

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



**DEPARTMENT OF BOTANY (UG)**

**CURRICULUM AND SCHEME OF EXAMINATIONS**  
**(CBCS)**  
**(2018 – 2019 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 Environmental Science.

## **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**

- Students were able to acquire knowledge and understand the range of plant diversity in terms of structure, function and environmental relationship from primitive to highly evolved plant groups of various life forms.

## **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.

# CURRICULUM AND SCHEME OF EXAMINATIONS (CBCS)

(APPLICABLE TO STUDENTS DURING THE ACADEMIC YEAR 2018-2019 AND ONWARDS)

Semester	Part	Subject code	Title of the Paper	Instruction Hours / Cycle	Exam. Marks			Duration of Exam.(hours)	Credit
					CIA	ESE	Total		
I	I	18TML101	Part-I -Lang. -Tamil-I /Hindi-I/French -I / Malayalam -I/ Sanskrit-I	6	25	75	100	3	3
	II	18ENG101	Part - II - English - I	6	25	75	100	3	3
	III	18UBO101	C.P.1- Plant Diversity - I	7	25	75	100	3	5
		18UZO1A1	Allied -I Zoology - I	5	20	55	75	3	4
			C.Pr.1 - Plant Diversity - I	2	-	-	-	-	-
			Allied Pr. Zoology - I	2	-	-	-	-	-
	IV	18EVS101	Environmental studies**	2	-	50	50	3	2
	Total			30			425		17
II	I	18TML202	Part - I- Tamil-II /Hindi-II /French-II / Malayalam-II / Sanskrit - II	6	25	75	100	3	3
	II	18ENG202	Part- II- English - II	6	25	75	100	3	3
	III	18UBO202	C.P.2 - Plant Diversity - II	7	25	75	100	3	5
		18UZO2A2	Allied - 2 Zoology - II	5	20	55	75	3	4
		18UBO2CL	C.Pr.1 - Plant Diversity I & II	2	40	60	100	3	2
		18UZO2AL	Allied. Pr. Zoology - I & II	2	20	30	50	3	2
	IV	18VED201	Value Education - Moral and Ethics**	2	-	50	50	3	2
	Total			30			575		21
III	I	18TML303	Part-I-Tamil-III /Hindi- III / French-III / Malayalam - III / Sanskrit - III	6	25	75	100	3	3
	II	18ENG303	Part - II -Lang. - English - III	6	25	75	100	3	3
	III	18UBO303	C.P. 3 - Microtechniques, Anatomy and Embryology of Angiosperms	5	25	75	100	3	4
		18UCH3A3	Allied - 3 - Chemistry - I	5	20	55	75	3	4
			C. Pr. 2. - Microtechniques, Anatomy and Embryology of Angiosperms	2	-	-	-	-	-
			Allied - Pr. - Chemistry	2	-	-	-	-	-
	IV	18UGA3S1	Skill based subject -I General awareness	2	25	75	100	3	3
		18TBT301/ 18TAT301/ 18UHR3N1	Basic Tamil* / Advanced Tamil**/ Non Major Elective - Human Rights**	2	-	75	75	3	2
	Total			30			550		19
IV	I	18TML404	Part-I-Tamil-IV / Hindi-IV / French - IV/ Malayalam - IV / Sanskrit - IV	6	25	75	100	3	3
	II	18ENG404	Part-- II -Lang - English IV	6	25	75	100	3	3
	III	18UBO404	C.P.4- Biophysics and Biostatistics	5	25	75	100	3	4
		18UCH4A4	Allied 4 - Chemistry - 2	5	20	55	75	3	4

**UBO2**

		18UBO4CM	C. Pr.2.- Microtechniques, Anatomy, Embryology of Angiosperms, Biophysics & Biostatistics	2	40	60	100	3	2
		18UCH4AL	Allied Pr. Chemistry	2	20	30	50	3	2
	IV	18UBO4S2	Skill based subject-II Horticulture	2	25	75	100	3	3
		18TBT401/ 18TAT402 18UWR4N2	Basic Tamil*/ Advanced Tamil**/ Non Major Elective – Women’s Rights**	2	-	75	75	3	2
	Total			30			700		23
V	III	18UBO505	C.P. 5 - Fundamentals of Computer and Bioinformatics	4	25	75	100	3	4
		18UBO506	C.P. 6 - Taxonomy of Angiosperms and Economic Botany	4	25	75	100	3	5
		18UBO507	C.P.7 - Cytology, Genetics and Plant Breeding	4	25	75	100	3	5
		18UBO508	C.P. 8 - Plant Ecology, Phytogeography and Resource Conservation	4	25	75	100	3	5
		18UBO5E1	Elective - I	4	25	75	100	3	5
		18UBO5CN	C.Pr.3 - Fundamentals of Computer and Bioinformatics	4	40	60	100	3	2
			C.Pr. 4 - Taxonomy of Angiosperms, Economic Botany, Cytology, Genetics, Plant Breeding, Plant Ecology, Phytogeography and Resource Conservation	4	-	-	-	-	-
	IV	18UZO5X1/ 18UBC5X1/ 18UBT5X1	EDC - Extra Departmental course	2	25	75	100	3	3
		18UBO5IT	Internship Training	Grade****					
Total			30			700		29	
VI	III	18UBO609	C.P.9 - Biochemistry	5	25	75	100	3	4
		18UBO610	C.P.10 - Plant Physiology	5	25	75	100	3	5
		18UBO611	C.P.11- Microbiology and Plant Pathology	5	25	75	100	3	4
		18UBO6CO	C.Pr. 4- Taxonomy of Angiosperms, Economic Botany, Cytology, Genetics, Plant Breeding, Plant Ecology, Plant Phytogeography and Resource Conservation	-	40	60	100	3	2
		18UBO6CP	C. Pr. 5 - Biochemistry, Plant physiology, Microbiology and Plant Pathology	4	40	60	100	3	2
		18UBO6E2	Elective- II	5	25	75	100	3	5
		18UBO6Z1	Project***	4	20	80	100	-	5
		18UBO6S4	Skill based Subject-III- Cultivation and Marketing of Medicinal plants	2	25	75	100	3	3
		18NCC/NSS/ YRC /PYE101	Extension activity *	-	50	-	50	-	1
Total			30			850		31	
Grand Total			180			3800		140	

## UBO3

### @ Hindi/Malayalam/ French/ Sanskrit - 13HIN/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. Medicinal plants

#### Non-Major Elective Papers

1. Human Rights
2. Women's Rights
3. Consumer affairs

#### List of Extra Departmental Course (EDC) papers

S. No.	Subject code	Title of the paper	Offering Department
1.	16UZO5X1	Ornamental Fishery Technology	Zoology
2.	17UBC5X1	Diagnostic Biochemistry	Biochemistry
3.	16UBT5X1	Life Style Biotechnology	Biotechnology

**Note:** In core/allied subjects, Number 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.

## UBO4

### **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/Project	1700	65
		Allied	400	20
		Elective	200	10
4.	IV	Basic Tamil / Advanced Tamil (OR) Non-major elective	150	4
		Skill Based subject	300	9
		Environmental Studies	50	2
		Value Education	50	2
5.	V	Extra Departmental Course (EDC)	100	3
		Extension Activities	50	1
		<b>Total</b>	<b>3800</b>	<b>140</b>

### **Note :**

- CBCS - Choice Based Credit System
- CIA - Continuous Internal Assessment
- ESE - End of Semester Examinations
- 25 % CIA is applicable to all theory subjects except JOC, COP and Diploma Courses, which are considered as extra credit courses.

