DEPARTMENT OF BOTANY

PERIYAR UNIVERSITY

(Reaccredited with A Grade by NACC)

SALEM – 636 011

TAMIL NADU, INDIA

M.Sc., Botany - Revised Syllabus

(2018 – 2019 onwards)

Periyar University

Syllabus Revised By

Board of Studies in Botany

Periyar University

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Regulations & Scheme

Department of Botany

Periyar University

Degree of Master of Science (M.Sc.,) Botany

Choice Based Credit System (CBCS)

Regulation, Scheme and Syllabus

1. Eligibility for Admission:

Candidate who has passed the B.Sc., degree in Botany/Plant Science/Life Sciences of the University or an Examination of any other University accepted by the Syndicate as equivalent thereto shall be eligible for admission to M.Sc., Degree of this University or any other University recognized by the Syndicate as equivalent thereto shall be eligible to register for the Degree of Master in Botany (M.Sc.,) and undergo the prescribed course of study in an approved department of this University.

2. Mode of Selection:

Applicants have to be selected through entrance examination and also as per the norms of Tamil Nadu Government.

3. Duration of the Course:

The duration of the M.Sc., Degree shall be two years consist of four semesters under Choice Based Credit System.

4. Distribution of Credit Points:

The minimum credit requirement for M.Sc., Degree shall be 90 Credits. The break-up of credits for the programme is as follows;

Course

Course Title

No. of

Hours/

Maximum

Credits

Courses

Week

Marks

Core Course

Theory and Practical

17

78

1700

59

Core Course

Project

01

24

200

11

Elective

Elective Course

02

06

200

06

(I & II Semester)

Supportive

Supportive Course

02

06

200

06

(II & III Semester)

SWAYAM

04

-

-

08

-

Garden, Library
&
-

06

-

-

Field study

20

120

2300

90

5. Course of Study:

The course of study for the M.Sc., Degree shall be in Botany (CBCS) with internal assessment according to syllabi prescribed from time to time.

5.1 The component of Internal Examination;

Internal Tests (Best of two out of 3)
10 Marks

Seminar
05 Marks
Assignment
05 Marks

Attendance
05 Marks
Total
25 Marks

The allotment of marks and Scheme of examination as follows;

5.2 Theory Core Paper

External 75 Marks	
Internal 25 Marks	
Total **100 Marks**	

5.3 Practical Internal & External

Model Practical 35 Marks	
Record 05 Marks	
Total **40 Marks**	

Total **100 Marks**

5.4 Marks allotment for attendance as follows;

% of attendance	Marks
100% - 91%	5
90% - 81%	4
80% - 71%	3
70%- 61%	2
Below 60%	No marks

6. Details of Project Marks;

Submission of Dissertation
100 Marks

Vivo-voce
50 Marks

Internal marks

The marks should be provide by

Internal Examiner only (Supervisor
50 Marks

of the student)

Total
200 Marks

7. Question paper Pattern:

Time: 3 Hrs.
Maximum Marks: 75

PART – A (20X1=20 Marks)

Answer All the questions

(Four questions from each unit with the pattern of multiple choice)

PART – B (3X5=15 Marks)

Answer any three

(One question from each unit)

PART – C (5X8=40)

Answer all the questions

Two questions from one unit with internal choice (either or pattern)

Passing Minimum:

There shall be no Passing Minimum for Internal.

For External Examination, Passing Minimum shall be of 50% (Fifty Percentage) of the maximum marks prescribed for the paper.

In the aggregate (External + Internal) the passing minimum shall be of 50% for each Paper/Practical/Project and Viva-Voce.

Grading shall be based on overall marks obtained (internal + external).

9. Classification of Successful Candidates

75% and above
First Class with Distinction

60% to 74%
First Class

Below 60%
Second Class

10. Ten point scale Grade and Grade point System (recommended by UGC)

The UGC recommends a 10-point grading system with the following letter grades as given below:

Letter Grade
Grade Point

O (Out Standing)
10

A+ (Excellent)
9

A (Very Good)
8

B+ (Good)

7

B (above Average)
6

C (Average)
5

P (Pass)
4

F (Fail)
0

Ab (Absent)
0

11. Plant Collection:

As per part of M.Sc., Botany Degree students shall undertake a study tour and field visit of different types of vegetation, ecosystems etc., under the guidance of faculty members not less than 4 - 5 days.

12. Elective courses:

The University Department of Botany offers following Elective course subjects.

