs cycle) and ATP synthesis and Respiratory quotient. Factors influencing respiration.

UNIT IV **(18 HOURS)**

Nitrogen metabolism - Nitrogen cycle, Biological Nitrogen Fixation - Symbiotic and Non- Symbiotic. Formation of root nodules in leguminous plants, role of nitrogenase enzyme and Leg-heamoglobin. Factors controlling biological nitrogen fixation.

20UBO610

UNIT V **(18 HOURS)**

Plant growth regulatory substances - Distribution, biosynthesis and physiological effects of Auxins, Gibberellins, Cytokinins, Ethylene and Abscissic acid. Physiology of flowering: Photoperiodism - Phytochrome, Vernalization. Seed dormancy*.

***Self study**

TEACHING METHODS

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Jain, V.K. (1993). Fundamentals of plant physiology. S. Chand & Co. New Delhi
2. Verma, S.K. (1999). A textbook of Plant physiology. S. Chand & Co. New Delhi
3. Annie Ragland, Rajkumar, Rajaatnam and Jayakumar. (2007). Plant Physiology. Saras Publications, Nagarcoil.
4. Chopra. (1995). A text book of Plant Physiology. EMKAY Publications, New Delhi.

REFERENCES

1. Noggle and Fritz. (1992). Introductory plant physiology. Prentice Hall of India. Pvt. Ltd. New Delhi.
2. Malik. (2002). Plant physiology. Kalyani Publishers, New Delhi.
3. Devilin, (1986). Plant physiology. CBS Publishers and distributors, New Delhi.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	M	H	M
CO2	H	H	S	M	H
CO3	S	M	H	H	S
CO4	H	S	S	M	H

S - Strong **H** - High **M** - Medium **L** - Low

20UBO611

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO611		**C.P. 11- HORTICULTURE**		
Batch 2020-2021	**Semester IV**	**Hours / Week 6**	**Total Hours 90**	**Credits 4**

COURSE OBJECTIVES

- To learn about the propagation methods of horticultural crops.
- To study the various types of gardening, landscaping and their management.
- To know about commercial floriculture and their significance.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Describe various horticultural practices
K2	CO2	Understand solutions to develop a wide variety of plants through vegetative propagules.
K3	CO3	Develop bonsai plants using various techniques.
K3	CO4	Preserve food and vegetables using suitable techniques for the commercial uses throughout the year.

SYLLABUS

UNIT I **(18 HOURS)**

Introduction to Horticulture - History**,** scope and divisions of Horticulture - Methods of vegetative propagation - cutting, layering, grafting and budding. Manures*: organic- Pancha kavya, and inorganic. Irrigation.

UNIT II **(18 HOURS)**

Gardening - Types of gardens - Japanese. Styles of garden - Formal and Informal. Garden components - shrubbery, fernery, arches and pergolas, edges and hedges, climbers and creepers, cacti and succulents. Special types of garden - rock garden and sacred groves. Lawn making, Terrarium and Bonsai techniques.

UNIT III **(18 HOURS)**

Olericulture - Cultivation of vegetables - Bhendi and Tomato. **Pomology** - Cultivation of fruits - Banana and Grapes. Growth regulators in horticulture. Plant protection measures for horticultural crops. Bioinsecticides and Biopesticides.

UNIT IV **(18 HOURS)**

Floriculture - Cultivation of flowers - Jasmine and Rose. Cut flowers and Flower arrangements. Cultivation of plantation crops - Tea and Cardamom. Basics of greenhouse design, different types of structures - glasshouse, shade net, poly tunnels - Design and development of low cost greenhouse structures.

UNIT V **(18 HOURS)**

Extraction of Jasmine concrete and papain. Postharvest handling of fruits and vegetables. Preservation of fruits and vegetables. Cultivation of medicinal plants - *Gloriosa superba* and *Aloe vera*.

20UBO611

*** Self study**

Teaching Methods

Smart Class Room/Powerpoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. George Aquach (2002). Horticulture - Principles and Practices.. Parson Education Ltd. Delhi
2. Kumar, N. (1999). An introduction to horticulture. Rajalakshmi Publication, Nagarcoil.
3. Bhattacharjee, S.K. (2006). Advances in Ornamental Horticulture. Pointer Publications, Jaipur.
4. Kumar N. (2006). Horticulture: Principles and practices. New India Publishing agency, New Delhi 88.

REFERENCES

1. Chaha, K.L. (2001). Handbook of horticulture. ICAR, New Delhi.
2. Edwin Biles. (2003). The complete book of gardening. Biotech book, New Delhi.
3. Singh, S.P. 1999. Advances in Horticulture and Forestry. Scientific Publishers, Jodhpur.
4. Sharma, V.K. (2004). Advances in Horticulture: Strategies, Production, Plant Protection and Value Addition - Deep and Deep Publications, New Delhi.
5. Desh Beer Singh and Poonam Wazir. (2002). Bonsai-An Art. Scientific Publishers, Jodhpur.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	S	H	M
CO2	S	H	M	H	H
CO3	H	S	H	M	S
CO4	S	H	M	H	M

S - Strong **H** - High **M** - Medium **L** - Low

20UBO6CO

Programme Code: 05		Title : B.Sc., BOTANY		
Course code : 20UBO6CO		Core Practical: 4 - Taxonomy of Angiosperms, Cytology, Genetics and Plant Breeding, Economic Botany, Plant Ecology, Plant Phytogeography and Resource Conservation		
Batch 2020 - 2021	Semester VI	Hours/Week 4	Total Hours 60	Credits 2

COURSE OBJECTIVES

- To learn the morphological, taxonomical and economic values of the plants.
- To impart knowledge on the determination of types of vegetations using quantitative ecological characters.
- To study the different types of eco-system
- To study the cellular details, genetic constitution and plant breeding techniques.

COURSE OUTCOMES

K3	CO1	Apply knowledge to segregate species variation using dichotomous keys.
K4	CO2	Analyze the progress of cell division and their significance for the
K5	CO3	Determine the distribution of vegetations in a given habitat using various quadrat methods.

Core Practical: 4 - Taxonomy of Angiosperms, Economic Botany, Plant Ecology, Plant Phytogeography and Resource Conservation

I. TAXONOMY OF ANGIOSPERMS & ECONOMIC BOTANY

1. Identification of plant specimens with reference to their families prescribed in the syllabus following Bentham & Hookers system of classification
2. Identification of economically important products with reference to their plant name and family
3. Technical description of plant parts, including floral parts L.S. of flower, floral diagram and floral formula with reference to the families mentioned in the theory
4. Field visit to nearby floristic regions for the study of flora
5. Submission of 25 herbarium sheets (local plants) with field notes for internal and external valuation

20UBO6CO

CYTOLOGY, GENETICS & PLANT BREEDING

1. Study of cell wall structure and cell organelles (plasma membrane, mitochondria, ER, golgi apparatus, chloroplast, ribosomes, nucleus and chromosomes) through slides and photographs
2. Study of mitosis using onion roots
3. Study of meiosis using *Rheo* flower buds
4. Simple problems in genetics (Monohybrid and Dihybrid cross, Incomplete dominance, Codominance, Collaborator genes, Epistasis, Complementary genes, Duplicate genes and Lethal genes)
5. Selection, mass selection and clonal propagation methods.
6. Emasculation technique

II. PLANT ECOLOGY, PHYTOGEOGRAPHY & RESOURCE CONSERVATION

1. Quadrat - determination of frequency and density of vegetation in the surrounding areas of college premises
2. Line transects - frequency determination of vegetation in the surrounding areas of college premises
3. Belt transects - frequency determination of vegetation in the surrounding areas of college premises
4. Observation of adaptive morphological and anatomical features of xerophytes hydrophytes, halophytes and epiphytes
5. Ecosystems (pond, forest and grasslands)
   Community succession patterns - hydrosere and lithosere
6. Global Positioning System (GPS)
7. Locate major Phytogeographical zones of India using photographs

UBO49

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	H	S
CO2	H	H	H	M	H
CO3	S	M	H	S	M

S - Strong **H** - High **M** - Medium **L** - Low

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)

COIMBATORE - 641 029

UG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2020-21 onwards)

Time: 3 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 4 - Taxonomy of Angiosperms, Economic Botany, Plant Ecology, Plant Phytogeography and Resource Conservation

I. Family description	**- 08 Marks**
II. Economic Botany	**- 04 Marks**
III. Phytogeography	**- 05 Marks**
IV. Plant ecology	**- 05 Marks**
V. Ecology experiment	**- 08 Marks**
VI. Spotters	**- 15 Marks**
VII. Herbarium	**- 05 Marks**
Record	**- 10 Marks**
TOTAL	**- 60 Marks**

20UBO6CP

Programme Code: 05		**Title : B.Sc., BOTANY**		
Course code : 20UBO6CP		**Core Practical: 5 – BIOCHEMISTRY, BIOINSTRUMENTATION, PLANT PHYSIOLOGY AND HORTICULTURE**		
Batch 2020-2021	**Semester VI**	**Hours/Week 4**	**Total Hours 60**	**Credits 2**

COURSE OBJECTIVES

- To acquire skills on handling of the instruments.
- To learn sequence and structure of genes and protein molecules.
- To learn principles and applications of instruments
- To provide hands-on techniques on instruments
- To learn metabolic process of the plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Apply knowledge on instrumentation techniques.
K4	CO2	Apply knowledge on handling and troubleshooting of instruments.
K5	CO3	Examine the various parts and functional units of instruments.

LIST OF PRACTICALS

I. BIOCHEMISTRY

1. Estimation of Carbohydrate by Anthrone method
2. Estimations of aminoacids by Ninhydrin method.
3. Estimation of protein by Lowry's method.
4. Estimation of Vitamin C
5. Preparation of Phosphate Buffers.

II. BIOINSTRUMENTATION

1. Analyze the pH of samples (soil, water and plant extract)
2. Colorimetry
3. Soxhlet apparatus, Clevenger apparatus
4. Column Chromatography
5. Centrifugation

UBO51

III. PLANT PHYSIOLOGY

1. Determination of osmotic pressure of cell sap of onion/*Rheo* leaf.
2. Separation of plant pigments by paper chromatography.
3. Measurement of oxygen evolution using different light intensities using Wilmott's bubbler.
4. Determination of photosynthetic rate in water plants under different CO_2 concentration.
5. Measurement of rate of respiration using flower buds/ germinated seeds with simple respiroscope.
6. Effect of light intensity on transpiration using Ganong's photometer.
7. Determination of absorption and transpiration ratio in plants.
8. Nitrification in soil.
9. Solution culture.
10. Effect of Auxins in apical dominance
11. Effect of Gibberellins in shoot elongation
12. Arc auxanometer

IV. Horticulture

a. Introduction -General introduction to the field of horticulture and horticulture greenhouse facility
b. Flower garden design - Garden design for annual and perennial flowering plants
c. Landscape design - Landscape design principles, landscape installation and maintenance
d. Interior plants - Identification of foliage plants.
e. Methods of training and pruning in horticultural crops
f. Cut flower arrangement

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	S	S	S	H	M
CO3	H	H	M	H	S

S - Strong **H** - High **M** - Medium **L** - Low

UBO52

20UBO6CP

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

UG MODEL QUESTION PAPER (PRACTICALS)

End Semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2020-21 onwards)

Time: 3 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

CORE PRACTICAL: 5 – BIOCHEMISTR, BIOINSTRUMENTATION, PLANT PHYSIOLOGY

I. Biochemistry		**- 10 Marks**
II. Bioinstrumentation		**- 10 Marks**
III. Physiology Experiment		**- 15 Marks**
V. Spotters (5 × 3)		**- 15 Marks**
Record		**- 10 Marks**
	TOTAL	**- 60 Marks**

20UBO6S3

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO6S3		**Skill Based Subject: III - CULTIVATION AND MARKETING OF MEDICINAL PLANTS**		
Batch 2020-2021	**Semester VI**	**Hours / Week 2**	**Total Hours 30**	**Credits 3**

COURSE OBJECTIVES

- To promote conservation strategies recommended by various agencies.
- To understand the medicinal values of various parts of the medicinal plants.
- To understand the present scenario on marketing of medicinal plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize *in situ* and *ex situ* conservation of various medicinal plants.
K2	CO2	Create awareness for utilization of herbal medicines for home remedies.
K3	CO3	Increase public awareness about the efficacies of herbal drugs and their intellectual property rights.
K3	CO4	Implement suitable methods for the cultivation of more and more wild indigenous and endemic medicinal plants.

SYLLABUS

UNIT I **(6 HOURS)**

Scope and importance of medicinal plants. Conservation of medicinal plants - *In situ* and *ex situ*. Medicinal Plants- Present and future status. Present scenario in India.

UNIT II **(6 HOURS)**

Role of conservation of medicinal plants by Indian Council of Agriculture Research, and National Medicinal Plants Board. Intellectual Property Rights (IPR) and their applications.

UNIT III **(6 HOURS)**

A general account on the methodology of cultivation, therapeutic uses of plants. Rhizome - *Curcuma longa,* Root- *Asparagus racemosus* Twigs - *Adathoda vasica,*

UNIT IV **(6 HOURS)**

Cultivation of Medicinal Plants: Leaves- *Andrographis paniculata.* Bark - *Cinchona officinalis,* Flower bud- *Syzygium caryophyllatum* - Fruits- *Phyllanthus emblica,* Seed - *Gloriosa superba.*

UNIT V **(6 HOURS)**

Marketing Scenario of Medicinal Plants - Domestic Market, Global Market, Export: Standard and Quality control (Constraints). Future strategy for Medicinal plants*.

20UBO6S3

***Self study**

Teaching Methods

Smart Class Room/Powerpoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Purohit, S.S and S.P. Vyas (2005). Medicinal Plant Cultivation. A Scientific Approach. Agrobios Publishers, Jodhpur, India.
2. G. E. Treases and W. G. Evans. (1983).Pharmocognosy Bailliare, Tindall Esaibolarna.

REFERENCES

1. D.N. Guha Bakshi, P. Sensarma, DC pal, (2001). A lexicon of medicinal plants in India. Vol.
   II. Naya Prakash, Calcutta.
2. S. Thirugnanam (2003). Mooligai maruthuvam, Selvi Pathipagam, Trichy.
3. R.S. Satoskar, S.D. Bhanalarkar, S.S. Ainapure. (2002) Pharmacology, Pharmaco Therapeutics - popular Prakasam, Mumbai.
4. Anil K. Dhiman, (2003). Sacred plants and their medicinal uses - Daya Publishing House,
   New Delhi.
5. H. Panda, (2001). Essential oils- hand book, national Institute of Industrial Research, New
   Delhi.
6. H. Panda, (2001) Hand book of herbal medicines. Asia Pacific Business Press, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	S
CO2	H	S	H	M	S
CO3	H	H	M	S	H
CO4	S	M	S	M	H

S - Strong **H** - High **M** - Medium **L** - Low

UBO55

20UBO6Z1

Programme Code: 05		**Title: B.Sc., BOTANY**		
Course Code: 20UBO6Z1		**PROJECT WORK & VIVA - VOCE**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**VI**	**2**	**30**	**5**

COURSE OBJECTIVES

- To know the practical problems in various fields of Botany.
- To understand to collect the related data in the selected fields.
- To apply suitable skill to solve the selected problems through proper execution.

COURSE OUTCOME

On successful completion of the project work, the students will be able to

K3	CO1	Applying theoretical knowledge in lab oriented experiments.
K4	CO2	Analyzing the importance of project while collecting the necessary data.
K5	CO3	Evaluating variations between the theories and the experiments.
K5	CO4	Executing appropriate methods to get the correct interpretation to present the results.

Group project work will be allotted to a group of students under the supervision and guidance of the Faculty members during the VI Semester. Project works will be given based on the field of Specializations of the supervisors under whom the students are allotted. Students will be allotted based on the lot system. The fields of specialization are Systematic Botany, Microbiology and Plant Pathology, Medicobotany, Ecology and Conservation Biology. The students shall do their projects under their supervisors and submit at the end of the VI Semester. Both the Internal and External Examiners shall jointly evaluate the project works submitted by the students and marks will be awarded on the basis as mentioned below.

Guidelines to the Distribution of Marks:

CIA	Project Review	15	**20**
	Regularity	5	
ESE	Project Report Present	60	**80**
	Viva – Voce	20	
	Grand Total		**100**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	H	H	S	M	S
CO2	S	S	H	S	H
CO3	S	H	S	H	S

S - Strong **H** - High **M** - Medium **L** - Low

ELECTIVE PAPERS

UBO57

Programme Code: 05	Title: B.Sc., BOTANY		
	Major Elective: 1 - FORESTRY		
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

COURSE OBJECTIVES

- To understand the basic concepts of forest and their distribution types.
- To acquire knowledge on forest resources and their utilization.
- To gain knowledge on laws of conservation of forests.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize the importance of forest produce to mankind.
K2	CO2	Understand the economic value of forest and their importance to the society.
K3	CO3	Reclamation of wastelands with suitable tree species.
K3	CO4	Implement the economic benefits of trees in day to day life

SYLLABUS

UNIT I **(12 Hours)**

Introduction to Forests: General introduction to forests, Natural, man-made forest. Classification of forest (Chambian and Seth, 1968). Tropical, subtropical, temperate, evergreen, semi-ever green and deciduous forests. Mangrove forests-species, Vivipary germination.

UNIT II **(12 Hours)**

Silviculture - concept, scope; clear felling, uniform shelter, wood selection, coppice. Conservation systems - *In vitro* and *In vivo*. Silviculture of some of the economically important species in India- *Casuarina, Dalbergia sisso* and *Tectona grandis*.

UNIT III **(12 Hours)**

Social and Agro forestry. Selection of species and role of multipurpose trees. food, fodder, energy and avenue plantation. Sacred grooves - definition and importance. Significance of sacred trees - *Terminalia arjuna, Aegle marmelos* and *Prosopis cineraria*.

UNIT IV **(12 Hours)**

Introduction to forest laws: Forest laws, necessity, General principles, Indian forest act, 1927, Forest conservation act, 1980, Indian forest law, 1988, Wild life protection act, 1972 and their amendments, endangered species act, 1982.

UBO58

UNIT V **(12 Hours)**

Plants as sources for food, fodder, fibres, spices, beverages, drugs, narcotics, insecticides, timber, gums, resins and dyes. Latex, cellulose Starch. Ethnobotany in human welfare*, Major Botanical garden - Kew.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Sagreiya, K.P. (1994). Forests and Forestry (Revised by S.S. Negi). National book trust. New Delhi.
2. Tribhawan Mehta, (1981). A handbook of forest utilization. Periodical Expert Book Agency, New Delhi.

REFERENCES

1. Kollmann and Cote (1988). Wood Science and Technology. Vol.I & II Springer verlag.
2. Sharma, P.D. (2004). Ecology and Environment. Rastogi Publications, Meerut
3. Singh, M.P. and Vinita Vishwakarma. (1997). Forest Environment and Biodiversity. Daya Publishing House, New Delhi
4. Tiwari.K.M. (1983). Social forestry in India.
5. Gray L. Rolfe, Johan, M. Edgington, I. Irving Holland and Gayle C. Fortenberry. (2005). Forests and Forestry. International book distributing Co., Lucknow.
6. B.S.Chundawat & S.K. Gautams. (1996). Textbook of Agroforestry. Oxford and IBH Publishnig Co., Pvt. Ltd., Kolkatta
7. Anil Kumar Dhiman. (2003). Sacred Plants and their medicinal uses. Daya publishing house, New Delhi.
8. Bedell, P.E. (1998). Seed Science & Technology. Allied Publishers Ltd.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	S
CO2	H	H	S	M	S
CO3	S	M	H	H	H
CO4	H	S	H	H	M

S - Strong **H** - High **M** - Medium **L** – Low

UBO59

Programme Code: 05	Title: B.Sc., BOTANY		
	Major Elective: 2 - BIOTECHNOLOGY		
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

COURSE OBJECTIVES

- To familiarize the fundamental principles of biotechnology
- To obtain knowledge on various developments and potential applications of gene cloning technology.
- To know the basic principles employed for the production of genetically modified foods

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Students can gain the basic concepts of biotechnology
K2	CO2	Students can understand the role and importance of biotechnological tools for the production of bioproducts
K3	CO3	Basic skills and techniques related to gene cloning for the development of transgenic plants may be understood
K3	CO4	Evaluate the potential for microbes in biofertilizer and waste water treatments

SYLLABUS

UNIT I **(12 HOURS)**

History, scope, importance and basic branches. Agarose gel electrophoresis, PCR-working principle, types and applications, Genetic engineering - enzymes used in gene cloning - polymerases, restriction endonucleases, ligases and reverse transcriptase, gene cloning procedure and isolation of specific genes.

UNIT II **(12 HOURS)**

Methods of direct gene transfer - electroporation, micro injection and liposomes mediated DNA delivery. Vectors for gene cloning- General characters of Agrobacterium, plasmids (Ti and Ri), phages, virus (CAMV), cosmids, BAC and YAC.

UNIT III **(12 HOURS)**

DNA finger printing and blotting techniques - Southern, Northern and Western. Application of genetic engineering- Golden rice, Flavr Savr, Bt cotton, herbicide resistance, insulin producing E. coli and monoclonal antibodies. Ethical, legal and social issues related to biotechnology.

UNIT IV **(12 HOURS)**

Vectors for gene cloning: Restriction endonucleases and DNA Ligases. general properties of a vector, Plasmids (Ti and Ri), Bacteriophages, Phagemids, Cosmids, Artificial Chromosomes: BAC and YAC. Plant genetic transformation: Biological and Physical methods.