### **Certificate Course**

- **Bonsai**

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
	18CCB101	C.P.1- Introduction to Bonsai Principles and Techniques	2	25	75	100	3	2
	18CCB102	C.P.2- Ethics, Values and Marketing of Bonsai	2	25	75	100	3	2
	18CCB1CL	C.Pr.1. Bonsai Techniques	2	40	60	100	3	2
	18PDB2Z1	Project	2	20	80	100	3	2
		<b>Grand Total</b>	<b>8</b>			<b>400</b>		<b>8</b>



**BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN****K1** - Remember; **K2** - Understanding; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate**1. Theory Examination - Part I, II & III****(i) CIA I & II and ESE: 75 Marks**

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K2 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K3 & 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 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	55
K2 Q11 to 15	B (Either or pattern)	5 x 3 = 15	Short Answers	
K3 & 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			

## UBO6

### Components of Continuous Internal Assessment (CIA)

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

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO101</b>		<b>Core Paper: 1 - PLANT DIVERSITY - I</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>I</b>	<b>Hours / Week</b> <b>7</b>	<b>Total Hours</b> <b>105</b>	<b>Credits</b> <b>4</b>

### COURSE OBJECTIVES

- To acquire knowledge on evolution of 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 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 and identify the algal species using algal pigments.
K2	CO2	Know about the distribution and mode of nutrition of fungal species.
K3	CO3	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.

### SYLLABUS

#### UNIT I

(21 hours)

**Algae:** Introduction and general characters; detailed study of habits, habitats and distribution of algae, algal components, outline classification of algae by Fritsch (1945). Detailed study of occurrence, thallus structure, reproduction and life cycle of Cyanophyceae - *Nostoc*, Chlorophyceae - *Volvox* and *Caulerpa*.

#### UNIT II

(21 hours)

Occurrence, thallus structure, reproduction and life cycle of Bacillariophyceae - *Diatom*; Phaeophyceae - *Sargassum*; Rhodophyceae - *Polysiphonia*. Economic importance of algae.

#### UNIT III

(21 hours)

**Fungi:** General characters, structure and reproduction of fungi. Outline classification of fungi by Alexopoulos and Mims (1979). Detailed study of occurrence, structure, reproduction and life cycles of Oomycetes - *Albugo*, Zygomycetes - *Pilobolous*.

#### UNIT IV

(21 hours)

Occurrence, thallus structure, reproduction and life cycles of Ascomycetes - *Saccharomyces*, Basidiomycetes - *Puccinia*, Deuteromycetes - *Cercospora*. Economic importance of fungi. Mycorrhizae and their significance.

**UNIT V****(21 hours)**

**Lichens:** Habits and habitats; role of Phycobionts and Mycobionts. Outline classification of lichens by Alexopoulos and Mims (1979). Thallus anatomy and reproduction of Ascolichen. Economic importance of Lichens\*.

**\* Self study****Teaching Methods**

Quiz / Class discussion/Assignment

**TEXT BOOKS**

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. Vashishta, B.R. (1998). Fungi. S. Chand & Co., New Delhi.
4. Vashishta, B.R. (1998). The Algae. S. Chand & Co., 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. Chopra, C.L. (1982). Algae. S. Nagin & Co., New Delhi.
4. Fritsch, F.E. (1972). The structure and reproduction of Algae Vol. I & II.
5. Sharma, O.P. (1986). Text book of Algae. Tata McGraw - Hill Publications, New Delhi.

**MAPPING**

<b>CO \ PSO</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	H	S	M
<b>CO2</b>	H	M	S	H	S
<b>CO3</b>	H	H	M	S	H
<b>CO4</b>	S	M	H	S	M

S - Strong

H - High

M - Medium

L - Low

**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 (6hours)**

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.

**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)

**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.

**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.

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO202</b>		<b>Core Paper: 2 - PLANT DIVERSITY - II</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>II</b>	<b>Hours / Week</b> <b>7</b>	<b>Total Hours</b> <b>105</b>	<b>Credits</b> <b>4</b>

**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*<sup>#</sup>, *Anthoceros*<sup>#</sup> and *Funaria*<sup>#</sup>. Economic importance of Bryophytes.

**UNIT II****(21 HOURS)**

**Pteridophytes:** Introduction and general characters of Pteridophytes. Classification of Pteridophytes (Riener, 1954). Occurrence, structure, reproduction and life cycle of *Lycopodium*<sup>#</sup>, *Selaginella*<sup>#</sup> and *Equisetum*<sup>#</sup>.

**UNIT III****(21 HOURS)**

Occurrence, structure, reproduction and life cycle of *Ophioglossum*<sup>#</sup> and *Adiantum*<sup>#</sup>. Stelar evolution. 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*<sup>#</sup> and *Gnetum*<sup>#</sup>. Economic importance of Gymnosperms.

## UNIT V

(21 HOURS)

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

# (Developmental studies are excluded)

\* Self study

## Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

## TEXT BOOKS

1. Gangulee, Das & Kar. (2001). College Botany Vol II. New central Book agency Pvt. Ltd. Calcutta.
2. Vashista, P.C. (1992). Pteridophyta. 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 Pteridophytes -B.I. Publications, New Delhi
4. Smith, G.M. (1955). Cryptogamic Botany Vol. II. Tata McGraw Hill Publications, New Delhi.

## MAPPING

CO \ PSO	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



<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO2CL</b>		<b>Core Practical: 1 - PLANT DIVERSITY - I &amp; II</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>II</b>	<b>Hours / Week</b> <b>4</b>	<b>Total Hours</b> <b>60</b>	<b>Credits</b> <b>2</b>

**COURSE OBJECTIVES**

- To enable students to know about diversity of lower organisms.
- To understand the life cycle pattern of Bryophytes, Pteridophytes and Gymnosperms.
- 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 Thallophytes.
K4	CO2	Analyze the internal organization of Cryptogams and Phanerogams.
K5	CO3	Examine the Mycorrhizal association in the roots of higher plants.

**Core Practical: 2 -PLANT DIVERSITY - I & II****I. PLANT DIVERSITY - I**

Structure and reproductive characters of the following:-

**1. Algae**

*Nostoc*  
*Volvox*  
*Caulerpa*  
*Diatoms*  
*Sargassum*  
*Polysiphonia*

**2. Fungi**

*Albugo*  
*Pilobolous*  
*Saccharomyces*  
*Puccinia*  
*Cercospora*

**3. Lichen *Usnea*****4. Examination of Mycorrhizal colonization in roots**

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	M	S	H
<b>CO2</b>	H	S	H	H	M
<b>CO3</b>	S	H	M	S	S

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

**UBO15**

**18UBO2CL**

**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: 2 - PLANT DIVERSITY - I & II**

I. Micro-preparation	<b>- 25 Marks</b>
II. Identify the given specimen to its class and specify their general characters	<b>- 04 Marks</b>
III. Write the Systematic position of the given specimen	<b>- 03 Marks</b>
IV. Spotters (6 x 3)	<b>- 18 Marks</b>
Record	<b>- 10 Marks</b>
	<hr/>
<b>TOTAL</b>	<b>- 60 Marks</b>
	<hr/>

**SEMESTER-II**  
**PART-IV VALUE EDUCATION: MORAL AND ETHICS**

**Total Hours: 30**

**Total Credits: 2**

**OBJECTIVES:**

- To impart the value education in every walk of life.
- To make them understand the relationship between Moral and Ethics.
- To impart the right attitude by practicing self introspection.
- To make them realize about their hidden power within them.
- To develop a knowledge for the steps of upliftment.
- To know about their goal of life.
- To make them understand the importance of yoga and meditation.
- To realize what is the real peace.
- To understand what are the ways to contribute peace to the whole world.
- To goad youth to reach excellence and reap success.