Herbal Technology

Fungal Biotechnology

Mushroom Technology

Cytogenetics and Plant Breeding

Biofertilizers Technology
Marine Botany

Photobiology

13. Supportive Courses:

The University Department of Botany offers following Supportive course subjects to other Department students.

- Bioremediation and Phytoremediation
- Biodiversity and Forest Ecology
- Horticulture and Gardening
- Marine Natural Resources
- Phytochemistry

PG Syllabus (Revised) -2018-2019 Onwards
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Course Structure

DEPARTMENT OF BOTANY

PERIYAR UNIVERSITY

SALEM – 11

PG Programme M.Sc., Botany – Course Structure

(Applicable to the candidates admitted from the academic year 2018-2019 onwards)

Semester - I

Core
Paper Code
Subject
Hrs/
Cre
CIA
EA
Total

Course

Week
dits

I

Plant Diversity I – Algae, Fungi,
04
04
25
75
100

18PBOTCT01
Lichens and Bryophytes

II
18PBOTCT02
Plant Diversity II – Pteridophytes,
04
04
25
75
100

Gymnosperms and Palaeobotany

III
18PBOTCT03
Microbiology and Plant Pathology
04
04
25
75
100

IV
18PBOTCT04
Plant Anatomy, Microtechnique
04
04
25
75
100

and Embryology

V
18PBOTCP01
Practical – 01 (Core I & II)
04
02
40
60
100

VI
18PBOTCP02
Practical – 02 (Core III & IV)
04
02
40

60
100

18PBOTE01
Elective - I
03
03
25
75
100

SWAYAM (Non Credit Course)
-
-
-
-
-

Garden
01
-
-
-
-

Library
01
-
-
-
-

Field Study
01
-
-
-
-

Sub Total
30
23
205

495
700

Semester - II

Core
Paper Code
Subject
Hrs/
Cre
CIA
EA
Total

Course

Week
dits

VII
18PBOTCT05
Plant Ecology and Phytogeography
4
4
25
75
100

VIII
18PBOTCT06
Cell Biology, Genetics and
4
4
25
75
100

Molecular Biology

IX
18PBOTCT07
Plant Physiology and Biochemistry
4
4
25

75
100

X
18PBOTCT08
Biological Techniques
4
4
25
75
100

XI
18PBOTCP03
Practical – 03 (Core VII & VIII)
4
2
40
60
100

XII
18PBOTCP04
Practical – 04 (Core IX & X)
4
2
40
60
100

18PBOTE02
Elective - II
3
3
25
75
100

18PBOTS01
Supportive - I
3
3
25
75
100

SWAYAM (Credit Course)
-
4
-
-
-

Sub Total
30
30
230
570
800

Semester - III

Core	Paper Code	Subject	Hrs/ Week	Cre dits	CIA	EA	Total	Course
XIII	18PBOTCT09	Taxonomy of Angiosperms and	6	4	25	75		

100

Economic Botany

XIV
18PBOTCT10
Plant Biotechnology and Genetic
6
4
25
75
100

Engineering

XV
18PBOTCT11
Nanobiotechnology
6
4

25
75
100

XVI
18PBOTCP05
Practical – 05 (Core XIII, XIV & XV)
6
3
40
60
100

18PBOTS02
Supportive - II
3
3
25
75
100

SWAYAM (Credit Course)
-
4
-
-
-

Garden
01
-
-
-
-

Library
01
-
-
-
-

Field Study
01
-

-
-
-

Sub Total
30
22
140
360
500

Semester - IV

Core
Paper Code

Subject

Hrs/
Cre

CIA
EA
Total

Course

Week
dits

XVII
18PBOTCT12

Research Trends in Botany

5

4

25
75
100

XVIII
18PBOTPR01

Project Work

25

11

50
150
200

SWAYAM (Non Credit Course)
-

-

-
-
-

Sub Total

30

15

75
225
300

Summary of Credits

Semester
Hrs/

Credits
CIA

EA

Total

Week

I

30

23
205

495

700

II

30

30
230

570

800

III

30

22
140

360

500

IV

30

15
75

225

300

Grand Total
120

90
650

1650

2300

PG Syllabus (Revised) -2018-2019 Onwards
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Detailed Syllabus

Semester - I

Core Course - Theory

Plant Diversity – I: Algae, Fungi, Lichens and Bryophytes

Plant Diversity II: Pteridophytes, Gymnosperms and Paleobotany

Microbiology and Plant pathology

Plant anatomy, Microtechnique and Embryology

Core Course - Practical - 01 & 02

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Semester I

Paper Code

18PBOTCT01

Core Course – I

Marks

25 + 75= 100

Plant Diversity I: Algae, Fungi, Lichens and

Credits
04

Bryophytes

Hours/Week

04

Course Outcomes:

At the end of the course, students will be able to

Provide the students with the knowledge of Thallophytes.

