KONGUNADU ARTS AND SCIENCE COLLEGE

(AUTONOMOUS)

COIMBATORE – 641 029

DEPARTMENT OF BOTANY (PG)

CURRICULUM AND SCHEME OF EXAMINATIONS

(CBCS)

(2019 – 2020 and onwards)

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

Vision:

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

Mission:

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

DEPARTMENT OF BOTANY

Vision:

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

Mission:

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

PROGRAMME OUTCOMES (PO)

PO1

- Students will be able design, conduct experiments, analyze and interpret data for investigating problems in the field of Plant Sciences.

PO2

- This programme aids an excellent opportunities for students to develop demonstrative knowledge, understanding skills, qualities and other attributes in the range of structural organization and evolution in terms of phylogenetic trends.

PO3

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

PO4

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

PO5

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

PO6

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

PO7

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

PO8

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

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1 Highest priority is given to morphology, taxonomy, anatomy and embryology to know each and every character of the plant both in external and internal characters for their identification and classification to involve plants further in biochemical and pharmaceutical aspects.

PSO2 Students will be able to apply fundamental biostatistics, bioinformatics tools and biophysical principles for the analysis of relevant biological situations and for developing intellectual skills on biological data and databases.

PSO3 Students will be able to explicate the ecological interconnections of life on earth by tracing energy and nutrient flows through the environment by the microbial and degradation of the waste. They will be able to relate the physical features of the environment to that of the structure of populations, communities and ecosystem.

PSO4 Study on medicinal plants provide firsthand knowledge on local, rare, endangered, endemic and exotic medicinal plants in their original habitats, their therapeutic values acquired through their physiological pathways and their cultivation practices for effective conservation for future use.

PSO5 Through microbiological core concepts the students were able to inter-relate integral and ubiquitous role of microbes with their environment. In plant pathology, students are expected to recognize plant diseases and their disease management in economically important crop plants.

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

Course Name :--M.Sc Botany

Curriculum and scheme of Examination under CBCS

(Applicable to the students admitted during the Academic Year 2019-2020)

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
I	19PBO101	C.P.1 - Plant Diversity I	7	25	75	100	3	5
	19PBO102	C.P.2 - Plant Diversity II	7	25	75	100	3	5
	19PBO103	C.P.3 – Anatomy, Embryology of Angiosperms and Microtechniques	6	25	75	100	3	5
	19PBO1E1	Major Elective I	6	25	75	100	3	5
	19PBO1CL	C.Pr.1 - Plant Diversity I & II , Anatomy, Embryology of Angiosperms and Microtechniques	4	40	60	100	4	2
		Total	**30**	-	-		-	
II	19PBO204	C.P.4- Bioinformatics	6	25	75	100	3	4
	19PBO205	C.P.5 - Cell biology, Genetics and Plant Breeding	7	25	75	100	3	5
	19PBO206	C.P.6 - Ecology, Bioenergetics and Natural Resource Management	7	25	75	100	3	5
	19PBO2E2	Major Elective II	6	25	75	100	3	5
	19PBO2CM	C.Pr. 2 - Bioinformatics , Cell biology, genetics, plant breeding, ecology, bioenergetics and natural resources management	4	40	60	100	4	2
		Total	**30**	-	-		-	
III	19PBO307	C.P.7 - Taxonomy and Biosystematics	7	25	75	100	3	5
	19PBO308	C.P.8 - Microbiology and Plant Pathology	7	25	75	100	3	5
	19PBO309	C.P.9 - Biophysics and Biostatistics	6	25	75	100	3	5
	19PBO3N1	Non major Elective I	6	25	75	100	3	4
	19PBO3CN	C.Pr.3 - Taxonomy and Biosystematics, Microbiology, plant pathology, Biophysics and Biostatistics	4	40	60	100	4	2
		Total	**30**	-	-		-	
IV	19PBO410	C.P.10 - Biochemistry and Bioinstrumentation	6	25	75	100	3	5
	19PBO411	C.P.11 - Plant Physiology	6	25	75	100	3	5
	19PBO412	C.P.12 Plant Biotechnology	6	25	75	100	3	5
	19PBO4N2	Non major Elective II	6	25	75	100	3	4
	19PBO4CO	C.Pr.4 – Biochemistry, Bioinstrumentation, Plant Physiology and Plant Biotechnology	4	40	60	100	4	2
	19PBO4Z1	Project Work & Viva - Voce	2	40	160	200	-	6
		Total	**30**	-	-		-	
		Grand Total	**120**	-	-	**2200**	-	**90**

Note :

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

Major Elective Papers

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

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

Non-Major Elective Papers

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

1. **Horticulture**
2. **Pharmacognosy**
3. **Medicinal Plants**
4. **Limnology**

Tally Table:

Part	Subject	No. of Subjects	Total Marks	Credits
I	Core - Theory / Practical / Project	19	1900	70
	Major Elective Paper	2	200	10
	Non - Major Elective Paper	2	200	10
	Grand Total	**22**	**2200**	**90**

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

Extra Credit Courses

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
II	**19PBO2J1**	**JOC - Floriculture and Landscaping**	4	-	100	**100**	3	**2**
	19PBO2J2	**JOC - Food Processing and Preservation**	4	-	100	**100**	3	**2**

Diploma Courses

Biodiversity - Principles, Management and Conservation.

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
I	**19PDB101**	**C.P.1. Introduction to Biodiversity**	2	25	75	**100**	3	**2**
	19PDB102	**C.P.2 . Values, uses and loss of Biodiversity**	2	25	75	**100**	3	**2**
	19PDB103	**C.P.3. Conservation and management of Biodiversity**	2	25	75	**100**	3	**2**
	19PDB1CL	**C.Pr.1. Biodiversity**	2	40	60	**100**	3	**2**
		Total	**8**			**400**		**8**
II	**19PDB204**	**C.P.4. Biodiversity prospecting and indigenous knowledge system (IKS) and Biotechnology for Biodiversity**	2	25	75	**100**	3	**2**
	19PDB205	**C.P.5. Wildlife biology and conservation policies and law**	2	25	75	**100**	3	**2**
	19PDB2Z1	**Project**	4	40	160	**200**	-	**4**
		Total	**8**			**400**		**8**
		Grand total	**16**			**800**		**16**

Note:

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

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

Components of Continuous Internal Assessment

Components		Marks	Total
Theory			
CIA I	75	(75+75 = 150/10)	25
CIA II	75	15	
Assignment/Seminar		5	
Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	
Project			
Review		30	40
Regularity		10	

PBO4

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

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

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

Knowledge Level	Section	Marks	Description	Total
K1 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	

2. Practical Examination:

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

3. Project Viva Voce:

Knowledge Level	Section	Marks	Total
K3	Project Report Viva - voce	120	160
K4		40	
K5			

19PBO101

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code:19PBO101		**Core Paper: 1 -PLANT DIVERSITY - I**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**I**	**7**	**105**	**5**

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT I **(21 HOURS)**

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

UNIT II **(21 HOURS)**

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

UNIT III **(21 HOURS)**

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

19PBO101

UNIT IV **(21 HOURS)**

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

UNITV **(21 HOURS)**

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

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

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

REFERENCES

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

MAPPING

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

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

19PBO102

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code:19PBO102		Core Paper: 2 -PLANT DIVERSITY - II		
Batch 2019-2020	Semester I	Hours / Week 7	Total Hours 105	Credits 5

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT 1 **(21 HOURS)**

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

UNIT II **(21 HOURS)**

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

UNIT III **(21 HOURS)**

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

UNIT IV **(21 HOURS)**

Gymnosperms: General characters, distribution and origin of Gymnosperms. Classification of Gymnosperms by Coulter and Chamberlain (1956). General structure

and inter-relationships of Pteridospermales, Bennettitales, Pentoxylales and Ginkgoales.

UNIT V **(21 HOURS)**

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

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

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

REFERENCES

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

MAPPING

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

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

19PBO103

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO103		**Core Paper: 3 –ANATOMY, EMBRYOLOGY OF ANGIOSPERMS AND MICROTECHNIQUES**		
Batch 2019-2020	**Semester I**	**Hours / Week 6**	**Total Hours 90**	**Credits 5**

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT I **(19 HOURS)**

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

UNIT II **(19 HOURS)**

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

UNIT III **(19 HOURS)**

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

19PBO103

UNIT IV **(19 HOURS)**

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

UNIT V **(19 HOURS)**

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

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

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

REFERENCES

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

MAPPING

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

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

19PBO1CL

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO1CL		**Core Practical: 1 - PLANT DIVERSITY- I & II, , ANATOMY, EMBRYOLOGY OF ANGIOSPERMS AND MICROTECHNIQUES**		
Batch 2019-2020	**Semester II**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

I. PLANT DIVERSITY - I

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

Algae

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

Fungi

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

Lichens

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

19PBO1CL

II. PLANT DIVERSITY - II

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

Bryophytes

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

Pteridophytes

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

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

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

Field trip

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

III. ANATOMY

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

EMBRYOLOGY OF ANGIOSPERMS

With the help of permanent slides to study

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

MICROTECHNIQUES

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

19PBO1CL

MAPPING

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

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

PBO14

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

PG MODEL QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2019-20 onwards)

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

BREAK UP OF MARKS

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

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

19PBO204

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO204		**Core Paper: 4 - BIOINFORMATICS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**II**	**6**	**90**	**4**

COURSE OBJECTIVES

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

COURSE OUTCOME

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

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

SYLLABUS

UNIT I **(19 HOURS)**

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

UNIT II **(19 HOURS)**

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

UNIT III **(19 HOURS)**

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

UNIT IV **(19 HOURS)**

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

19PBO204

UNIT V **(19 HOURS)**

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

*** 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. Dan E. Krane and Michael L. Raymer. (2006). Fundamental concepts of bioinformatics. Dorling Kindersley (India) Pvt Ltd.