**UNIT I** **6hrs**  
Introduction - Meaning of Moral and Ethics - Ethics and Culture - Aim of Education.

**UNIT II** **6hrs**  
Swami Vivekananda - A Biography.

**UNIT III** **6hrs**  
The Parliament of Religions - Teachings of Swami Vivekananda.

**UNIT IV** **6hrs**  
Steps for Human Excellence.

**UNIT V** **6hrs**  
Yoga & Meditation.

**TEXT BOOKS**

1. Value Base Education - Moral and Ethics - Published by Kongunadu Arts and Science College (Autonomous), First Edition, 2015.

**REFERENCES**

1. Easy steps to Yoga by Swami Vivekananda, A Divine Life Society Publication, 2000.

**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.

<b>Programme Code : 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course code : 18UBO303</b>		<b>Core Paper: 3 - MICROTECHNIQUES, ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS</b>		
<b>Batch 2018-2019</b>	<b>Semester III</b>	<b>Hours/Week 5</b>	<b>Total Hours 75</b>	<b>Credits 5</b>

### COURSE OBJECTIVES

1. To learn the techniques of temporary microscopic slide preparations.
2. To inculcate knowledge on the basics of tissues and anatomical features of plants.
3. 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	Familiarize the basic skills on fixation, dehydration, infiltration and staining process of the specimens.
K3	CO4	Imply the embryological and anatomical knowledge to differentiate the plant taxa.

### SYLLABUS

#### UNIT I

(15 HOURS)

**Killing and Fixing:** Principles and techniques of killing and fixing; Fixative reagents - Carnoy's fluid, FAA, Chromic acid fluids. **Dehydration:** Principles of dehydration; Dehydrating methods: Tertiary-butyl alcohol method, Alcohol-Xylo method. **Embedding:** Paraffin embedding. **Sectioning:** Free hand sections, Sectioning by Rotary microtome. **Staining:** Principles of staining; Techniques of staining - single staining (Haematoxylin), double staining (Safranin and Fast green method). **Mounting:** Mounting by DPX. Cleaning, labeling and storage of slides.

#### Unit II

(15 HOURS)

Scope and significance of plant anatomy; **Apical organization:** Origin and structure of primary meristem (Angiosperm), theories of apical organization, Primary thickening meristem in monocots, Reproductive apex in angiosperms. **Epidermal tissue system :** Stomata - types and functions; Trichomes - Types and functions, structure and functions of secretory trichomes in *Drosera* and *Nepenthes*, salt gland, collectors, floral and extrafloral nectarines, resin duct, oil glands and laticiferous (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*).

**Unit V****(15 HOURS)**

**Fertilization:** Double fertilization. **Endosperm:** Nuclear, Cellular, Helobial and Ruminant 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**

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

**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 Wiley
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.

**REFERENCES**

1. De Robertis. (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. 7<sup>th</sup> Edition

## MAPPING

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	H	M	H
<b>CO2</b>	H	H	M	S	M
<b>CO3</b>	S	H	S	H	H
<b>CO4</b>	H	S	H	M	M

S - Strong

H - High

M - Medium

L - Low

**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.



**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) - Drill - 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 Administrative 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.

**SEMESTER - III**  
**PART IV - NON MAJOR ELECTIVE - I HUMAN RIGHTS**

**Total Hours of Teaching: 30**

**Total Credits: 2**

**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**

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**

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**

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

**UNIT IV**

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

**UNIT V**

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

**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, 1<sup>st</sup> 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

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO404</b>		<b>Core Paper: 4 - BIOPHYSICS AND BIOSTATISTICS</b>		
<b>Batch</b> 2018-2019	<b>Semester</b> IV	<b>Hours / Week</b> 5	<b>Total Hours</b> 75	<b>Credits</b> 5

### COURSE OBJECTIVES

- To understand the nature of light.
- 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:** Electromagnetic radiation - nature, absorption, interaction with matter, role of electrons in absorption of light, electron multiplicity. Excitation, de-excitation & path of de-excited electrons. Thermodynamic principles - enthalpy, entropy, free energy, coupling of chemical reactions and efficiency of coupling.

#### 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 counter 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.

**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**

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	M	S	H
<b>CO2</b>	H	S	S	H	S
<b>CO3</b>	S	H	H	M	H
<b>CO4</b>	H	M	H	S	H

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

Programme Code : 05		Title : B.Sc., Botany		
Course code : 18UBO4CM		Core Practical: 2 - Microtechniques, Plant Anatomy and Embryology of Angiosperms, Biophysics and Biostatistics		
Batch 2018 - 2019	Semester IV	Hours/Week 4	Total Hours 60	Credits 2

### COURSE OBJECTIVES

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

### COURSE OUTCOME

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

### Core Practical: 2 - Microtechniques, Plant Anatomy and Embryology of Angiosperms, Biophysics and Biostatistics

#### I. MICROTECHNIQUES

1. Preparation of temporary microslides
2. Composition of some fixatives - FAA and Carnoy's fluid (Demonstration)

#### II. PLANT ANATOMY

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

#### III. 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 embryo sac
  - v. Endosperm types
  - vi. Types of embryos
  - vii. Polyembryony

**IV. BIOPHYSICS**

1. Demonstration of 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**

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

**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 2017-18 onwards)

**Time: 3 Hours**

**Max. Marks: 60 Marks**

**BREAK UP OF MARKS**

**Core Practical: 2 - Microtechniques, Plant Anatomy and Embryology of  
Angiosperms, Biophysics and Biostatistics**

I. Anatomy section (A & B) (2x10)	- 20 Marks
II. Biostatistics (C & D) (10+5)	- 15 Marks
III. Embryo dissection (2x2 1/2)	- 05 Marks
IV. Spotters (5 × 2)	- 10 Marks
Record	- 10 Marks
	_____
<b>TOTAL</b>	<b>- 60 Marks</b>
	_____

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code:18UBO4S2</b>		<b>Skill Based Subject: II - HORTICULTURE</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>IV</b>	<b>Hours / Week</b> <b>2</b>	<b>Total Hours</b> <b>30</b>	<b>Credits</b> <b>3</b>

### 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

(6 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

(6 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

(6 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

(6 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****(6 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*.

\* Self study

**Teaching Methods**

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	H	S	S	H	M
<b>CO2</b>	S	H	M	H	H
<b>CO3</b>	H	S	H	M	S
<b>CO4</b>	S	H	M	H	M

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

**SEMESTER-IV**

**NON MAJOR ELECTIVE-II WOMEN'S RIGHTS**

**Total Hours of Teaching: 30**

**Total Credits: 2**

**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**

**6hrs**

**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**

**6hrs**

**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**

**6hrs**

**Women's Rights: Access to Justices**

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

**Unit IV**

**6hrs**

**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, 1856 - The Dowry Prohibition Act, 1961.

**Unit V**

**6hrs**

**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, Raquel Kennedy 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.