UNIT V **(12 HOURS)**

Microbial biotechnology: Biofertilizers - Advantages, mass cultivation and application techniques of *Rhizobium* and *Azosprillum*. Blue green algae (*Nostoc*), Phosphobacteria, *Azolla* and VAM. **Environmental biotechnology:** Wastewater treatment, recycling water for food and feed. Treatment of paper and distillery effluents - oxidation ponds. Source of alternate fuel - biomass and bioenergy production of biogas and its advantage. Photo biological production of hydrogen. Petrochemical plants.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Dubey. R.C. (1996). A Text Book of Biotechnology. Rastogi Publications, Meerut.
2. Kumaresan, V.K. (2003). Biotechnology. Saras Publications, Kanyakumari
3. Ignacimuthu, S. (1996). Applied Plant Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Ignacimuthu, S. (1997). Plant Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.
5. Kalyan Kumar De (1997). Plant tissue culture. New Central Book Agency,

REFERENCES

1. Chhatwal. (1995). Text book of Biotechnology. Anmol Publications Pvt. Ltd., New Delhi.
2. Gupta, P.K. (2004). Elements of Biotechnology, 2004. Rastogi Publications, Meerut.
3. Primrose, S.B. and Twyman, R. (2006). Principles of Gene Manipulation and Genomics. 7th Edition, Blackwell Publishing, Malden, MA, USA.
4. Slater, Scott and Fowler, (2008). Plant Biotechnology, 2nd Edition, Oxford University Press

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	M
CO2	S	M	H	S	H
CO3	H	S	H	M	S
CO4	H	H	M	H	M

S - Strong **H** - High **M** - Medium **L** – Low

UBO61

Programme Code: 05	Title: B.Sc., BOTANY		
	Major Elective: 3 - FOOD SCIENCE		
Batch **2020-2021**	**Hours / Week** **4**	**Total Hours** **60**	**Credits** **5**

COURSE OBJECTIVES

- To know about the food groups.
- To understand the food processing technology.
- To analyze and communicate food issues.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire manufacturing processes and technologies used in the production of food products.
K2	CO2	Understand the knowledge on the process of food product development and their environmental consideration.
K3	CO3	Explain the functional properties of food in human nutrition.
K3	CO4	Develop skills in researching, analyzing and communicating food issues.

SYLLABUS

UNIT I **(12 Hours)**

Food groups: basic groups- basic four, five and seven, food in relation to health. Preliminary preparation of food- cleaning, cleaning, peeling, stinging, cutting and grating, soaking, marinating, sprouting, fermenting, grinding, drying and filtering their advantages and disadvantages.

UNIT II **(12 Hours)**

Cereals and cereal products, structure and composition and nutritive value of cereals - wheat and wheat products; fermented and unfermented products.

UNIT III **(12 Hours)**

Biotechnology in food - biofertification, nutraceuticals, space food. Fruits and vegetables - classification, composition and nutritive value. Milk & milk products* - processing, clarification, pasteurization and homogenization. Tea processing and marketing.

UNIT IV **(12 Hours)**

Food preservation by high and low temperatures- outline. Preservation by high osmotic pressure, high concentration of sugar, jam and jelly preparation. High concentration of salts. Principles and preparation of pickles- preservation by dehydration. Principles and methods of drying such as freeze drying, sun drying, mechanical driers - spray drying and foam mat drying and by smoking.

UNIT V **(12 Hours)**

Packing of food- classification of package, materials used for packing, active food packing, packing of fruits and vegetables. Nutrition labeling - guiding principles, codex Guidelines. Some recent development on the food labeling front in India.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Srilakshmi, B. (2003). Food science. New Age International Pvt. Ltd.
2. James, M. Jay. (1987). Modern Food Microbiology. CBS, Mylapore, Chennai.

REFERENCES

1. Subbulakeshmi, G. (2003). Food processing and preservation. New Age International Pvt. Ltd.
2. Srilakshmi, B. (2005). Food and Health. National Institute of Nutrition, ICMR, Hyderabad.
3. Janet, D Ward and T. Larry. (2002). Principles of Food Science. Good Heart, Wilcox, Illinois.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	S
CO2	S	S	H	S	M
CO3	H	M	H	M	H
CO4	H	H	M	H	M

S - Strong **H** - High **M** - Medium **L** - Low

UBO63

Programme Code: 05	Title: B.Sc., BOTANY		
	Major Elective: 4 - SEED BIOLOGY		
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

COURSE OBJECTIVES

- To study the structure of angiospermic seeds
- To analyze various products produced by the seeds.
- To examine the germination capacity of the seeds.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize the chemical and physical properties of seeds.
K2	CO2	Understand the factors responsible for seed germination.
K3	CO3	Apply the various methods of processing of seeds for storage.
K3	CO4	Implement knowledge to break the seed dormancy and to enhance the plant growth.

SYLLABUS

UNIT- I **(12 Hours)**

Scope of seed biology - Structure of monocot and dicot seeds / grains. Albuminous (endospermic) and ex-albuminous (non-endospermic) seeds. Chemical composition - cereals (Paddy) - Oil seed (Castor) - Fibre (Cotton) and Pulses (Bean).

UNIT- II **(12 Hours)**

Seed germination: Factors affecting germination. Methods of germination test (using paper, sand and soil) - Seed viability (Tetrazolium test), vigour (Direct and Indirect test). Concept of seed vigour.

UNIT- III **(12 Hours)**

Seed drying, Process and Equipments. Methods of moisture determination of seed. Seed cleaning and upgrading - Equipments involved. Seed testing and quality control.

UNIT- IV **(12 Hours)**

Seed dormancy: Primary and Secondary dormancy - significance - Factors involved - methods used to break dormancy*.

UNIT- V **(12 Hours)**

Seed treatment - methods of seed treatment, seed treating formulations and equipments, seed disinfestations, identification of treated seeds; Pelleting and their significance, packaging, bagging and labeling, storage and marketing.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Agarwal R. L. (1982). Seed Technology -. Oxford and IBH Publishing Company, New Delhi.
2. Bewley, J.D and M. Black (1978). Seed Biology Vol. I & II Academic press, New York

REFERENCES

1. Bewley, J.D and M. Black. (1985). (Eds.) Seeds; Physiology of development and germination Plenum Press: New York.
2. Murray, D.R. (1984). (Ed.) Seed physiology. Vol. I & II Academic Press: Sydney - New York- London
3. Khan, A.A. (Latest Edition) (Ed.). The Physiology and Biochemistry of seed Dormancy and germination. North-Holland Publishing Company: Amsterdam-New York- Oxford.
4. Mehta S.L. Lodha, M.L. and Sane P.V. (1993). (Eds.) Recent advances in Plant Biochemistry. Publication and information division ICAR, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	S	M	S
CO2	S	S	H	H	S
CO3	H	S	H	M	H
CO4	H	H	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low

UBO65

Programme Code: 05	Title: B.Sc., BOTANY		
	Major Elective: 5 - PHARMACOGNOSY		
Batch **2020-2021**	**Hours / Week** **4**	**Total Hours** **60**	**Credits** **5**

COURSE OBJECTIVES

- To study the drug development from medicinal plants.
- To understand the traditional systems of medicines like Ayurveda, Siddha & Unani.
- To know the pharmacological actions of plant drugs.

COURSE OUTCOME

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on the therapeutic uses of plant drugs.
K2	CO2	Understand the traditional and modern system of medicine.
K3	CO3	Relates physiological action of various plant drugs.
K3	CO4	Recognize route of drug administration and its pharmaceutical dosage forms.

SYLLABUS

UNIT I **(12 Hours)**

Definition, history and scope of Pharmacognosy. Study of various system of classification of drugs. Traditional system of medicines (AYUSH - Ayurveda Siddha, Unani and Homeopathy).

UNIT II **(12 Hours)**

A general survey of biological sources, Geographical sources and cell cultures in the production of drugs. Factors involved in the production of drugs.

UNIT III **(12 Hours)**

Pharmacological action of plant drugs - act on central nervous system- Lysergic acid Diethylomids, cannabis, Cocaine and reserpine. Action on heart muscles - Digitalis, Quinidine, Papaverine and Ergotamine.

UNIT IV **(12 Hours)**

Drugs of plant origin - Phytochemical tests and application of plant derived Phenols, Resins, alkaloids, flavonoids, terpenoid, steroids, Glycosides and Vitamins. A general procedure for separation of the compounds by TLC technique.

UNIT V **(12 Hours)**

Organized natural products - wood and bark. Quassia and *Cinchona*. Leaves and Flowers - Adhathoda and clove Seed and fruits- Fennel, Nutmeg. Unorganized products - Acacia gum and Castor oil*.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Trease G.E. and W. C Evans (1983) Pharmocognosy, ELBS, Britain
2. Medical microbiology (1983) Churchill Livingstone ELBS Britain.

REFERENCES

1. Hocking, G.M. (1955). A dictionary of terms used in Pharmacognosy, Spring Field.
2. Ballow M. H. (1969). Marine Pharmacology, Williams and Wilkins.
3. Chopra, R.N, Badhwa, R. L and Ghosh, S. (1965). Poisonous plants of India Govt. of India Press.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	H	M
CO2	S	H	M	S	H
CO3	H	S	H	M	S
CO4	H	M	H	H	M

S - Strong **H** - High **M** - Medium **L** - Low

UBO67

Programme Code: 05	Title: B.Sc., BOTANY		
	Major Elective 6 - MUSHROOM CULTIVATION TECHNOLOGY		
Batch **2020-2021**	**Hours / Week** **4**	**Total Hours** **60**	**Credits** **5**

COURSE OBJECTIVES

- To understand the Importance of mushrooms.
- To learn the methodology involved in mushroom cultivation.
- To know the disease management.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize the nutritive, medicinal and food values of mushrooms.
K2	CO2	Determine suitable climate and cultivation techniques for different mushrooms.
K3	CO3	Relate knowledge on designing farming houses for various mushrooms.
K3	CO4	Apply knowledge on processing and storage for better marketing.

SYLLABUS

UNIT I **(12 HOURS)**

Mushroom an Introduction - Importance, Identification and classification of Mushrooms. Food value and composition, Medicinal value of Mushrooms, Mushrooms Nutriceutical, Medicine of Mushrooms, Identification of Mushrooms, Poisonous Mushroom, Classification of edible mushroom*.

UNIT II **(12 HOURS)**

Systematic position, morphology and life cycle of white button mushroom (*Agaricus bisporus*). Cultivation- farm designing, spawn preparation- Spawn production Technology, Preparation of the planting spawn from master spawn, Multiplication of spawn from Mass culture and harvesting.

UNIT III **(12 HOURS)**

Systematic position, morphology and life cycle of oyster mushroom (*Pleurotus sajor-caju*). Cultivation- farm designing, spawn preparation- Spawn production Technology, Preparation of the planting spawn from master spawn, Multiplication of spawn from Mass culture and harvesting.

UNIT IV **(12 HOURS)**

Systematic position, morphology and life cycle of paddy straw mushroom (*Volvariella* Sp.). Cultivation- farm designing, spawn preparation- Spawn production Technology, Preparation of the planting spawn from master spawn, Multiplication of spawn from Mass culture and harvesting.

UNIT V **(12 HOURS)**

Common fungal and bacterial diseases of button, oyster and paddy straw mushrooms and their control measures. Post harvesting techniques- packaging, transport, short term and long term storage of mushrooms (canning, drying, freeze drying, sun drying and pickling).

***Self study**

Teaching Methods

Smart Class Room/Powerpoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS:

1. Reeti Singh and U.C. Singh (2005). Modern mushroom cultivation, Agrobios India, Jodhpur.
2. Kumaresan, V. (2001). Biotechnology, Saras-publication, Nagarcoil.
3. Gupta, P.K. (2004). Elements of biotechnology, Rastogi publication, Meerut.

REFERENCES:

1. Singh, B.D. (2002). Biotechnology. Kalyani Publishers, New Delhi.
2. Kaul, T.N. (2001). Biology and conservation of Mushrooms. Oxford & IBH Publishing Company Pvt. Ltd. New Delhi.
3. Giovanni Pacioni.(1985). Mushrooms and Toadstools. Mac Donald & Co. Ltd., London.
4. Pandey, B.P. (1996). A text book of fungi. Chand & Co., New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	M	S
CO2	H	S	M	S	H
CO3	S	S	H	M	H
CO4	M	H	S	H	S

S - Strong **H** - High **M** - Medium **L** - Low

ALLIED PAPER

UBO70

20UBO1A1

Programme Code: 05		**For B.Sc., ZOOLOGY**		
Course Code: 20UBO1A1		**Allied-1 Botany: 1 (PHYCOLOGY, MYCOLOGY, PLANT PATHOLOGY, BRYOPHYTES, PTERIDOPHYTES & GYMNOSPERMS) (FOR ZOOLOGY STUDENTS)**		
Batch 2020-2021	**Semester I**	**Hours / Week 5**	**Total Hours 75**	**Credits 4**

COURSE OBJECTIVES

- To study the classification of Cryptogams & Gymnosperms.
- To learn the structure and life cycle patterns of primitive to advanced life forms.
- To impart knowledge on the economic values of plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Gain knowledge on disease causing microorganisms.
K2	CO2	Understand the life cycle patterns of Cryptogams and Gymnosperms.
K3	CO3	Explore the economic importance of lower life forms.
K3	CO4	Apply their knowledge to identify plant diseases and their control measures.

SYLLABUS

UNIT I **(15 HOURS)**

Phycology: Classification by Fritsch (1945) (outline only), Structure, Reproduction and life cycle of the following Genus: *Oscillatoria*, *Caulerpa*, and *Chara*. Economic importance of algae (briefly).

UNIT II **(15 HOURS)**

Mycology and Plant Pathology: Classification by Alexopoulos and Mims (1979) (outline only), Structure, Reproduction and Life cycle of the following Genus: *Albugo* and *Agaricus*. Tikka disease of ground nut and Citrus canker. Economic importance of Fungi.

UNIT III **(15 HOURS)**

Bryophytes: Classification by Smith (1955) (outline only), Structure, Reproduction and Life cycle of *Marchantia* and *Funaria***.** Economic importance of Bryophytes.

UNIT IV **(15 HOURS)**

Pteriodophytes: Classification by Riemers (1954) (outline only), Structure, Reproduction and Life cycle of *Lycopodium* and *Adiantum*. Economic importance of Pteridophytes.

20UBO1A1

UNIT V **(15 HOURS)**

Gymnosperms: Classification by K.R. Sporne (1962) (outline only), Structure, Reproduction and Life cycle of *Cycas* and *Gnetum*. Economic importance of Gymnosperms*

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Gangulee, Das & Kar. (2001). College Botany Vol II. New central Book agency
   Pvt. Ltd. Calcutta.
2. Pandey, B.P. (1994). A Text book of Botany - Pteridophyta. Chand & Co. New Delhi.

REFERENCES

1. Vashishta, B.R. (1998). The Algae.S. Chand & Co., New Delhi.
2. Vashishta, B.R. (1998). Fungi. S. Chand & Co., New Delhi.
3. Vashista, P.C., Sinha and Anil Kumar. (2008). Text book of Bryophytes. Chand & Co., New Delhi.
4. Vashista, P.C. (1992). Pteriodophyta. Chand & Co., New Delhi.
5. Pandey, B.P. (1981). Gymnosperms. Chand & Co., New Delhi.
6. Gilbert M Smith (1951). Manual of Phycology.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	H	H
CO2	S	S	H	M	S
CO3	H	H	M	S	M
CO4	S	M	S	H	H

S - Strong **H** - High **M** - Medium **L** - Low

20UBO2A2

Programme Code: 05		For B.Sc., ZOOLOGY		
Course Code: 20UBO2A2		Allied-2 Botany: 2 (ANATOMY, EMBRYOLOGY, TAXONOMY OF ANGIOSPERMS, PHYSIOLOGY AND ENVIRONMENTAL BOTANY) (FOR ZOOLOGY STUDENTS)		
Batch 2020-2021	Semester II	Hours / Week 5	Total Hours 75	Credits 4

COURSE OBJECTIVES

- To differentiate the anatomical and reproductive features of monocot and dicots.
- To acquire knowledge on the classification and nomenclature of Angiosperms.
- To understand physiological process and metabolism in plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize structural organization and morphological variations among the Angiospermic taxa.
K2	CO2	Understand the use of keys and manuals for identifying any unknown plants at species level.
K3	CO3	Application of micronutrients and growth regulators for the development of plants.
K3	CO4	Explore knowledge on ecosystems, environmental pollution and soil conservation strategies.

SYLLABUS

UNIT I **(15 HOURS)**

Anatomy: Scope and significance of plant anatomy. A brief account of meristems and tissues (simple and complex tissue). Primary structure of dicot and monocot stem and root.

UNIT II **(15 HOURS)**

Embryology: Microsporogenesis. Development of Male gametophyte, Megasporogenesis, Development of female gametophyte (*Polygonum* type). Structure of mature embryo sac. Type of embryo sac - Polygonum type (8 nucleus) and Oenothera type (4 nucleus). Types of endosperms. Development of Dicot embryo (*Capsella* type).

UNIT III **(15 HOURS)**

Taxonomy of Angiosperms: Bentham and Hooker's classification (outline only). Study of the following families with their economic importance- Annonaceae, Cucurbitaceae, Asteraceae, Apocyanaceae, Lamiaceae, Amarantaceae, Liliaceae and Poaceae. Herbarium techniques.

20UBO2A2

UNIT IV **(15 HOURS)**

Physiology: Water relationships of plants. Osmosis, absorption of water, absorption of ions. Photosynthesis: Photosynthetic apparatus, primary photochemical reaction, path of carbon (Calvin cycle). Respiration: Glycolysis and Krebs's cycle. Phytohormones: auxins and cytokinins.

UNIT V **(15 HOURS)**

Environmental Botany: Scope and significance of environmental studies**.** Structure and functions of ecosystems. Vegetational types of Southern India. Pollution - Air*, water and noise. Soil conservation methods.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Gangulee H C Das, K S Dutta CT (1986). College Botany Vol. - I.AIU publications. New Delhi
2. Gangulee and Kar, A K. (1986). College Botany Vol. - II. AIU Publications. New Delhi

REFERENCE BOOKS

1. Pandey, B.P. (1997). Taxonomy of Angiosperms. Chand & Co., New Delhi.
2. Jain, V.K. (1993). Fundamentals of plant physiology. S. Chand & Co. New Delhi
3. Shukla. R.S. and P. S. Chandal. (2000). Plant Ecology and soil science. Chand & Co. Ltd., New Delhi.
4. Bhojwani & Bhatnager. (1977). The embryology of angiosperms. Vikas Publishing House, New Delhi
5. Pandey, B.P. (1978). Plant Anatomy. Chand and Co, New Delhi.
6. Maheswari P (1950). An introduction to the embryology of Angiosperms. McGraw Hill.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	M	H	H
CO2	S	H	H	M	S
CO3	H	M	S	H	M
CO4	S	H	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low

20UBO2AL

Programme Code: 05		For B.Sc., ZOOLOGY		
Course code : 20UBO2AL		ALLIED PRACTICAL BOTANY- I & II		
Batch 2020 - 2021	Semester II	Hours/Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To acquire knowledge on the morphological and anatomical features of vascular plants.
- To learn the basic concepts and principles of ecosystem.
- To create basic skills on biosystematics and herbarium preparation techniques.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	**CO1**	Apply knowledge on the identification of lower life forms.
K4	**CO2**	Analyze various diseases and their impact on crop plants
K5	**CO3**	Examine physiological process that occur in plant life .

LIST OF PRACTICALS

ALLIED PR. BOTANY - I

1. **Phycology**: Structure and the reproduction of the following:
   - *i. Oscillatoria*
   - *ii. Caulerpa*
   - iii. *Chara*
2. **Mycology**
   - i. *Albugo*
   - *ii. Agaricus*
3. **Plant pathology:** Symptoms, causative organisms and control measures of
   - i. Tikka disease of Groundnut
   - ii. Citrus canker
4. **Bryophytes**
   - i. *Marchantia*
   - *ii. Funaria*
5. **Pteridophytes**
   - i. *Lycopodium*
   - *ii. Adiantum*
6. **Gymnosperms**
   - i. *Cycas*
   - *ii. Gnetum*

UBO75

20UBO2AL

ALLIED PR. BOTANY - II

1. **Anatomy**
    1. Primary and secondary structure of Dicot stem and root
    2. Primary structure of monocot stem and root.

2. **Embryology**
    1. T.S. of mature anther
    2. Types of the endosperm

3. **Taxonomy of Angiosperms:**
    1. Study of the Morphology and systematic position of plant families mention in theory

4. **Physiology**
    1. Osmosis, O_2 evolution during photosynthesis

5. **Environmental Botany**
    1. Aquatic and terrestrial ecosystem.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	M	H	H
CO2	S	H	H	M	S
CO3	H	M	S	H	M

S - Strong **H** - High **M** - Medium **L** - Low

UBO76

20UBO2AL

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029
UG MODEL QUESTION PAPER (PRACTICALS)

End semester Examination Question Paper Pattern

(For the candidates admitted from the academic year 2020-21 onwards)

Time: 3 Hours **Max. Marks: 30 Marks**

BREAK UP OF MARKS

ALLIED PRACTICAL BOTANY - I & II

I. Algae and Bryophytes		**- 04 Marks**
II. Pteridophytes/Gymnosperm		**- 06 Marks**
III. Anatomy section		**- 04 Marks**
IV. Taxonomy		**- 04 Marks**
IV. Physiology setup		**- 03 Marks**
V. Spotters		**- 04 Marks**
Record		**- 05 Marks**
	TOTAL	**- 30 Marks**

EXTRA DEPARTMENTAL COURSE (EDC) PAPER

UBO78

20UBO5X1

Programme Code: 05		**For UG STUDENTS**		
Course Code: 20UBO5X1		**Extra Departmental Course (EDC) - MEDICINAL BOTANY AND HUMAN WELFARE**		
Batch 2020-2021	**Semester V**	**Hours / Week 2**	**Total Hours 30**	**Credits 3**

COURSE OBJECTIVES

- To study the Indian system of traditional medicine.
- To gain knowledge on pharmacognosy of medicinal plants.
- To familiarize cultivation technologies of medicinal plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize crude drugs used in traditional system of medicine.
K2	CO2	Understand the therapeutic potential of crude drugs.
K3	CO3	Apply the knowledge in the cultivation practices of medicinal plants.
K3	CO4	Implement knowledge in identifying novel drug leads against allopathic medicine.