REFERENCES

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

MAPPING

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

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

19PBO205

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO205		**Core Paper: 5 - CELL BIOLOGY, GENETICS AND PLANT BREEDING**		
Batch 2019-2020	**Semester II**	**Hours / Week 7**	**Total Hours 105**	**Credits 5**

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT I **(21 HOURS)**

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

UNIT II **(21 HOURS)**

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

UNIT III **(21 HOURS)**

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

19PBO205

UNIT IV **(21 HOURS)**

Introduction- History- Major objectives- Principles - important achievements of plant breeding, self pollinated crops - Pure line theory, pure line selection and mass selection methods; Line breeding, pedigree, bulk, backcross, Population breeding- Breeding methods in cross pollinated crops; Population breeding-mass selection; clonal selection. Incompatibility - male sterility.

UNIT V **(21 HOURS)**

Hybridization-Role and methods, inter-varietal, inter-specific and inter-generic crosses. Heterosis -genetical and physiological basis, inbreeding depression. Breeding for biotic (disease) and abiotic (drought) stresses. Loss due to diseases - disease development, escape and resistance methods. Mutation breeding - methods, limitation and crop improvement. Modern trends in plant breeding.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

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

REFERENCES

1. De Robertis. (1975). Cell Biology. (6th Ed.) Saunders Philadelphia
2. Gardener, E.J. Peter Suns tad, D. (1975). (5th Ed.). Principles of genetics. John Wiley & Sons Inc.
3. Strick Berger M.W. (1997). Genetics. (2nd Ed.) MacMillan, New York.
4. Gupta, P.K. (1985 - 91). Genetics. (2nd Ed.). Rastogi Publications.
5. Allard, R.W. (1960). Principles of Plant breeding. John Wiley & Sons Inc.
6. Shukla R. S. and P. S. Chandel. (1996). Cytogenetics - Evolution and Plant Breeding. S. Chand & Pvt.Ltd. New Delhi.
7. S.P. Gupta, S.P. (2001). Statistical methods. Sultan Chand & Sons, Educational Publishers, New Delhi.

MAPPING

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

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

19PBO206

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 19PBO206		Core Paper: 6 - ECOLOGY, BIOENERGETICS AND NATURAL RESOURCE MANAGEMENT		
Batch 2019-2020	Semester II	Hours / Week 7	Total Hours 105	Credits 5

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT I **(21 HOURS)**

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

UNIT II **(21 HOURS)**

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

UNIT III **(21 HOURS)**

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

UNIT IV **(21 HOURS)**

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

19PBO206

UNIT V **(21 HOURS)**

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

***Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

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

REFERENCES

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

MAPPING

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

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

19PBO2CM

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO2CM		**Core Practical: 2 – BIOINFORMATICS, CELL BIOLOGY, GENETICS, PLANT BREEDING, ECOLOGY, BIOENERGETICS AND NATURAL RESOURCES MANAGEMENT**		
Batch 2019-2020	**Semester II**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**

COURSE OBJECTIVES

- To know the sequence of a gene using bioinformatic tools.
- To understand genetic analysis at gene, genome and population level
- To find out the dominant species in the particular environment.
- To understand the structural and functional organization of an ecosystem.

COURSE OUTCOMES

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

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

LIST OF PRACTICALS

I.BIOINFORMATICS

1. 3-D Molecular visualization using RASMOL
2. Phylogenetic analysis using Clustal-X.
3. Protein Structure prediction using ExPASy Tools
4. Protein secondary structure prediction using GOR IV.
5. Protein secondary structure prediction using SOPMA.
6. Transmembrane protein prediction using TmPred.

II. CYTOLOGY, GENETICS, PLANT BREEDING

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

19PBO2CM

III. ECOLOGY

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

MAPPING

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

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

PBO23

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

PG MODEL QUESTION PAPER (PRACTICALS)
End Semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2019-20 onwards)

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

BREAK UP OF MARKS

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

I. Writing Algorithms for A & B (2 × 7)	**-14 Marks**
II. Any two stages of Mitosis (2 × 2)	**- 04 Marks**
III. Genetics problems of (3 × 4)	**- 12 Marks**
IV. Ecology Experiment	**- 08 Marks**
V. Spot at sight (4 × 3)	**- 12 Marks**
Record	**- 10 Marks**
TOTAL	**- 60 Marks**

19PBO307

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO307		**Core Paper: 7 - TAXONOMY AND BIOSYSTEMATICS**		
Batch 2019-2020	**Semester III**	**Hours / Week 7**	**Total Hours 105**	**Credits 5**

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT I **(21 HOURS)**

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

UNIT II **(21 HOURS)**

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

UNIT III **(21 HOURS)**

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

UNIT IV **(21 HOURS)**

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

19PBO307

UNIT V **(21 HOURS)**

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

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

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

REFERENCES

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

MAPPING

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

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

19PBO308

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO308		**Core Paper: 8 - MICROBIOLOGY AND PLANT PATHOLOGY**		
Batch 2019-2020	**Semester III**	**Hours / Week 7**	**Total Hours 105**	**Credits 5**

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT I **(21 HOURS)**

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

UNIT II **(21 HOURS)**

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

UNIT III **(21 HOURS)**

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

19PBO308

UNIT IV **(21 HOURS)**

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

UNIT V **(21 HOURS)**

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

***Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

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

REFERENCES

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

PBO28

19PBO308

MAPPING

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

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

19PBO309

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO309		**Core Paper: 9 - BIOPHYSICS AND BIOSTATISTICS**		
Batch 2019-2020	**Semester III**	**Hours / Week 6**	**Total Hours 90**	**Credits 5**

COURSE OBJECTIVES

- To understand the role of electrons in absorption of light.
- To impart knowledge on bioenergetics of living organisms.
- To learn the experimental designs using biostatistical tools.

COURSE OUTCOMES

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

K1	CO1	Recognize the role of electrons in photosynthesis.
K2	CO2	Impart knowledge on energy couplings in living systems.
K3	CO3	Apply the role of radioactive isotopes in day today life with reference to ionization and detections.
K3	CO4	Design experimental methods using the statistical knowledge.

SYLLABUS

UNIT I **(19 HOURS)**

Electromagnetic radiation - Nature, absorption, absorption spectrum and action spectrum, law of absorption, interaction with matter, role of electrons in absorption of light, electron multiplicity. Excitation, de-excitation & path of de-excited electrons. Bioluminescence, Fluorescence and Phosphorescence.

UNIT II **(19 HOURS)**

Bioenergetics - Energy and work, laws of Thermodynamics. Energy transductions in biological systems - Redox couple, redox potential, ATP bioenergetics, NADP/NAPH redox couple, mitochondrial bioenergetics and chloroplast bioenergetics.

UNIT III **(19 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. Molecular imaging of radioactive material and safety guidelines*.

UNIT IV **(19 HOURS)**

Biostatistics - Measures of central tendencies - Mean (only arithmetic), median and mode. Measures of deviation - mean deviation, variance, standard deviation, standard error and co-efficient of variation. Probability of distribution - Binomial, Poison and Normal distribution. Linear regression and correlation (Simple and multiple).

19PBO309

UNIT V **(19 HOURS)**

Tests of statistical significance - Chi-square test and student t-test. Analysis of variance (ANOVA) - one way and two ways. Experimental designs - replication and randomization. Common designs in biological experiments - completely randomized design, randomized block design, Latin square design and factorial design.

***Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

1. S.P. Gupta, S.P. (2001). Statistical Methods. Sultan Chand & Sons, Educational Publishers, New Delhi.
2. Chandel, R.S. (1975). A Hand Book of Agricultural Statistics. Achal Prakashan Mandir.
3. Palanichamy, S & M. Manoharan. (1994). Statistical methods for biologists. Paramount Publication, Palani.

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.
4. Gomez, K.A., Gomez, A.A. (1984). Statistical Procedures for Agricultural Research. John Wiley and Sons.

MAPPING

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

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

19PBO3CN

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO3CN		**Core Practical: 3 – TAXONOMY AND BIOSYSTEMATICS, MICROBIOLOGY, PLANT PATHOLOGY, BIOPHYSICS AND BIOSTATISTICS**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**III**	**4**	**60**	**2**

COURSE OBJECTIVES

- To identify selected taxa using taxonomic keys.
- To understand the pathogenic organisms causing various diseases.
- To learn the data processing and analysis using biostatistical tools.

COURSE OUTCOMES

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

K3	CO1	Acquire knowledge identification and external morphology of plants.
K4	CO2	Analyze the techniques used for the cultivation of microorganisms
K5	CO3	Gain the proficiency skills using various statistical tools.

I. TAXONOMY AND BIOSYSTEMATICS

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

II. MICROBIOLOGY

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

BIOPHYSICS

1. Nature of EMR and Spectrum.
2. Path of de-excitation - Fluorescence, Phosphorescence, Radiationless transition and Delayed light emission.
3. Radioactive emission (alpha, beta & gamma), Autoradiography, Geiger-Muller counter and Scintillation counter.

PBO32

19PBO3CN

BIOSTATISTICS

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

MAPPING

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

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

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

PG MODEL QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2019-20 onwards)

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

BREAK UP OF MARKS

Core Practical: 4 – TAXONOMY AND BIOSYSTEMATICS, MICROBIOLOGY, PLANT PATHOLOGY, BIOPHYSICS AND BIOSTATISTICS

I. Specimen identification (2 × 2) - **04Marks**

II. Identification of the family (4 × 2) - **08 Marks**

III. Find out the binomial and family (2 × 3) - **06 Marks**

IV. Microbiology Experiment - **06 Marks**

V. Spotters (5 ×3) - **15 Marks**

V. Herbarium - **05 Marks**

Record - **10 Marks**

TOTAL **- 60 Marks**

19PBO410

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 19PBO410		Core Paper: 10 - BIOCHEMISTRY AND BIOINSTRUMENTATION		
Batch 2019-2020	Semester IV	Hours / Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To know the biological importance of the macromolecules.
- To learn about the hormones and vitamins and their roles.
- To know the principles and operational techniques of bioinstruments

COURSE OUTCOMES

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

K1	CO1	Acquire knowledge on properties and nature of macromolecules.
K2	CO2	Understand the importance of enzymes and immunological techniques.
K3	CO3	Apply current biochemical and molecular techniques to plan and carry out their experiments.
K3	CO4	Implement knowledge for the separation of bioentities.