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code : 18UBO505</b>		<b>Core Paper: 5 - FUNDAMENTALS OF COMPUTER AND BIOINFORMATICS</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>V</b>	<b>Hours / Week</b> <b>4</b>	<b>Total Hours</b> <b>60</b>	<b>Credits</b> <b>4</b>

**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.

**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**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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**

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

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

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code:18UBO506</b>		<b>Core Paper: 6 - TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY</b>		
<b>Batch 2018-2019</b>	<b>Semester I</b>	<b>Hours / Week 7</b>	<b>Total Hours 105</b>	<b>Credits 5</b>

### 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	Familiarize immense knowledge on economic importance of higher plants.

### SYLLABUS

#### UNIT I

(21 HOURS)

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

#### UNIT II

(21 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

(21 HOURS)

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

#### UNIT IV

(21 HOURS)

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



**UNIT V****(21 HOURS)**

Economic Botany- study of botany, cultivation and utilization of the following with reference to Tamil Nadu. Fiber yielding plant (cotton), sugar yielding plant (sugarcane) and food crops - (Cereals - Paddy and Pulses - Soyabean). Spices and condiments (Pepper and turmeric)\*.

**\* Self Study****TEACHING METHODS**

Seminar/Quiz/Assignment

**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.

**MAPPING**

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

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO507</b>		<b>Core Paper: 7 - CYTOLOGY, GENETICS &amp; PLANT BREEDING</b>		
<b>Batch 2018-2019</b>	<b>Semester V</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

### 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 - DNA as a genetic material, structure, properties, replication of DNA (Conservative, semiconservative method) 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.

**UNIT IV****(12 HOURS)**

Multiple alleles - ABO Blood groups, Bombay phenotype, M-N blood groups, Rh factor. 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**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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 (25<sup>th</sup> 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. Dobzonsky, (1995). Principles of Genetics. TATA Mc Graw Hill Company Ltd. New Delhi.
5. Gupta, P.K. (2004). Elements of genetics. FNA 2<sup>nd</sup> Edition.

**MAPPING**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	H	S	H	M	H
<b>CO2</b>	S	H	H	H	M
<b>CO3</b>	H	S	M	S	H
<b>CO4</b>	S	H	H	H	M

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

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO508</b>		<b>Core Paper: 8 - PLANT ECOLOGY, PHYTOGEOGRAPHY AND RESOURCE CONSERVATION</b>		
<b>Batch 2018-2019</b>	<b>Semester V</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

**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****(12 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****(12 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****(12 HOURS)**

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

**UNIT IV****(12 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****(12 HOURS)**

Resource conservation - types of resources, conservation of soil, water, agriculture resources, range, forest and freshwater bodies. Case study\* - Project Tiger and Biosphere reserves.

\*Self study

**Teaching Methods**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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**

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

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

<b>Programme Code: 05</b>		<b>Title : B.Sc., BOTANY</b>		
<b>Course code : 18UBO5CN</b>		<b>Core Practical: 3 - FUNDAMENTALS OF COMPUTER AND BIOINFORMATICS</b>		
<b>Batch 2018-2019</b>	<b>Semester V</b>	<b>Hours/Week 4</b>	<b>Total Hours 60</b>	<b>Credits 2</b>

**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

## MAPPING

CO \ PSO	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**

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<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO609</b>		<b>Core Paper: 9 - BIOCHEMISTRY</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>VI</b>	<b>Hours / Week</b> <b>5</b>	<b>Total Hours</b> <b>75</b>	<b>Credits</b> <b>4</b>

**COURSE OBJECTIVES**

- To study the structure of atom and chemical bonds
- To learn the metabolism of chemical reactions in a cell
- To understand biochemical techniques.

**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	Applying the nature of enzymes in biochemical pathways
K3	CO4	Acquire and apply knowledge on the biosynthesis of secondary metabolites.

**SYLLABUS****UNIT I****(15 Hours)**

Introduction to acids, base, pH and buffers and salts. Strong acid and weak acids and salts, colloids, (Examples). Handerson - Hasselbach equation. Buffers- definition, chemical composition, requirements, mechanism of buffer action, water - forms - structure and properties.

**UNIT II****(15 Hours)**

Carbohydrates - classification, monosaccharaides-structure (glucose), open chain and cyclic (or) ring structure. Biological functions. Oligosaccharides (sucrose) - glycosidic linkages and biological functions. Polysaccharides (cellulose). Lipid- classification, structure, properties and functions. Fat breakdown -  $\beta$  -oxidations, fatty acids - saturated and unsaturated.

**UNIT III****(15 Hours)**

**Amino acids and proteins:** Amino acids - classification, structure and properties. Proteins - classification, structure - primary, secondary, tertiary and quaternary structures.

**UNIT IV****(15 Hours)**

**Enzymes:** Chemistry of enzyme (Structure), Classification, properties, mechanism of enzyme activities (i) lock and key hypothesis, (ii) Induced fit theory, Activation energy of a reaction. Factors affecting enzyme activity. Michael's-Menton constant ( $k_m$ ) enzyme inhibitors, allosteric enzyme (feedback inhibition).



**UNIT V****(15 Hours)**

**Nucleic acids:** Double helical structure of DNA- Watson and crick model. Replication of DNA - semi-conservative and conservative methods. RNA - structure, types - Clover leaf model of tRNA. **Secondary metabolites\*:** Classification sources from plants and functions of terpenoids, alkaloids, phenolics, flavonoids and coumarins.

**\*Self study****Teaching Methods**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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. Veerakumari, L. (2009). Bioinstrumentation. MJP Publishers
4. Narayanan L.M., Dulsy Fathima, K.Nallasingam, R.P. Meyyan Pillai, N.Arumugam, S.Prasanna Kumar. (2010). Biochemistry. Saras Publication

**REFERENCES**

1. Weel, J.H. (1990). General Biochemistry. Wiley Eastern Ltd.
2. Albert L. Lehninger. (2002). Principles of Biochemistry. ICAR, Delhi.
3. L. Stryer, (2002). Biochemistry, W.H. Freeman.
4. Satyanarayana, V. (2005). Essentials of Biochemistry. Arunabha Sen & Allied Pvt., Ltd

**MAPPING**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	H	S	H	M	H
<b>CO2</b>	S	H	M	H	S
<b>CO3</b>	H	H	S	M	H
<b>CO4</b>	S	M	H	H	M

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

<b>Programme Code: 05</b>		<b>Title : B.Sc., BOTANY</b>		
<b>Course code : 18UBO610</b>		<b>Core Paper: 10 - PLANT PHYSIOLOGY</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>VI</b>	<b>Hours/Week</b> <b>5</b>	<b>Total Hours</b> <b>75</b>	<b>Credits</b> <b>5</b>

### 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

(15 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

(15 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.

#### UNIT III

(15 HOURS)

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

**UNIT IV****(15 HOURS)**

**Nitrogen metabolism** - Nitrogen cycle, Biological Nitrogen Fixation - Symbiotic and Non- Symbiotic. Formation of root nodules in leguminous plants, Factors controlling biological nitrogen fixation, Biosynthesis of amino acids.

**UNIT V****(15 HOURS)**

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

**\*Self study**

**TEACHING METHODS**

Power point presentation/Seminar/Quiz/Discussion/Assignment

**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. Devlin, (1986). Plant physiology. CBS Publishers and distributors, New Delhi.