SYLLABUS

UNIT-I **(6 Hours)**

Indian systems of medicine - AYUSH (Ayurvedha, Unani, Siddha and Homeopathy). Classification of crude drugs and evaluation of drugs. Drug adulteration.

UNIT-II **(6 Hours)**

Morphological and histological studies Chemical constituents. Therapeutic and other pharmaceutical uses of bark - *Cinchona*, Leaves - *Adathoda* and Flower-*clove*.

UNIT-III **(6 Hours)**

Fruits and seeds - Gooseberry and poppy seeds, Underground stem-ginger-Unorganized drugs. Gum - Gugul, Resin - *Ferula*, Fixed oil- Castor oil.

UNIT-IV **(6 Hours)**

A brief account of the following: Drugs acting on the central nervous system, Drugs used in the disorders of the gastro-intestinal tract and Cardio vascular drugs.

20UBO5X1

UNIT-V **(6 Hours)**

Botanical features, medicinal uses and cultivation of medicinal plants - *Emblica*, *Gloriosa* and *Rauwolfia**.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOK

1. Trease and Evans. (1978). Pharmacognosy, Baillere Tindall London.
2. T.E.Wallis. (2005). Text book of Pharmacognosy Fifth Edition. Publishers- CBS publishers and distributions Delhi.

REFERENCES

1. S.S Handa and V.K. Kapoor. (1989). Pharmacognosy, Second Edition. Publishers- CBS Publishers and Distributors, Delhi.
2. Kumar N.C. (1993). An introduction to Medical Botany and Pharmacognosy, Emky Publications, New Delhi.
3. Supriya Kumar B. (2005). Hand Book of Medicinal Plants, Pointers Publishers, Jaipur.
4. Kokate C.K., A.Purohit and S.R. Gokhale. (2002). Pharmacognosy, 13th Edition Publishers Nirali Prakashan. Pune.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	S	H
CO2	S	M	S	H	M
CO3	H	S	M	H	H
CO4	S	H	S	H	M

S - Strong **H** - High **M** - Medium **L** - Low

NON-MAJOR ELECTIVE

UBO81

20UHR3N1

Programme Code : 05	Title: B.Sc., BOTANY		
	Non- Major Elective 1 – HUMAN RIGHTS		
Batch	**Hours/Week**	**Total Hours**	**Credits**
2020-2021	**2**	**30**	**2**

Course Objectives

1. To prepare for responsible citizenship with awareness of the relationship between Human Rights, democracy and development.
2. To impart education on national and international regime on Human Rights.
3. To sensitive students to human suffering and promotion of human life with dignity.
4. To develop skills on human rights advocacy
5. To appreciate the relationship between rights and duties
6. To foster respect for tolerance and compassion for all living creature.

UNIT I **(6 Hours)**

Definition, Meaning, Concept ,Theories and Kinds of Human Rights- Evaluation and Protection of Human Rights in India- Development of Human Rights under the United Nations.

UNIT II **(6 Hours)**

United Nations Charter and Human Rights - U.N.Commission on Human Rights- Universal Declaration of Human Rights - International Covenant on

- Civil & Political Rights
- Economic, Social and Cultural Rights

UNIT III **(6 Hours)**

Human Rights and Fundamental Rights (Constitution) - Enactments regarding Human Rights Laws in India - National Human Rights Commission and State Human Rights Commission.

UNIT IV **(6 Hours)**

Aged persons and their Human Rights - Human Rights of Persons with Disabilities - Tribal Human Rights in India - Three Generation Human Rights.

UNIT V **(6 Hours)**

Rights of Women, Child, Refugees and Minorities - Media and Human Rights - NGO's in protection of Human Rights - Right to Election

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

20UHR3N1

TEXT BOOKS

1. Human Rights Compiled by Dr. V. Sugantha, Kongunadu Arts and Science College, Coimbatore -29.

REFERENCES

1. Human Rights, Jaganathan,MA., MBA., MMM., ML., ML., Humanitarian Law and J.P.Arjun Proprietor,Usha Jaganathan Refugee Law law series, 1st floor, Narmatha Nanthi Street, Magathma Gandhi Nagar, Madurai - 625014.
2. Promoting Women's Rights Publisher : United Nations. As Human Rights New York., 1999.

Question Paper Pattern
(External only)

Duration: 3 hrs **Max: 75 marks**

Section A (5x5=25)

Short notes
Either - Or/ Type - Question from each unit

Section B (5x10=50)

Essay type
Either - Or/ Type - Question from each unit

UBO83

20UWR4N2

Programme Code : 05	Title: B.Sc., BOTANY		
	Non- Major Elective II – WOMEN'S RIGHTS		
Batch	**Hours/Week**	**Total Hours**	**Credits**
2020-2021	**2**	**30**	**2**

COURSE OBJECTIVES

- To know about the laws enacted to protect women against violence.
- To impart awareness about the hurdles faced by women.
- To develop a knowledge about the status of all forms of women to access to justice.
- To create awareness about women's rights.
- To know about laws and norms pertaining to protection of women.
- To understand the articles which enables the women's rights.
- To understand the Special Women Welfare laws.
- To realize how the violence against women puts an undue burden on health care services.

Unit I **(6 Hours)**

Laws, Legal System & Change

Definition- Constitutional law, CEDAW and international human rights-law and norms-laws and social context-constitutional and legal frame.

Unit II **(6 Hours)**

Politics of Land and Gender in INDIA

Introduction-faces of poverty-land as productive resources-locating identities women's claim to land -rights of properties-case studies.

Unit III **(6 Hours)**

Women's Rights: Access to Justices

Introduction-criminal law-crime agent women-domestic violence-dowry related harassment and dowry deaths-molestation-sexual abuse and rape-loopholes in practice-laws enforcement agency.

Unit IV **(6 Hours)**

Women's Right

Violence against-women-domestic violence-the protection of women from domestic violence act, 2005-The Marriage Validation Act, 1982-The Hindu Widow Re-marriage Act, 1956 - The Dowry Prohibition Act, 1961.

20UWR4N2

Unit V **(6 Hours)**

Special Women Welfare Laws

Sexual harassment at work place-rape and indecent representation-the indecent representation act, 1956-acts enacted for women development and empowerment-role of rape crisis center.

Book for study: Published by Kongunadu Arts & Science College, 2011.

Books for reference:

1. Good Women do not Inherit land Nitya Rao, Social Science Press and Orient Blackswan (2008).
2. Knowing Our Rights An Impart for Kali for Women (2006). International solidarity network.
3. Women Rights P.D.Kaushik, Bookwell Publications (2007).
4. Violence Protective Measures for Aruna Goal, Women Development and Empowerment Deep and Deep Publications Pvt. (2004).
5. Gender Justice Monika Chawla, Deep and Deep Publications Pvt. (2006).
6. Domestic Violence Against Women Preeti Mishra, Deep and Deep Publication, Pvt. (2007).
7. Violence against Women Clair M. Renzetti, Jeffrey L. Edleson, RaquelKennedy Bergen, Sage Publications (2001).

Question paper pattern

(External Only)

Duration: 3 hrs **Max: 75 Marks**

Section A (5 x 5=25)

Short notes

Either - or / type - question from each unit.

Section B (5 x 10=50)

Essay type

Either - or / type - question from each unit.

UBO85

Programme Code : 05	Title: B.Sc., BOTANY		
	Non- Major Elective III – Consumer Affairs		
Batch	Hours/Week	Total Hours	Credits
2020-2021	2	30	2

Course Objectives

1. To familiarize the students with their rights and responsibilities as a consumer.
2. To understand the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards.
3. To have a handle the business firms' interface with consumers and the consumer related regulatory and business environment.

UNIT I **(6 Hours)**

Conceptual Framework - Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Experiencing and Voicing Dissatisfaction: Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

UNIT II **(6 Hours)**

The Consumer Protection Law in India - Objectives and Basic Concepts: Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, restrictive trade practice.

Organizational set-up under the Consumer Protection Act: Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

UNIT III **(6 Hours)**

Grievance Redressal Mechanism under the Indian Consumer Protection Law - Who can file a complaint? Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties.

Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNIT IV **(6 Hours)**

Role of Industry Regulators in Consumer Protection

i. Banking: RBI and Banking Ombudsman
ii. Insurance: IRDA and Insurance Ombudsman
iii. Telecommunication: TRAI
iv. Food Products: FSSAI
v. Electricity Supply: Electricity Regulatory Commission
vi. Real Estate Regulatory Authority

UNIT V **(6 Hours)**

Contemporary Issues in Consumer Affairs - Consumer Movement in India: Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings. Quality and Standardization: Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

Note: Unit 2 and 3 refers to the Consumer Protection Act, 1986. Any change in law would be added appropriately after the new law is notified.

Suggested Readings:

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) Consumer Affairs, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). Consumer Protection Law Provisions and Procedure, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). Globalisation and Consumerism: Issues and Challenges, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). Consumer Protection in India: Issues and Concerns, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), Consumer is King, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). Consumer Right for Everyone Penguin Books.
7. E-books :- www.consumereducation.in
8. Empowering Consumers e-book, www.consumeraffairs.nic.in
9. ebook, www.bis.org
10. The Consumer Protection Act, 1986 and its later versions.

CERTIFICATE COURSE - BONSAI

20CCB101

Programme Code: 05	Title: CERTIFICATE COURSE - BONSAI		
Course Code: 20CCB101	C.P. 1. INTRODUCTION TO BONSAI PRINCIPLES AND TECHNIQUES		
Batch 2020-2021	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To know the latest development in the field of Bonsai.
- To develop skills in the area of designing, styles and making of bonsai.
- To create knowledge on self employment through and entrepreneur skills.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize about preliminary techniques about Bonsai.
K2	CO2	Understand the necessary skills to take care and maintain a Bonsai plant.
K3	CO3	Apply knowledge on Bonsai cultivation and marketing.
K3	CO4	Implement the acquired knowledge on commercial applications Bonsai

SYLLABUS

UNIT I: **(6 hours)**

Introduction - History, aim, scope and importance of Bonsai - Identification and collection of suitable plants for bonsai making.

UNIT II: **(6 hours)**

Tools, containers, wiring and preparation of media. Designing, Styles and making of bonsai. Training and pruning techniques in bonsai. Irrigation, pest and disease management.

UNIT III: **(6 hours)**

Styles of Bonsai - Upright Style, Formal Upright, Informal Upright Style, Slanting Style Windswept Style, Broom Style.

UNIT IV: **(6 hours)**

Cascade Styles of Bonsai - Semi Cascade Style, Formal Cascade Style, Informal or Vertical Cascade Style, Displaying Cascade Style Bonsai.

UNIT V: **(6 hours)**

Multiple tree styles of Bonsai - Two-Tree and Twin Trunk Style Bonsai. Forest Style Bonsai*. Bonsai with Special Characteristics.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Paul Lesniewicz., 1994. Bonsai in your home. Sterling publishing Co, New York.
2. Randhawa, G.S., and Amitabha Mukhopadhyay, 2000. Floriculture in India, Allied publishers, India.

REFERENCES

1. Roy Edwin Biles, (2003). The complete Book of Gardening. Biotech Books, Delhi - 35.
2. Bhattacharjee, S.K. (2006). Advances in Ornamental Horticulture. Pointer Publication, Jaipur.
3. Doesh Beer Singh and Poonam Wazir, (2002). Bonsai - An art. Scientific Publishers, Jodhpur.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	H
CO2	S	M	H	H	M
CO3	H	S	M	H	H
CO4	S	H	M	S	M

S - Strong **H** - High **M** - Medium **L** - Low

UBO91

20CCB102

Programme Code: 05	**Title: CERTIFICATE COURSE - BONSAI**		
Course Code: 20CCB102	**C.P. 2. ETHICS, VALUES AND MARKETING OF BONSAI**		
Batch 2020-2021	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To know the ethical value of bonsai
- To understand the common and special types of bonsai.
- To recognize the marketing potential of bonsai in India

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize the traditions and rituals values of bonsai
K2	CO2	Understand the types of commercial and aesthetic types of bonsai
K3	CO3	Implement knowledge on marketing practice of bonsai
K3	CO4	Describe the economic value of bonsai

SYLLABUS

UNIT I: **(6 hours)**

Bonsai rules, traditions and rituals - Respect for Nature and conservation - Miniature Bonsai - Developing Miniature Bonsai, Containers and Soil for Miniature Bonsai, Care and Maintenance.

UNIT II: **(6 hours)**

Special techniques in Bonsai - Driftwood Style, Selecting Material for Driftwood Style Bonsai, Creating Driftwood Style Bonsai and Dead Wood on Bonsai. Root over rock bonsai.

UNIT III: **(6 hours)**

Collecting, refining and displaying Bonsai - Sources of Material for Bonsai, Collecting Material from the Ground, Buying Material, Propagating Bonsai Material by, Seeds, Cuttings, Dividing, Grafting and Layering.

UNIT IV: **(6 hours)**

Refining Bonsai, Review the Basic Styles*, Species, Roots, Trunk, Branches and Foliage, Container, Soil and Displaying. Displaying in a Private Collection, Displaying in a Public Exhibit.

20CCB102

UNIT V: **(6 hours)**

Economic importance of Bonsai in tribal livelihood - marketing of Bonsai in ecotourism places. Bonsai - Rehabilitation prospects.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

Text books

1. Chadha, K.L., 2001. Handbook of horticulture. ICAR, New Delhi.

2. Bhattacharjee, S.K., 2004. Landscape gardening and design with plants. Aavishkar Publishers and Distributors, Jaipur, India.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	H
CO2	S	M	H	H	M
CO3	H	S	M	H	H
CO4	S	H	M	S	M

S - Strong **H** - High **M** - Medium **L** - Low

UBO93

20CCB1CL

Programme Code: 05		**Title: CERTIFICATE COURSE - BONSAI**		
Course Code: 20CCB1CL		**C.Pr.1. Bonsai Techniques**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**2**	**30**	**2**

COURSE OBJECTIVES

- To identify the wild plants species for bonsai making.
- To select the suitable tools for bonsai making.
- To prepare the bonsai of market value.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Understand the programmes being carried out to conserve species through bonsai techniques
K4	CO2	Investigate the current status of bonsai .
K5	CO3	Implement the acquired knowledge on commercial applications of Bonsai

LIST OF PRACTICALS

1. Identification of Plants suitable for making bonsai
2. Identification of tools for making bonsai (Repotting, pruning tools)
3. Role of fertilizer and its importance for bonsai making (organic and inorganic)
4. Selection of the suitable plants to make different styles of bonsai
5. To acquire knowledge on special styles in bonsai (Bonsai on Rock and Root over bonasi)

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	H	S	M	S
CO2	S	M	H	S	H
CO3	H	H	M	H	H

S - Strong **H** - High **M** - Medium **L** - Low

UBO94

20CCB1CL

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

CERTIFICATE COURSE QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2020-21 onwards)

Time: 3 Hours **Max. Marks: 100 Marks**

BREAK UP OF MARKS

A. Identification of Plants suitable for making bonsai	**-15 Marks**
B. Identification of tools for making bonsai	**-15 Marks**
C. Cutting, Wiring and Pruning techniques	**-20 Marks**
D. Role of fertilizer and its importance for bonsai making	**- 5 Marks**
E. Styles of bonsai	**-15 Marks**
F. Set-up Root over Rock	**-10 Marks**
Record	**- 20 Marks**
TOTAL	**- 100 Marks**

KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE – 641 029

DEPARTMENT OF BOTANY (PG)

CURRICULUM AND SCHEME OF EXAMINATIONS
(CBCS)
(2020 – 2021 and onwards)

KONGUNADU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
COIMBATORE – 641 029

Vision:

Developing the total personality of every student in a holistic way by adhering to the principles of **Swami Vivekananda** and **Mahatma Gandhi**.

Mission:

- Imparting holistic and man-making education with emphasis on character, culture and value - moral and ethical.
- Designing the curriculum and offering courses that transform its students into value added skilled human resources.
- Constantly updating academic and management practices towards total quality management and promotion of quality in all spheres.
- Extending the best student support services by making them comprehensive and by evolving a curriculum relevant to student community and society at large.
- Taking steps to make education affordable and accessible by extending scholarships to the meritorious and economically disadvantaged students.
- Moulding the teachers in such a way that they become the role models in promoting Higher Education.

DEPARTMENT OF BOTANY

Vision:

- Disseminate the knowledge on plants and their utility to the society.
- To develop feasible strategies in plant sciences for obtaining sustainable benefits from them.

Mission:

- Designing the curriculum by frequently updating the syllabi according to the need.
- Preparing the students with more aptitude, skill and leadership quality by educating them.
- Make the students as entrepreneurs in the plant based industries.
- Identification and encouragement to turn the students into eminent Scientists/ Laurels.

PROGRAMME OUTCOMES (PO)

PO 1

- This programme aids an excellent opportunities for students to develop demonstrative knowledge, understanding skills, qualities and other attributes in the range of plant diversity in terms of structure, function, evolution and their environmental relationships.

PO2

- Plant diversity conservation strategies such as tissue culture techniques, *in situ* and *ex situ* methods motivate students to create interest towards nature and its protection of plant heritage.

PO3

- Contribution and importance of medicinal plants instill a sense of care and concern over the improved production of our supply on medicine, food and other plant products for the betterment of man's holistic development and welfare.

PO4

- Explore the therapeutic aspects of medicinal plants by traditional indigenous approaches and perspectives on treating ailments.

PO5

- Contribution and importance of medicinal plants instill a sense of care and concern over the improved production of out supply on medicine, food and other plant products for the betterment of man's holistic development and welfare.

PO6

- Students can acquire acquainted knowledge on basic scientific phenomena, fundamental principles, and applications of various mathematical tools and physical principles in relevant biological situations.

PO7

- Students will be able to understand the potentials, and impact of biotechnological innovations by implementing modern appropriate techniques and practical exposures in the field of Plant Molecular Biology, Plant Biotechnology and Nanobiology.

PO8

- Demonstrate knowledge and understanding of concepts and principles in recent research approaches and to manage projects in multidisciplinary environments.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1

- Highest priority is given to morphology, taxonomy, anatomy and embryology to know each and every character of the plant both in external and internal characters for their identification and classification to involve plants further in biochemical and pharmaceutical aspects.

PSO2

- Students will be able to apply fundamental biostatistics, bioinformatics tools and biophysical principles for the analysis of relevant biological situations and for developing intellectual skills on biological data and databases.

PSO3

- Students will be able to explicate the ecological interconnections of life on earth by tracing energy and nutrient flows through the environment by the microbial and degradation of the waste. They will be able to relate the physical features of the environment to that of the structure of populations, communities and ecosystem.

PSO4

- Study on medicinal plants provide firsthand knowledge on local, rare, endangered, endemic and exotic medicinal plants in their original habitats, their therapeutic values acquired through their physiological pathways and their cultivation practices for effective conservation for future use.

PSO5

- Through microbiological core concepts the students were able to inter-relate integral and ubiquitous role of microbes with their environment. In plant pathology, students are expected to recognize plant diseases and their disease management in economically important crop plants.

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

Course Name: M.Sc. Botany

Curriculum and scheme of Examination under CBCS

(Applicable to the students admitted during the Academic Year 2020-2021)

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
I	20PBO101	C.P.1 - Plant Diversity I	7	25	75	100	3	5
	20PBO102	C.P.2 - Plant Diversity II	7	25	75	100	3	5
	20PBO103	C.P.3 - Anatomy, Embryology of Angiosperms and Microtechniques	6	25	75	100	3	5
	20PBO1E1	Major Elective I	6	25	75	100	3	5
	20PBO1CL	C.Pr.1 - Plant Diversity I & II , Anatomy, Embryology of Angiosperms and Microtechniques	4	40	60	100	4	2
		Total	**30**	-	-	**500**	-	**22**
II	20PBO204	C.P.4 - Bioinformatics	6	25	75	100	3	4
	20PBO205	C.P.5 - Cell Biology, Genetics, Plant Breeding and Biostatistics	6	25	75	100	3	5
	20PBO206	C.P.6 - Ecology, Bioenergetics and Natural Resource Management	6	25	75	100	3	5
	20PBO2E2	Major Elective II	6	25	75	100	3	5
	20PBO2CM	C.Pr.2 – Bioinformatics	2	40	60	100	4	2
	20PBO2CN	C.Pr. 3 - Cell Biology, Genetics, Plant Breeding and Biostatistics, Ecology, Bioenergetics and Natural Resources Management	4	40	60	100	4	2
		Total	**30**	-	-	**600**	-	**24**
III	20PBO307	C.P.7 - Taxonomy and Biosystematics	6	25	75	100	3	5
	20PBO308	C.P.8 - Microbiology and Plant Pathology	6	25	75	100	3	5
	20PBO309	C.P.9 - Biotechnology and Nanobiology	6	25	75	100	3	5
	20PBO3N1	Non-Major Elective I	6	25	75	100	3	4
	20PBO3CO	C.Pr.4 - Taxonomy and Biosystematics, Microbiology and Plant Pathology & Biotechnology and Nanobiology	4	40	60	100	4	2
	-	Extra Departmental Course (EDC)	2	25	75	100	3	2
		Total	**30**	-	-	**600**	-	**23**
IV	20PBO410	C.P.10 – Biophysics, Biochemistry and Bioinstrumentation	7	25	75	100	3	5
	20PBO411	C.P.11 - Plant Physiology	7	25	75	100	3	5
	20PBO4N2	Non-Major Elective II	7	25	75	100	3	4
	20PBO4CP	C.Pr.5– Biophysics, Biochemistry and Bioinstrumentation & Plant Physiology	4	40	60	100	4	2
	20PBO4Z1	Project Work & Viva - Voce	5	20	80	100	-	5
		Total	**30**	-	-	**500**	-	**21**
		Grand Total		-	-	**2200**	-	**90**

Note:

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

Major Elective Papers

(2 papers are to be chosen from the following 4 papers)

1. **Forest Resources and Utilization**
2. **Seed Technology**
3. **Food Science and Nutrition**
4. **Horticulture**

Non-Major Elective Papers

(2 papers are to be chosen from the following 4 papers)

1. **Pharmacognosy**
2. **Limnology**
3. **Plant Biotechnology**
4. **Medicinal Plants**

Sub code and title of the Extra Department Course (EDC)

20PBO3X1- APPLIED HORTICULTURE

Tally Table:

Part	Subject	No. of Subjects	Total Marks	Credits
I	Core - Theory / Practical / Project	17	1700	70
	Major Elective Paper	2	200	10
	EDC Paper	1	100	2
	Non - Major Elective Paper	2	200	8
	Grand Total	**22**	**2200**	**90**

- 25 % CIA is applicable to all subjects except JOC, COP and SWAYAM courses which are considered as extra credit courses.
- The students are advised to complete a **SWAYAM-MOOC** before the completion of the 3rd semester and the course completed certificate should be submitted to the HOD. Two credits will be given to the candidates who have successfully completed.
- A **Field Trip** preferably relevant to the course should be undertaken every year.