Get acquainted with the basic understanding about evolution of plants.

Acquire History and development of Phycology, Mycology, Lichenology and Bryology.

Develop an understanding of Classification, Nomenclature, Occurrence and Distribution, Ultra structure of cell components.

Understand the life cycle patterns and economic importance.

Unit -I

Phycology – History and Development of Phycology – Modern Phycology – Classification of algae (F.E. Fritch) – Criteria for algal classification - Occurrence and Distribution– range of thallus structure – Ultra structure (Flagella, Chloroplast, Pyrenoids, Photosynthetic pigments and Eyespot) – Ecology (Habit and Habitat), cytology, reproduction, life cycles and economic importance of algae - molecular phylogeny of algae.

Unit-II

Nomenclature – Significant features – Occurrence - Cell structure - Thallus organisation – Reproduction and broad classification – Life cycles – Economic importance of Cyanophyta, Xanthophyta, Bacillariophyta, Dinophyta, Chlorophyta, Phaeophyta, Cryptophyta and Rhodophyta and their comparative account.

Unit-III

Mycology – Introduction – Systematics of fungi (Ainsworth) – Evolution of fungi – Ecology of fungi (Habit and Habitat) – Reproduction and life cycles – Chemistry of Fungal cell – Growth – Nutrition – Metabolism and regulation of metabolism – Diagnostic characters of Myxomycota, Oomycota, Chytidriomycota, Zygomycota, Ascomycota, Basidiomycota and Deutromycota – Economic importance of Fungi.

Unit-IV

Lichens – Components of lichens – Occurrence – Classification – Morphology and anatomy of thallus – Different types of reproduction in lichens – Recent developments in lichen's research - Economic importance of lichens – Phycobionts (Photobionts) – Mycobionts.

Unit-V

Bryology – Introduction – Definition – Origin of Bryophytes – Evolutionary and Ecological significance – Classification of Bryophytes - Reproduction in Bryophytes – Chemical constituents of Bryophytes – Bryophytes as indicators of Pollution – Role of bryophytes in global climate regulation (Carbon concentration and sequestration)-Diagnostic characters of Liverworts, Mosses, Hornworts – Life histories of *Sphagnum,*

Marchantia and *Anthoceros*.

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1.Alexopolous, C.J., C.W. Mims and M. Blackwell. Introductory Mycology. 4 th Ed. John Wiley & Sons, New York. 880 pp. 2007.

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Moore, D., Robson, G.D. and Trinci, A.P.J. 21st Century Guide book of Fungi, Cambridge University Press, N.Y. 2011.

Webster, C.J. Introduction to Fungi. 3 rd., Cambridge University Press, Cambridge.

pp. 2007.

Sharma, P.D. The Fungi . 2 nd Ed. Rastogi Publications, Meerut. 2004.

LICHENS

1.BRYOPHYTES AND LICHENS IN A CHANGING ENVIRONMENT. Bates, J. W., and A. M. Farmer, eds. Oxford: Clarendon, 1992.

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1.Chopra, R.N. and P. K. Kumar. Biology of Bryophytes. Wiley Eastern Ltd., New Delhi.350 pp.1988.

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Kashyap, S.R.. Liverworts of Western Himalayas and the Punjab plains. Vols I II. Researchco Publications, New Delhi. 1932

7. Kumar, S.S. An approach towards Phylogenetic Classification of Mosses. Jour. Hattori Bot. Lab. Nichinan , Japan. 1984.

Semester I

Core Course – II

Plant Diversity II: Pteridophytes,

Gymnosperms and Palaeobotany

Marks
25 + 75= 100

Credits
04

Hours/Week
04

Paper Code
18PBOTCT02

Course Outcomes

This course provides the better understating about the structure, development of plant kingdom, origin and modern evolutionary concepts.

Unit – I

Pteridophytes – Introduction – Vascular cryptogams – Characteristic features – Habitat of Pteridophytes – Lifecycles - Origin of Pteridophytes – Evolution of Sporophyte - Classification (Sporne, 1967) – Economic Importance – Recent scenario in Pteridology.