**MAPPING**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	<b>S</b>	<b>H</b>	<b>M</b>	<b>H</b>	<b>M</b>
<b>CO2</b>	<b>H</b>	<b>H</b>	<b>S</b>	<b>M</b>	<b>H</b>
<b>CO3</b>	<b>S</b>	<b>M</b>	<b>H</b>	<b>H</b>	<b>S</b>
<b>CO4</b>	<b>H</b>	<b>S</b>	<b>S</b>	<b>M</b>	<b>H</b>

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO611</b>		<b>Core Paper: 11 - MICROBIOLOGY AND PLANT PATHOLOGY</b>		
<b>Batch</b> <b>2018-2019</b>	<b>Semester</b> <b>VI</b>	<b>Hours / Week</b> <b>5</b>	<b>Total Hours</b> <b>75</b>	<b>Credits</b> <b>4</b>

### COURSE OBJECTIVES

- To know the major groups of microbes.
- To understand the exploitation of microbes in industries.
- To learn the different pathogenic organisms of plants causing various diseases.

### COURSE OUTCOMES

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

K1	CO1	Acquire knowledge on the role of prokaryotic organisms.
K2	CO2	Understand the use of microbes in industries for the welfare of mankind.
K3	CO3	Apply the knowledge on microbial technology for the production of antibiotics.
K3	CO4	Implement knowledge on management of plant diseases to increase crop yield.

### SYLLABUS

#### UNIT I

(15 Hours)

Introduction to microbiology - Historical account, Scope of microbiology, major groups, and classification - five kingdom concept and three domain system. Eukaryotic organisms. Bacterial morphology. Classification based on morphological characteristics, Ultrastructure of bacteria, Gram +ve and Gram -ve bacteria, chemical composition of cell membrane and cell wall. Recombination in bacteria - conjugation, transformation and transduction. Bacterial growth curve.

#### UNIT II

(15 Hours)

Classification of plant viruses (outline only). General characters. Symmetrical structures of Viruses. Morphology of Bacteriophage (T<sub>2</sub>). Viral replication - Lytic and lysogenic cycles in T- even phages. Fermentation - Aerobic and anaerobic fermentation (outline). Industrial microbiology - Manufacture of alcohol, antibiotics - penicillin and organic acids-vinegar.

#### UNIT III

(15 Hours)

Food microbiology - Milk and milk products (yoghurt and cheese) - physical and chemical composition, pasteurization, Microbial flora of fresh food, microbial examination of poisoning (Botulism).

**UNIT IV****(15 Hours)**

Introduction, definition and classification of diseases, organisms and causal factors responsible for plant diseases. Methods of studying plant diseases. Defence mechanism in plants. Integrated disease management. Secondary assimilatory response.

**UNIT V****(15 Hours)**

**Common plant diseases:** Symptoms, causative organisms, life cycle and control measures. Virus - Tobacco Mosaic disease\* and Cucumber Mosaic disease; Bacteria - Citrus canker, Rice bacterial blight disease; Fungi - Tikka disease of ground nut and Red rot of sugarcane.

\* Self study

**Teaching Methods**

Power point presentation/Seminar/Quiz/Discussion/Assignment

**TEXT BOOKS**

1. Pelezar, M.J. Reid, R.D. and E.C.S. Chan, (1983). Microbiology, Tata Mc Graw Hill,
2. , Paul A. Ketchum, (1988) Microbiology John Wiley and Sons., USA.
3. Read A. Prescott and Dunns, (1983). Industrial Microbiology, AUS Publishing,
4. S.S. Purohit, (1994). Microbiology, Fundamentals and applications
5. Pandey, B.P. (1982). A text book of Plant Pathology, Pathogen and Plant Diseases. S. Chand and Co. Ltd., New Delhi.

**REFERENCES**

1. Ed. D.S. Chahal, (1991). Food, Feed and Fuel from Biomass, Oxford & IBH, Publishing Co. Pvt. Ltd., New Delhi.
2. Richard G. Burns and J. Howard Slater, (1982). Experimental Microbial Ecology, Black Well Scientific Publications, Oxford.
3. Casido L.E and J.R. Willey, (1968). Industrial Microbiology, Eastern Ltd., ISBN,
4. Jay, J.M. Ed. (1983). Modern Food Microbiology, CBS. Publishers, Delhi.
5. Schiesel, H.B. (1993). General microbiology, 6th Edition, Cambridge University Press.
6. Steindrans, KH, (1983). Hand Books of Indigenous fermented food parcel. Edition Inc, New York,
7. Wintrien, G.M. and M.D. Lechtman, (1976). Microbiology, 3rd Edition, Macmillan Publishing Co. London.
8. Rangaswamy, G. (1972). Diseases of crop plants in India. Prentice Hall of India. Pvt., Ltd., New Jersey.

**UBO50****18UBO611****MAPPING**

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

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

<b>Programme Code: 05</b>		<b>Title : B.Sc., BOTANY</b>		
<b>Course code : 18UBO6CO</b>		<b>Core Practical: 4 - Taxonomy of Angiosperms, Economic Botany, Cytology, Genetics, Plant Breeding, Plant Ecology, Plant Phytogeography and Resource Conservation</b>		
<b>Batch 2018 - 2019</b>	<b>Semester VI</b>	<b>Hours/Week 4</b>	<b>Total Hours 60</b>	<b>Credits 2</b>

### COURSE OBJECTIVES

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

### COURSE OUTCOMES

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

### **Core Practical: 4 - Taxonomy of Angiosperms, Economic Botany, Cytology, Genetics, Plant Breeding, 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

**II. CYTOLOGY, GENETICS & PLANT BREEDING**

1. Study of cell wall structure and cell organelles (plasma membrane, mitochondria, chloroplast and nucleus) through slides and photographs
2. Study of mitosis using onion roots
3. Study of meiosis using *Rheo* flower buds
4. Simple problems in genetics
5. Demonstration of selection, mass selection and clonal propagations
6. Emasculation technique

**III. 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. Demonstration of ecosystems (pond, forest and grasslands)
6. Demonstration of community succession patterns - hydrosere and lithosere
7. Locate major Phytogeographical zones of India using photographs

**MAPPING**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	M	S	H	S
<b>CO2</b>	H	H	H	M	H
<b>CO3</b>	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 2017-18 onwards)****Time: 3 Hours****Max. Marks: 60 Marks****BREAK UP OF MARKS**

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

I. Family description	- 05 Marks
II. Phytogeography	- 05 Marks
III. Meiosis/Mitosis	- 05 Marks
IV. Plant ecology	- 05 Marks
V. Ecology experiment	- 07 Marks
IV. Genetics problem	- 04 Marks
IV. Spotters (7 × 2)	- 14 Marks
VII. Herbarium	- 05 Marks
Record	- 10 Marks
	<hr/>
<b>TOTAL</b>	<b>- 60 Marks</b>
	<hr/>

<b>Programme Code: 05</b>		<b>Title : B.Sc., BOTANY</b>		
<b>Course code : 18UBO6CP</b>		<b>Core Practical: 5 - BIOCHEMISTRY, PLANT PHYSIOLOGY, MICROBIOLOGY AND PLANT PATHOLOGY</b>		
<b>Batch 2018-2019</b>	<b>Semester VI</b>	<b>Hours/Week 4</b>	<b>Total Hours 60</b>	<b>Credits 2</b>

### COURSE OBJECTIVES

- To acquire skills on handling of the instruments.
- To elucidate the pigments using chromatographic techniques.
- 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	Analyze the biological samples using biochemical experiments.
K5	CO3	Examine the various physiological activities of the plants.