Extra Credit Courses

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
II	**20PBO2J1**	**JOC - Floriculture and Landscaping**	4	-	100	**100**	3	**2**
	20PBO2J2	**JOC - Food Processing and Preservation**	4	-	100	**100**	3	**2**

Diploma Courses

PG Diploma in Biodiversity -

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
I	**20PDB101**	**C.P.1. Introduction to Biodiversity**	2	25	75	**100**	3	**2**
	20PDB102	**C.P.2. Values, Uses and Loss of Biodiversity**	2	25	75	**100**	3	**2**
	20PDB103	**C.P.3. Conservation and Management of Biodiversity**	2	25	75	**100**	3	**2**
	20PDB1CL	**C.Pr.1. Biodiversity**	2	40	60	**100**	3	**2**
		Total	**8**			**400**		**8**
II	**20PDB204**	**C.P.4. Biodiversity Prospecting and Indigenous Knowledge System (IKS) and Biotechnology for Biodiversity**	2	25	75	**100**	3	**2**
	20PDB205	**C.P.5. Wildlife Biology and Conservation Policies and Law**	2	25	75	**100**	3	**2**
	20PDB2Z1	**Project**	4	40	160	**200**	-	**4**
		Total	**8**			**400**		**8**
		Grand total	**16**			**800**		**16**

Note:

CBCS - Choice Based Credit System
CIA - Continuous Internal Assessment
ESE - End of Semester Examinations

25 % CIA is applicable to all subjects except JOC, ALC, COP and Diploma Courses, which are considered as extra credit courses.

Components of Continuous Internal Assessment

Components		Marks	Total
Theory			
CIA I	75	(75+75 = 150/10)	25
CIA II	75	15	
Assignment		5	
Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	
Project			
Review		15	20
Regularity		5	

PBO4

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate

1. Theory Examination: CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 – K2 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K2 – K4 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K2 - K4 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

2. Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments	50	60
K4	Record Work	10	
K5			

3. Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report Viva - voce	60	80
K4		20	
K5			

20PBO101

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO101		**Core Paper: 1 -PLANT DIVERSITY - I**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**7**	**105**	**5**

COURSE OBJECTIVES

- To obtain knowledge on diverse groups of Thallophytes.
- To impart insight knowledge on the diversity, structural organization and reproduction of algae, fungi and lichens.
- To acquire knowledge on the life cycle patterns of Thallophytes and their significance.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Grasp the basic concepts of lower life forms.
K2	CO2	Understand the diversity in habits, habitats and organization of various groups of lower plants.
K3	CO3	Inherit knowledge on the exploitation of useful products from lower forms for the betterment of human welfare.
K3	CO4	Apply their acquired knowledge to improve the economic quality of the lower life forms.

SYLLABUS

UNIT I **(21 HOURS)**

Algae: History, Details of habit, habitats and distribution of algae. Systems of classification in algae, Classification of algae by Fritsch (1945). Algal pigments. General characters - thallus organization, algal pigments, reproduction and life cycle patterns in algae. Thallus organization, reproduction and life cycles of Cyanophyceae, Chlorophyceae and Xanthophyceae.

UNIT II **(21 HOURS)**

Thallus organization, reproduction and life cycle patterns of Bacillariophyceae, Phaeophyceae and Rhodophyceae. Phylogeny and evolution of algae. Ecological and economical aspects of algae. Algae as pollution indicators*. Centers of algal research in India. Contribution of Indian Phycologists. Algal blooms.

UNIT III **(21 HOURS)**

Fungi: History, General features, occurrence and distribution, fungal taxonomy, mode of nutrition, classification of fungi by Alexopoulos and Mims (1979). Range of thallus structures, reproduction and types of fructifications in fungi and types of spores . Thallus organization, reproduction and life cycle patterns of Myxomycetes and Oomycetes.

20PBO101

UNIT IV **(21 HOURS)**

Thallus organization, reproduction and life cycle patterns of Zygomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes. Homothallism and heterothallism. Phylogeny and interrelationship of fungi. Ecological and economic importance of fungi. Fungi as symbionts- recent insights of fungal phylogeny and evolution.

UNITV **(21 HOURS)**

Lichens: Brief history of lichens. General features, distribution, classification and thallus organization. Nature of dual organisms, Interrelationships of phycobionts and mycobionts in lichen thallus. Structure, reproduction and life cycle patterns of Ascolichen, Basidiolichen and Deutrolichens. Ecological and economical importance of lichens. Lichens as pollution indicators.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Fritsch F.E. (1965). (Rep) Structure and reproduction of the Algae. Vol I & II Cambridge University Press.
2. Alexopoulos C.J. and C.W. Mims. (1952). Introductory Mycology. East Wiley Ltd. New Delhi.
3. Sharma, O.P. (1986). Text book of Fungi. Tata McGraw - Hill publishing Co. New Delhi.
4. Gangulee, Das & Kar - (2001). College Botany Vol. I & II. New central Book agency Pvt. Ltd. Calcutta.
5. V. Singh, P.C. Pandey and D.K. Jain. (2012). A Text book of Botany. Rastogi Publication. Meerut, India.

REFERENCES

1. Bessey, E.A. (1971). Morphology and Taxonomy of Fungi. Hafner Publication Company, New York.
2. Bilgrams, K.S. and R.N. Verma, (1978). Physiology of Fungi. Vikas Publishing House.
3. Deacon, J.W. (1984). Introduction to Mycology. Blackwell Science publication, Oxford.
4. Duke, H.C. (1983). Introduction to fungi. Vikas publishing house. New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong **H** - High **M** - Medium **L** - Low

20PBO102

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO102		**Core Paper: 2 -PLANT DIVERSITY - II**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**7**	**105**	**5**

COURSE OBJECTIVES

- To impart insight knowledge on the structural organizations and life cycle patterns of Bryophytes, Pteridophytes and Gymnosperms.
- To understand the basic concepts of evolutionary trends in Cryptogams and Phanerogams.
- To learn the preserved vestiges of various plant life forms of geological past.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Gain the knowledge on phylogeny of Bryophytes, Pteridophytes and Gymnosperms.
K2	CO2	Understand the alternation and generations of Cryptogams and Phanerogams.
K3	CO3	Apply the knowledge on identification of living fossils from the fossils.
K3	CO4	Distinguish various kinds of fossilization process.

SYLLABUS

UNIT 1 **(21 HOURS)**

Bryophytes: General features and distribution. Classification of Bryophytes (Smith, 1955). General characters of Hepaticopsida, Anthoceropsida and Bryopsida. Structure and evolution of gametophyte and sporophyte. Ecological and economic importance of Byrophytes*. Fossil Bryophytes.

UNIT II **(21 HOURS)**

Pteridophytes: General features and distribution of Pteridophytes. Classification of Pteridophytes by Sporne (1966). General characters of Psilotopsida, Lycopsida, Sphenopsida and Pteropsida.

UNIT III **(21 HOURS)**

Reproduction methods in Pteridophytes. Origin and evolution. Vascular organization and Stelar evolution in Pteridophytes. Heterospory and origin of seed habits. Evolution of sorus. Ecological and economic importance of Pteridophytes.

UNIT IV **(21 HOURS)**

Gymnosperms: General characters, distribution and origin of Gymnosperms. Classification of Gymnosperms by Coulter and Chamberlain (1956). General structure and inter-relationships of Pteridospermales, Bennettitales, Pentoxylales and Ginkgoales.

20PBO102

UNIT V **(21 HOURS)**

General structure and inter-relationships of Cycadales, Coniferales and Gnetales. Angiospermic characters of Gnetales. Phylogenetic trends and affinities of various classes. Ecological and economic importance of Gymnosperms. Distribution of living Gymnosperms in India.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Gangulee, Das & Kar. (2001. College Botany Vol I & II. New central Book agency Pvt. Ltd. Calcutta.
2. Pandey, B.P. (1990). (6th Ed.). A Textbook of Botany Vol. II. S. Chand & Co. Ltd., New Delhi.
3. Vasistha, P.C. (1971). Botany for Degree students. S. Chand & Co. Ltd., New Delhi.

REFERENCES

1. Sporne, K. R. (1966). The morphology of Pteridophytes. Bal Bergen Boeken, London.
2. Sporne, K.R. (1967). The morphology of Gymnosperms. Bal Bergen Boeken, London.
3. Arnold, C.D. (1947). An introduction to Paleobotany. McGraw Hill Publications, New York.
4. Seward A.C. (1991). Fossil plants. Today and Tomorrow Publishers, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	H	S	H	H	M
CO3	S	H	M	S	S
CO4	H	M	H	H	M

S - Strong **H** - High **M** - Medium **L** - Low

20PBO103

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 20PBO103		Core Paper: 3 –ANATOMY, EMBRYOLOGY OF ANGIOSPERMS AND MICROTECHNIQUES		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**6**	**90**	**5**

COURSE OBJECTIVES

- To understand the histochemical techniques involved in permanent micro slides.
- To acquire knowledge about complex vascular tissues.
- To obtain inherit knowledge on mega and macro sporangial development and their functions.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize various histochemical techniques involved in anatomy and embryology.
K2	CO2	Understand phylogenetic relationship of vascular tissues.
K3	CO3	Prepare their own microslides taken from the microtome.
K3	CO4	Adopt the parthenocarpic techniques for economically important crop improvements.

SYLLABUS

UNIT I (18 HOURS)

Introduction to complex tissue: xylem - tracheids and vessels. Dendrochronology - sap wood and heart wood - arrangement of vessels in secondary xylem. Phloem structure and transfer cells. Differentiate between primary and secondary xylem and phloem. Compression wood and tension wood. Phylogenetic trends of xylem and phloem.

UNIT II (18 HOURS)

Normal secondary growth in dicot stem*. Vascular cambium - origin, types - storied and non storied cambium, cork cambium, wound healing activity. Anomalous secondary growth in dicot and monocot stem in *Aristolochia*, *Boerhaavia*, *Piper* and *Draceana*. Nodes - types and evolution. Kranz anatomy - anatomical features of CAM plants and leaf abscission.

UNIT III (18 HOURS)

Development of anther, types of tapetum, role of tapetum in pollen wall development, pollen wall morphogenesis, Pollen sterility, pollen-stigma compatibility, megasporogenesis, female gametophyte and nutrition of embryo sac.

UNIT IV (18 HOURS)

Fertilization, control of fertilization, development of dicot and monocot embryo. Endosperm development, types of endosperm, haustoria of endosperm. Apomixis. Polyembryony - types and causes. Seed formation, dormancy and germination. Experimental embryology (Embryo rescue and Anther culture) and Parthenocarpy.

20PBO103

UNIT V (18 HOURS)

Microtomy - Fixing and killing of plant tissues – Chemical and physical fixative reagents, Methods of tissue processing – Dehydration, clearing and infiltration, embedding, sectioning, single and double staining, mounting, labelling and storage of slides. Types of microtome and its knives. Histochemical staining.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Bhojwani S. S. and Bhatnager S.P. (1997). The embryology of Angiosperms. Vikas Publishers House, Chennai.
2. Fahn, A. Plant Anotamy. (1985) Pergman press, London.

REFERENCES

1. Esau, K. (1991). Anatomy of seed plants. (7th Ed.). Wely Eastern Ha, Chennai.
2. Eames A. J. and Mac Daniels. (1976). An introduction to plant Anatomy. Tata Mac Graw Hill, New Delhi.
3. Johri, B.M., K.B. Ambegaokar and P.S. Srivastava. (1992). Vol. I. Embryology of Angiosperms. Springer - Verlac, New York.
4. Maheswari, P. (2006). Introduction to embryology and Angiosperms. Tata Mac Graw Hill, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	M	H
CO2	H	H	S	S	H
CO3	M	H	H	M	S
CO4	H	S	H	S	M

S - Strong **H** - High **M** - Medium **L** - Low

20PBO1CL

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO1CL		**Core Practical: 1 - PLANT DIVERSITY- I & II, ANATOMY, EMBRYOLOGY OF ANGIOSPERMS AND MICROTECHNIQUES**		
Batch 2020-2021	**Semester I**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**

COURSE OBJECTIVES

- To understand the diversity and distribution of lower life forms.
- To know the variations in the internal structural organization among plants.
- To understand the basic concept and modern techniques of microtome.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Acquire and analyze interrelationships between algae and fungi.
K4	CO2	Understand the primary and secondary structure of plants.
K5	CO3	Monitor the sequential changes in the internal structure of plants by sectioning through microtechniques.

I. PLANT DIVERSITY - I

Study of morphology, anatomy, vegetative and reproductive organs using clear whole mounts / sections of the following genera.

Algae

Cyanophyceae : *Spirulina, Lyngbya, Anabaena, Nostoc* and *Scytonema*.
Chlorophyceae : *Volvox, Ulothrix, Cladophora, Pithophora, Oedogonium, Codium, Caulerpa* and *Chara*.
Xanthophyceae : *Vaucheria*
Bacillariophyceae : *Diatoms*
Phaeophyceae : *Ectocarpus, Dictyota, Padina, Sargassum* and *Turbinaria*
Rhodophyceae : *Gelidium, Amphiroa, Gracilaria* and *Polysiphonia*.

Fungi

Myxomycetes : *Plasmodiophora*.
Oomycetes : *Albugo* and *Phytophthora*.
Zygomycetes : *Rhizopus*.
Ascomycetes : *Saccharomyces, Penicillium* and *Aspergillus*.
Basidiomycetes : *Agaricus* and *Puccinia*.
Deuteromycetes : *Colletotrichum* and *Cercospora*.

Lichens

Morphology of Crustose, Foliose and Fruticose Lichens. Structure and reproduction of *Usnea*.

20PBO1CL

II. PLANT DIVERSITY - II

Study of morphology, anatomy, vegetative and reproductive organs using clear whole mounts / sections of the following genera.

Bryophytes

Marchantiales	:	*Marchantia, Lunularia* and *Reboulia*
Jungermanniales	:	*Fossombronia* and *Pellia*
Anthocerotales	:	*Anthoceros*
Sphagnidae	:	*Sphagnum*
Bryidae	:	*Bryum* and *Funaria*

Pteridophytes

Psilotopsida	:	*Psilotum*
Lycopsia	:	*Lycopodium, Selaginella* and *Isoetes*
Sphenopsida	:	*Equisetum*
Pteropsida	:	*Ophioglossum, Pteris, Adiantum, Marsilea* and *Azolla*.

Gymnosperms: *Cycas, Pinus, Cupressus, Podocarpus, Araucaria, Ephedra* and *Gnetum.*

Fossils: *Rhynia, Asteroxylon, Sphenophyllum, Ankyropteris, Botryopteris, Lagenostoma, Heterangium, Pentoxylon, Medullosa, Cycadeoidea* and *Cordaites*.

Field trip

Three days field visit - Observations of species habits in their natural habitats and specimen collection.

III. ANATOMY

- Identification using permanent slides / photographs
  - i. Structure of tracheids and vessels
  - ii. Types of wall thickening
  - iii. Types of wood
  - iv. Types of cambium
  - v. Nodal anatomy
- Anomalous secondary thickening – Dicot – *Aristolochia, Boerhaavia, Piper betel* ; Monocot – *Dracaena*.

EMBRYOLOGY OF ANGIOSPERMS

With the help of permanent slides to study

1. Stages in development of microsporangium and male gametophyte.
2. Configurations of ovules, 2, 4 nucleate embryo sac, mature embryo sac.
3. Types of endosperm.
4. Stages in embryogeny 2 or 3 celled, globular, proembryos mature embryos of monocot and dicot. Interpretation of embryological drawings.

MICROTECHNIQUES

- Rotary microtome
- Maceration
- Free hand sectioning and preparation of semipermanent slide (Submission of 5 slides for evaluation).
- Histochemical staining for starch, protein, lipid, polyphenol and tannin.

20PBO1CL

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	H
CO2	H	S	H	H	S
CO3	H	M	S	H	M

S - Strong **H** - High **M** - Medium **L** - Low

PBO14

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

PG MODEL QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2020-21 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 1- PLANT DIVERSITY- I & II, ANATOMY, EMBRYOLOGY OF ANGIOSPERMS AND MICROTECHNIQUES

I. Algal mixture	**- 06 Marks**
II. Micro preparation (5 × 4)	**- 20 Marks**
III. Histochemical staining	**- 04 Marks**
IV. Embryo mounting (2 × 1½)	**- 03 Marks**
V. Spot at sight (6 × 2)	**- 12 Marks**
Submission of permanent slides	**- 05 Marks**
Record	**- 10 Marks**
TOTAL	**- 60 Marks**

20PBO204

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO204		**Core Paper: 4 - BIOINFORMATICS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**II**	**6**	**90**	**4**

COURSE OBJECTIVES

- To have the knowledge of bioinformatics in various fields.
- To understand the structure of biological databases and their utilities.
- To impart knowledge about various tools to manipulate the biological databases.

COURSE OUTCOME

On successful completion of the course, the students will be able to

K1	CO1	Grasp knowledge on various biological databases.
K2	CO2	Impart knowledge on gene and its expression both in prokaryotes and eukaryotes.
K3	CO3	Use the specific tools to know the biological relationships existing among the living organisms.
K3	CO4	Execute appropriate algorithms to identify the similarities and dissimilarities existing between the genes of various organisms.

SYLLABUS

UNIT I (18 HOURS)

Central dogma of molecular biology. Gene structure and information content. Promoter sequences. Genetic code, open reading frames, introns and exons. Gene finding methods, tools and problems in gene finding.

UNIT II (18 HOURS)

Regulation of gene expression in prokaryotes and eukaryotes. Transcription factors. Classification of Biological Databases: Sequence, Structural databases, Specialized and Literature databases.

UNIT III (18 HOURS)

Protein structures: primary, secondary, tertiary and quaternary structures, domain, motifs and protein families. Protein prediction.

UNIT IV (18 HOURS)

Sequence - alignment - definition, types, local, global, pairwise and multiple sequence alignment. Scoring methods - matrices, PAM, BLOSUM and Gap Penallty, Dotplot, dynamic programming, sequence similarity search using BLAST and FASTA.

UNIT V (18 HOURS)

Recent trends in Bioinformatics. Biomolecular visualization, phylogenetic analysis and computer aided drug designing. Applications of Bioinformatics in various fields*.

20PBO204

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Mani, K and N. Vijayaraj. (2002). Bioinformatics for beginners. Kalaikathir Achakam, Coimbatore.
2. Dan E. Krane and Michael L. Raymer. (2006). Fundamental concepts of bioinformatics. Dorling Kindersley (India) Pvt Ltd.

REFERENCES

1. Cold Spring Harbor. (2004). Bioinformatics - Sequence and Genome Analysis. (2nd Ed.) Laboratory Press,
2. Arthur M. Lesk. (2002). Introduction to Bioinformatics. Oxford University Press, UK.
3. David W. Mount. (2001). Bioinformatics-Sequence and Genome analysis. Cold Spring Harbor Laboratory Press.
4. D.R. Westhead, J.H. Parish and R.M. Twyman. (2003). Instant Notes in Bioinformatics.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	S	H
CO2	S	S	M	H	H
CO3	H	H	H	S	M
CO4	S	M	H	H	S

S - Strong **H** - High **M** - Medium **L** - Low

20PBO205

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 20PBO205		Core Paper: 5 - CELL BIOLOGY, GENETICS, PLANT BREEDING AND BIOSTATICS		
Batch 2020-2021	Semester II	Hours / Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To learn about concept of genes and gene interactions.
- To study about the principles of mendelian's and non-mendelian's inheritances
- To assess the methods of plant breeding and crop improvement.
- To learn the experimental designs using biostatistical tools.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge about different fields of genetics.
K2	CO2	Identify the sex linked disease among the population.
K3	CO3	Implement their knowledge on mutation for the betterment of the mankind.
K3	CO4	Describe various molecular breeding techniques for genetic improvement of the crops. Design experimental methods using the statistical knowledge.

SYLLABUS

UNIT I (18 HOURS)

Structure and functions of cell organelles and nucleus*. Chromosome - Structure, Molecular organization of chromosome, Special type of chromosome - Lamp brush chromosome, Polytene chromosome and Super numerary chromosome, Chromosomal aberration - Numerical and Structural variations. Genes - Features of gene concept, molecular structure of gene, gene function. Genetic code - salient features & Wobble hypothesis.

UNIT II (18 HOURS)

Mendelism - Basic principles, Gene Interaction, Quantitative inheritance, Sex determination: Mechanism (Genetical, Metabolical, Hormonal and Environmental sex determination), Sex linked inheritance - X linked, Y linked and XY linked, Sex influenced and sex limited characters, Cytoplasmic inheritance: Plastid inheritance, Cytoplasmic male sterility, Mitochondrial inheritance and Inheritance in haploid organisms.

UNIT III (18 HOURS)

Mutation : Detection of mutation - Lethal mutation and Visible mutation. Molecular basis of mutation, Physical and chemical mutagens. Biochemical genetics: Biochemical mutation in Bacteria and *Neurospora*. Population genetics: Gene pool, gene frequencies, Hardy-Weinburg law, Factors affecting gene frequencies - mutation, selection, migration, genetic drift. Chromosome mapping: Genetic mapping.