SYLLABUS

UNIT I **(19 HOURS)**

Carbohydrates: Introduction to carbohydrates - classification, properties and biosynthesis - monosaccharides, oligosaccharides and polysaccharides. Linear/ open chain and ring forms of monosaccharides. Isomerism, structural and functional polysaccharides. Biosynthesis of carbohydrate and their regulation, Catabolism of glucose. **Lipids:** Classification, properties and biosynthesis - simple, complex and derived lipids - fatty acids - types **-** nomenclature - isomerism - Biosynthesis of fatty acids and its regulation, fatty acid oxidation (α and β-Oxidation)

UNIT II **(19 HOURS)**

Aminoacids: General structure - optical isomerism - classification (based on side chain and polarity) - properties - nonprotein aminoacids- Biosynthesis of aminoacids. **Proteins:** Introduction - structure and configuration of proteins - different bonding systems - classification of proteins based on chemical nature and solubility - properties - denaturation. **Nucleic acids**: Nitrogenous bases- purine and pyrimidine biosynthesis, DNA and RNA-structure and types. Biosynthesis of nucleotides

UNIT III **(19 HOURS)**

Enzymes: Introduction to enzymes – classification, chemical nature and properties, theories of enzyme action, enzyme inhibitors and factors affecting enzyme activity, Michael -Menton's constant, coenzyme - FAD, NAD **Vitamins:** Classification - chemical structure and biochemical properties of vitamins A, D, E and K and B complex.

UNIT IV **(19 HOURS)**

Bioinstrumentation: Beer-Lambert's law, Colorimeter, UV-visible spectrophotometer, flame photometer. Centrifuge - types and their applications*, Lyophilizer.

19PBO410

UNIT V **(19 HOURS)**

Chromatography: TLC, column and ion exchange chromatography, GLC, HPTLC and HPLC. Electrophoresis - AGE and PAGE. Blotting techniques - Southern, Northern and Western. PCR - types and its application, RFLP and RAPD, DNA fingerprinting.

***Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

1. Janin, K.L. Sunjay Jain and Nitin Jain, (2009). Fundamentals of Biochemistry, S.Chand and Company Ltd, New Delhi.
2. Daniel, M. (1989). Basic Biophysics for Biologists, Agro-Botanical Publishers, Bikaner, India.
3. Srivastava, H.S. (1999). Elements of Biochemistry. Rastogi publications, Meerut.
4. Palanisamy, S. (2008). Principles of biophysics, Palani Paramount Publications
5. Asokan, P. (2002). Analytical Biochemistry (Biochemical Techniques). Chinna Publications, Chennai.

REFERENCES

1. Weel, J.H. (1990). General Biochemistry. Wiley Eastern Ltd.
2. Albert L. Lehninger (1984). Principles of Biochemistry. ICAR, Delhi.
3. Voet & Voet, (2000). Fundamentals of Biochemistry, John Wiley, New York.
4. Zubay, (1995). Biochemistry, Brown Publishers.
5. L. Stryer, (2002). Biochemistry,W.H. Freeman.
6. Satyanarayana, V. (2005). Essentials of Biochemistry. Arunabha Sen & Allied Pvt., Ltd

MAPPING

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

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

19PBO411

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 19PBO411		Core Paper: 11 - PLANT PHYSIOLOGY		
Batch 2019-2020	Semester IV	Hours / Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To study the basic physiological functions of plants.
- To learn about the metabolic pathways in plants.
- To understand the importance of phytohormones in the growth of plants.

COURSE OUTCOMES

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

K1	CO1	Acquire knowledge on water relations in plants.
K2	CO2	Understand the significance of metabolic pathways in plants.
K3	CO3	Assess the stress resistance mechanism for the better yield of the crops.
K3	CO4	Apply the acquired applicable techniques for fruit ripening.

SYLLABUS

UNIT I **(19 HOURS)**

Water relations - Structure and properties of water. Water transport - diffusion, Osmosis and Imbibition, water potential. Absorption of water, Active and Passive absorption. Water relations of plants – Structure and Physicochemical properties of water, soil and plant atmosphere, stomatal physiology and regulation.

UNIT II **(19 HOURS)**

Transpiration - types, mechanism and factors affecting transpiration. Ascent of sap* - Theories, Mechanism and Factors influencing on ascent of sap. Mineral salt absorption - Mechanism and Types. Translocation of organic solutes - Mechanism, Phloem loading and unloading and Factors affecting translocation.

UNIT III **(19 HOURS)**

Mechanism of photosynthesis - Light reaction, Carbon fixation in C_3 & C_4 plants. Outline of CAM pathway. Photorespiration, Respiration, Glycolysis, Krebs cycle & Pentose phosphate pathway, ATP synthesis. Biological Nitrogen Fixation - Symbiotic & Non-Symbiotic.

UNIT IV **(19 HOURS)**

Stress physiology - Classification of stress - abiotic and biotic stress factors. Stress effects - morphological, biochemical, physiological changes, associated with stress due to heat, water, salinity and metal. Stress resistance and mechanism.

19PBO411

UNIT V **(19 HOURS)**

Phytohormones - Fruit ripening - Introduction, Climacteric and non-climacteric fruits, Role of ethylene in fruit ripening, symptoms of fruit ripening. Environmental control of fruit ripening. Circadian rhythms-Biological clock. Plant movements-nastic and Tropic movements, Photomorphogenesis - Phytochrome and Cryptochrome response in plants.

***Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

1. V. K. Jain. (1999). Fundamentals of Plant Physiology. S. Chand and Company Ltd, New Delhi.
2. Verma, V. (2001). Plant physiology. Emkay Publication, New Delhi.

REFERENCES

1. Devlein, R.E. (1986). Plant Physiology. CBS Publishers and Distributors, New Delhi.
2. Srivastava, H.S. & N. Shankar. (2005). Plant physiology & Biochemistry. Rastogi publications, Meerut.
3. Ray Noggle, G. and George J. Fritz. (2002). Introductory plant Physiology. Prentice Hall of India, Pvt., Ltd., New Delhi.
4. Hess, D. (1975). Plant Physiology. Narosa Publishing house, New Delhi.
5. Hewilt, E.J. and Cutting, C.V. (1979). Nitrogen Metabolism in Plants. Academic Press London.

MAPPING

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

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

19PBO412

Programme Code: 05		Title: M.Sc., BOTANY		
Course Code: 19PBO412		Core Paper: 12 - PLANT BIOTECHNOLOGY		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**IV**	**6**	**90**	**5**

COURSE OBJECTIVES

- To study the basic and advanced developments in the field of Plant Biotechnology
- To equip students with theoretical knowledge regarding the techniques and applications of Plant Biotechnology and Genetic Engineering
- To help students to get a career in Industry/R&D/Academic

COURSE OUTCOMES

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

K1	CO1	Describe the genome organizations in plants
K2	CO2	Elaborate on the plant cell and tissue culture systems
K3	CO3	Explain the genetic transformation techniques in plants
K3	CO4	Demonstrate the application of genetic transformation techniques in plants and evaluate the importance of metabolic engineering and molecular farming in plant

UNIT-I **(19 Hours)**

Genome organization: Nucleus, Chloroplast and Mitochondria. Molecular Markers: RFLP, RAPD, AFLP and Microsatellites (SSR/STR). Model Plant: Arabidopsis

UNIT-II **(19 Hours)**

Plant Cell and Tissue Culture: Tissue culture media (composition and preparation), Plant growth regulators, Micropropagation, Callus culture, Cell culture-single cell and suspension culture, Somatic embryogenesis and Artificial seeds, Protoplast culture- isolation, fusion and somatic hybridization, Haploid production: Anther and Pollen culture, Somaclonal variation.

UNIT-III **(19 Hours)**

Genetic transformation and vectors: *Agrobacterium* characteristics; Ti and Ri plasmids and mechanism of T-DNA transfer, Physical and chemical methods of gene transfer Binary and cointegrate vector systems. CaMV and Gemini viruses, Markers genes for selection of transformants and Gene silencing. Chloroplast transformation.

UNIT-IV **(19 Hours)**

Application of plant transformation: Nutraceuticals-Golden Rice and Flavr Savr, herbicide resistance- EPSP and Glyposate, bacteria, virus and insect resistance. Terminator technology and Marker free transgenics. Abiotic stress resistance- drought, cold and salt.

19PBO412

UNIT-V **(19 Hours)**

Plant molecular farming and metabolic engineering: Plantibodies and Biodegradable plastics and Edible vaccines. Metabolic engineering for plant secondary metabolites-Introduction, alkaloid and flavonoid biosynthesis.

***Self study**

Teaching Methods

Power Point presentation/Seminar/Quiz/Discussion/Assignment

Text books

1. Chawla, H. S. 2002. Introduction to Plant Biotechnology. 2nd Edition, Science Publishers, Inc., Enfield, NH, USA.
2. Kalyan Kumar De. 2004. An Introduction to Plant Tissue Culture.2008. New Central Book Agency, Kolkata.
3. Dubey, R.C., 2013. A text book of Biotechnology (Revised Edition), S. Chand & Company Ltd. New Delhi.
4. Razdan, M. K., 2003. Introduction to Plant Tissue Culture. 2nd Edition, Science Publishers, Inc., Enfield, NH, USA.