### LIST OF PRACTICALS

#### I. BIOCHEMISTRY

1. Demonstrations of pH meter, spectrophotometer and centrifuge.
2. Estimations of aminoacids by Ninhydrin method.
3. Estimation of protein by Lowry's method.
4. Separation of secondary metabolite through Column chromatography (Plant pigments) (Demonstration only).
5. Preparation of Phosphate Buffers
6. Separation and Identification of Lipids and amino acids by TLC

#### II. PLANT PHYSIOLOGY

##### Individual experiments

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<sub>2</sub> concentration.
5. Measurement of rate of respiration using flower buds/ germinated seeds with simple respiroscope.

**Demonstrations**

1. Effect of light intensity on transpiration using Ganong's photometer.
2. Determination of absorption and transpiration ratio in plants.
3. Nitrification in soil.
4. Solution culture (Demonstration only).
5. Effect of auxins on rooting.
6. Arc auxonometer

**III. MICROBIOLOGY**

1. Isolation of microbes by serial dilution and pour plate / spread plate techniques from soil.
2. Preparation of culture media for bacteria and fungi.
3. Differential staining of bacteria using Gram stain.
4. Antimicrobial assay - disc - diffusion / agar well method -Demonstration.
5. Book morphology - bacteria and viruses.

**IV. PLANT PATHOLOGY****Plant diseases**

- i. Virus - Tobacco Mosaic disease & Cucumber Mosaic disease.
- ii. Bacteria - Citrus canker & Rice bacterial blight disease.
- iii. Fungi - Tikka disease of ground nut & Red rot of sugarcane.

**MAPPING**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	M	S	H
<b>CO2</b>	S	S	S	H	M
<b>CO3</b>	H	H	M	H	S

**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: 5 - BIOCHEMISTRY, PLANT PHYSIOLOGY, MICROBIOLOGY  
AND PLANT PATHOLOGY**

I. Biochemistry	- 10 Marks
II. Physiology major experiment	- 10 Marks
III. Physiology setup	- 05 Marks
IV. Microbiology	- 05 Marks
V. Plant Pathology	- 05 Marks
V. Spotters (5 × 3)	- 15 Marks
Record	- 10 Marks
	<hr/>
<b>TOTAL</b>	<b>- 60 Marks</b>
	<hr/>

Programme Code: 05		Title: B.Sc., BOTANY		
Course Code:18UBO6S3		Skill Based Subject: III - CULTIVATION AND MARKETING OF MEDICINAL PLANTS		
Batch 2018-2019	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 <i>in situ</i> and <i>ex situ</i> 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\*.

**\*Self study**

**Teaching Methods**

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

**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).Pharmacognosy Bailliere, 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, Pharmacotherapy - 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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	H	M	S
<b>CO2</b>	H	S	H	M	S
<b>CO3</b>	H	H	M	S	H
<b>CO4</b>	S	M	S	M	H

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

<b>Programme Code: 05</b>		<b>Title: B.Sc., BOTANY</b>		
<b>Course Code: 18UBO6Z1</b>		<b>PROJECT WORK &amp; VIVA - VOCE</b>		
<b>Batch 2018-2019</b>	<b>Semester VI</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

### 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 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 (Mycorrhiza), Medicobotany and 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:

<b>CIA</b>	Project Review	15	<b>20</b>
	Regularity	5	
<b>ESE</b>	Project Report Present	60	<b>80</b>
	Viva – Voce	20	
<b>Grand Total</b>			<b>100</b>

### MAPPING

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	H	H	S	M	S
<b>CO2</b>	S	S	H	S	H
<b>CO3</b>	S	H	S	H	S

**S** - Strong

**H** - High

**M** - Medium

**L** - Low





## UBO61

<b>Programme Code: 05</b>	<b>Title: B.Sc., BOTANY</b>		
	<b>Major Elective: 1 - FORESTRY</b>		
<b>Batch 2018-2019</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

### 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.

**UNIT V****(12 Hours)**

Origin of cultivated plants, Vavilov's centres of origin. 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's - Kew, Calcutta and TBGRI.

**\*Self study****Teaching Methods**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	M	H	S
<b>CO2</b>	H	H	S	M	S
<b>CO3</b>	S	M	H	H	H
<b>CO4</b>	H	S	H	H	M

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

## UBO63

Programme Code: 05	Title: B.Sc., BOTANY		
	Major Elective: 2 - BIOTECHNOLOGY		
Batch 2018-2019	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 biogoods.

### COURSE OUTCOMES

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

K1	CO1	Demonstrate the basic concepts of biotechnology
K2	CO2	Understand the role and importance of biotechnological tools for the production of bioproducts.
K3	CO3	Implement the basic skills and techniques related to gene cloning for the development of transgenic plants.
K3	CO4	Adoption of conservation strategies through micropropagation techniques and to protect RET listed plant species.

### SYLLABUS

#### UNIT I

(12 HOURS)

**Introduction to Biotechnology:** Brief history and important milestones. Plant tissue culture: general composition of culture media - sterilization of medium - glassware - instruments - plant material - transfer area - preparation of explants and inoculation - pattern of growth and development – subculturing, hardening - organogenic differentiation - techniques and stages of micropropagation and its advantages and disadvantages.

#### UNIT II

(12 HOURS)

**Culture protocols:** Methods and applications of tissue culture - shoot tip and meristem culture, synthetic seed production, embryo culture, *In vitro* mutagenesis, protoplast isolation - culture and regeneration- transformation and transgenics, somatic cell hybridization- cybrids. *In vitro* secondary metabolite production - cell immobilization, bioreactors, *in vitro* production of haploids - anther and pollen culture - somaclonal variation -applications of plant tissue culture\*.

#### UNIT III

(12 HOURS)

**Genetic engineering:** Brief history, scope, importance and basic branches - basic principles, tools and techniques - gene cloning procedures - enzymes used in gene cloning - polymerases, restriction endonucleases, ligases and reverse transcriptase - genetically modified organisms (GMOs). Methods of gene transfer - gene gun method - gene cloning procedure in *Agrobacterium* -.genomic organization in Ti plasmids- applications of genetic engineering.

**UNIT IV**

**(12 HOURS)**

Vectors for gene cloning - general properties of a vector - shuttle vector - expression vector - construction and specific uses of plasmids, phages, cosmids and artificial chromosomes - creation of recombinant DNA. **Tools and techniques:** basic techniques and working principles of PCR, DNA finger printing techniques, Southern blotting, ELISA, agarose gel electrophoresis.

**UNIT V**

**(12 HOURS)**

**Microbial biotechnology:** Biofertilizers - Advantages, mass cultivation and application techniques of *Rhizobium*, and *Azospirillum*. Blue green algae (*Nostoc*), Phosphobacteria, *Azolla* and VAM. **Environmental biotechnology:** Wastewater treatment, recycling water for food and feed. Treatments 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**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**TEXT BOOKS**

1. Dubey. R.C. (1996). A Text Book of Biotechnology. Rastogi Publications, Meerut.
2. Kumaresan, V.K. (2003). Biotechnology. Saras Publications, Kanyakumari.

**REFERENCES**

1. Ignacimuthu, S. (1996). Applied Plant Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.
2. Ignacimuthu, S. (1996). Basic Biotechnology. 1996. Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. Ignacimuthu, S. (1997). Plant Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Gupta, P.K. (2004). Elements of Biotechnology, 2004. Rastogi Publications, Meerut.
5. Chhatwal. (1995). Text book of Biotechnology. Anmol Publications Pvt. Ltd., New Delhi.