Unit - II

Morphology, structure and reproduction of *Selaginella, Isoetes, Gleichenia, Equisetum, Ophioglossum, Marselia, Salvinia, Adiantum, Psilopsida, Lycopsida, Sphenopsida, Pteropsida* and *Pteris*. Stelar and soral evolution. Telome theory - Heterospory and Seed habit. Apogamy and Apospory.

Unit – III

Classification of Gymnosperms (Sporne, 1967). Comparative study of vegetative, anatomy and reproduction structure of Cycadales, Coniferales and Taxales. Woods of gymnosperms.

Unit – IV

Comparative study of vegetative, anatomy and reproductive structure of Ginkgoales and Gnetales. Economic importance of gymnosperms.

Unit – V

Geological times scale. Fossilization, types and age determination. Rajmahal hills, Deccan intertrappean flora. Study of morphology, anatomy and evolutionary trends of following groups of fossil forms. Lepidodendrales, Rhyniales

Sphenophyllales, Psilophytales, Pterdospermales, Bennettitales, Cycadales, Cordaitales and Coniferales. Institute of Palaeobotany - Birbal Sahni.

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Semester I

Paper Code
18PBOTCT03

Core Course – III

Marks
25 + 75= 100

Credits
04

Microbiology and Plant pathology

Hours/Week
04

Course Outcomes

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

understand life cycle, reproduction, physiology of microorganisms (Bacteria and Virus).

recognize plant disease and their causal microorganisms.

be acquainted plant disease management

Unit I

Definition of microbiology - Classification of microorganisms. Microbiological staining method. Bacteriology: General characters and classification (Bergey's)growth – continuous & synchronous culture. Virology: General characters, classification, structure, multiplication - lytic and lysogenic cycles.

Unit II

Sterilization techniques - types and preparation of culture media – pure culture & subculture methods - nitrogen fixers, biological decomposers (solid waste, composting, biodegradation and bioremediation)

Unit III

Food & dairy microbiology. Food spoilage & poisoning by microorganisms. Methods of food preservation. Microbes of milk & milk products - milk pasteurization-industrial microbiology-alcoholic fermentation – process and recovery of products. Bio pesticides - immobilization of microbes.

Unit IV

Plant Pathology – definition of plant disease, classification of diseases - Etiology. Disease caused by fungi (Blast of paddy, Red rot of Sugarcane, Tikka disease) – Bacteria (Blight of paddy, Black arm of Cotton) - Virus (Bunchy top of Banana & TMV) – Mycoplasma (little Leaf diseases) – A detailed account on Nematodes and Phytoplasma – Non-Parasitic diseases.

Unit V

Epidemiology and forecasting of plant diseases – host parasite interrelationship and interaction – environment and nutrition in relation to disease development – defense mechanism - principles of plant diseases - integrated disease studying plant diseases - Integrated Disease Management (IDM) – biotechnology in relation to plant pathology.

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Semester I

Paper Code

18PBOTCT04

Core Course – IV

Marks

25 + 75= 100

Plant Anatomy, Microtechnique and

Credits
04

Embryology

Hours/Week

04

Course Outcomes

At the successful completion of this course, students will be able to learn

Types of cells, Functions, Morphology and internal structure of plants

Principles, Techniques and Applications of Microscopes

Study of palynology, fertilization, nutrition of embryo and sexual incompatability

Unit I

Structure and Organisation of tissue – unicellular, colonial and multicellular forms

– organization of shoot and root apical meristem, - Cambium and seasonal activities, Cambium in monocotyledons. Vascular cambium – types – Ontogeny - Secondary xylem

– sap wood and heartwood, reaction wood, growth rings.

Unit II

Anomalous secondary thickening in dicot (*Aristolochia*, *Boerhaavia*, *Bignonia*, *Achyranthes, Nyctanthes*) and monocot stems (*Dracaena* and *Yucca*) - Nodal anatomy - Leaf development – phyllotaxy – floral meristem and development (*Arabidopsis*).

Unit III

Microscopy – Principles and applications – types of microscopes (Compound, Phase contrast, Fluorescent, SEM, TEM and Cryo-electron microscopy) - Photomicrograph – Preparation of microscopic Slides – Types - Microtomy - Staining and Mounting – Whole mount methods – Squash and smears – Labelling methods – Histochemistry and Cytochemistry.