References

1. Slater, Scott and Fowler, 2008. Plant Biotechnology, 2nd Edition, Oxford University Press.
2. Primrose, S.B. and Twyman, R. 2006. Principles of Gene Manipulation and Genomics. 7th Edition, Blackwell Publishing, Malden, MA, USA.
3. Buchanan, Gruissem and Jones.2000. Biochemistry and Molecular Biology of Plants. John Wiley & Sons, UK.

MAPPING

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

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

19PBO4CO

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO4CO		**Core Practical: 4 - BIOCHEMISTRY, BIOINSTRUMENTATION, PLANT PHYSIOLOGY AND PLANT BIOTECHNOLOGY**		
Batch 2019-2020	**Semester IV**	**Hours / Week 4**	**Total Hours 60**	**Credits 2**

COURSE OBJECTIVES

- To quantify the biochemical contents present in a given plant sample.
- To utilize proper analytical instruments based on the need.
- To obtain knowledge on physiological functions of the plants.

COURSE OUTCOMES

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

K3	CO1	Apply the principles of reagents to estimate the macromolecular contents of the plant samples.
K4	CO2	Examine the significance of hydrogen ion concentrations in biochemical reactions of the plants.
K5	CO3	Determine the metabolic process of plants using standard procedures.

LIST OF PRACTICALS

I. BIOCHEMISTRY

1. Preparation of phosphate & citrate buffers.
2. Estimation of carbohydrates, proteins, amino acids & lipids.
3. Preparation of molal, molar, normal and percentage solutions
4. Estimation of peroxidase/catalase amylase - Demonstration.

II. BIOINSTRUMENTATION

1. Haemocytometer
2. Agarose Gel Electrophoresis
3. pH meter
4. UV - visible spectrophotometer
5. Centrifuge
6. HPLC (Demo)

III. PLANT PHYSIOLOGY

1. Measurement of stomatal index and frequency.
2. Measurement of membrane permeability as affected by pH, chemicals and temperature.
3. Separation of photosynthetic pigments by TLC.
4. Estimation of chlorophyll pigments.
5. Measurement of Hill reaction in the chloroplast suspension.

6. Measurement of the rate of photosynthesis under varying condition of CO_2 concentration.
7. Rate of respiration in flower buds/germinated seeds using simple respiroscope.
8. Determine the rate of transpiration using Ganong's potometer.
9. Determination of water absorption and transpiration ratio.
10. Nitrogen fixation through nodule formation in leguminous plants.
11. Solution culture.

IV. PLANT BIOTECHNOLOGY

1. Preparation of MS medium and sterilization
2. Micropropagation - Nodal culture
3. Callus culture
4. Artificial seed preparation and culture
5. Isolation of plant genomic DNA
6. Genetic Transformation

MAPPING

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

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

19PBO4CO

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

PG MODEL QUESTION PAPER (PRACTICALS)
End semester Examination Question Paper Pattern
(For the candidates admitted from the academic year 2019-20 onwards)

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

BREAK UP OF MARKS

Core Practical: 4 - BIOCHEMISTRY, BIOINSTRUMENTATION, PLANT PHYSIOLOGY AND PLANT BIOTECHNOLOGY

I. Physiology experiment - A	**- 10 Marks**
II. Biochemistry experiment - B	**- 10 Marks**
III. Plant Biotechnology - C	**- 10 Marks**
IV. Explain the principle (Bioinstruments) - D	**- 05 Marks**
V. Spotters E, F, G, H & I (5 × 3)	**- 15 Marks**
Record	**- 10 Marks**
TOTAL	**- 60 Marks**

19PBO4Z1

Programme Code: 05		**Title: M.Sc., BOTANY**		
Course Code: 19PBO4Z1		**PROJECT WORK & VIVA – VOCE**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**IV**	**2**	**30**	**5**

COURSE OBJECTIVES

- To acquire knowledge related to the practical problems in various fields.
- To understand the analytical skills to solve the selected problems.
- To get confidence by solving the selected problems through proper execution.

COURSE OUTCOME

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

K3	CO1	Applying theoretical knowledge in real field.
K4	CO2	Analyzing the importance of the task to collect the related necessary data.
K5	CO3	Evaluating relationships existing between the theories and the fields.
K5	CO4	Executing appropriate statistical tools to get the correct interpretation to present the results.

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

Guidelines to the Distribution of Marks:

CIA	Project Review	20	**40**
	Regularity	20	
ESE	Project Report Present	140	**160**
	Viva – Voce	20	
	Grand Total		**200**

MAPPING

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

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

MAJOR ELECTIVE PAPERS

PBO44

Programme Code: 05	Title: M.Sc., BOTANY		
	Major Elective: 1 - FOREST RESOURCES AND UTILIZATION		
Batch 2019-2020	**Hours / Week** 6	**Total Hours** 90	**Credits** 5

COURSE OBJECTIVES

- To understand the importance and value of trees.
- To learn the revenue sources of the forests.
- To grasp various products derived from forests for the betterment of the human beings.

COURSE OUTCOMES

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

K1	CO1	Recognize the location of the forests in India and their deterioration.
K2	CO2	Understand the significance of the forests for the enhancement of environmental quality and the reduction of environmental pollution.
K3	CO3	Apply the knowledge on seasonal variation in production from the forest resources for the human welfare.
K3	CO4	Implement the acquired knowledge on electricity generation using the biomass.

SYLLABUS

UNIT I **(19 HOURS)**

Forest cover and national status. Factors for the deterioration of forest cover. Major forest types in India.

UNIT II **(19 HOURS)**

Forest and climate, forest as carbon sink, forest and water, forest and soil, forest and air.

UNIT III **(19 HOURS)**

Major forest products- Timber, charcoal. Minor forest products resource of fibers and flosses, bamboos and canes, essential oils, including those from grasses, Tannins and dyes, gums , resins and oleo resins, drugs, spices, poisons and insecticides, edible products , minerals and miscellaneous products.

UNIT IV **(19 HOURS)**

Forest industries- composite wood industries, match industry, Pulp and paper industry, furniture and other timber utilizing industries. Industries utilizing forest products resins.

UNIT V **(19 HOURS)**

Conservation and plantation forestry - reserve forests, commercial forestry, social forestry, agro forestry and energy plantations. Biomass conversion - technologies - pyrolysis* and gasification for thermal and electric applications.

***Self study**

Teaching Methods

Power point presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

1. Sharma, V.B. (1998). Trees and Environment. APH Publishing Corporation, New Delhi.
2. Sagreiya, K.P. (1994). Forests and Forestry. National book Trust, India, New Delhi.
3. S.S Negi, (2002). Forest products and their utilization. International book distributiors, 9/3 Rajpur road, Dehradun.
4. Tribhawan Mehta, (1981). A hand book of Forest Utilization. Periodical Expert Book Agency. New Delhi.

REFERENCES

1. Subrahmanyam, N.S. and A.V.S.S. Sambamurty. (2004). Ecology. Narosa Publishing House. New Delhi.
2. Sharma, P.D. (2004). Ecology and Environment. Rastogi Publications, Meerut.
3. Arvind Kumar. (2004). Biodiversity and Environment. APH Publishing Corporation, New Delhi.
4. Singh, M.P. and Vinita Vishwakarma. (1997). Forest Environment and Biodiversity. Daya Publishing House, New Delhi.

MAPPING

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

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

PBO46

Programme Code: 05	Title: M.Sc., BOTANY		
	Major Elective: 2 - SEED TECHNOLOGY		
Batch 2019-2020	Hours / Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To understand the principles of agronomy of seeds.
- To learn the methodology of seed germination, seed drying and seed treatments.
- To know the seed dormancy and their significance

COURSE OUTCOMES

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

K1	CO1	Recognize seed borne diseases due to genetic constitution and storage of seeds.
K2	CO2	Determine the seed viability and vigour.
K3	CO3	Apply knowledge on seed processing and their storage for better marketing.
K3	CO4	Assess seed dormancy periods of different crop seeds.

SYLLABUS

UNIT I **(19 HOURS)**

Seed production- Genetic and Agronomic principles- Disease and Insect control - Nutrition - Irrigation - Harvesting - Storage.

UNIT II **(19 HOURS)**

Seed germination test - (using paper, sand and soil) seed viability - Tetrozolium test, Embryo Excision method - Seed vigor Test - Concept - Direct and indirect vigor test. Seed health testing-objectives - Methods of seed health test for Fungi, virus and insects.

UNIT III **(19 HOURS)**

Seed drying - Sun drying-Forced air drying, Process and equipments. Determination of seed moisture methods- one and two stage determination. Seed testing and quality control- Principles and importance. Sampling rules.

UNIT IV **(19 HOURS)**

Seed treatment - Significance - packaging- Certification - Storage and marketing- Demand forecast, marketing structure, marketing organization, arrangement for storage of seed, factors affecting seed marketing*.

UNIT V **(19 HOURS)**

Seed dormancy - Primary and Secondary dormancies - Significance - Factors involved - Methods to break dormancy.

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXTBOOKS

1. Agrawal, R.L. (1997). Seed Technology. Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta
2. Dahiya, B.S & Rai K.N (1998). Seed Technology. Kalyani publishers. Calcutta

REFERENCES

1. Dhirendra khara & Mohan S.Bhale. (2000). Seed technology, Scientific Publishers Jothpur, India
2. Lawrence O.copeland, Miller B. McDonald (1936). Principles of seed science and Technology IV Edition Springer Pvt Ltd , New Delhi.
3. Agarwal P.K, M.Dadlani (1980). Techniques in seed science and Technology, South Asian publishers, Ned Delhi.

MAPPING

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

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

Programme Code: 05	Title: M.Sc., BOTANY		
	Major Elective 3 - FOOD SCIENCE AND NUTRITION		
Batch 2019-2020	Hours / Week 6	Total Hours 90	Credits 5

COURSE OBJECTIVES

- To learn the importance of different kinds of foods.
- To acquire knowledge on nutritive values of the foods.
- To create awareness about the food adulterations.