UNIT IV (18 HOURS)

Plant Breeding –Introduction, History, Major objectives- Principles - important achievements of plant breeding, self and cross pollinated crops - pure line selection and mass selection methods; Line breeding, pedigree, clonal selection. Incompatibility - male sterility. Mutation breeding - methods, limitation and crop improvement. Modern trends in plant breeding.

UNIT V (18 HOURS)

Biostatistics - Measures of central tendencies - Mean (only arithmetic), median and mode. Measures of deviation - mean deviation, variance, standard deviation, standard error and co-efficient of variation. Probability of distribution - Binomial, Poison and Normal distribution. Linear regression and correlation (Simple and multiple). Tests of statistical significance - Chi-square test and student t-test. Analysis of variance (ANOVA) - one way and two ways. Recent advances and applications of biostatistics.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Verma, P.S. and Agarwal, V. K. (1998). Cytology. (1st Ed.). S. Chand & Pvt.Ltd., New Delhi
2. Veerbala Rastogi. (2004). A text book of genetics. Kedarnach & Ramnath, Meerut.
3. Singh,B.D. (2014). Plant Breeding Principles and Methods. (Reprtd.) Kalyani Publisher, New Delhi
4. S.P. Gupta, S.P. (2001). Statistical Methods. Sultan Chand & Sons, Educational Publishers, New Delhi.

REFERENCES

1. De Robertis. (1975). Cell Biology. (6th Ed.) Saunders Philadelphia
2. Gardener, E.J. Peter Suns tad, D. (1975). (5th Ed.). Principles of genetics. John Wiley & Sons Inc.
3. Strick Berger M.W. (1997). Genetics. (2nd Ed.) MacMillan, New York.
4. Gupta, P.K. (1985 - 91). Genetics. (2nd Ed.). Rastogi Publications.
5. Allard, R.W. (1960). Principles of Plant breeding. John Wiley & Sons Inc.
6. Shukla R. S. and P. S. Chandel. (1996). Cytogenetics - Evolution and Plant Breeding. S. Chand & Pvt.Ltd. New Delhi.
7. Khan, I.D. and A. Khanum. (1994). Fundamentals of Biostatistics. Mc Graw Hill, New Delhi.
8. Vasantha Pattabhi & N. Gautham. (2004). Bistatistics. Narosa Publishing House, Chennai.

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20PBO205

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	M
CO2	S	M	H	H	S
CO3	H	S	H	M	H
CO4	H	H	S	S	H

S - Strong **H** - High **M** - Medium **L** - Low

20PBO206

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO206		**Core Paper: 6 - ECOLOGY, BIOENERGETICS AND NATURAL RESOURCE MANAGEMENT**		
Batch 2020-2021	**Semester II**	**Hours / Week 6**	**Total Hours 90**	**Credits 5**

COURSE OBJECTIVES

- To understand the structural and functional organization of the ecosystems.
- To know the causes of environmental deterioration and possible measures for their rejuvenation.
- To understand the natural calamities and disaster management.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire and analyze interrelationships between living and non-living things.
K2	CO2	Understand the cyclic flow of the elements between organisms and the environment.
K3	CO3	Monitor and document the biodiversity changes and their management approaches through remote sensing techniques.
K3	CO4	Apply strategies for the conservation of natural resources.

SYLLABUS

UNIT I (18 HOURS)

Population and community Ecology - Ecology - concepts and applications, biotic community concepts, characteristics and structure of population, ecological variants, and methods of studying plant communities. Ecological niches, edge effect and ecotone.

UNIT II (18 HOURS)

Ecosystem ecology - Structural and functional characteristics of ecosystem, major ecosystems of world, biogeochemical cycle - cycling and reservoir pool, gaseous (nitrogen and carbon) and sedimentary pattern (sulphur and phosphorous) of cycling. Nutrient cycling and agricultural patterns in tropical and temperate regions. Plant indicators of conditions, uses and processes.

UNIT III (18 HOURS)

Bioenergetics - Energy dispersion, law of thermodynamics, concept and energy flow models, productivity concept, turn over - primary production processes in C_4 and CAM plants, adaptations in C_4 plants for efficient primary production. Productivity in different ecosystems, measurement of primary production.

UNIT IV (18 HOURS)

Environmental Pollution and Education - Air, water, soil, noise and radiation pollution - causes and possible control measures*. Climate change. Global warming, green house effect, ozone depletion, Acid rain. Environmental education-principles, Environmental education programmes in India. Environmental organizations and agencies, Man and Biosphere (MAB) and National and International organizations.

20PBO206

UNIT V (18 HOURS)

Natural Resource Conservation and Management - Biodiversity - International and National scenarios, importance. Ecological principles and applications in conservation of biodiversity. *ex situ* and *in situ* conservation of species. Biosphere reserves, sanctuaries, national parks, world hot spots. Remote sensing- principle, tools, concepts and applications-mapping of forest cover. Soil conservation - erosion and control. Water standards, quality and management. Surface water and ground water development. Water conservation and waste water reuse. Afforestation, deforestation and social forestry. Disaster Management - Bhopal tragedy and Tsunami.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Sharma, P.D. (2000). Ecology and Environment. Rastogi Publications, Meerut.
2. Kumar, H.D. (1994). General Ecology. Vikas Publishing Co. New Delhi.

REFERENCES

1. Odum, E.P. (1971). Fundamentals of Ecology. N.B.Saunders Co. Ltd. Philadelphia.
2. Krebs.(1985). Ecology. C.J, Haper & Row, New York.
3. Ambasht, R.S.(1988). Text book of plant ecology. Lanka Publishers, Varanasi.
4. Misra, K.C. (1980). Manual of plant ecology. Oxford and IBH Publishing Co., New Delhi.
5. Alan Wellburm. (1988). Air pollution and acid rain - the biological impact. Longman Scientific and technical, Singapore.
6. Varshney, C.K. (1989). Water pollution and Management. S.P. Printers, Noida.
7. Weaver and Clements. (1929). Plant Ecology. Tata McGraw Hill Publishing Co. New Delhi.
8. Sinha, R.K. and Dalbir Singh. (1997). Global Biodiversity. INA Shree Publishers, Jaipur.
9. Biology of Fresh Water (1981). By Mason, C.F. Longman, London.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	H
CO2	H	S	H	H	M
CO3	H	S	M	H	S
CO4	S	M	H	S	H

S - Strong **H** - High **M** - Medium **L** - Low

20PBO2CM

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO2CM		**Core Practical: 2 - BIOINFORMATICS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**II**	**2**	**30**	**2**

COURSE OBJECTIVES

- To know the sequence of a gene using bioinformatic tools.
- To acquire knowledge on biological databases maintained by various institutes.
- To analyze the biological databases using computer softwares.
- To realize evolutionary relationships existing between the organisms.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Apply their knowledge about the details of biological databases.
K4	CO2	Analyze genetic variations existing among the organisms.
K5	CO3	Evaluate the quality of tools (algorithms) by analyzing same macromolecule using different tools.

LIST OF PRACTICALS

I. BIOINFORMATICS

1. Biological data retrieval from Nucleic acid databases - NCBI,EMBL & DDBJ.
2. Data retrieval from Protein databases - SwissProt & PDB.
3. Use of literature databases - Virtual library and PubMed.
4. Similarity search using BLASTs and FASTA
5. 3-D Molecular visualization using RASMOL
6. Phylogenetic analysis using Clustal-X.
7. Protein Structure prediction using ExPASy Tools
8. Protein secondary structure prediction using GOR IV.
9. Protein secondary structure prediction using SOPMA.

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	H	H	S	H
CO2	H	S	H	H	M
CO3	H	M	S	H	S

S - Strong **H** - High **M** - Medium **L** - Low

20PBO2CM

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

PG MODEL QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2020-21 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 3 - BIOINFORMATICS

I. Writing Algorithms for A, B & C (15 + 15 + 07)	**- 37 Marks**
II. Results and Viva-voce for A, B & C (05 + 05 + 03)	**- 13 Marks**
Record	**- 10 Marks**
TOTAL	**- 60 Marks**

20PBO2CN

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO2CM		**Core Practical: 3 – CELL BIOLOGY, GENETICS, PLANT BREEDING AND BIOSTATISTICS, ECOLOGY, BIOENERGETICS AND NATURAL RESOURCES MANAGEMENT**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**II**	**4**	**60**	**2**

COURSE OBJECTIVES

- To acquire knowledge about cellular inclusions and their functions
- To understand genetic analysis at gene, genome and population level
- To learn the experimental designs using biostatistical tools.
- To find out the dominant species in the particular environment.
- To understand the structural and functional organization of an ecosystem.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Apply the basic principles of genetics and plant breeding for genetic improvement of plants.
K4	CO2	Analyze the physico-chemical nature of the soil. Design experimental methods using the statistical knowledge.
K5	CO3	Determine the distribution of vegetation using quantitative ecological characters.

II. CYTOLOGY, GENETICS, PLANT BREEDING

1. Ultra structure of cell organelles, nucleus, chromosome and its special types (electron microscopic photographs).
2. Study of mitosis and meiosis with different materials.
3. Simple problem in genetics - monohybrid cross, Dihybrid cross, Interaction of genes, Sex-determination, Sex-linked inheritance, Gene mapping.
4. Training in hybridization techniques using potted plants.

BIOSTATISTICS

1. Analysis of data to find the mean, median and mode.
2. Analysis of a given data for mean deviation variances, standard deviation and standard error.
3. Analysis of a set of data for correlation / regression.
4. Test the significance of a given data using Chi-square test, t-test and ANOVA.

20PBO2CM

III. ECOLOGY

1. To determine the quantitative characters in the community by using quadrat methods.
   a) Frequency b) Abundance c) Density d) Basal cover e) IVI.
2. Synthetic characters: Similarity index, FICC, dominance index, diversity index.
3. Raunkiaer's life form classes and percentage distribution of species in vegetation.
4. Stratification, Zonation.
5. Soil analysis - Physical - bulk density, water-holding capacity, soil moisture. Chemical - nitrate and carbonate.
6. Mapping of tree species in vegetations.
7. Field visit - Report preparation on vegetation types, conservation measures undertaken in biosphere reserves/ national parks/ sanctuaries etc.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	S	H
CO2	H	S	M	H	S
CO3	H	M	S	H	M

S - Strong **H** - High **M** - Medium **L** - Low

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KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

PG MODEL QUESTION PAPER (PRACTICALS)
End Semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2020-21 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 2 –CELL BIOLOGY, GENETICS, PLANT BREEDING, BIOSTATISTICS ECOLOGY, BIOENERGETICS AND NATURAL RESOURCES MANAGEMENT

I. Any two stages of Mitosis (2 × 2)	**- 04 Marks**
II. Genetics problems of (3 × 4)	**- 12 Marks**
III. Biostatistics problem of (1 × 4)	**- 04 Marks**
IV. Ecology Experiment	**- 10 Marks**
V. Spot at sight (5 × 4)	**- 20 Marks**
Record	**- 10 Marks**
TOTAL	**- 60 Marks**

20PBO307

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 20PBO307		Core Paper: 7 - TAXONOMY AND BIOSYSTEMATICS		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**III**	**6**	**90**	**5**

COURSE OBJECTIVES

- To study about the classification and nomenclature of Angiosperms.
- To understand the theory and practices involved in plant systematics.
- To learn the striking affinities of different plant families.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge both on ICN and APG.
K2	CO2	Differentiate various systems of classifications based on their natural and phylogenetic characters of flowering plants.
K3	CO3	Gain the proficiency skills by the use of keys and identify any unknown plant species using the manual of floras.
K3	CO4	Explore the uses of medicinal plants through traditional indigenous approaches.

SYLLABUS

UNIT I (18 HOURS)

Historical account of the classification of angiosperms up to the present day. Systems of classification- Detailed study of Bentham and Hooker, Bessey, Hutchinson, Cronquist and APG IV - merits and demerits. ICN- history, principles, typification, principles of priority and their limitations, Herbarium and its potential role in teaching and research, effective and valid publication, author citation, retention, choice and rejection of names, names of hybrids.

UNIT II (18 HOURS)

Computer aided taxonomy (TROPICOS, IPNI, The Plant List - 2010). Taxonomic tools - flora, monograph, icons and journals. Keys - dichotomous keys and their uses. Botanic gardens. Sources of taxonomic information- embryology, cytology, chemotaxonomy. RET species-India, Tamil Nadu and IUCN criteria, 2012.

UNIT III (18 HOURS)

Description and economic importance of the following families - Menispermaceae, Polygalaceae, Caryophyllaceae, Portulacaceae, Oxalidaceae, Tiliaceae, Meliaceae, Vitaceae, Rhamnaceae, Sapindaceae, Rosaceae, Combretaceae, Onagraceae, Lythraceae and Aizoaceae.

UNIT IV (18 HOURS)

Description and economic importance of the following families - Oleaceae, Gentianaceae, Convolvulaceae, Boraginaceae, Bignoniaceae, Pedaliaceae, Nyctaginaceae, Aristolochiaceae, Loranthaceae, Orchidaceae, Dioscoreaceae, Commelinaceae, Araceae and Cyperaceae.

20PBO307

UNIT V (18 HOURS)

Biosystematics- aim and scope. Biosystematics categories. Phenotypic plasticity. Turreson's work. Population concept, speciation. Species and genus concept. Numerical taxonomy, molecular taxonomy. Evolutionary relationship among taxa*.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Subramaniam, N.S. (1997). Modern plant taxonomy. Vikas Publishing House, New Delhi.
2. Sharma, O.P. (1986). Plant taxonomy -Rastogi Publications, New Delhi.
3. Sivarajan, V.V. (1986). Introduction to principles of plant taxonomy. Oxford & IBH Pvt. Company.

REFERENCES

1. Lawrence, H.M. (1951). Taxonomy of vascular plants. Macmillan & Co.
2. Bennet, S.S.R. (1986). An introduction to plant nomenclature. International Book Distribution India.
3. Henry, A.N. and Chandra Bose. (1982). An aid to the International code of Botanical nomenclature. BSI, Calcutta.
4. Jain, S.K. and R.R. Rao. (1977). A hand book of field and herbarium methods. Today & Tomorrow Pvt. Ltd.
5. Pandey, B.P. (1997). Taxonomy of angiosperms. Chand & Co. Ltd., New Delhi.
6. Vasudevan Nair, R. (1997). Taxonomy of angiosperms. APH Publishing Corporation, New Delhi.
7. Sokal, S.R. & P.H. Sneath. (1973). Principles of numerical taxonomy. N.H. Freemen and Co.
8. Gurcharan Singh. (2004). Plant systematic - theory and practices. Oxford and IBH Publishers, New Delhi.
9. Naik, V.N. (1984). Taxonomy of Angiosperms. TATA Mc Graw Hill, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	S
CO2	H	S	H	M	S
CO3	S	S	M	H	H
CO4	S	H	H	H	M

S - Strong **H** - High **M** - Medium **L** - Low

20PBO308

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 20PBO308		Core Paper: 8 - MICROBIOLOGY AND PLANT PATHOLOGY		
Batch 2020-2021	**Semester** III	**Hours / Week** 6	**Total Hours** 90	**Credits** 5

COURSE OBJECTIVES

- To disseminate knowledge on pathogenic group of organisms.
- To gain knowledge on disease management.
- To analyze the quality of water.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize evolutionary relationships of microorganisms through various classifications.
K2	CO2	Understand skills through isolation and cultural techniques of the microorganisms.
K3	CO3	Apply the latest methods of microbiological experiments.
K3	CO4	Implement the disease management techniques in the fields.

SYLLABUS

UNIT I (18 HOURS)

Introduction to microbiology: Historical account, Scope of microbiology, major groups and classification - five kingdom concept and three domain system. Prokaryotic and eukaryotic organisms. Bacteria: morphology, classification (Bergey's manual), ultrastructure, chemical composition of cell wall. Bacterial reproduction - conjugation, transformation and transduction. Culture methods - pour plate, spread plate, streak plate and stab inoculation. Bacterial growth curve.

UNIT II (18 HOURS)

Classification of plant viruses (outline only). General morphology and symmetrical structures of viruses. Morphology of Bacteriophages (T - types). Ultrastructure of TMV and HIV. Viral replication - lytic and lysogenic cycles in T- even phages. Isolation and purification of viruses.

UNIT III (18 HOURS)

Fermentation: Aerobic and Anaerobic fermentation*. Industrial production of Antibiotics - penicillin; Enzyme - amylase, Organic acid - lactic acid, Biofuel - ethanol. Biopolymer - PHB; Microbial cell - Baker's yeast. Waste water treatment, detection of coliform bacteria - membrane filtration technique, multiple tube fermentation test. Milk microbiology - chemical composition of milk, microbes in milk.

20PBO308

UNIT IV (18 HOURS)

Plant Pathology: History of Plant Pathology - milestones in phytopathology - Classification and factors responsible for plant diseases - concepts in epidemiology - methods of studying plant diseases - Koch's postulates - host parasite interactions, structural, physiological and biochemical defense mechanism in hosts, dissemination of diseases - integrated disease management.

UNIT V (18 HOURS)

Common plant diseases of India - symptoms, causal organisms and control measures of Red rust of Tea, Late blight of Potato, Powdery mildew of Grapes, Black rust of Wheat, Bacterial blast disease of Paddy, Bunchy top of Banana - general principles of plant quarantine - sanitary and phytosanitary issues - genetic basis of disease resistance and pathogenicity - Protection of Plant Varieties (PPV) - genetically modified varieties.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Michael J. Pelczar, E.C.S. Chan and Noel R. Krieg (2008). 'Microbiology' 5th edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
2. Dubey, R.C. and D.K. Maheshari (2005). A Text Book of Microbiology' S. Chand and Company Limited, New Delhi.
3. Prescott, L.M., Harley, J.P. and Klien, D.A. (1996). Microbiology (3rd ed.), Brown W.C. Publishers, Boston, USA.
4. Bilgrami, K.S. and Dube, H.C. (1990). A text book of modern plant pathology, Vikas Publishing House Pvt. Ltd., New Delhi.
5. Mehrota, R.S. (1994). Plant Pathology, Tata Mc. Graw Hill Publishing Co. Ltd., New Delhi.

REFERENCES

1. Sullia, S.B. and Shantharam, S. (1998). General Microbiology, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Jay, J.M. (1983). Modern Food Microbiology, CBS Publishers, New Delhi.
3. Reed, G. (1983). Prescott & Dunn's Industrial Microbiology (4th ed.), AVI publishing Co., Connecticut, USA.
4. Schegel, H.B. (1986). General Microbiology (6th ed.), Cambridge University Press, UK.
5. Singh, R.S. (1990). Plant diseases (6th ed.) Oxford and IBH, New Delhi.

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20PBO308

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	H	S	H
CO2	H	H	S	M	S
CO3	H	M	H	H	M
CO4	S	H	M	H	H

S - Strong **H** - High **M** - Medium **L** - Low

20PBO309

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO309		**Core Paper: 9 – BIOTECHNOLOGY AND NANOBIOLOGY**		
Batch 2020-2021	**Semester III**	**Hours / Week 6**	**Total Hours 90**	**Credits 5**

COURSE OBJECTIVES

- To familiarize with the fundamental principles of biotechnology
- To know the principles and applications of plant tissue culture
- To have a basic knowledge on Nanobiology

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on various developments and potential applications of tissue culture.
K2	CO2	Understand the basic techniques of gene manipulation and their rapid applications in field of plant tissue culture.
K3	CO3	Exploit nanotechnological tools to create new biomedical research tools, diagnostic tests and drug delivery systems.
K3	CO4	Apply the concept of nanotechnology for achieving major task using the nanoparticles.

SYLLABUS

UNIT I (18 HOURS)

Plant tissue culture: History, laboratory organization, sterilization methods*, types and composition of media and preparation, Ovule and Embryo culture, Cryopreservation and DNA banking for germplasm conservation. *In vitro* secondary metabolite production - cell immobilization, bioreactors. Applications of tissue culture*.

UNIT II (18 HOURS)

Introduction to classical and modern biotechnology - scope and importance. Genetic engineering : Gene cloning, isolation of genes, sequencing of genes, synthesis of genes, construction of genomic and cDNA library. Gene transfer methods in plants - *Agrobacterium* mediated and Biolistic gun method, Societal issues in biotechnology - GM food and bioterrorism.

UNIT III (18 HOURS)

Green fluorescence protein, Molecular probing - radiolabelled probes and non-radioactive probes, DNA finger printing, Monoclonal antibodies, Biotechnology in paper industry, biohydro-metallurgy, biomineralisation and bioinoculants.

UNIT IV (18 HOURS)

Definition - Historical aspects, classification of nanomaterials, General properties of nanoparticles, types of nanoparticles - metallic, semiconductors and polymeric types, carbon nanotubes, bucky balls, methods of synthesis of nanoparticles-top down and

bottom up approach, Principle, working mechanism and applications –TEM, SEM and AFM.

UNIT V (18 HOURS)

Application of nanoscience and nanotechnology in agriculture, nanofoods, nanotherapeutics, environmental applications, fuel energy resources. Biosensors and biochips.

***Self study**

Teaching Methods

PowerPoint presentation/Quiz/Discussion/Assignment

TEXTBOOKS

1. Gupta, P.K. (1998). Biotechnology and Genetics. Rastogi Publications, Meerut.
2. Gregory, L. Timp. (1998). Nanotechnology (1st Ed.). American Institute of Physics.
3. Bharat Bhusan. (2006). Hand Book of Nanotechnology. (1st Ed.).Springer.
4. Madhuri Sharon (2011). Bio-Nanotechnology: Concepts and Applications. CRC Press. Taylor & Francis Group
5. Subbaiah Balaji (2013). Nanobiotechnology. MjP Publishers, India.