## UBO65

### MAPPING

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

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

## UBO66

<b>Programme Code: 05</b>	<b>Title: B.Sc., BOTANY</b>		
	<b>Major Elective: 3 - FOOD SCIENCE</b>		
<b>Batch 2018-2019</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

### 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 - biofertilization, 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**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	H	M	S
<b>CO2</b>	S	S	H	S	M
<b>CO3</b>	H	M	H	M	H
<b>CO4</b>	H	H	M	H	M

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

## UBO68

<b>Programme Code: 05</b>	<b>Title: B.Sc., BOTANY</b>		
	<b>Major Elective: 4 - SEED BIOLOGY</b>		
<b>Batch 2018-2019</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

### 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**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	H	M	S	M	S
<b>CO2</b>	S	S	H	H	S
<b>CO3</b>	H	S	H	M	H
<b>CO4</b>	H	H	M	S	H

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

## UBO70

<b>Programme Code: 05</b>	<b>Title: B.Sc., BOTANY</b>		
	<b>Major Elective: 5 - PHARMACOGNOSY</b>		
<b>Batch 2018-2019</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

### 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.

## UBO71

### 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

Power Point presentation/Seminar/Quiz/Discussion/Assignment

### TEXT BOOKS

1. Trease G.E. and W. C Evans (1983) Pharmacognosy, 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

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

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

## UBO72

<b>Programme Code: 05</b>	<b>Title: B.Sc., BOTANY</b>		
	<b>Major Elective: 6 - MEDICINAL PLANTS</b>		
<b>Batch 2018-2019</b>	<b>Hours / Week 4</b>	<b>Total Hours 60</b>	<b>Credits 5</b>

### COURSE OBJECTIVES

- To obtain knowledge on the various secondary metabolites in medicinal plants
- To acquire knowledge on the geographical sources of drugs and their classification.
- To analyze the cultivation and trading practices of medicinal plants.

### COURSE OUTCOME

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

K1	CO1	Describe the various categories of plant drugs.
K2	CO2	Explore ethnobotanical knowledge of plants through traditional indigenous approaches.
K3	CO3	Interrelate indigenous medicinal plants for the endemic ailments of local habitats.
K3	CO4	Extend the acquired knowledge for cultivation and marketing of medicinal plants.

### SYLLABUS

#### UNIT I

**(12 Hours)**

Ethnobotany - definition - categories - major tribes of southern India - regional studies - ethno-medicinal plants - wild food plants - socio-economic status. Conservation of medicinal plants (*in situ*, *ex situ*, sacred grooves).

#### UNIT II

**(12 Hours)**

Pharmacognosy- definition and scope - the ancient and modern science (AYUSH - Ayurveda, Unani, Siddha and Homeopathy), classification of vegetable drugs, identification of drugs (Taxonomical, anatomical, fluorescence, chemicals, organoleptic and microscopic).

#### UNIT III

**(12 Hours)**

Sources of vegetable drugs - biological geographical and cultural. Production of vegetable drugs - role of growth regulators. Deterioration of drugs and their control measures - adulteration of drugs.

## UBO73

### UNIT IV

(12 Hours)

Importance and significance of flavonoids and alkaloids, vitamins, hormones. Pesticides and antibiotics of plant origin.

### UNIT V

(12 Hours)

Cultivation and trading of medicinal and aromatic plants - *Rauwolfia serpentina*, *Carica papaya*\*, *Cymbopogon martini*, *Aloe vera*, *Catharanthus roseus*, *Chrysanthemum cinerariifolium* and *Phyllanthus emblica*.

### \*Self study

### Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

### TEXTBOOKS

1. Trease G.e. and Evans, W.C. (1978). Pharmacognosy. Bailliere Trinda, London.
2. Shah, C.S. and J.S. Qudry. (1995). A textbook Pharmacognosy. Prakasam Publishers, Ahamadabad.
3. Purohit, S.S. (1989). Medicinal plants cultivation - a scientific approach. Scientific Publishers, Jodhpur.
4. Jain, S.K. (1981). Glimpses of Indian Ethnobotany. Oxford and IBH, New Delhi.

### REFERENCES

1. Anonymous. (1970). The Pharmacopoeia of India. Govt. of India, New Delhi.
2. Jain. S.K. (Ed.). (1996). Ethnobotany in human welfare. Deep. Pub. New Delhi
3. Nadkarni, K.M. (1954). Indian Materia Medica. Karnataka Printing press, Bombay
4. Wallis, T.E. (1985). Text Book of Pharmacognosy (5<sup>th</sup> Ed). CBS Pub. Distributors. Bhola North nagar, New Delhi - 110 032.
5. Jain, S.K. (1990). Contribution Indian Ethnobotany. Scientific Publishers, Jodhpur.
6. Jothiprakash, E.J. (2006). Medicinal Botany and Pharmacognosy. Emky Publications, New Delhi.

### MAPPING

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

S - Strong

H - High

M - Medium

L - Low

UBO74

**ALLIED PAPER**

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<b>Programme Code: 05</b>		<b>For B.Sc., ZOOLOGY</b>		
<b>Course Code: 18UBO1A1</b>		<b>Allied-1 Botany: 1 (PHYCOLOGY, MYCOLOGY, PLANT PATHOLOGY, BRYOPHYTES, PTERIDOPHYTES &amp; GYMNOSPERMS) (FOR ZOOLOGY STUDENTS)</b>		
<b>Batch 2018-2019</b>	<b>Semester I</b>	<b>Hours / Week 5</b>	<b>Total Hours 105</b>	<b>Credits 4</b>

### 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 (21 HOURS)

**Phycology:** Classification by Fritsch (1945) (outline only), Structure, Reproduction and life cycle of the following Genus: *Oscillatoria*, *Caulerpa*, and *Chara*. Details of habit, habitat and distribution of Algae. Algal components: cell wall, flagella, eye-spot, pigments, pyrenoid, photosynthetic products. Range of thallus structure and their evolution. Economic importance of algae (briefly).

#### UNIT II (21 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, Citrus canker and TMV. Economic importance of Fungi.

#### UNIT III (21 HOURS)

**Bryophytes:** Classification by Smith (1955) (outline only), Structure, Reproduction and Life cycle of the following Genus: *Marchantia* and *Funaria*. Ecological significance of Bryophytes- role as pollution indicators. Economic importance of Bryophytes

**UNIT IV****(21 HOURS)**

**Pteridophytes:** Classification by Riemers (1954) (outline only), Structure, Reproduction and Life cycle of the following Genus: *Lycopodium* and *Adiantum*. Ecological and economic significance of Pteridophytes.

**UNIT V****(21 HOURS)**

**Gymnosperms:** Classification by K.R. Sporne (1962) (outline only), Structure, Reproduction and Life cycle of the following genus: *Cycas* and *Gnetum*. Distribution of living Gymnosperms in India and Economic importance of Gymnosperms\*

**\*Self study**

**Teaching Methods**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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). Pteridophyta. Chand & Co., New Delhi.
5. Pandey, B.P. (1981). Gymnosperms. Chand & Co., New Delhi.
6. Gilbert M Smith (1951). Manual of Phycology.