Unit IV

Floral parts – Microsporangium – Morphology and development of Male gametophyte – Megasporangium – Morphology and Development of Female

Gametophyte – Embryo sac - types (Monosporic, Bisporic and Tetrasporic) - Nutrition of embryo sac. Palynology – Pollination - Fertilization – Double fertilization.

Unit V

Sexual Incompatibility – Mechanism and Methods to overcome Sexual Incompatibility - Endosperm – Types – Functions (haustoria) - Embryo development in Dicot and Monocot – Polyembryony – Parthenocarpy – Apomixes - Seed germination and Seedling growth – Embryology relation to taxonomy and applications of Embryology.

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Pullaiah, T., Lakshminarayanan, K. and Hanumantha Rao, B. 2001.Text book of embryology of angiosperms, Regency Publications, New Delhi.

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Department of Botany

Periyar University

Paper Code

18PBOTCP01

Semester I

Marks

40 + 60 = 100

Core Course – V

Credits
02

Practical - 01

Hours/Week

04

Plant Diversity I: Algae, Fungi, Lichens and Bryophytes

and Plant Diversity II: Pteridophytes, Gymnosperms and Palaeobotany

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ALGAE

Morphology and internal structures of vegetative and reproductive organs in the genera

Cyanophyta : *Oscillatoria, Nostoc, Anabaena*.

Chlorophyta: *Volvox, Hydrodictyon, Chlorella, Oedogonium*,

Xanthophyta : *Vaucheria, Botrydium*.

Bacillariophyta : *Cyclotella*.

Phaeophyta : *Ectocarpus, Fucus, Laminaria, Sargassum, Padina*.

Rhodophyta : *Porphyra, Gelidium.*

Preparation and submission of fifteen (15) herbaria specimen (Seaweeds) in the course of field study in fresh and coastal ecosystem.

FUNGI

Study of diagnostic features of the following types of fungi

Myxomycota*: Stemonitis, Physarum.* Oomycota*: Albugo, Phytophthora.* Chytidriomycota*: Synchitrium, Allomyces, Blastocladia.* Zygomycota*: Mucor, Rhizopus, Pilobolus.* Ascomycota*: Aspergillus, Penicillium, Xylaria, Morchella, Peziza, Saccharomyces.* Basidiomycota*: Puccinia, Auricularia, Agaricus, Ustilago, Polyporus, Pleurotus.* Anamorphic fungi*: Fusarium, Cercospora, Alternaria*

LICHENS

Study of morphology and anatomical features of foliose, crustose and fruticose lichens through permanent slides (*Parmelia* and *Usnea*).

BRYOPHYTES

Study of morphology and internal structures of vegetative and reproductive organs in the genera of

Marchantia, *Sphagnum*, *Fossombronia*, *Anthoceros* and Moss

PTERIDOPHYTES

Study of vegetative, anatomy and reproductive structure of *Selaginella*,

Ophioglossum, *Equisetum*, *Gleichenia*, *Marselia* and *Azolla*.

GYMNOSPERMS

Study of morphology, anatomy and reproductive structure of *Araucaria*,

Cupressus, *Podocarpus*, *Ginkgo*, *Taxus*, *Ephedra* and *Gnetum*.

PALAEOBOTANY

Study of salient features of the following through permanent slides;

Lepidodendron, *Lepidocarpon*, *Gleichenties*, *Williamsonia*, *Calamites*, *Sphenophyllum*, *Glossopteris* and *Cycads*.

Semester I	Marks 40 + 60 = 100
Core Course – VI	
Practical - 02	
Microbiology, Plant pathology and Plant Anatomy, Microtechnique and Embryology	Credits 02

Paper Code 18PBOTCP02	Hours/Week 04

Microbiology:

Cleaning and Sterilization of Glassware

Preparation of culture media

Sterilization techniques

Serial dilution techniques – Pure culture (Pour/Streak/Spread)

Differential staining methods of bacteria by using Gram stain

Antibacterial assay - disc diffusion/agar well method

Isolation of microorganisms from various sources (Milk, Water, Air, Vegetables, Fruits and Bread)

Motility of Bacteria

Plant Pathology:

Isolation of pathogens from diseased tissues (leaf, stem and fruit)

Symptoms and identification of diseases caused by fungi (Blast of paddy, red rot of sugar cane, Tikka disease), Bacteria (Blight of paddy, Black arm of Cotton) Virus

(Bunchy top of Banana & TMV), – Mycoplasma (little Leaf diseases).