REFERENCES

1. Kartha, K.K. (1985). Cryopreservation of plant cells and organs. CRC Press Boca Raton, Florida, USA.
2. Ignachimuthu, S. (1995). Basic Biotechnology. Tata Mc Graw-Hill Publishing Company Ltd., Madras.
3. Callow, J.A., Ford Lloyd, B.V. and Newbury, H.J. (1997). Biotechnology and Plant Genetics Resources: Conservation and Use. CAB International, Oxon, UK.
4. Gupta, P.K. (1998). Elements of Biotechnology. Rastogi Publications.
5. Santharam, S. and J.F. Montgomery (1999). Biotechnology, Biosafety and Biodiversity. Oxford and IBH Publishing Co. New Delhi.
6. Meyyan, R.P. and V. Kumaresan. (2004). Genetics and Biotechnology. Saras Publication, Nagercoil.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	S
CO2	S	S	H	S	M
CO3	H	M	S	H	H
CO4	H	H	S	M	S

S - Strong **H** - High **M** - Medium **L** - Low

20PBO3CO

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 20PBO3CO		Core Practical: 4 – TAXONOMY AND BIOSYSTEMATICS, MICROBIOLOGY AND PLANT PATHOLOGY, BIOTECHNOLOGY AND NANOBIOLOGY		
Batch 2020-2021	Semester III	Hours / Week 4	Total Hours 60	Credits 2

COURSE OBJECTIVES

- To identify selected taxa using taxonomic keys.
- To understand the pathogenic organisms causing various diseases.
- To learn the basic techniques of biotechnology and nanobiology

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Acquire knowledge identification and external morphology of plants
K4	CO2	Analyze the techniques used for the cultivation of microorganisms
K5	CO3	Gain the hands-on exposure on plant cell culture medium preparation and PCR

I. TAXONOMY AND BIOSYSTEMATICS

1. Study of the characters of the above mentioned families and economic importance.
2. Field visit for plant collection at least for three days. Preparation of artificial keys and submission of herbarium sheets (50) by collecting of local plants only.

II. MICROBIOLOGY

1. Culture of microbes using serial dilution and pure culture techniques.
2. Isolation of microbes by pour plate, spread plate and streak plate methods.
3. Hydrogen sulphide test.
4. Methylene blue reductase test for milk.
5. Mobility by Hanging drop method.
6. Isolation of Acetobacter from soil.
7. Lab level production of wine.
8. Differential staining of bacteria using Gram stain.
9. Antimicrobial assay - disc - diffusion / agar well method.
10. Book photographs/diagrams: morphology - bacteria, viruses, media, serial dilution methods and any tools used in microbiology.

III. BIOTECHNOLOGY AND NANOBIOLOGY

1. MS medium preparation
2. Polymerase Chain Reaction (PCR)
3. Agarose Gel Electrophoresis
4. Carbon nano tubes (Demo)
5. Bucky balls (Demo)
6. Electron microscope (Demo)

20PBO3CO

MAPPING

CO \ PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	H
CO2	H	S	M	H	H
CO3	S	M	H	H	M

S - Strong **H** - High **M** - Medium **L** – Low

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

PG MODEL QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2020-21 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 4 – TAXONOMY AND BIOSYSTEMATICS, MICROBIOLOGY, PLANT PATHOLOGY, BIOTECHNOLOGY AND NANOBIOLOGY

I. Specimen identification (2 × 2) **- 04Marks**

II. Identification of the family (4 × 2) **- 08 Marks**

III. Find out the binomial and family (2 × 3) **- 06 Marks**

IV. Microbiology Experiment **- 06 Marks**

V. Biotechnology experiment **- 06 Marks**

V. Spotters (5 ×3) **- 15 Marks**

V. Herbarium **- 05 Marks**

Record **- 10 Marks**

TOTAL **- 60 Marks**

20PBO410

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO410		**Core Paper: 10 – BIOPHYSICS, BIOCHEMISTRY AND BIOINSTRUMENTATION**		
Batch 2020-2021	**Semester IV**	**Hours / Week 7**	**Total Hours 105**	**Credits 5**

COURSE OBJECTIVES

- To know the biological importance of the macromolecules
- To learn about the hormones and vitamins and their roles
- To know the principles and operational techniques of bioinstruments
- To understand the role of electrons in absorption of light and To impart knowledge on bioenergetics of living organisms

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on properties and nature of macromolecules.
K2	CO2	Understand the importance of enzymes and immunological techniques.
K3	CO3	Apply current biochemical and molecular techniques to plan and carry out their experiments.
K3	CO4	Implement knowledge for the separation of bioentities

SYLLABUS

UNIT I (21 HOURS)

Electromagnetic radiation - Nature, absorption, absorption spectrum and action spectrum, law of absorption, interaction with matter, role of electrons in absorption of light, electron multiplicity. Excitation, de-excitation and path of de-excited electrons. Bioluminescence, Fluorescence and Phosphorescence. **Bioenergetics** - Energy and work, laws of Thermodynamics. Energy transductions in biological systems - Redox couple, redox potential, ATP bioenergetics, NADP/NAPH redox couple, mitochondrial bioenergetics and chloroplast bioenergetics.

UNIT II (21 HOURS)

Carbohydrates: Introduction to carbohydrates - classification, properties and biosynthesis - monosaccharides, oligosaccharides and polysaccharides. Linear/ open chain and ring forms of monosaccharides. Isomerism, structural and functional polysaccharides. Biosynthesis of carbohydrate and their regulation, Catabolism of glucose. **Lipids:** Classification, properties and biosynthesis - simple, complex and derived lipids - fatty acids - types - nomenclature - isomerism - Biosynthesis of fatty acids and its regulation, fatty acid oxidation (α and β-Oxidation)

UNIT III (21 HOURS)

Aminoacids: General structure - optical isomerism - classification (based on side chain and polarity) - properties - nonprotein aminoacids- Biosynthesis of aminoacids. **Proteins:** Introduction - structure and configuration of proteins - different bonding systems - classification of proteins based on chemical nature and solubility - properties - denaturation. **Nucleic acids**: Nitrogenous bases- purine and pyrimidine biosynthesis, DNA and RNA-structure and types. Biosynthesis of nucleotides

20PBO410

UNIT IV (21 HOURS)

Enzymes: Introduction to enzymes – classification, chemical nature and properties, theories of enzyme action, enzyme inhibitors and factors affecting enzyme activity, Michael -Menton's constant, coenzyme - FAD, NAD **Vitamins:** Classification - chemical structure and biochemical properties of vitamins A, D, E and K and B complex.

UNIT V (21 HOURS)

Bioinstrumentation: Chromatography - TLC, HPTLC, column and ion exchange chromatography, GLC and HPLC. Electrophoresis - AGE and PAGE. Blotting techniques - Southern, Northern and Western. PCR - types and its application. Photometry- Beer and Lambert's law, Colorimeter, UV - visible spectrophotometer, Atomic absorption spectrometer. Centrifuge - types and their applications*, Lyophilizer.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Daniel, M. (1989). Basic Biophysics for Biologists, Agro-Botanical Publishers, Bikaner, India.
2. Srivastava, H.S. (1999). Elements of Biochemistry. Rastogi publications, Meerut.
3. Asokan, P. (2002). Analytical Biochemistry (Biochemical Techniques). Chinna Publications, Chennai.
4. Palanisamy, S. (2008). Principles of biophysics, Palani Paramount Publications
5. Thiraviyaraj, S. (2009). Biophysics. Saras Publications, Nagercoil, Tamilnadu.
6. Janin, K.L. Sunjay Jain and Nitin Jain, (2009). Fundamentals of Biochemistry, S.Chand and Company Ltd, New Delhi.
7. Veerakumari, L. (2015).Bioinstrumentation. MJP Publishers, Chennai-600005, Tamilnadu, India

REFERENCES

1. Albert L. Lehninger (1984). Principles of Biochemistry. ICAR, Delhi.
2. Weel, J.H. (1990). General Biochemistry. Wiley Eastern Ltd.
3. Zubay, (1995). Biochemistry, Brown Publishers.
4. Voet & Voet, (2000). Fundamentals of Biochemistry, John Wiley, New York.
5. Wilson, K. and Walker, J. (2000). Principles and Techniques of Practical Biochemistry, 5th edition, Cambridge University Press, Cambridge.
6. L. Stryer, (2002). Biochemistry,W.H. Freeman.
7. Satyanarayana, V. (2005). Essentials of Biochemistry. Arunabha Sen & Allied Pvt., Ltd
8. Narayanan, P. (2007). Essentials of Biophysics. Second Edition. New Age International Publishers.

20PBO410

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	S	M
CO2	H	H	M	H	H
CO3	S	H	S	M	S
CO4	S	M	M	S	H

S - Strong **H** - High **M** - Medium **L** – Low

20PBO411

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 20PBO411		Core Paper: 11 - PLANT PHYSIOLOGY		
Batch 2020-2021	Semester IV	Hours / Week 7	Total Hours 105	Credits 5

COURSE OBJECTIVES

- To study the basic physiological functions of plants.
- To learn about the metabolic pathways in plants.
- To understand the importance of phytohormones in the growth of plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on water relations in plants.
K2	CO2	Understand the significance of metabolic pathways in plants.
K3	CO3	Assess the stress resistance mechanism for the better yield of the crops.
K3	CO4	Apply the acquired applicable techniques for fruit ripening.

SYLLABUS

UNIT I (21 HOURS)

Water relations - Structure and properties of water. Water transport - diffusion, Osmosis and Imbibition, water potential. Absorption of water, Active and Passive absorption. Water relations of plants – Structure and Physicochemical properties of water, soil and plant atmosphere, stomatal physiology and regulation.

UNIT II (21 HOURS)

Transpiration - types, mechanism and factors affecting transpiration. Ascent of sap* - Theories, Mechanism and Factors influencing on ascent of sap. Mineral salt absorption - Mechanism and Types. Translocation of organic solutes - Mechanism, Phloem loading and unloading and Factors affecting translocation.

UNIT III (21 HOURS)

Mechanism of photosynthesis - Light reaction, Carbon fixation in C_3 & C_4 plants. Outline of CAM pathway. Photorespiration, Respiration, Glycolysis, Krebs cycle & Pentose phosphate pathway, ATP synthesis. Biological Nitrogen Fixation - Symbiotic & Non-Symbiotic.

UNIT IV (21 HOURS)

Stress physiology - Classification of stress - abiotic and biotic stress factors. Stress effects - morphological, biochemical, physiological changes, associated with stress due to heat, water, salinity and metal. Stress resistance and mechanism.

20PBO411

UNIT V (21 HOURS)

Phytohormones - Fruit ripening - Introduction, Climacteric and non-climacteric fruits, Role of ethylene in fruit ripening, symptoms of fruit ripening. Environmental control of fruit ripening. Circadian rhythms-Biological clock. Plant movements-nastic and Tropic movements, Photomorphogenesis - Phytochrome and Cryptochrome response in plants.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. V. K. Jain. (1999). Fundamentals of Plant Physiology. S. Chand and Company Ltd, New Delhi.
2. Verma, V. (2001). Plant physiology. Emkay Publication, New Delhi.

REFERENCES

1. Devlein, R.E. (1986). Plant Physiology. CBS Publishers and Distributors, New Delhi.
2. Srivastava, H.S. & N. Shankar. (2005). Plant physiology & Biochemistry. Rastogi publications, Meerut.
3. Ray Noggle, G. and George J. Fritz. (2002). Introductory plant Physiology. Prentice Hall of India, Pvt., Ltd., New Delhi.
4. Hess, D. (1975). Plant Physiology. Narosa Publishing house, New Delhi.
5. Hewilt, E.J. and Cutting, C.V. (1979). Nitrogen Metabolism in Plants. Academic Press London.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	M	H
CO2	H	M	H	H	H
CO3	S	M	H	S	S
CO4	S	S	S	H	M

S - Strong **H** - High **M** - Medium **L** – Low

20PBO4CP

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO4CP		**Core Practical: 5 - BIOPHYSICS, BIOCHEMISTRY AND BIOINSTRUMENTATION & PLANT PHYSIOLOGY**		
Batch 2020-2021	**Semester IV**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**

COURSE OBJECTIVES

- To quantify the biochemical contents present in a given plant sample.
- To utilize proper analytical instruments based on the need.
- To obtain knowledge on physiological functions of the plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Apply the principles of reagents to estimate the macromolecular contents of the plant samples.
K4	CO2	Examine the significance of hydrogen ion concentrations in biochemical reactions of the plants.
K5	CO3	Determine the metabolic process of plants using standard procedures.

LIST OF PRACTICALS

BIOPHYSICS

1. Nature of EMR and Spectrum.
2. Path of de-excitation - Fluorescence, Phosphorescence, Radiationless transition and Delayed light emission.
3. Radioactive emission (alpha, beta & gamma), Autoradiography, Geiger-Muller counter and Scintillation counter.

BIOCHEMISTRY

1. Preparation of phosphate & citrate buffers.
2. Estimation of carbohydrates, proteins, amino acids & lipids.
3. Preparation of molal, molar, normal and percentage solutions
4. Estimation of peroxidase/catalase amylase - Demonstration.

BIOINSTRUMENTATION

1. Haemocytometer
2. Agarose Gel Electrophoresis
3. pH meter
4. UV - visible spectrophotometer
5. Centrifuge
6. HPLC (Demo)

20PBO4CP

PLANT PHYSIOLOGY

1. Measurement of stomatal index and frequency.
2. Measurement of membrane permeability as affected by pH, chemicals and temperature.
3. Separation of photosynthetic pigments by TLC.
4. Estimation of chlorophyll pigments.
5. Measurement of Hill reaction in the chloroplast suspension.
6. Measurement of the rate of photosynthesis under varying condition of CO_2 concentration.
7. Rate of respiration in flower buds/germinated seeds using simple respiroscope.
8. Determine the rate of transpiration using Ganong's potometer.
9. Determination of water absorption and transpiration ratio.
10. Nitrogen fixation through nodule formation in leguminous plants.
11. Solution culture.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	M	S
CO2	S	M	H	S	H
CO3	H	H	M	H	H

S - Strong **H** - High **M** - Medium **L** - Low

20PBO4CP

KONGUNADU ARTS AND SCIENCE COLLEGE (Autonomous)
COIMBATORE - 641 029

PG MODEL QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2020-21 onwards)

Time: 4 Hours **Max. Marks: 60 Marks**

BREAK UP OF MARKS

Core Practical: 4 - BIOCHEMISTRY, BIOINSTRUMENTATION AND BIOPHYSICS PLANT PHYSIOLOGY AND HORTICULTURE

I. Explain the principle of Biophysics- D	**- 05 Marks**
II. Biochemistry experiment - B	**- 10 Marks**
III. Bioinstrumentation experiment- C	**- 10 Marks**
IV. Physiology experiment - A	**- 10 Marks**
V. Spotters E, F, G, H & I (5 × 3)	**- 15 Marks**
Record	**- 10 Marks**
TOTAL	**- 60 Marks**

20PBO4Z1

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 20PBO4Z1		**PROJECT WORK & VIVA – VOCE**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**IV**	**5**	**75**	**5**

COURSE OBJECTIVES

- To acquire knowledge related to the practical problems in various fields.
- To understand the analytical skills to solve the selected problems.
- To get confidence by solving the selected problems through proper execution.

COURSE OUTCOME

On successful completion of the project work, the students will be able to

K3	CO1	Applying theoretical knowledge in real field.
K4	CO2	Analyzing the importance of the task to collect the related necessary data.
K5	CO3	Evaluating relationships existing between the theories and the fields.
K5	CO4	Executing appropriate statistical tools to get the correct interpretation to present the results.

Individual project work will be allotted to individual student under the supervision and guidance of the Faculty members during the IV Semester. Project works will be given based on the Field of Specialization of the supervisors under whom the students are allotted. The fields of specialization are Systematic Botany, Microbiology and Plant Pathology, Medicobotany and Ecology and Conservation Biology. The students shall do their projects under their supervisors and submit at the end of the IV Semester. Both the Internal and External Examiners shall jointly evaluate the project works submitted by the students and marks will be awarded on the basis as mentioned below.

Guidelines to the Distribution of Marks:

CIA	Project Review	20	**40**
	Regularity	20	
ESE	Project Report Present	40	**60**
	Viva – Voce	20	
	Grand Total		**100**

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	H	S	M	S
CO2	S	M	H	S	H
CO3	H	H	M	H	H

S - Strong **H** - High **M** - Medium **L** - Low

MAJOR ELECTIVE PAPERS

PBO46

Programme Code: 05	Title: M.Sc., BOTANY		
	Major Elective: 1 - FOREST RESOURCES AND UTILIZATION		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**6**	**90**	**5**

COURSE OBJECTIVES

- To understand the importance and value of trees.
- To learn the revenue sources of the forests.
- To grasp various products derived from forests for the betterment of the human beings.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize the location of the forests in India and their deterioration.
K2	CO2	Understand the significance of the forests for the enhancement of environmental quality and the reduction of environmental pollution.
K3	CO3	Apply the knowledge on seasonal variation in production from the forest resources for the human welfare.
K3	CO4	Implement the acquired knowledge on electricity generation using the biomass.

SYLLABUS

UNIT I (18 HOURS)

Forest cover and national status. Factors for the deterioration of forest cover. Major forest types in India.

UNIT II (18 HOURS)

Forest and climate, forest as carbon sink, forest and water, forest and soil, forest and air.

UNIT III (18 HOURS)

Major forest products- Timber, charcoal. Minor forest products resource of fibers and flosses, bamboos and canes, essential oils, including those from grasses, Tannins and dyes, gums , resins and oleo resins, drugs, spices, poisons and insecticides, edible products , minerals and miscellaneous products.

UNIT IV (18 HOURS)

Forest industries- composite wood industries, match industry, Pulp and paper industry, furniture and other timber utilizing industries. Industries utilizing forest products resins.

UNIT V (18 HOURS)

Conservation and plantation forestry - reserve forests, commercial forestry, social forestry, agro forestry and energy plantations. Biomass conversion - technologies - pyrolysis* and gasification for thermal and electric applications.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Sharma, V.B. (1998). Trees and Environment. APH Publishing Corporation, New Delhi.
2. Sagreiya, K.P. (1994). Forests and Forestry. National book Trust, India, New Delhi.
3. S.S Negi, (2002). Forest products and their utilization. International book distributiors, 9/3 Rajpur road, Dehradun.
4. Tribhawan Mehta, (1981). A hand book of Forest Utilization. Periodical Expert Book Agency. New Delhi.

REFERENCES

1. Subrahmanyam, N.S. and A.V.S.S. Sambamurty. (2004). Ecology. Narosa Publishing House. New Delhi.
2. Sharma, P.D. (2004). Ecology and Environment. Rastogi Publications, Meerut.
3. Arvind Kumar. (2004). Biodiversity and Environment. APH Publishing Corporation, New Delhi.
4. Singh, M.P. and Vinita Vishwakarma. (1997). Forest Environment and Biodiversity. Daya Publishing House, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	H	M
CO2	S	H	H	M	H
CO3	H	M	S	M	S
CO4	S	S	H	H	M

S - Strong **H** - High **M** - Medium **L** - Low

PBO48

Programme Code: 05	Title: M.Sc., BOTANY		
	Major Elective: 2 - SEED TECHNOLOGY		
Batch 2020-2021	Hours / Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To understand the principles of agronomy of seeds.
- To learn the methodology of seed germination, seed drying and seed treatments.
- To know the seed dormancy and their significance

COURSE OUTCOMES

On successful completion of the curse, the students will be able to

K1	CO1	Recognize seed borne diseases due to genetic constitution and storage of seeds.
K2	CO2	Determine the seed viability and vigour.
K3	CO3	Apply knowledge on seed processing and their storage for better marketing.
K3	CO4	Assess seed dormancy periods of different crop seeds.

SYLLABUS

UNIT I (18 HOURS)

Seed production- Genetic and Agronomic principles- Disease and Insect control - Nutrition - Irrigation - Harvesting - Storage.

UNIT II (18 HOURS)

Seed germination test - (using paper, sand and soil) seed viability - Tetrozolium test, Embryo Excision method - Seed vigor Test - Concept - Direct and indirect vigor test. Seed health testing-objectives - Methods of seed health test for Fungi, virus and insects.

UNIT III (18 HOURS)

Seed drying - Sun drying-Forced air drying, Process and equipments. Determination of seed moisture methods- one and two stage determination. Seed testing and quality control- Principles and importance. Sampling rules.

UNIT IV (18 HOURS)

Seed treatment - Significance - packaging- Certification - Storage and marketing- Demand forecast, marketing structure, marketing organization, arrangement for storage of seed, factors affecting seed marketing*.

UNIT V (18 HOURS)

Seed dormancy - Primary and Secondary dormancies - Significance - Factors involved - Methods to break dormancy.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Agrawal, R.L. (1997). Seed Technology. Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta
2. Dahiya, B.S & Rai K.N (1998). Seed Technology. Kalyani publishers. Calcutta

REFERENCES

1. Dhirendra khara & Mohan S.Bhale. (2000). Seed technology, Scientific Publishers Jothpur, India
2. Lawrence O.copeland, Miller B. McDonald (1936). Principles of seed science and Technology IV Edition Springer Pvt Ltd , New Delhi.
3. Agarwal P.K, M.Dadlani (1980). Techniques in seed science and Technology, South Asian publishers, Ned Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	S
CO2	H	S	H	M	H
CO3	S	H	H	H	M
CO4	S	H	M	H	S

S - Strong **H** - High **M** - Medium **L** - Low

PBO50

Programme Code: 05	Title: M.Sc., BOTANY		
	Major Elective 3 - FOOD SCIENCE AND NUTRITION		
Batch 2020-2021	Hours / Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To learn the importance of different kinds of foods.
- To acquire knowledge on nutritive values of the foods.
- To create awareness about the food adulterations.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize different nutritive values of cereals, pulses, vegetables and fruits.
K2	CO2	Understand storage practices of various foods based on their nutrients composition.
K3	CO3	Apply the acquired knowledge on food processing technology using the naturally available spices and condiments.
K3	CO4	Assess industrial productions of beverages and their adulterations.

SYLLABUS

UNIT I (18 HOURS)

Introduction of food science - Classification according to function, food groups (ICMR) - Classification; Cereals and Cereal products - Composition and Nutritive value and processing of Rice, Wheat, Maize; Fermented products- Bread-ingredients; Unfermented products- Cakes- Classes and ingredients.