**MAPPING**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	M	S	H	H
<b>CO2</b>	S	S	H	M	S
<b>CO3</b>	H	H	M	S	M
<b>CO4</b>	S	M	S	H	H

**S** - Strong

**H** - High

**M** - Medium

**L** - Low



<b>Programme Code: 05</b>		<b>For B.Sc., ZOOLOGY</b>		
<b>Course Code: 18UBO2A2</b>		<b>Allied-2 Botany: 2 (ANATOMY, EMBRYOLOGY, TAXONOMY OF ANGIOSPERMS, PHYSIOLOGY AND ENVIRONMENTAL BOTANY) (FOR ZOOLOGY STUDENTS)</b>		
<b>Batch 2018-2019</b>	<b>Semester II</b>	<b>Hours / Week 5</b>	<b>Total Hours 105</b>	<b>Credits 4</b>

### 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

(21 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

(21 HOURS)

**Embryology:** Microsporogenesis. Development of Male gametophyte, Megaspores, Development of female gametophyte (*Polygonum* type). Structure of mature embryo sac. A brief account of types of endosperms. Development of Dicot embryo (*Capsella* type). Applications of palynology - palynology in relation to taxonomy.

#### UNIT III

(21 HOURS)

**Taxonomy of angiosperms:** Outline Bentham and Hooker's classification (order level). Study of the following families with their economic importance. Annonaceae, Cucurbitaceae, Asteraceae, Apocyanaceae, Lamiaceae, Amarantaceae, Liliaceae and Poaceae. Herbarium techniques.

**UNIT IV****(21 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****(21 HOURS)**

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

**\*Self study****Teaching Methods**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	H	S	M	H	H
<b>CO2</b>	S	H	H	M	S
<b>CO3</b>	H	M	S	H	M
<b>CO4</b>	S	H	M	S	H

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

<b>Programme Code: 05</b>		<b>For B.Sc., ZOOLOGY</b>		
<b>Course code : 18UBO2AL</b>		<b>ALLIED PRACTICAL BOTANY- I &amp; II</b>		
<b>Batch</b> 2018 - 2019	<b>Semester</b> II	<b>Hours/Week</b> 2	<b>Total Hours</b> 60	<b>Credits</b> 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

<b>K3</b>	<b>CO1</b>	Apply knowledge on the identification of lower life forms.
<b>K4</b>	<b>CO2</b>	Analyze various diseases and their impact on crop plants
<b>K5</b>	<b>CO3</b>	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**
  - Cycas*

**ALLIED PR. BOTANY - II****1. Anatomy**

1. Primary and secondary structure of Dicot stems and roots
2. Primary structure of monocot stem and root

**2. Embryology**

1. Microsporogenesis
2. Types of the endosperm

**3. Taxonomy of Angiosperms:**

1. Study of the Morphology and Taxonomy of mentioned in the theory

**4. Physiology**

1. Osmosis, O<sub>2</sub> evolution during photosynthesis- demonstration only

**5. Environmental Botany**

1. Aquatic and terrestrial ecosystem.

**MAPPING**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	H	S	M	H	H
<b>CO2</b>	S	H	H	M	S
<b>CO3</b>	H	M	S	H	M

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

**UBO81**

**18UBO2AL**

**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: 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 (2 × 2)	- 04 Marks
Record	- 05 Marks
<b>TOTAL</b>	<hr/> <b>- 30 Marks</b> <hr/>

**EXTRA DEPARTMENTAL COURSE  
(EDC) PAPER**

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<b>Programme Code: 05</b>		<b>For B.Sc., ZOOLOGY, BIOCHEMISTRY AND BIOTECHNOLOGY</b>		
<b>Course Code: 18UBO5X1</b>		<b>Extra Departmental Course (EDC) - MEDICINAL BOTANY AND HUMAN WELFARE</b>		
<b>Batch 2018-2019</b>	<b>Semester V</b>	<b>Hours / Week 2</b>	<b>Total Hours 30</b>	<b>Credits 3</b>

**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.

**UNIT-V****(6 Hours)**

Botanical features, medicinal uses and cultivation of medicinal plants - *Emblica*, *Artemisia* and *Rauvolfia*\*.

\*Self study

**Teaching Methods**

Power Point presentation/Seminar/Quiz/Discussion/Assignment

**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, 13<sup>th</sup> Edition Publishers Nirali Prakashan. Pune.

**MAPPING**

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

**S** - Strong

**H** - High

**M** - Medium

**L** - Low



**NON-MAJOR ELECTIVE**

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## UBO86

<b>Programme Code : 05</b>	<b>Title: B.Sc., BOTANY</b>		
	<b>Non- Major Elective – Consumer Affairs</b>		
<b>Batch</b> <b>2018-2021</b>	<b>Hours/Week</b> <b>2</b>	<b>Total Hours</b> <b>30</b>	<b>Credits</b> <b>2</b>

### 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

**(15 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

**(15 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**

**(15 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**

**(15 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**

**(15 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](http://www.consumereducation.in)
8. Empowering Consumers e-book, [www.consumeraffairs.nic.in](http://www.consumeraffairs.nic.in)
9. ebook, [www.bis.org](http://www.bis.org)
10. The Consumer Protection Act, 1986 and its later versions.

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**CERTIFICATE COURSE - BONSAI**

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<b>Programme Code: 05</b>	<b>Title: CERTIFICATE COURSE - BONSAI</b>		
<b>Course Code: 18CCB101</b>	<b>C.P. 1. INTRODUCTION TO BONSAI PRINCIPLES AND TECHNIQUES</b>		
<b>Batch 2018-2019</b>	<b>Hours / Week 2</b>	<b>Total Hours 30</b>	<b>Credits 2</b>

### 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**

Power Point presentation/Seminar/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	H	M	H
<b>CO2</b>	S	M	H	H	M
<b>CO3</b>	H	S	M	H	H
<b>CO4</b>	S	H	M	S	M

**S** - Strong

**H** - High

**M** - Medium

**L** - Low

<b>Programme Code: 05</b>	<b>Title: CERTIFICATE COURSE - BONSAI</b>		
<b>Course Code: 18CCB102</b>	<b>C.P. 2. ETHICS, VALUES AND MARKETING OF BONSAI</b>		
<b>Batch 2018-2019</b>	<b>Hours / Week 2</b>	<b>Total Hours 30</b>	<b>Credits 2</b>

**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:**

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.

**UNIT V:****(6 hours)**

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

**\* Self study****Teaching Methods**

Power Point presentation/Seminar/Discussion/Assignment

**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**

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	H	M	H
<b>CO2</b>	S	M	H	H	M
<b>CO3</b>	H	S	M	H	H
<b>CO4</b>	S	H	M	S	M

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

<b>Programme Code: 05</b>		<b>Title: CERTIFICATE COURSE - BONSAI</b>		
<b>Course Code: 18CCB1CL</b>		<b>C.Pr.1. Bonsai Techniques</b>		
<b>Batch 2018-2019</b>	<b>Semester I</b>	<b>Hours / Week 2</b>	<b>Total Hours 30</b>	<b>Credits 2</b>

### 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. To know the identification of Plants suitable for making bonsai
2. To know the Identification of tools for making bonsai
3. To know the role fertilizer and its importance for bonsai making
4. To select the suitable plants to make different styles of bonsai
5. To acquire knowledge on special styles in bonsai

### MAPPING

<b>CO \ PSO</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	S	H	S	M	S
<b>CO2</b>	S	M	H	S	H
<b>CO3</b>	H	H	M	H	H

S - Strong

H - High

M - Medium

L - Low

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**CERTIFICATE COURSE QUESTION PAPER (PRACTICALS)**

**End semester Examination Question Paper Pattern**

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

**Time: 3 Hours  
Marks**

**Max. Marks: 100**

**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
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<b>TOTAL</b>	<b>- 100 Marks</b>
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