Plant Anatomy & Microtechnique:

Study the structures of various Microscopes

Study the structure of Microtome

Staining methods (Simple/Permanent)

Student should submit two number of Permanent slides for practical Examination

Study the anomalous, primary and secondary features in selected Monocot and Dicot plants

Detailed study of TS, TLS and RLS from various wood for to identify the soft and hard wood

Study the anatomical abnormality of C4 and CAM plants (Leaf/Stem).

Embryology:

Study of pollen morphology

Pollen germination experimental study

Identify the different types of embryos, polyembryony, endosperm types, types of pollen grains.

Any stage of embryo excision from Cucumber seeds.

Semester - II

Core Course - Theory

Plant Ecology and Phytogeography

Cell Biology, Genetics and Molecular Biology

Plant physiology and Biochemistry

Biological techniques

Core Course - Practical - 03 & 04

Semester II
Paper Code
18PBOTCT05

Core Course – VII
Marks
25 + 75 = 100

Plant Ecology and Phytogeography
Credits
04

Hours/Week
04

Course Outcomes:

The course will enable students to understand how environment influence the life of different organisms and vice versa.

Unit I

Basic ecological principles: definition of ecology and environment - components and characters of ecosystem – homeostasis. Ecosystem - structure and function. Factors affecting environment – Abiotic- Edaphic, Climatic, Topographic. Biotic – Allelopathy. Biotic and Abiotic interaction, Population Ecology, Curve, r and k Selection, meta population, species interaction, interspecific competition.

Unit II

Ecosystem – types – aquatic, terrestrial, desert and forest ecosystem. Estuarine and mangrove ecosystem – adaptations. Studying vegetation – types – list and count quadrat methods - density abundance frequency, Ecological niche, ecotone, edge effect. Flow of energy in ecological system, quality of energy, Primary and secondary foundation species enhance biodiversity. Non Conventional Sources of Energy (Solar, Hydro, Wind, Biogas, Geothermal, Ocean thermal, Tidal energy).

Unit III

Ecological succession – Seral and Climax communities – Hydrosere, Xerosere. Bog succession, sand dune succession. Ecosystem components – energy flow, food chain, food web and ecological pyramids. Biogeochemical cycle – water cycle, carbon cycle and nitrogen cycle.

Unit IV

Pollution : types – Pollutants, air, water, soil, thermal, radiation and noise pollution and their impact in environment and control measures. Global environmental changes; biodiversity status, monitoring and documentation; major drivers of biodiversity change;

- biodiversity management approaches; Green house effect and its consequences. Waste recycling. Environmental Impact Assessment (EIA). Disaster management: Floods, earthquake, Cyclone and landslides and Tsunami – Ozone depletion – Invasive species – Global warming and glaciers.

Unit V

Phytogeography – major biome in world and India. Continental drift - hypothesis - Gondwana land factors involved in distribution., Introduction to IUCN criteria - Red data, rare, endangered species Endemism - Age and Area hypothesis. Hot spots, Plant exploration. Invasion and introduction. Remote sensing-introduction and its principle

References: `

Text Books:

Anathakrishnan,T.N. (1982)-Bioresource Ecology-Oxford & IBH Publ.Co.,Inc.,Belmont.

Ambasht, R.S. (1974) - A text book of plant ecology (3rd Edn.) Students' Friends. & Co., Varanasi, India. • Agarwal, K.C. (1987) - Environmental biology- Agro-botanical publications, India.

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Delhi.

Reference Books:

Billings, W.B.(1965)- Plants and the ecosystem - Wardsworth Publ.Co.,Inc., Belmont.

Conard, H.S. Plant Ecology - Iowa state Press., Iowa.

Odum E.P. Gray, W. Barrelt 2004. Fundamentals of Ecology. 15th edition. Thomas Asia Pvt. Ltd.

Chapman, J.L. and Reiss, M.J. 1999. Ecology; Principles and Applications. II Ed. Cambridge University Press. New York.

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Schulze, E.D., Beck, E. And K. Muller-Hohenstein. 2005. Plant Ecology. Springer. New York.

Odum, E.P. 1978. Basic principles of ecology.

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PG Syllabus (Revised) -2018-2019 Onwards

Department of Botany

Periyar University

Paper Code

18PBOTCT06

Semester II

Marks

25 + 75 = 100

Core Course – VIII

Credits
04

Cell Biology, Genetics and Molecular Biology

Hours/Week

04

Course Outcomes:

The course will facilitate the adequate knowledge about the cell biology and basic concept of genetics, structure of organisms and advanced molecular techniques.