UNIT II (18 HOURS)

Pulses- Nutrient values and processing and products of Black gram, Soya bean-Medicinal values of pulses. Nuts and Oilseeds- Coconut, Groundnut-Nutritive values, processing and products, role of nuts and oil & seed in cooking.

UNIT III (18 HOURS)

Vegetables- classification*-Composition and nutritive values - Storage; Fungi as food- Mushroom- Algae- *Spirulina*. Role of vegetables in cookery. Fruits-Classification, Composition and nutritive values - storage of fruits-Enzymaticbrowning- Prevention - Non-enzymatic browning.

UNIT IV (18 HOURS)

Sugar- Nutritive values- Properties - Sugar related products- Role of sugar in cookery. Spices- General function of spices-Asafotida, Clove, Garlic, Turmeric- role of spices in cookery

UNIT V (18 HOURS)

Beverages - classification- coffee, Tea, Cocoa- processing- adulterants; Fruit beverages - types. Food adulteration - Types of adulterants. Food preservation - Principles and Methods.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Swaminathan, M. (2006). Hand book of food and nutrients. The Bangalore printing & Publishing Co Ltd, India

REFERENCES

1. Sumati R Mudambi (2001). Fundamentals of foods and nutritions , New age International publishers, New Delhi.
2. Mahtab s. Bamji, N. Pralhad Rao and Vinodini Reddy (2003). Text book of Human nutrition Second Edition, Oxford &IBH Publishing Co.Pvt, New Delhi.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	M	H	M
CO2	H	S	H	S	M
CO3	S	H	M	H	H
CO4	H	H	S	M	S

S - Strong **H** - High **M** - Medium **L** - Low

PBO52

Programme Code: 05		Title: M.Sc., BOTANY		
		Major Elective 4 - HORTICULTURE		
Batch 2020-2021	**Semester IV**	**Hours / Week 6**	**Total Hours 90**	**Credits 5**

COURSE OBJECTIVES

- To learn about the propagation methods of horticultural crops.
- To study about gardening, landscaping and their maintenance.
- To acquire knowledge about commercial floriculture and cut flower arrangements.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Demonstrate solutions for a wide spectrum of plant health issues.
K2	CO2	Understand the components and adornments of gardening.
K3	CO3	Develop employability skills in the landscape field.
K3	CO4	Gain hand's on training knowledge on Terrarium and Bonsai techniques.

SYLLABUS

UNIT I (18 HOURS)

Scope and importance - Divisions of horticulture - classification of horticultural crops - climate, soil and nutritional needs - Irrigation. Organic horticulture - definition, synonyms, principles, methods, merits and demerits.

UNIT II (18 HOURS)

Gardening and landscaping - Importance and scope of gardening - Gardens in India* - types - layout of a garden - Garden components and adornments - Special types of garden - principles and design - Water garden, bog garden, terrace garden, rockery garden, vertical garden, clock garden, colour wheels and temple garden. Terrarium and Bonsai techniques.

UNIT III (18 HOURS)

Asexual propagation - Advantages and disadvantages - Cuttings:- types, factors influencing rooting of cuttings - use of growth regulators in relation to horticulture - layering - types - Grafting and Budding - methods - factors for successful graft union - Stock scion relationship - Factors influencing the heeling of graft union.

UNIT IV (18 HOURS)

Pomology - Establishment of orchard***** - cultivation of Banana, Citrus - Olericulture - cultural aspects of vegetables - types of vegetable growing - Kitchen garden, Market garden, vegetable garden - Preservation of fruits and vegetables - ornamental floriculture - Cultivation of Jasmine and Rose - Extraction of jasmine concrete.

UNIT V (18 HOURS)

Bio-aesthetic planning, eco-tourism, theme parks, indoor gardening, therapeutic gardening, non-plant components, water scaping, xeriscaping and hardscaping.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Kumar, N.(1999). An introduction to horticulture.Rajalakshmi Publication, Nagarcoil.
2. Chaha, K.L. (2001). Handbook of horticulture. ICAR, New Delhi.
3. Prasad, S., U.Kumar. (2013). A handbook of Floriculture. Agrobios, Jodhpur.

REFERENCES

1. Bose, T.K., J. Kabir, P. Das and P.P. Joy. (2001). Tropical Horticulture. Naya Prakash Publications, Calcutta.
2. George Acquaach. (2003). Horticulture - Principles and practices.
3. Edwin Biles. (2003). The complete book of gardening. Biotech book, New Delhi.
4. Singh, S.P. (1999). Advances in Horticulture and Forestry - Scientific Publishers, Jodhpur.
5. Sharma, V.K. (2004). Advances in Horticulture: Strategies, Production, Plant Protection and Value Addition - Deep and Deep Publications, New Delhi.
6. Bhattacharjee, S.K. (2006).Advances in Ornamental Horticulture -Pointer Publications, Jaipur.
7. Desh Beer Singh and Poonam Wazir. (2002). Bonsai-An Art. Scientific Publishers, Jodhpur.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	M	S
CO2	S	H	M	H	H
CO3	H	S	H	M	H
CO4	S	M	S	H	S

S - Strong **H** - High **M** - Medium **L** - Low

NON-MAJOR ELECTIVE PAPERS

PBO55

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 1 – PHARMACOGNOSY		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**6**	**90**	**4**

COURSE OBJECTIVES

- To apply the gained knowledge and advice the community on issues concerning the cultivation, harvesting and processing of medicinal plants and their products.
- To classify crude drugs based on their morphological, taxonomical, chemical or pharmacological characters.
- To know the methodology for component analysis of plants.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recollect the history on indigenous knowledge of Indian traditional systems of medicines.
K2	CO2	Acquire therapeutic and pharmaceutical knowledge of traditionally used medicinal plants.
K3	CO3	Apply knowledge on the exploitation of phytoconstituents for production of novel drugs.
K3	CO4	Train the cultivation and marketing strategies of medicinal plants.

SYLLABUS

UNIT I (18 HOURS)

Scope of Pharmocognosy and modern medicines. Indian medicinal system - AYUSH (Ayurvedha, Unani, Siddha and Homeopathy) - principles and diagnostic methods.

UNIT II (18 HOURS)

Morphological and histological studies and therapeutic and pharmaceutical uses of the following drugs; Bark:- *Cinnamomum zeylanicum;* Leaves:- *Rubus idoeus*, Flower:- *Syzygium aromaticum*, Fruit:- *Citrus limon*, Seed:- *Trigonella foenum-graecum*; Rhizome:- *Zingiber officinale*, Gum:- *Acacia senegal*, Gum resin:- *Commiphora* sp., Fixed oil:- *Ricinus communis*, Essential oil:- *Eucalyptus globules*.

UNIT III (18 HOURS)

Method of plant analysis: - Phytochemical tests and application of plant derived alkaloids, flavonoids, terpenoids, phenols and steroids. A general procedure for solvent extraction. Separation of the compounds by TLC technique.

UNIT IV (18 HOURS)

A brief account of medicinal plants and their chemical constituents, plants remedies for Diabetes, anti-fertility, rheumatism, drugs acting on central nervous system, cardiovascular and cancer, Potentiate plant derived drugs in market - Taxol, Camptothecin, Vincristine - source, morphology and properties.

UNIT V (18 HOURS)

Cultivation and role of medicinal Plants: - *Catharanthus roseus*, *Digitalis purpurea*, *Aloe vera*, *Withania somnifera* and *Papavar somniferum*. Recommendations for promoting traditional medicinal plants cultivation in India*.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Trease, G.E. and Evans, W.C. (1985). Pharmocognosy. (12th Ed.). English Language books Society, Baillie Tindall.
2. Wallis, T.E. (1985). Textbook of Pharmocognosy (5th Ed.). CBS Publishers & Distributors, New Delhi.

REFERENCE

1. Satoskar, R.S., S.D. Bhandarkar and Nimala N. Rege. (2005). Pharmocognosy and pharmacotherapueatics. (12th Ed.). Popular Prakashan Pvt., Ltd., Mumbai.
2. Jain, S.K. (1996). Ethnobotany in human welfare (Ed.). Deep Publishers, New Delhi.
3. Nadkarni, K.M. (1954). Indian Materia medica. Karnataka Printing Press, Mumbai.
4. James A. Duke. (1996). The Green Pharmacy. Scientific Publishers, Jodhpur.
5. Guha Bakshi, Sensararma and Pal. (2001). A Lexicon of Medicinal Plants in India. Nayaprokas, Kolkatta.
6. Shah, C.S. and J.S. Qadry. (1996). A Textbook of Pharmocognosy. Unique Offset Printers, Ahemedabad.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S
CO2	H	S	S	H	S
CO3	S	S	S	S	S
CO4	H	H	H	S	H

S - Strong **H** - High **M** - Medium **L** - Low

PBO57

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 2 -LIMNOLOGY		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**6**	**90**	**4**

COURSE OBJECTIVES

- To study of morphological and anatomical characters of aquatic flora.
- To understand the significance of the diffused light for the planktons.
- To find the gross and net productivity in fresh water life forms.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on structure and functions of fresh water ecosystem.
K2	CO2	Understand the factors responsible for lotic and lentic ecosystems.
K3	CO3	Implement the gross and net primary productivity models to know the value of fresh water ecosystem.
K3	CO4	Apply the knowledge on eutrophication for the conservation and management of fresh water bodies.

SYLLABUS

UNIT I (18 HOURS)

Definintion, facts of limnology - scope and importance of limnology. The structure of freshwater aquatic system - lentic - lakes, their distribution, origin and forms, morphology, sonation, physical, chemical and biological structure, water shed. Ponds - swamps and estuaries. Lotic - stream, springs and rivers - discharge, temperature, nutrient, biotic categories and drift.

UNIT II (18 HOURS)

Physical factors influencing lotic and lentic type of vegetation, light, heat, water movements. Chemical factors - O_2 and CO_2, Nitrogen, Phosphorus, and other nutrients, alkalinity and pH.

UNIT III (18 HOURS)

Water pollution and eutrophication* - effluent water, nature, treatment, and uses. Fresh formation and flora of India. Conservation and management of fresh water bodies.

UNIT IV (18 HOURS)

Fresh water formation. Planktonic communities - phyto and zoo planktons. Littoral communities, algae and zoo planktons, large plants benthas formation organisms - a knowledge of the adaptations of the above mentioned formations.

UNIT V (18 HOURS)

Fresh water ecosystem - Energy and production, community concept, diversity, community succession, food chains and biogeochemical aspects of ecosystems, energy flow in ecosystem and community metabolism. Productivity - primary, biomass and efficiency of primary production, secondary production. Biomass and efficiency. Gross and net productivity.

***Self study**

Teaching Methods

PowerPoint presentation/Quiz/Discussion/Assignment

TEXT BOOKS

1. The text book of limnology. Cole. The C.V. Morby Company

REFERENCES

1. Charles R. Goldmen, Alexander, Jorne. (1994). Limnology.. International students Edition.
2. Wezel. Sauders, (). Limnology College Publishing Co

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	M	S
CO2	H	M	H	S	H
CO3	H	H	M	H	H
CO4	S	H	S	M	M

S - Strong **H** - High **M** - Medium **L** - Low

PBO59

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 3- PLANT BIOTECHNOLOGY		
Batch 2020-2021	Hours / Week 6	Total Hours 90	Credits 4

COURSE OBJECTIVES

- To study the basic and advanced developments in the field of Plant Biotechnology
- To equip students with theoretical knowledge regarding the techniques and applications of Plant Biotechnology and Genetic Engineering
- To help students to get a career in Industry/R&D/Academic

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Describe the genome organizations in plants
K2	CO2	Elaborate on the plant cell and tissue culture systems
K3	CO3	Explain the genetic transformation techniques in plants
K3	CO4	Demonstrate the application of genetic transformation techniques in plants and evaluate the importance of metabolic engineering and molecular farming in plant

UNIT-I (18 HOURS)

Genome organization: Nucleus, Chloroplast and Mitochondria. Molecular Markers: RFLP, RAPD, AFLP and Microsatellites (SSR/STR). Model Plant: Arabidopsis

UNIT-II (18 HOURS)

Plant Cell and Tissue Culture: Tissue culture media (composition and preparation), Plant growth regulators, Micropropagation, Callus culture, Cell culture-single cell and suspension culture, Somatic embryogenesis and Artificial seeds, Protoplast culture- isolation, fusion and somatic hybridization, Haploid production: Anther and Pollen culture, Somaclonal variation.

UNIT-III (18 HOURS)

Genetic transformation and vectors: *Agrobacterium* characteristics; Ti and Ri plasmids and mechanism of T-DNA transfer, Physical and chemical methods of gene transfer Binary and cointegrate vector systems. CaMV and Gemini viruses, Markers genes for selection of transformants and Gene silencing. Chloroplast transformation.

UNIT-IV (18 HOURS)

Application of plant transformation: Nutraceuticals-Golden Rice and Flavr Savr, herbicide resistance- EPSP and Glyposate, bacteria, virus and insect resistance. Terminator technology and Marker free transgenics. Abiotic stress resistance- drought, cold and salt.

UNIT-V (18 HOURS)

Plant molecular farming and metabolic engineering: Plantibodies and Biodegradable plastics and Edible vaccines. Metabolic engineering for plant secondary metabolites-Introduction, alkaloid and flavonoid biosynthesis.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

Text books

1. Chawla, H. S. 2002. Introduction to Plant Biotechnology. 2nd Edition, Science Publishers, Inc., Enfield, NH, USA.
2. Kalyan Kumar De. 2004. An Introduction to Plant Tissue Culture.2008. New Central Book Agency, Kolkata.
3. Dubey, R.C., 2013. A text book of Biotechnology (Revised Edition), S. Chand & Company Ltd. New Delhi.
4. Razdan, M. K., 2003. Introduction to Plant Tissue Culture. 2nd Edition, Science Publishers, Inc., Enfield, NH, USA.

References

1. Slater, Scott and Fowler, 2008. Plant Biotechnology, 2nd Edition, Oxford University Press.
2. Primrose, S.B. and Twyman, R. 2006. Principles of Gene Manipulation and Genomics. 7th Edition, Blackwell Publishing, Malden, MA, USA.
3. Buchanan, Gruissem and Jones.2000. Biochemistry and Molecular Biology of Plants. John Wiley & Sons, UK.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	M	H
CO2	H	M	H	H	H
CO3	S	M	H	S	S
CO4	S	S	S	H	M

S - Strong **H** - High **M** - Medium **L** – Low

PBO61

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 4 - MEDICINAL PLANTS		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**6**	**90**	**4**

COURSE OBJECTIVES

- To learn about the ethnobotanical knowledge and its traditional significance.
- To understand the role of governmental and non-governmental organizations and their recommended conservation strategies.
- To acquire key knowledge on herbal home remedies.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize about the ethnobotanical significance of medicinal plants.
K2	CO2	Understand the traditional practices for curing various ailments.
K3	CO3	Implement knowledge on the ethnomedicinal plants for preventing life threatening diseases.
K3	CO4	Apply ethnopharmacological knowledge for the development of novel lead drugs.

SYLLABUS

UNIT 1 (18 HOURS)

Ethnobotany-definition - sub divisions-methodology-major tribes in southern India-regional studies-Ethnobotany in human welfare-food-medicine. Role of tribes in medicinal plants conservation-crop protection.

UNIT II (18 HOURS)

Sources of drugs - adulteration - collection and processing of vegetable drugs - role of growth regulators - drug deterioration and their control measures. Herbal home remedies in Tamil Nadu*.

UNIT III (18 HOURS)

Cultivation of medicinal plants - Medicinal plants in trade-cultivation practices and medicinal uses of *Cinchona officinalis, Mentha arvensis, Phyllanthus emblica, Cymbopogan martini, Rauvolfia serpentina, Allium sativum* and *Gloriosa superba.*

UNIT IV (18 HOURS)

Nutraceuticals and cosmeceuticals. Natural pesticides. Immuno modulators. Drugs from mineral origin.

UNIT V (18 HOURS)

Biopiracy - bioprospecting - recommendation for promoting traditional medicines in India. Role of NBA, AYUSH, NMPB, CDRI, FRLHT, NBRI, BSI - Role of biotechnology in medicinal plant conservation.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Purohit and Vyas. (2005). Medicinal plant cultivation- A scientific approach, Agrobios, Jodhpur.
2. Rajiv, K. Sinha & Shweta Sinha, (2001). Ethnobiology. Surabi Publications, Jaipur.

REFERENCES

1. Anonymous (1970). The pharmocopoea of India - Govt. of India, New Delhi.
2. Jain. S.K.(Ed.) (1996). Ethnobiology in human welfare. Deep. Pub. New Delhi
3. Jain, S.K. (1989). Methods and approaches in Ethnobotany, Society of Ethnobotanist, Lucknow.
4. Jain, S.K. (1987). A manual of Ethnobotany. Oxford publication, Jodhpur.
5. Trease G.e. and Evans, W.C. (1978). Pharmacognosy Bailliere Trinda, London.
6. Kokatae, C.K. A.P. Purohit and S.B Gokhale (2007). Pharmacognosy. Nirali Prakashan, Pune.
8. Jain, S.K. (Ed). (1981). Glimpses of Ethnobotany. Oxford & IBH Publications.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	M	H	H
CO2	H	M	H	H	M
CO3	S	H	S	M	H
CO4	S	M	H	S	M

S - Strong **H** - High **M** - Medium **L** - Low

EXTRA DEPARTMENTAL COURSE

Programme Code: 05		For PG STUDENTS		
Course Code: 20PBO3X1		Extra Departmental Course (EDC) - APPLIED HORTICULTURE		
Batch 2020-2021	Semester III	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To learn about the propagation methods of horticultural crops.
- To study about gardening, landscaping and their maintenance.
- To acquire knowledge about commercial floriculture and cut flower arrangements.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Demonstrate solutions for a wide spectrum of plant health issues.
K2	CO2	Understand the components and adornments of gardening.
K3	CO3	Develop employability skills in the landscape field.
K3	CO4	Gain hand's on training knowledge on Terrarium and Bonsai techniques.

SYLLABUS

UNIT I (6 HOURS)

Landscaping: Importance and scope of Landscape Architecture. Functional uses of plants for landscape and pollution control. Landscaping for specific areas (home garden, public parks, educational institutes).

UNIT II (6 HOURS)

Principles of Garden Designs: Styles of gardens - English, Italian, French, Persian, Mughal, Japanese gardens and its layout. Some Famous gardens of India.

UNIT III (6 HOURS)

Gardening: Definition, objectives and scope - different types of gardening - Special types of gardens (rock, water, terrace, vertical and terrarium).

UNIT IV (6 HOURS)

Nursery Management and Routine Garden Operations: Definition of a nursery. Different types of nursery beds – (flat beds, raised beds and sunken beds), their merits and demerits. Different nursery techniques and their management. Propagation Methods: Advantages and disadvantages of each method.

UNIT V (6 HOURS)

Cut flowers - Identification and selection of flowers and plant parts, value addition in cut flowers, flower arrangement, styles, Ikebana, morebana, free style, bouquets, flower baskets, garlands. Selection of containers and accessories for floral products and decorations. Dry flowers - Designing and arrangement

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXTBOOKS

1. Kumar, N.(1999). An introduction to horticulture.Rajalakshmi Publication, Nagarcoil.
2. Chaha, K.L. (2001). Handbook of horticulture. ICAR, New Delhi.
3. Prasad, S., U.Kumar. (2013). A handbook of Floriculture. Agrobios, Jodhpur.

REFERENCES

1. Bose, T.K., J. Kabir, P. Das and P.P. Joy. (2001). Tropical Horticulture. Naya Prakash Publications, Calcutta.
2. George Acquaach. (2003). Horticulture - Principles and practices.
3. Edwin Biles. (2003). The complete book of gardening. Biotech book, New Delhi.
4. Singh, S.P. (1999). Advances in Horticulture and Forestry - Scientific Publishers, Jodhpur.
5. Sharma, V.K. (2004). Advances in Horticulture: Strategies, Production, Plant Protection and Value Addition - Deep and Deep Publications, New Delhi.
6. Bhattacharjee, S.K. (2006).Advances in Ornamental Horticulture -Pointer Publications, Jaipur.
7. Desh Beer Singh and Poonam Wazir. (2002). Bonsai-An Art. Scientific Publishers, Jodhpur.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	S	H	M	S
CO2	S	H	M	H	H
CO3	H	S	H	M	H
CO4	S	M	S	H	S

S - Strong **H** - High **M** - Medium **L** - Low

JOB ORIENTED COURSE PAPERS

20PBO2J1

Programme Code: 05	Title: M.Sc., BOTANY	
Course Code: 20PBO2J1	JOC: 1 - Floriculture and Landscaping	
Batch 2020-2021	Hours / Week 4	Credits 2

COURSE OBJECTIVES

- To know the latest development in the field of floriculture.
- To develop skills in the area of floriculture and landscaping.
- To create knowledge on self employment through entrepreneur skills.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Acquire knowledge on cultivation of economic flowers.
K2	CO2	Understand the techniques involved in flower arrangement and decoration.
K3	CO3	Apply the knowledge on green house cultivation methods.
K3	CO4	Implement the acquired knowledge on commercial applications of dry flowers.

SYLLABUS

UNIT I

Floriculture - Global floriculture - Floriculture in India - Economic flowers - Rose, Jasmine, Crossandra, Chrysanthemum - Cultivation and uses.

UNIT II

Cut flowers - Significance of cut flower industry in India* - Export - Flower arrangement and decoration - dehydrated flowers, foliage and floral craft.

UNIT III

Green house cultivation of cut flowers -Green house technology - advantages - Green house cultivation of Orchids - Anthurium - Gerbera - Dahlia - Tuberosa - Gladioli.

UNIT IV

Landscape gardening - important principles in layout a garden - Aboriculture - Shrubs and climbers - annual, biennial herbaceous perennials - Ornamental palms - Succulents and Cacti.