COURSE OUTCOMES

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

K1	CO1	Recognize different nutritive values of cereals, pulses, vegetables and fruits.
K2	CO2	Understand storage practices of various foods based on their nutrients composition.
K3	CO3	Apply the acquired knowledge on food processing technology using the naturally available spices and condiments.
K3	CO4	Assess industrial productions of beverages and their adulterations.

SYLLABUS

UNIT I **(19 HOURS)**

Introduction of food science - Classification according to function, food groups (ICMR) - Classification; Cereals and Cereal products - Composition and Nutritive value and processing of Rice, Wheat, Maize; Fermented products- Bread- ingredients; Unfermented products- Cakes- Classes and ingredients.

UNIT II **(19 HOURS)**

Pulses- Nutrient values and processing and products of Black gram, Soya bean- Medicinal values of pulses. Nuts and Oilseeds- Coconut, Groundnut-Nutritive values, processing and products, role of nuts and oil & seed in cooking.

UNIT III **(19 HOURS)**

Vegetables- classification*-Composition and nutritive values - Storage; Fungi as food- Mushroom- Algae- *Spirulina.* Role of vegetables in cookery. Fruits- Classification, Composition and nutritive values - storage of fruits- Enzymaticbrowning- Prevention - Non-enzymatic browning.

UNIT IV **(19 HOURS)**

Sugar- Nutritive values- Properties - Sugar related products- Role of sugar in cookery. Spices- General function of spices-Asafotida, Clove, Garlic, Turmeric- role of spices in cookery

UNIT V **(19 HOURS)**

Beverages - classification- coffee, Tea, Cocoa- processing- adulterants; Fruit beverages - types. Food adulteration - Types of adulterants. Food preservation - Principles and Methods.

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXTBOOKS

1. Swaminathan, M. (2006). Hand book of food and nutrients. The Bangalore printing & Publishing Co Ltd, India

REFERENCES

1. Sumati R Mudambi (2001). Fundamentals of foods and nutritions , New age International publishers, New Delhi.
2. Mahtab s. Bamji, N. Pralhad Rao and Vinodini Reddy (2003). Text book of Human nutrition Second Edition, Oxford &IBH Publishing Co.Pvt, New Delhi.

MAPPING

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

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

PBO50

Programme Code: 05	Title: M.Sc., BOTANY		
	Major Elective 4 - BIOTECHNOLOGY AND NANOBIOLOGY		
Batch 2019-2020	**Hours / Week** 6	**Total Hours** 90	**Credits** 5

COURSE OBJECTIVES

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

COURSE OUTCOMES

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

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

SYLLABUS

UNIT I **(19 HOURS)**

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

UNIT II **(19 HOURS)**

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

UNIT III **(19 HOURS)**

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

UNIT IV **(19 HOURS)**

Definition - Historical aspects, classification of nanomaterials, General properties of nanoparticles, types of nanoparticles - metallic, semiconductors and polymeric types, carbon nanotubes, bucky balls, methods of synthesis of nanoparticles-top down and bottom up approach, Principle, working mechanism and applications –TEM, SEM and AFM.

UNIT V **(19 HOURS)**

Application of nanoscience and nanotechnology in agriculture, drug delivery systems, cancer chemotherapy, artificial blood, anti-AIDS drugs, medical implants, nanotherapeutics and health care, nanofoods, environmental applications, fuel energy resources and consumption, biosensors and biochips.

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXTBOOKS

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

REFERENCES

1. Callow, J.A., Ford Lloyd, B.V. and Newbury, H.J. (1997). Biotechnology and Plant Genetics Resources: Conservation and Use. CAB International, Oxon, UK.
2. Gupta, P.K. (1998). Elements of Biotechnology. Rastogi Publications.
3. Ignachimuthu, S. (1995). Basic Biotechnology. Tata Mc Graw-Hill Publishing Company Ltd., Madras.
4. Kartha, K.K. (1985). Cryopreservation of plant cells and organs. CRC Press Boca Raton, Florida, USA.
5. Santharam, S. and J.F. Montgomery (1999). Biotechnology, Biosafety and Biodiversity. Oxford and IBH Publishing Co. New Delhi.
6. Meyyan, R.P. and V. Kumaresan. (2004). Genetics and Biotechnology. Saras Publication, Nagercoil.
7.

MAPPING

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

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

NON-MAJOR ELECTIVE PAPERS

PBO53

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 1 – HORTICULTURE		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**6**	**90**	**4**

COURSE OBJECTIVES

- To learn about the propagation methods of horticultural crops.
- To study about gardening, landscaping and their maintenance.
- To acquire knowledge about commercial floriculture and cut flower arrangements.

COURSE OUTCOMES

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

K1	CO1	Demonstrate solutions for a wide spectrum of plant health issues.
K2	CO2	Understand the components and adornments of gardening.
K3	CO3	Develop employability skills in the landscape field.
K3	CO4	Gain hand's on training knowledge on Terrarium and Bonsai techniques.

SYLLABUS

UNIT I **(19 HOURS)**

Scope and importance - Divisions of horticulture - classification of horticultural crops - climate, soil and nutritional needs - Irrigation. Organic horticulture - definition, synonyms, principles, methods, merits and demerits.

UNIT II **(19 HOURS)**

Gardening and landscaping - Importance and scope of gardening - Gardens in India* - types - layout of a garden - Garden components and adornments - Special types of garden - principles and design - Water garden, bog garden, terrace garden, rockery garden, vertical garden, clock garden, colour wheels and temple garden. Terrarium and Bonsai techniques.

UNIT III **(19 HOURS)**

Asexual propagation - Advantages and disadvantages - Cuttings:- types, factors influencing rooting of cuttings - use of growth regulators in relation to horticulture - layering - types - Grafting and Budding - methods - factors for successful graft union - Stock scion relationship - Factors influencing the heeling of graft union.

UNIT IV **(19 HOURS)**

Pomology - Establishment of orchard* - cultivation of Banana, Citrus - Olericulture - cultural aspects of vegetables - types of vegetable growing - Kitchen garden, Market garden, vegetable garden - Preservation of fruits and vegetables - ornamental floriculture - Cultivation of Jasmine and Rose - Extraction of jasmine concrete.

UNIT V **(19 HOURS)**

Bio-aesthetic planning, eco-tourism, theme parks, indoor gardening, therapeutic gardening, non-plant components, water scaping, xeriscaping and hardscaping.

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXTBOOKS

1. Kumar, N.(1999). An introduction to horticulture.Rajalakshmi Publication, Nagarcoil.
2. Chaha, K.L. (2001). Handbook of horticulture. ICAR, New Delhi.
3. Prasad, S., U.Kumar. (2013). A handbook of Floriculture. Agrobios, Jodhpur.

REFERENCES

1. Bose, T.K., J. Kabir, P. Das and P.P. Joy. (2001). Tropical Horticulture. Naya Prakash Publications, Calcutta.
2. George Acquaach. (2003). Horticulture - Principles and practices.
3. Edwin Biles. (2003). The complete book of gardening. Biotech book, New Delhi.
4. Singh, S.P. (1999). Advances in Horticulture and Forestry - Scientific Publishers, Jodhpur.
5. Sharma, V.K. (2004). Advances in Horticulture: Strategies, Production, Plant Protection and Value Addition - Deep and Deep Publications, New Delhi.
6. Bhattacharjee, S.K. (2006).Advances in Ornamental Horticulture -Pointer Publications, Jaipur.
7. Desh Beer Singh and Poonam Wazir. (2002). Bonsai-An Art. Scientific Publishers, Jodhpur.

MAPPING

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

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

PBO55

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 2 – PHARMACOGNOSY		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**6**	**90**	**4**

COURSE OBJECTIVES

- To apply the gained knowledge and advice the community on issues concerning the cultivation, harvesting and processing of medicinal plants and their products.
- To classify crude drugs based on their morphological, taxonomical, chemical or pharmacological characters.
- To know the methodology for component analysis of plants.

COURSE OUTCOMES

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

K1	CO1	Recollect the history on indigenous knowledge of Indian traditional systems of medicines.
K2	CO2	Acquire therapeutic and pharmaceutical knowledge of traditionally used medicinal plants.
K3	CO3	Apply knowledge on the exploitation of phytoconstituents for production of novel drugs.
K3	CO4	Train the cultivation and marketing strategies of medicinal plants.

SYLLABUS

UNIT I **(19 HOURS)**

Scope of Pharmocognosy and modern medicines. Indian medicinal system - AYUSH (Ayurvedha, Unani, Siddha and Homeopathy) - principles and diagnostic methods.

UNIT II **(19 HOURS)**

Morphological and histological studies and therapeutic and pharmaceutical uses of the following drugs; Bark:- *Cinnamomum zeylanicum;* Leaves:- *Rubus idoeus*, Flower:- *Syzygium aromaticum,* Fruit:- *Citrus limon*, Seed:- *Trigonella foenum-graecum*; Rhizome:- *Zingiber officinale,* Gum:- *Acacia senegal*, Gum resin:- *Commiphora* sp., Fixed oil:- *Ricinus communis*, Essential oil:- *Eucalyptus globules*.

UNIT III **(19 HOURS)**

Method of plant analysis: - Phytochemical tests and application of plant derived alkaloids, flavonoids, terpenoids, phenols and steroids. A general procedure for solvent extraction. Separation of the compounds by TLC technique.

UNIT IV **(19 HOURS)**

A brief account of medicinal plants and their chemical constituents, plants remedies for Diabetes, anti-fertility, rheumatism, drugs acting on central nervous system, cardiovascular and cancer, Potentiate plant derived drugs in market - Taxol, Camptothecin, Vincristine - source, morphology and properties.

UNIT V **(19 HOURS)**

Cultivation and role of medicinal Plants: - *Catharanthus roseus*, *Digitalis purpurea*, *Aloe vera, Withania somnifera* and *Papavar somniferum.* Recommendations for promoting traditional medicinal plants cultivation in India*.