Unit – I

The plant cell: Structure and function of cell wall, membrane, chloroplast, mitochondria, ribosomes, peroxisomes, golgi apparatus, nucleus, nucleolar organizer and ER. Structure and functions of biomolecules, stablizing interaction -Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction. Cell division – crossing over

– synaptonemal complex and cell cycle –cytokinesis.

Unit - II

Organization of gene and chromosomes: Morphology and chemistry of chromosome; molecular organization of centromere and telomere. Karyotype. Polytene, lampbrush and B-chromosomes,. Structural and numerical alteration of chromosome (Eu and polyploidy) and its significance. Detection of molecules using immunoprecipitation, flowcytometry and immunofluorescence microscopy. In –situ hybridization – FISH and GISH.

Unit – III

Mendalian principles – Laws of inheritance - monohybrid, dihybrid, test cross, back cross. Alleles, Epitasis, Interaction of genes, complementary genes, dominance, segregation, independent assortment - Gene mapping methods, Linkage maps - Sex determination. Extra chromosomal inheritance involving chloroplast and mitochondria. Mutation types, causes and detection, mutant types, insertional mutagenesis.

Unit – IV

Chromatin organization – DNA replication, repair, recombination, C- value paradox, Operon concept, transposans. Transcription, RNA splicing – post

transcriptional modification. Enzymes involving in replication and transcription. Translation – targeting of proteins to different cellular compartments.

Unit – V

Plastome – structure and function. Transcription and processing of chloroplast RNA. Gene knock out and knocking in bacterial and eukaryotic organisms. Isolation, separation and analysis of carbohydrate and lipid molecules. Gene expression analysis micro array based techniques.

References

Text Books

- Gupta P.K 2013 Genetics and Cytogenetics. 7th Edition. Rastogi Publications.

- Ahluwalia K.B 2005 (First Edition). Genetics. New Age International Private Ltd. Publishers, New Delhi.

Sariu C 2004 (Sixth Edition) Genetics. TATA McGraw-Hill Publishing Company Ltd., New Delhi.

- Pawar C.B 2003 (First Edition). Genetics Vol. I and II. Himalaya Publishing House, Mumbai

Reference Books

Derobertis E.D. and De Robertis E.M.F. 2002. Cell and Molecular Biology 8th Edition. Lee and Fab International edition, Philadelphia.

Cooper G. 1996. The cell – A molecular approach. ASM Press, Washington

Buchanan B.B. Gruissem W., Jones R.L. (2008). Biochemistry and Molecular Biology. American Society of Plant Physiologist, Maryland, USA.

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Khush, G.S 1973. Cytogenetics of Aneuploids. Academic Press, New York, London.

Karp, G. 1999. Cell and Molecular Biology : Concept and Experiments. John Wiley and Sons, Inc., USA.

Lewin, B. 2000. Gene VII. Oxford University Press, New York, USA.

Lewis, R. 1997. Human Genetics: Concepts and Application (Second Edition). WCB McGraw Hill, USA.

Paul Khurana, S.M and Machiavelli Singh 2015. Biotechnology: Progress & Prospects. Studium Press USA.

Robert, F and Weaver. 2012. Molecular biology -5th ed. The McGraw-Hill Companies, Inc. New York.

Kar D.K. 2011. Cell Biology Genetics & Molecular Biology .New Central Book Agency (P) Limited.

David Clark Nanette Pazdernik 2012. Molecular Biology 2nd Edition. Academic Cell

David P. Clark, 2009.Molecular Biology. Elsevier

Molecular Biology of the Cell, Sixth Edition 2017. Bruce Alberts, Alexander

Johnson, Julian Lewis, David Morgan, Martin Raff, Keith Roberts, Peter Walter. Garland Science.

25 + 75 = 100

Semester II

Core Course – IX

Plant Physiology and Biochemistry

Credits
04

Paper Code
18PBOTCT07

Hours/Week
04

Marks

Course Outcomes:

The subject provides to understand fundamentals of Physiological aspects of plants and their different biochemical pathways.

Unit I

Water relations of plants – Structure and Physicochemical properties of water, Solute transport and photo assimilate translocation – uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates. Stomatal physiology; source and sink relationship.

UNIT II

Photosynthesis - Light harvesting complexes; Photophosphorylation - photoprotective mechanisms; CO2 fixation-C3, C4 and CAM pathways. Respiration and photorespiration – Citric acid cycle; plant mitochondrial electron transport and ATP synthesis; alternate oxidase; photorespiratory pathway.