UNIT V

Water garden, Rock garden, Roof garden, Vertical garden, Hydrophonics, Lawn, Bonsai - Horticultural shows.

20PBO2J1

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Kumar, N. (1999). An introduction to horticulture. Rajalakshmi Publication, Nagarcoil.
2. T.K. Bose, R.G. Maity, R.S. Dhua and P.Das, (1999). Floriculture and Landscaping, Naya Prokash, Calcutta.
3. S.Prasad and U.Kumar. (2013). A handbook of Floriculture Agrobios (India),

REFERENCES

1. Roy Edwin Biles, (2003). The complete Book of Gardening. Biotech Books, Delhi - 35.
2. Bhattacharjee, S.K. (2006). Advances in Ornamental Horticulture. Pointer Publication, Jaipur.
3. Doesh Beer Singh and Poonam Wazir, (2002). Bonsai - An art. Scientific Publishers, Jodhpur.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	M	H
CO2	S	M	H	H	M
CO3	H	S	M	H	H
CO4	S	H	M	S	M

S - Strong **H** - High **M** - Medium **L** - Low

20PBO2J2

Programme Code: 05	Title: M.Sc., BOTANY	
Course Code: 20PBO2J2	JOC: 2 - Food Processing and Preservation	
Batch 2020-2021	Hours / Week 4	Credits 2

COURSE OBJECTIVES

- To know the latest technologies developed in the field of food science.
- To develop skills in the area of Food processing and Preservation.
- To get employment opportunities in food processing industries.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Recognize about preliminary preparation of food through various process.
K2	CO2	Understand the nutritive values and their significance of cereals and pulses.
K3	CO3	Apply knowledge on the diary products and marketing.
K3	CO4	Implement food preservation techniques applicable to day to day life.

SYLLABUS

UNIT I

Food groups - Basic groups basic Four, Five and Seven, food in relation to health. Preliminary preparation of food - cleaning, peeling, stinging, cutting and grafting, soaking marinating, sprouting, fermenting, grinding, drying and filtering. Their advantages and disadvantages.

UNIT II

Cereals and cereal products, structure composition and nutritive value of cereals - wheat and wheat products, rice and its products; fermented and unfermented products.

UNIT III

Pulses composition and nutritive value of pulses, toxic constituents, Trypsin inhibitor, haemaglutinins, cyanogenic glucoside, saponins and tannins. Nutritive values of nuts and oil seeds, toxin such as afflotoxins and gossypol. Fruits and vegetables - Classification, composition and nutritive values.

UNIT IV

Milk and Milk products, nutritive value of milk, processing - clarification, pasteurization and homogenization. Milk products - fermented milk products - butter, cheese and curd. Preparation of cheese only. Non-fermented products - skimmed milk, dry milk, ice cream. Flesh foods - meat, fish and poultry - composition and nutritive values.

20PBO2J2

UNIT V

Food preservation by high and low temperatures (outline). Preservation by high osmotic pressure - High concentration of sugar, jam and jelly preparation. High concentration of salts. Principles and preparation of pickles preservation by dehydration*, principles and methods of drying such as freeze drying, sun drying, mechanical driers - spray drying and foam mat drying and by smoking.

***Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Srilakshmi. B. (2003). Food Science, New Age International Publishers, New Delhi.
2. Frazier W.C. and Westhoff. D.C. (1978). Food Microbiology, Tata McGraw-Hill, Chennai.

REFERENCES

1. Subblakshmi, G. (2006). Food processing and preservation, New Age International Pvt Ltd Publishers.
2. Adams M.R. and Moss M.O. (2008). Food Microbiology, The Royal Society of Chemistry, Cambridge.
3. Swaminathan M.S. (1985). Essentials of food and nutrition, Bappco Publisher, Bangalore.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	H	S
CO2	H	H	S	H	H
CO3	S	M	H	M	H
CO4	S	M	S	H	M

S - Strong **H** - High **M** - Medium **L** - Low

PG DIPLOMA IN BIODIVERSITY

20PDB101

Programme Code: 05		**Title: PG Diploma in Biodiversity**		
Course Code: 20PDB101		**C.P. 1 - INTRODUCTION TO BIODIVERSITY**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**2**	**30**	**2**

COURSE OBJECTIVES

- To know the principles and concepts of biodiversity.
- To understand the services of species diversity.
- To acquire knowledge on the role of biodiversity in maintaining ecobalance.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the services of biodiversity.
K2	CO2	Understand the types of species diversity.
K3	CO3	Analyze the concepts of biodiversity.
K3	CO4	Evaluate the economic value of biodiversity

SYLLABUS

UNIT – I **(6 Hours)**

Introduction: Concept and definition. Types of biodiversity – genetic, species ecosystem and landscape diversities. α, β and γ diversity. Pattern diversity.

UNIT - II **(6 Hours)**

Species diversity status: Species inventory – problems and monitoring. Current diversity status of flora, fauna and microbes at global and national levels. Centres of diversity – hotspots, megadiversity centres, future of species diversity studies.

UNIT - III **(6 Hours)**

Species diversity history and indices: History and origin of species diversity*. Diversity indices based on species – species richness, abundance and taxic diversity. Comparisons of species diversity of various sites – species/area relationships, spatial patterns of species diversity. Global distribution of species richness – latitudinal, altitudinal and rainfall gradients and other factors.

UNIT - IV **(6 Hours)**

Agrobiodivesity: Introduction. Origin and evolution of cultivated species diversity – act of domestication, geography of domestication, dispersal and diversification. Diversity in domesticated species – land races, advanced cultivars, wild relatives of cultivated plants, wild plants, and feral plants.

20PDB101

UNIT - V **(6 Hours)**

Ecosystem types and services: Classification, measuring ecosystem diversity, major ecosystems of world – forests, grasslands, deserts, fresh water, wetlands and marine. Functional role of species diversity in ecosystems.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity oxford of IBH publishing Co. Pvt. Ltd. New Delhi.
2. Harris, D.R. and Hillman, G.C. 1989. Introduction. *In*: Harris, D.R. and Hillman, G.C. (Eds.). Foraging and Farming: the Evolution of Plant Exploitation. Unwin Hyman, London, pp. 1-8.
3. Sharma, P.D. Ecology and Environment, Eastogi Publications, Murur.

REFERENCES

1. Thomas, R. 1992. Genetic Diversity. *In:* Goombridge, E. (Ed.). Global Biodiversity. Status of the Earth's Living Sources. Chapman & Hall, London, pp. 1-6.
2. Magurran, A.E. 1988. Ecological Diversity and its Measurement. Princeton Univ. Press, Princeton, NJ.
3. Pielou, E.C. 1975. Ecological Diversity. John Wiley and Sons. New York. NY.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong **H** - High **M** - Medium **L** - Low

20PDB102

Programme Code: 05		**Title: PG Diploma in Biodiversity**		
Course Code: 20PDB102		**C.P.2 - VALUES, USES AND LOSS OF BIODIVERSITY**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**2**	**30**	**2**

COURSE OBJECTIVES

- To know the value of biodiversity.
- To understand the valuation methods of species content.
- To gain knowledge on the factors of species loss.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the values of bioresources.
K2	CO2	Know the possible ways to reduce the ecosystem loss.
K3	CO3	Understand the role of several factors on biodiversity loss.
K3	CO4	Evaluate the values of species by various methods

SYLLABUS

UNIT - I **(6 Hours)**

Introduction. Biodiversity values – Total environmental value, primary value, total economic value, use value, consumptive use value, productive use value, indirect use value, non-consumptive use value, non-use value, option value, quasi-option value, existence value and bequest value. Ethical and aesthetic value*. Precautionary principle.

UNIT - II **(6 Hours)**

Valuation of biodiversity: Methods – outline on basics of MaCArthur, 1997, Changes in productivity method, contingent valuation method, hedonic pricing method, travel cost method.

UNIT - III **(6 Hours)**

Loss of genetic diversity: Factors causing loss of genetic diversity – Founder effects, demographic bottlenecks, genetic drift, inbreeding depression.

UNIT - IV **(6 Hours)**

Loss of species diversity: Processes responsible for species extinction – Deterministic processes, stochastic processes – demographic uncertainty, environmental uncertainty, natural catastrophis, and genetic uncertainty. Population size as a critical factor in species extinction – minimum viable population and population viability analysis. Threatened species – definition. IUCN threatened categories and unknown categories.

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UNIT - V **(6 Hours)**

Loss of ecosystem diversity: Factors affecting ecosystem degradation and loss. Loss in diversity of major ecosystems – tropical forests, grasslands, inland wetlands, coastal ecosystems, arctic and alpine ecosystems, temperate forests systems, arid and semiarid lands, open oceans. Projected scenario for biodiversity loss.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Myers, N. 2000. The new millennium: An ecology and economy of hope. Curr. Sci. 78: 686-693.
3. MacArthur, J. 1997. The economic valuation of biodiversity, its implications and importance in bioresource planning, and initiations for its regular use in planning conservation projects in India. *In:* Pushpangandan, P., Ravi, K. and Santhosh, V. (Eds.). Conservation and Economic Evaluation of Biodiversity. Vol. 2. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 335-354.
4. Balmford, A., Mace, G.M. and Ginsberg, J.R. 1998. The challenges to conservation in a changing world putting process on the map. *In:* Mace, G.M., Balmford, A. and Ginsberg, J.R. (Eds.). Conservation in a Changing World. Cambridge University Press, Cambridge, pp. 1-28.

REFERENCES

1. Hughes, J.B., Daily, G.C. and Ehrlich, P.R. 1997. Population diversity: its extinction. Science 278: 689-691.
2. Lande, R. and Barrowclough, G.F. 1987. Effective population size, genetic variation, and their uses in population management. *In:* Soule, M.J. (Ed.). Viable Populations for Conservation. Cambridge University Press, Cambridge, pp. 87-124.

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MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	H
CO2	H	S	H	H	M
CO3	H	S	M	H	S
CO4	S	M	H	S	H

S - Strong **H** - High **M** - Medium **L** - Low

20PDB103

Programme Code: 05		**Title: PG Diploma in Biodiversity**		
Course Code: 20PDB103		**C.P. 3 - CONSERVATION AND MANAGEMENT OF BIODIVERSITY**		
Batch 2020-2021	**Semester I**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To know the methods of conservation of species.
- To gain knowledge in the area of ecosystem conservation.
- To know the various laws of biodiversity conservation.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the species conservation methods.
K2	CO2	Understand the *in situ* and *ex situ* conservation strategies.
K3	CO3	Understand the laws prevailing in biodiversity conservation both at national and international levels.
K3	CO4	Analyze the ecosystem conservation by noval strategies.

SYLLABUS

UNIT - I **(6 Hours)**

Practice of Conservation: Current practice in conservation. Conservation of genetic diversity. Conservation of species diversity – categories of species for conservation – threatened species, directly harvested plants, indicator species, umbrella species, keystone species, charishmatic species and recreational species.

UNIT - II **(6 Hours)**

Conservation of ecosystem diversity: Relevance of ecosystem diversity as well as services in conservation. Topdown and bottmup protocol for conservation.

UNIT - III **(6 Hours)**

***In situ* conservation:** Protected areas – biosphere reserves and national parks. World biosphere reserve programmes. Design of biosphere reserves – issues determines the success of a reserve - reserve size, spatial and temporal heterogeneity and dynamics, ideal geographic context, connection of different reserves, natural landscape elements, creation of zones within in a limit. Homegardens.

UNIT - IV **(6 Hours)**

***Ex situ* conservation:** Germplasm collections, botanic gardens, seed banks, test tube gene banks, pollen banks, field gene banks, DNA banks. *In vitro* conservation methods. Ecosystem restoration. Social approaches to conservation – sacred grooves*, sthalavrikshas.

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UNIT - V **(6 Hours)**

Legislations: Role of educational institutions in biodiversity conservation. IUCN, UNEP, UNESCO, WWF, ICSU, FAO, CAB International, WCMC, ISBI. Biodiversity legislation and conservations – International biodiversity laws. Conservation on biological diversity. Trade related intellectual property rights.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Ambasht, R.S. 1988. Text book of Plant Ecology. Lanka Publishers, Varanasi.
3. Sharma, P.D. Ecology and Environment. Rastogi Publications, Meerut.
4. Given, D.R. 1984. Monitoring and science – the next stage in threatened plant conservation in New Zealand. *In:* Given, D.R. (Ed.). Conservation of Plant Species and Habitats. Nature Conservation Council, Wellington, New Zealand, pp. 83-102.

REFERENCES

1. Lande, R. 1988. Genetics and demography in biological conservation. Science 241: 1455-1460.
2. McNeely, J.A., Miller, K.R., Reid, W.V., Mittermeier, R.A. and Werner, T.B. 1990. Conserving the World's Biological Diversity, IUCN, Gland, Switzerland.
3. Ganeshaiah, K.N., Uma Shaanker, K. and Bawa, K.S. 2001. Conservation of forest genetic resources of a region: combining species-centered and ecosystem based approaches. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 273-281.
4. Ayenus, E. and 24 others. 1999. International ecosystem assessment. Science 286: 685-686.

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MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	H
CO2	H	S	H	H	M
CO3	H	M	S	H	S

S - Strong **H** - High **M** - Medium **L** – Low

20PDB1CL

Programme Code: 05		**Title: PG Diploma in Biodiversity**		
Course Code: 20PDB1CL		**C.Pr.1. Biodiversity**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**I**	**2**	**30**	**2**

COURSE OBJECTIVES

- To learn the techniques for plant community analysis.
- To know the complexity and diversity of plant communication.
- To have the knowledge on endangered animals in protected areas.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Understand the programmes being carried out to conserve species in protected areas.
K4	CO2	Investigate the biodiversity status of plant communities.
K5	CO3	Analyze the plant community quantitatively.

LIST OF PRACTICALS

1. To know the ecological status of plants in the communities, the field experiments to be done in the natural vegetation are: a) IVI, b) dominance index c) diversity index d) similarity index.
2. To know the animal status with particular reference to tiger and Nilgiri thar - techniques involved census will be studied.
3. To know the richness of birds, aquatic ecosystems are studied using bird census techniques.
4. Field visits to protected areas for biodiversity conservation.

MAPPING

PSO / CO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	H	S	M	S
CO2	S	M	H	S	H
CO3	H	H	M	H	H

S - Strong **H** - High **M** - Medium **L** - Low

20PDB204

Programme Code: 05		Title: PG Diploma in Biodiversity		
Course Code: 20PDB204		C.P.4 - BIODIVERSITY PROSPECTING AND INDIGENOUS KNOWLEDGE SYSTEM (IKS) AND BIOTECHNOLOGY FOR BIODIVERSITY		
Batch 2020-2021	Semester II	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To know the ethnic communities of India and their role in bioresource management.
- To understand the bioprospecting of natural bioresources.
- To gain knowledge on the role of biotechnology in processing biogoods.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the practices of ethnic groups in conserving wild species.
K2	CO2	Know the database of biodiversity.
K3	CO3	Understand the bioprospecting principles.
K3	CO4	Apply the biotechnological tools for bioprocessing.

SYLLABUS

UNIT - I **(6 Hours)**

Ethnic Community and Biodiversity: Indigenous and ethnic communities of world. Environmental conservation and sustainable uses of natural resources by ethnic societies. Important plant genetic resources conserved by ethnic people in India.

UNIT - II **(6 Hours)**

Bioprospecting: Introduction, IKS, biopiracy. IPRs and ownership of traditional knowledge - issues, Traditional Resource Rights (TRR), Local efforts to date.

UNIT - III **(6 Hours)**

Traditional Societies and Protected areas: Territorial demarcation of traditional societies - introduction. Community forest management. Indigenous people and Protected areas.

UNIT - IV **(6 Hours)**

Biodiversity database: Community biodiversity register. Database and networks on IKS. Community controlled Research. Center for farmers rights. Participatory approach in biodiversity management. Roll of Women, NGOs*.

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UNIT - V **(6 Hours)**

Biotechnology and Biodiversity: Monitoring DNA - diversity, PCR based techniques. Use of molecular (DNA) markers to detect plant diversity. Animal biotechnology - recent trends - reproductive technology - artificial insemination, embryo transfer, *in vitro* fertilization. Cloning - DNA cloning, embryo cloning, adult DNA cloning, therapeutic cloning.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Jain, S.K. 1987. A manual of ethnobotany. Scientific Publishers, Jodhpur.
3. Rajiv, K. Sinha and Shweta Sinha. Ethnobotany. Surabhi Publications, Jaipur.
4. Duff, F. 1997. Overview of the UNEP/GEF Biodiversity Data Management Project (BDM). *In:* Hawksworth, D.L., Kirk, P.M. and Dextre Clarke, S. (Eds.). Biodiversity Information: Needs and Options. CAB International, Wallingford, UK, pp. 115-123.

REFERENCES

1. Amaral, W. 2001. Characterization, evaluation and conservation of forest genetic resources: The potential and limitation of new biotechnology tools. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 115-125.
2. Lakshikumaran, M., Srivastava, P.S. and Singh, A. 2001. Applications of molecular marker technologies for genetic analysis and assessment of genetic diversity in forest tree species. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 153-191.
3. McCarty, P.L. 1983. *In situ* bioremediation of chlorinated solvents. Curr. Opinions Biotech. 4: 323-330.

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MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	S	H	S	M	S
CO3	H	S	S	H	H
CO4	S	H	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low

20PDB205

Programme Code: 05		**Title: PG Diploma in Biodiversity**		
Course Code: 20PDB205		**C.P.5 - WILDLIFE BIOLOGY AND CONSERVATION POLICIES AND LAW**		
Batch 2020-2021	**Semester II**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To understand the values and ethics in wild life conservation.
- To know the diversity and importance of avian fauna.
- To gain knowledge on issues in wildlife conservation.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the diversity in avian fauna.
K2	CO2	Know the places of application of Indian Forest Law for forest protection.
K3	CO3	Understand the values and ethics of wildlife conservation.
K3	CO4	Analyze the current issues in wild life conservation.

SYLLABUS

Unit - I **(6 Hours)**

Values and Ethics in Wildlife Conservation: Definitions and (Instrumental; Intrinsic; Ecocentrism; Religious traditions and conservation) Ethics in conservation. Field Techniques: For invertebrates (planktons; insects/arachnids) and vertebrates (amphibian, reptile, aves and mammals), Line/belt transects, Quadrat sampling, Point count, Scan sampling, Focal sampling, Time constraints sampling, Population indices, Introduction of Wildlife telemetry, Remotely triggered Camera Trapping Avian acoustics and identification based on calls.

Unit - II **(6 Hours)**

Avian ecology: Avian community ecology and habitat selection. Sexual selection in birds. Bird migration. Bird census techniques, Migratory flyways, threats to migrant populations. Sampling designs for population estimation: Population estimation methods, Distance based Sampling Methods, Mark-Recapture for Closed Population, Indices, and Estimation of Demographic parameters.

20PDB205

Unit - III **(6 Hours)**

Current issues in wildlife conservation with case studies: Community based conservation approach, Impact of climate change on species diversity, Compensate payment for environmental services, Human-wildlife conflict, Poaching, illegal trading, Conflict management.

Unit - IV **(6 Hours)**

Protection of Forest and Wildlife Forest Law in India: - Forestry in British and Post British India, Forest as a source of Revenue, Forest Protection and Sustainable use of Forests: Judicial Perspective ,The Indian forest Act, 1927, The Forest (Conservation) Act, 1980, The Forest (Conservation) Rules, 1981,2003, The Environment (Protection) Act, 1986, Ozone Depleting Substances (Regulation)Rules, 2000 Wildlife laws in India - The Wildlife (Protection) Act, 1972; The Wildlife (Protection) Rules, 1995; The Wildlife (Protection) Amendment Act, 2002 , Preservation and Management of wildlife in India: Court Decisions; Ecotourism and Forest Protection*.

Unit - V **(6 Hours)**

Laws Concerning Forest: Wildlife and People The Circular Concerning Joint Forest Management, 1990; Panchayats (Extension to Scheduled Areas) PESA Act, 1996; Forest Right Act, 2006; Recognition of ZOO Rules, 1992; International Laws and Policies Concerning Biodiversity; Gaps in Present Laws and Polices with respect to Biodiversity Conservation.

*** Self study**

Teaching Methods

Smart Class Room/PowerPoint presentation/Seminar/Quiz/Discussion

TEXT BOOKS

1. Krishnamurthy, K.V. 2003. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Sharma, P.D. 1994. Ecology and Environment. Rastogi Publications, Meerut.
3. Ambasht, R.S. 1988. Text book of Plant Ecology. Lanka Publishers, Varanasi.

REFERENCES

1. Rosenecraz, A. 1995. Environmental law and policy in India: Cases, materials and statutes. *In*: Armin Rosenecraz, Shyam Divan, Martha L Noble. (Reprt Eds). N M Tripathi Pvt. Ltd, Bombay, India, pp 555.
2. Leela Krishnan, P. 1999. Environmental law in India. Butterworths, New Delhi, India, p. 194.
3. Cirelli, M.T. 2002. Legal Trends in Wildlife Management, FAO Legislative Study No. 74.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	S	M
CO2	H	H	M	H	H
CO3	S	H	S	M	S
CO4	S	M	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low

20PDB2Z1

Programme Code: 05		**Title: PG Diploma in Biodiversity**		
Course Code: 20PDB2Z1		**Project Work and Vivo – Voce**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2020-2021	**II**	**4**	**60**	**4**

COURSE OBJECTIVES

- To gain knowledge on species diversity at microbe, plant and animal level in natural vegetations.
- To learn the techniques used to sample the vegetation.
- To understand the modern methods in conservation of species.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Develop local-specific management strategies for the sustainable utilization and conservation of bioresources.
K4	CO2	Analyze the population structure of flora in natural vegetation.
K5	CO3	Evaluate the population size of various wild animals in forests.

PROJECT WORK

1. Project works related to survey and population studies of microbes, plants and animals.
2. Projects related to management of bioresearches and conservation of flora and fauna.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	S	M
CO2	H	S	M	H	M
CO3	S	H	S	S	S
CO4	S	M	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low