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXTBOOKS

1. Trease, G.E. and Evans, W.C. (1985). Pharmocognosy. (12th Ed.). English Language books Society, Baillie Tindall.
2. Wallis, T.E. (1985). Textbook of Pharmocognosy (5th Ed.). CBS Publishers & Distributors, New Delhi.

REFERENCE

1. Satoskar, R.S., S.D. Bhandarkar and Nimala N. Rege. (2005). Pharmocognosy and pharmacotherapueatics. (12th Ed.). Popular Prakashan Pvt., Ltd., Mumbai.
2. Jain, S.K. (1996). Ethnobotany in human welfare (Ed.). Deep Publishers, New Delhi.
3. Nadkarni, K.M. (1954). Indian Materia medica. Karnataka Printing Press, Mumbai.
4. James A. Duke. (1996). The Green Pharmacy. Scientific Publishers, Jodhpur.
5. Guha Bakshi, Sensararma and Pal. (2001). A Lexicon of Medicinal Plants in India. Nayaprokas, Kolkatta.
6. Shah, C.S. and J.S. Qadry. (1996). A Textbook of Pharmocognosy. Unique Offset Printers, Ahemedabad.

MAPPING

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

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

PBO57

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 3 - MEDICINAL PLANTS		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**6**	**90**	**4**

COURSE OBJECTIVES

- To learn about the ethnobotanical knowledge and its traditional significance.
- To understand the role of governmental and non-governmental organizations and their recommended conservation strategies.
- To acquire key knowledge on herbal home remedies.

COURSE OUTCOMES

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

K1	CO1	Recognize about the ethnobotanical significance of medicinal plants.
K2	CO2	Understand the traditional practices for curing various ailments.
K3	CO3	Implement knowledge on the ethnomedicinal plants for preventing life threatening diseases.
K3	CO4	Apply ethnopharmacological knowledge for the development of novel lead drugs.

SYLLABUS

UNIT 1 **(19 HOURS)**

Ethnobotany-definition - sub divisions-methodology-major tribes in southern India-regional studies-Ethnobotany in human welfare-food-medicine. Role of tribes in medicinal plants conservation-crop protection.

UNIT II **(19 HOURS)**

Sources of drugs - adulteration - collection and processing of vegetable drugs - role of growth regulators - drug deterioration and their control measures. Herbal home remedies in Tamil Nadu*.

UNIT III **(19 HOURS)**

Cultivation of medicinal plants - Medicinal plants in trade-cultivation practices and medicinal uses of *Cinchona officinalis, Mentha arvensis, Phyllanthus emblica, Cymbopogan martini*, *Rauvolfia serpentina*, *Allium sativum* and *Gloriosa superba.*

UNIT IV **(19 HOURS)**

Nutraceuticals and cosmeceuticals. Natural pesticides. Immuno modulators. Drugs from mineral origin.

UNIT V **(19 HOURS)**

Biopiracy - bioprospecting - recommendation for promoting traditional medicines in India. Role of NBA, AYUSH, NMPB, CDRI, FRLHT, NBRI, BSI - Role of biotechnology in medicinal plant conservation.

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXTBOOKS

1. Purohit and Vyas. (2005). Medicinal plant cultivation- A scientific approach, Agrobios, Jodhpur.
2. Rajiv, K. Sinha & Shweta Sinha, (2001). Ethnobiology. Surabi Publications, Jaipur.

REFERENCES

1. Anonymous (1970). The pharmocopoea of India - Govt. of India, New Delhi.
2. Jain. S.K.(Ed.) (1996). Ethnobiology in human welfare. Deep. Pub. New Delhi
3. Jain, S.K. (1989). Methods and approaches in Ethnobotany, Society of Ethnobotanist, Lucknow.
4. Jain, S.K. (1987). A manual of Ethnobotany. Oxford publication, Jodhpur.
5. Trease G.e. and Evans, W.C. (1978). Pharmacognosy Bailliere Trinda, London.
6. Kokatae, C.K. A.P. Purohit and S.B Gokhale (2007). Pharmacognosy. Nirali Prakashan, Pune.
8. Jain, S.K. (Ed). (1981). Glimpses of Ethnobotany. Oxford & IBH Publications.

MAPPING

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

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

PBO59

Programme Code: 05	Title: M.Sc., BOTANY		
	Non-Major Elective: 4-LIMNOLOGY		
Batch	**Hours / Week**	**Total Hours**	**Credits**
2019-2020	**6**	**90**	**4**

COURSE OBJECTIVES

- To study of morphological and anatomical characters of aquatic flora.
- To understand the significance of the diffused light for the planktons.
- To find the gross and net productivity in fresh water life forms.

COURSE OUTCOMES

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

K1	CO1	Acquire knowledge on structure and functions of fresh water ecosystem.
K2	CO2	Understand the factors responsible for lotic and lentic ecosystems.
K3	CO3	Implement the gross and net primary productivity models to know the value of fresh water ecosystem.
K3	CO4	Apply the knowledge on eutrophication for the conservation and management of fresh water bodies.

SYLLABUS

UNIT I **(19 HOURS)**

Definintion, facts of limnology - scope and importance of limnology. The structure of freshwater aquatic system - lentic - lakes, their distribution, origin and forms, morphology, sonation, physical, chemical and biological structure, water shed. Ponds - swamps and estuaries. Lotic - stream, springs and rivers - discharge, temperature, nutrient, biotic categories and drift.

UNIT II **(19 HOURS)**

Physical factors influencing lotic and lentic type of vegetation, light, heat, water movements. Chemical factors - O_2 and CO_2, Nitrogen, Phosphorus, and other nutrients, alkalinity and pH.

UNIT III **(19 HOURS)**

Water pollution and eutrophication* - effluent water, nature, treatment, and uses. Fresh formation and flora of India. Conservation and management of fresh water bodies.

UNIT IV **(19 HOURS)**

Fresh water formation. Planktonic communities - phyto and zoo planktons. Littoral communities, algae and zoo planktons, large plants benthas formation organisms - a knowledge of the adaptations of the above mentioned formations.

UNIT V **(19 HOURS)**

Fresh water ecosystem - Energy and production, community concept, diversity, community succession, food chains and biogeochemical aspects of ecosystems, energy flow in ecosystem and community metabolism. Productivity - primary, biomass and efficiency of primary production, secondary production. Biomass and efficiency. Gross and net productivity.

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

1. The text book of limnology. Cole. The C.V. Morby Company

REFERENCES

1. Charles R. Goldmen, Alexander, Jorne. (1994). Limnology.. International students Edition.
2. Wezel. Sauders, (). Limnology College Publishing Co

MAPPING

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

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

JOB ORIENTED COURSE PAPERS

19PBO2J1

Programme Code: 05	Title: M.Sc., BOTANY	
Course Code: 19PBO2J1	JOC: 1 - Floriculture and Landscaping	
Batch 2019-2020	Total Hours 4	Credits 2

COURSE OBJECTIVES

- To know the latest development in the field of floriculture.
- To develop skills in the area of floriculture and landscaping.
- To create knowledge on self employment through entrepreneur skills.

COURSE OUTCOMES

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

K1	CO1	Acquire knowledge on cultivation of economic flowers.
K2	CO2	Understand the techniques involved in flower arrangement and decoration.
K3	CO3	Apply the knowledge on green house cultivation methods.
K3	CO4	Implement the acquired knowledge on commercial applications of dry flowers.

SYLLABUS

UNIT I

Floriculture - Global floriculture - Floriculture in India - Economic flowers - Rose, Jasmine, Crossandra, Chrysanthemum - Cultivation and uses.

UNIT II

Cut flowers - Significance of cut flower industry in India* - Export - Flower arrangement and decoration - dehydrated flowers, foliage and floral craft.

UNIT III

Green house cultivation of cut flowers -Green house technology - advantages - Green house cultivation of Orchids - Anthurium - Gerbera - Dahlia - Tuberosa - Gladioli.

UNIT IV

Landscape gardening - important principles in layout a garden - Aboriculture - Shrubs and climbers - annual, biennial herbaceous perennials - Ornamental palms - Succulents and Cacti.

UNIT V

Water garden, Rock garden, Roof garden, Vertical garden, Hydrophonics, Lawn, Bonsai - Horticultural shows.

***Self study**

19PBO2J1

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

1. Kumar, N. (1999). An introduction to horticulture. Rajalakshmi Publication, Nagarcoil.
2. T.K. Bose, R.G. Maity, R.S. Dhua and P.Das, (1999). Floriculture and Landscaping, Naya Prokash, Calcutta.
3. S.Prasad and U.Kumar. (2013). A handbook of Floriculture Agrobios (India),

REFERENCES

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

MAPPING

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

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

19PBO2J2

Programme Code: 05	Title: M.Sc., BOTANY	
Course Code: 19PBO2J2	JOC: 2 - Food Processing and Preservation	
Batch 2019-2020	Total Hours 4	Credits 2

COURSE OBJECTIVES

- To know the latest technologies developed in the field of food science.
- To develop skills in the area of Food processing and Preservation.
- To get employment opportunities in food processing industries.

COURSE OUTCOMES

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

K1	CO1	Recognize about preliminary preparation of food through various process.
K2	CO2	Understand the nutritive values and their significance of cereals and pulses.
K3	CO3	Apply knowledge on the diary products and marketing.
K3	CO4	Implement food preservation techniques applicable to day to day life.

SYLLABUS

UNIT I

Food groups - Basic groups basic Four, Five and Seven, food in relation to health. Preliminary preparation of food - cleaning, peeling, stinging, cutting and grafting, soaking marinating, sprouting, fermenting, grinding, drying and filtering. Their advantages and disadvantages.

UNIT II

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

UNIT III

Pulses composition and nutritive value of pulses, toxic constituents, Trypsin inhibitor, haemaglutinins, cyanogenic glucoside, saponins and tannins. Nutritive values of nuts and oil seeds, toxin such as afflotoxins and gossypol. Fruits and vegetables - Classification, composition and nutritive values.

UNIT IV

Milk and Milk products, nutritive value of milk, processing - clarification, pasteurization and homogenization. Milk products - fermented milk products - butter, cheese and curd. Preparation of cheese only. Non-fermented products - skimmed milk, dry milk, ice cream. Flesh foods - meat, fish and poultry - composition and nutritive values.

19PBO2J2

UNIT V

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

***Self study**

Teaching Methods

Powerpoint presentation/Seminar/Quiz/Discussion/Assignment

TEXT BOOKS

1. Srilakshmi. B. (2003). Food Science, New Age International Publishers, New Delhi.
2. Frazier W.C. and Westhoff. D.C. (1978). Food Microbiology, Tata McGraw-Hill, Chennai.

REFERENCES

1. Subblakshmi, G. (2006). Food processing and preservation, New Age International Pvt Ltd Publishers.
2. Adams M.R. and Moss M.O. (2008). Food Microbiology, The Royal Society of Chemistry, Cambridge.
3. Swaminathan M.S. (1985). Essentials of food and nutrition, Bappco Publisher, Bangalore.

MAPPING

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

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

DIPLOMA IN BIODIVERSITY – PRINCIPLES, MANAGEMENT AND CONSERVATION

19PDB101

Programme Code: 05		**Title: PG Diploma in Biodiversity – Principles, Management and Conservation**		
Course Code:19PDB101		**C.P. 1 - INTRODUCTION TO BIODIVERSITY**		
Batch 2019-2020	**Semester I**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To know the principles and concepts of biodiversity.
- To understand the services of species diversity.
- To acquire knowledge on the role of biodiversity in maintaining ecobalance.

COURSE OUTCOMES

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

K1	CO1	Know the services of biodiversity.
K2	CO2	Understand the types of species diversity.
K3	CO3	Analyze the concepts of biodiversity.
K3	CO4	Evaluate the economic value of biodiversity

SYLLABUS

UNIT – I **(6 Hours)**

Introduction: Concept and definition. Types of biodiversity – genetic, species ecosystem and landscape diversities. α, β and γ diversity. Pattern diversity.

UNIT - II **(6 Hours)**

Species diversity status: Species inventory – problems and monitoring. Current diversity status of flora, fauna and microbes at global and national levels. Centres of diversity – hotspots, megadiversity centres, future of species diversity studies.

UNIT - III **(6 Hours)**

Species diversity history and indices: History and origin of species diversity*. Diversity indices based on species – species richness, abundance and taxic diversity. Comparisons of species diversity of various sites – species/area relationships, spatial patterns of species diversity. Global distribution of species richness – latitudinal, altitudinal and rainfall gradients and other factors.

UNIT - IV **(6 Hours)**

Agrobiodivesity: Introduction. Origin and evolution of cultivated species diversity – act of domestication, geography of domestication, dispersal and diversification. Diversity in domesticated species – land races, advanced cultivars, wild relatives of cultivated plants, wild plants, and feral plants.

19PDB101

UNIT - V **(6 Hours)**

Ecosystem types and services: Classification, measuring ecosystem diversity, major ecosystems of world – forests, grasslands, deserts, fresh water, wetlands and marine. Functional role of species diversity in ecosystems.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity oxford of IBH publishing Co. Pvt. Ltd. New Delhi.
2. Harris, D.R. and Hillman, G.C. 1989. Introduction. *In*: Harris, D.R. and Hillman, G.C. (Eds.). Foraging and Farming: the Evolution of Plant Exploitation. Unwin Hyman, London, pp. 1-8.
3. Sharma, P.D. Ecology and Environment, Eastogi Publications, Murur.

REFERENCES

1. Thomas, R. 1992. Genetic Diversity. *In:* Goombridge, E. (Ed.). Global Biodiversity. Status of the Earth's Living Sources. Chapman & Hall, London, pp. 1-6.
2. Magurran, A.E. 1988. Ecological Diversity and its Measurement. Princeton Univ. Press, Princeton, NJ.
3. Pielou, E.C. 1975. Ecological Diversity. John Wiley and Sons. New York. NY.

MAPPING

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

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

19PDB102

Programme Code: 05		**Title: PG Diploma in Biodiversity – Principles, Management and Conservation**		
Course Code: 19PDB102		**C.P.2 - VALUES, USES AND LOSS OF BIODIVERSITY**		
Batch 2019-2020	**Semester I**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To know the value of biodiversity.
- To understand the valuation methods of species content.
- To gain knowledge on the factors of species loss.

COURSE OUTCOMES

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

K1	CO1	Know the values of bioresources.
K2	CO2	Know the possible ways to reduce the ecosystem loss.
K3	CO3	Understand the role of several factors on biodiversity loss.
K3	CO4	Evaluate the values of species by various methods

SYLLABUS

UNIT - I **(6 Hours)**

Introduction. Biodiversity values – Total environmental value, primary value, total economic value, use value, consumptive use value, productive use value, indirect use value, non-consumptive use value, non-use value, option value, quasi-option value, existence value and bequest value. Ethical and aesthetic value*. Precautionary principle.

UNIT - II **(6 Hours)**

Valuation of biodiversity: Methods – outline on basics of MaCArthur, 1997, Changes in productivity method, contingent valuation method, hedonic pricing method, travel cost method.

UNIT - III **(6 Hours)**

Loss of genetic diversity: Factors causing loss of genetic diversity – Founder effects, demographic bottlenecks, genetic drift, inbreeding depression.

UNIT - IV **(6 Hours)**

Loss of species diversity: Processes responsible for species extinction – Deterministic processes, stochastic processes – demographic uncertainty, environmental uncertainty, natural catastrophis, and genetic uncertainty. Population size as a critical factor in species extinction – minimum viable population and population viability analysis. Threatened species – definition. IUCN threatened categories and unknown categories.

19PDB102

UNIT - V **(6 Hours)**

Loss of ecosystem diversity: Factors affecting ecosystem degradation and loss. Loss in diversity of major ecosystems – tropical forests, grasslands, inland wetlands, coastal ecosystems, arctic and alpine ecosystems, temperate forests systems, arid and semiarid lands, open oceans. Projected scenario for biodiversity loss.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Myers, N. 2000. The new millennium: An ecology and economy of hope. Curr. Sci. 78: 686-693.
3. MacArthur, J. 1997. The economic valuation of biodiversity, its implications and importance in bioresource planning, and initiations for its regular use in planning conservation projects in India. *In:* Pushpangandan, P., Ravi, K. and Santhosh, V. (Eds.). Conservation and Economic Evaluation of Biodiversity. Vol. 2. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 335-354.
4. Balmford, A., Mace, G.M. and Ginsberg, J.R. 1998. The challenges to conservation in a changing world putting process on the map. *In:* Mace, G.M., Balmford, A. and Ginsberg, J.R. (Eds.). Conservation in a Changing World. Cambridge University Press, Cambridge, pp. 1-28.

REFERENCES

1. Hughes, J.B., Daily, G.C. and Ehrlich, P.R. 1997. Population diversity: its extinction. Science 278: 689-691.
2. Lande, R. and Barrowclough, G.F. 1987. Effective population size, genetic variation, and their uses in population management. *In:* Soule, M.J. (Ed.). Viable Populations for Conservation. Cambridge University Press, Cambridge, pp. 87-124.

PBO71

19PDB102

MAPPING

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

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

19PDB103

Programme Code: 05		**Title: PG Diploma in Biodiversity – Principles, Management and Conservation**		
Course Code: 19PDB103		**C.P. 3 - CONSERVATION AND MANAGEMENT OF BIODIVERSITY**		
Batch 2019-2020	**Semester I**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To know the methods of conservation of species.
- To gain knowledge in the area of ecosystem conservation.
- To know the various laws of biodiversity conservation.

COURSE OUTCOMES

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

K1	CO1	Know the species conservation methods.
K2	CO2	Understand the *in situ* and *ex situ* conservation strategies.
K3	CO3	Understand the laws prevailing in biodiversity conservation both at national and international levels.
K3	CO4	Analyze the ecosystem conservation by noval strategies.

SYLLABUS

UNIT - I **(6 Hours)**

Practice of Conservation: Current practice in conservation. Conservation of genetic diversity. Conservation of species diversity – categories of species for conservation – threatened species, directly harvested plants, indicator species, umbrella species, keystone species, charishmatic species and recreational species.

UNIT - II **(6 Hours)**

Conservation of ecosystem diversity: Relevance of ecosystem diversity as well as services in conservation. Topdown and bottmup protocol for conservation.

UNIT - III **(6 Hours)**

***In situ* conservation:** Protected areas – biosphere reserves and national parks. World biosphere reserve programmes. Design of biosphere reserves – issues determines the success of a reserve - reserve size, spatial and temporal heterogeneity and dynamics, ideal geographic context, connection of different reserves, natural landscape elements, creation of zones within in a limit. Homegardens.

UNIT - IV **(6 Hours)**

***Ex situ* conservation:** Germplasm collections, botanic gardens, seed banks, test tube gene banks, pollen banks, field gene banks, DNA banks. *In vitro* conservation methods. Ecosystem restoration. Social approaches to conservation – sacred grooves*, sthalavrikshas.

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UNIT - V **(6 Hours)**

Legislations: Role of educational institutions in biodiversity conservation. IUCN, UNEP, UNESCO, WWF, ICSU, FAO, CAB International, WCMC, ISBI. Biodiversity legislation and conservations – International biodiversity laws. Conservation on biological diversity. Trade related intellectual property rights.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Ambasht, R.S. 1988. Text book of Plant Ecology. Lanka Publishers, Varanasi.
3. Sharma, P.D. Ecology and Environment. Rastogi Publications, Meerut.
4. Given, D.R. 1984. Monitoring and science – the next stage in threatened plant conservation in New Zealand. *In:* Given, D.R. (Ed.). Conservation of Plant Species and Habitats. Nature Conservation Council, Wellington, New Zealand, pp. 83-102.

REFERENCES

1. Lande, R. 1988. Genetics and demography in biological conservation. Science 241: 1455-1460.
2. McNeely, J.A., Miller, K.R., Reid, W.V., Mittermeier, R.A. and Werner, T.B. 1990. Conserving the World's Biological Diversity, IUCN, Gland, Switzerland.
3. Ganeshaiah, K.N., Uma Shaanker, K. and Bawa, K.S. 2001. Conservation of forest genetic resources of a region: combining species-centered and ecosystem based approaches. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 273-281.
4. Ayenus, E. and 24 others. 1999. International ecosystem assessment. Science 286: 685-686.

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MAPPING

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

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

19PDB1CL

Programme Code: 05		**Title: PG Diploma in Biodiversity – Principles, Management and Conservation**		
Course Code: 19PDB1CL		**C.Pr.1. Biodiversity**		
Batch 2019-2020	**Semester I**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To learn the techniques for plant community analysis.
- To know the complexity and diversity of plant communication.
- To have the knowledge on endangered animals in protected areas.

COURSE OUTCOMES

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

K3	CO1	Understand the programmes being carried out to conserve species in protected areas.
K4	CO2	Investigate the biodiversity status of plant communities.
K5	CO3	Analyze the plant community quantitatively.

LIST OF PRACTICALS

1. To know the ecological status of plants in the communities, the field experiments to be done in the natural vegetation are: a) IVI, b) dominance index c) diversity index d) similarity index.
2. To know the animal status with particular reference to tiger and Nilgiri thar - techniques involved census will be studied.
3. To know the richness of birds, aquatic ecosystems are studied using bird census techniques.
4. Field visits to protected areas for biodiversity conservation.

MAPPING

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

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

19PDB204

Programme Code: 05		**Title: PG Diploma in Biodiversity – Principles, Management and Conservation**		
Course Code: 19PDB204		**C.P.4 - BIODIVERSITY PROSPECTING AND INDIGENOUS KNOWLEDGE SYSTEM (IKS) AND BIOTECHNOLOGY FOR BIODIVERSITY**		
Batch 2019-2020	**Semester II**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To know the ethnic communities of India and their role in bioresource management.
- To understand the bioprospecting of natural bioresources.
- To gain knowledge on the role of biotechnology in processing biogoods.

COURSE OUTCOMES

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

K1	CO1	Know the practices of ethnic groups in conserving wild species.
K2	CO2	Know the database of biodiversity.
K3	CO3	Understand the bioprospecting principles.
K3	CO4	Apply the biotechnological tools for bioprocessing.

SYLLABUS

UNIT - I **(6 Hours)**

Ethnic Community and Biodiversity: Indigenous and ethnic communities of world. Environmental conservation and sustainable uses of natural resources by ethnic societies. Important plant genetic resources conserved by ethnic people in India.

UNIT - II **(6 Hours)**

Bioprospecting: Introduction, IKS, biopiracy. IPRs and ownership of traditional knowledge - issues, Traditional Resource Rights (TRR), Local efforts to date.

UNIT - III **(6 Hours)**

Traditional Societies and Protected areas: Territorial demarcation of traditional societies - introduction. Community forest management. Indigenous people and Protected areas.

UNIT - IV **(6 Hours)**

Biodiversity database: Community biodiversity register. Database and networks on IKS. Community controlled Research. Center for farmers rights. Participatory approach in biodiversity management. Roll of Women, NGOs*.

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UNIT - V **(6 Hours)**

Biotechnology and Biodiversity: Monitoring DNA - diversity, PCR based techniques. Use of molecular (DNA) markers to detect plant diversity. Animal biotechnology - recent trends - reproductive technology - artificial insemination, embryo transfer, *in vitro* fertilization. Cloning - DNA cloning, embryo cloning, adult DNA cloning, therapeutic cloning.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Jain, S.K. 1987. A manual of ethnobotany. Scientific Publishers, Jodhpur.
3. Rajiv, K. Sinha and Shweta Sinha. Ethnobotany. Surabhi Publications, Jaipur.
4. Duff, F. 1997. Overview of the UNEP/GEF Biodiversity Data Management Project (BDM). *In:* Hawksworth, D.L., Kirk, P.M. and Dextre Clarke, S. (Eds.). Biodiversity Information: Needs and Options. CAB International, Wallingford, UK, pp. 115-123.

REFERENCES

1. Amaral, W. 2001. Characterization, evaluation and conservation of forest genetic resources: The potential and limitation of new biotechnology tools. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 115-125.
2. Lakshikumaran, M., Srivastava, P.S. and Singh, A. 2001. Applications of molecular marker technologies for genetic analysis and assessment of genetic diversity in forest tree species. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 153-191.
3. McCarty, P.L. 1983. *In situ* bioremediation of chlorinated solvents. Curr. Opinions Biotech. 4: 323-330.

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MAPPING

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

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

19PDB205

Programme Code: 05		**Title: PG Diploma in Biodiversity – Principles, Management and Conservation**		
Course Code: 19PDB205		**C.P.5 - WILDLIFE BIOLOGY AND CONSERVATION POLICIES AND LAW**		
Batch 2019-2020	**Semester II**	**Hours / Week 2**	**Total Hours 30**	**Credits 2**

COURSE OBJECTIVES

- To understand the values and ethics in wild life conservation.
- To know the diversity and importance of avian fauna.
- To gain knowledge on issues in wildlife conservation.

COURSE OUTCOMES

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

K1	CO1	Know the diversity in avian fauna.
K2	CO2	Know the places of application of Indian Forest Law for forest protection.
K3	CO3	Understand the values and ethics of wildlife conservation.
K3	CO4	Analyze the current issues in wild life conservation.

SYLLABUS

Unit - I **(6 Hours)**

Values and Ethics in Wildlife Conservation: Definitions and (Instrumental; Intrinsic; Ecocentrism; Religious traditions and conservation) Ethics in conservation. Field Techniques: For invertebrates (planktons; insects/arachnids) and vertebrates (amphibian, reptile, aves and mammals), Line/belt transects, Quadrat sampling, Point count, Scan sampling, Focal sampling, Time constraints sampling, Population indices, Introduction of Wildlife telemetry, Remotely triggered Camera Trapping Avian acoustics and identification based on calls.

Unit - II **(6 Hours)**

Avian ecology: Avian community ecology and habitat selection. Sexual selection in birds. Bird migration. Bird census techniques, Migratory flyways, threats to migrant populations. Sampling designs for population estimation: Population estimation methods, Distance based Sampling Methods, Mark-Recapture for Closed Population, Indices, and Estimation of Demographic parameters.

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Unit - III **(6 Hours)**

Current issues in wildlife conservation with case studies: Community based conservation approach, Impact of climate change on species diversity, Compensate payment for environmental services, Human-wildlife conflict, Poaching, illegal trading, Conflict management.

Unit - IV **(6 Hours)**

Protection of Forest and Wildlife Forest Law in India: - Forestry in British and Post British India, Forest as a source of Revenue, Forest Protection and Sustainable use of Forests: Judicial Perspective ,The Indian forest Act, 1927, The Forest (Conservation) Act, 1980, The Forest (Conservation) Rules, 1981,2003, The Environment (Protection) Act, 1986, Ozone Depleting Substances (Regulation)Rules, 2000 Wildlife laws in India - The Wildlife (Protection) Act, 1972; The Wildlife (Protection) Rules, 1995; The Wildlife (Protection) Amendment Act, 2002 , Preservation and Management of wildlife in India: Court Decisions; Ecotourism and Forest Protection*.

Unit - V **(6 Hours)**

Laws Concerning Forest: Wildlife and People The Circular Concerning Joint Forest Management, 1990; Panchayats (Extension to Scheduled Areas) PESA Act, 1996; Forest Right Act, 2006; Recognition of ZOO Rules, 1992; International Laws and Policies Concerning Biodiversity; Gaps in Present Laws and Polices with respect to Biodiversity Conservation.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2003. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Sharma, P.D. 1994. Ecology and Environment. Rastogi Publications, Meerut.
3. Ambasht, R.S. 1988. Text book of Plant Ecology. Lanka Publishers, Varanasi.

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1. Rosenecraz, A. 1995. Environmental law and policy in India: Cases, materials and statutes. *In*: Armin Rosenecraz, Shyam Divan, Martha L Noble. (Reprt Eds). N M Tripathi Pvt. Ltd, Bombay, India, pp 555.
2. Leela Krishnan, P. 1999. Environmental law in India. Butterworths, New Delhi, India, p. 194.
3. Cirelli, M.T. 2002. Legal Trends in Wildlife Management, FAO Legislative Study No. 74.

MAPPING

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

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

19PDB2Z1

Programme Code: 05		**Title: PG Diploma in Biodiversity – Principles, Management and Conservation**		
Course Code: 19PDB2Z1		**Project Work and Vivo – Voce**		
Batch 2019-2020	**Semester II**	**Hours / Week 4**	**Total Hours 60**	**Credits 4**

COURSE OBJECTIVES

- To gain knowledge on species diversity at microbe, plant and animal level in natural vegetations.
- To learn the techniques used to sample the vegetation.
- To understand the modern methods in conservation of species.

COURSE OUTCOMES

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

K3	CO1	Develop local-specific management strategies for the sustainable utilization and conservation of bioresources.
K4	CO2	Analyze the population structure of flora in natural vegetation.
K5	CO3	Evaluate the population size of various wild animals in forests.

PROJECT WORK

1. Project works related to survey and population studies of microbes, plants and animals.
2. Projects related to management of bioresearches and conservation of flora and fauna.

MAPPING

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

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