UNIT III

Nitrogen metabolism - Nitrate and ammonium assimilation; amino acid biosynthesis. Plant hormones – Biosynthesis, storage, breakdown and transport; physiological effects and mechanisms of action. Sensory photobiology - Structure, function and mechanisms of action of phytochromes, cryptochromes and phototropins; stomatal movement; responses of plants

to biotic and abiotic stress - photoperiodism and biological clocks – vernalization – seed dormancy.

UNIT IV

Biomolecules of the cell: Classification of Carbohydrates - Monosaccharaides-Disaccharides – Polysaccharides – Homopolysaccharides - Heteropolysaccharides-

Protein – Structure - Glycoproteins. Lipids- Fatty acids- Essential fatty acids-Triglycerides - Phospholipids - Glycolipids- Lipoproteins- Steroids - Aliphatic Lipids.

UNIT V

Enzyme as catalysts – kinetics, classification, nomenclature, properties and mechanisms of enzyme action. Vitamins – general characters – classification – structure and properties – fat soluble and water soluble vitamins. Secondary metabolites: Classification, biosynthesis, and functions of terpenoids, alkaloids, phenolics, flavonoids, coumarins.

REFERENCES:

Jain, V.K. (2007). Fundamentals of Plant Physiology. S. Chand & Co. Ltd., New Delhi.

Salisbury, F.B. and Ross, C.W. (1992). Plant Physiology.Wadsworth Publishing Company, Belmont, California, USA.

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Pandey, S.N. and Sinha, B.K. 2010. Plant Physiology, Vikas Publishing, New Delhi.

Nelson,D.L and M.M.Cox. Lehninger.2005 Principles of Biochemistry, 4th Edition, W.H. Freeman & Company, New York.

Sathanarayana, U.2002 Biochemistry, 2nd Edition, Books & India Co Ltd, Kolkata. 3. Berg,J.M., J.L.Tymolzko& L.Stryer.2002 4th Edition, W.H. Freeman & Company, New York.

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Roberts, E.A. 1987. Plant growth regulators.Kluwer Academic publishers, London.

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Department of Botany

Periyar University

Paper Code

18PBOTCT08

Semester II

Marks

25 + 75 = 100

Core Course – X

Credits
04

Biological Techniques

Hours/Week

04

Course Outcomes:

On successful end of this course, students will talented to

understand much knowledge about different separation techniques of biomolecules, structure, function and application of basic equipments and

advanced equipments used in biology and molecular biological techniques

Unit I

General Principles of Biochemical analysis – Principles and Methodology of Colorimetry, Spectrophotometry, pH meter and Centrifugation techniques.

Unit II

Chromatographic techniques: principles and methods (Paper. Thin layer, Column, Adsorption, Partition, Ion-Exchange, Gas-liquid, chromatography and HPLC). Electrophoretic techniques – Principles, Methodology, Types of Electerophoresis (Agarose gel electerophoresis, SDS-PAGE).

Unit III

Principles and applications of FTIR, XRD, LCMS, NMR, MALDI-TOF – PCR (Thermocycler and Real Time PCR) – ELISA – Flow Cytometry - AAS

Unit IV

Structure, function and application of basic equipments used in biology experiments - Rotary evaporator, Autoclave, Laminar air flow chamber, Laboratory freezer, Hot air oven, Incubator, Magnetic stirrer, Water, Refrigerated, thermostatic and Plasma thawing bath, Shakers (Orbital, Rotary, Vortex, Gyratory sieve shaker and rotary flask shaker) – Distillation Unit – Photo flame meter, Ultrsonicator – Transilluminator – Soxhlet apparatus – Lyophilizers.

Unit V

Immunological techniques: structure of antibodies and its types – Antigenicity and immunogenicity – generation of antibody – production of polyclonal and monoclonal antibody – Antigen Antibody interaction – Immunoprecipitation – Epitope mapping - immunodiffusion – Agglutination.

References:

Jeyaraman, J. 1981. Laboratory Manual in Biochemistry. Wiley Eastern Ltd. Mumbai.

Plummer, D.T. An Introduction to practical biochemistry. Tata MC Graw Hill Co. New York.

Keith Wilson and John Walker. 1995. Practical biochemistry. Univ. of Cambridge., New York.

Chawla, H.S. 2000. Introduction to biotechnology. Oxford and IBH publishing Co., New Delhi.

Johansen, D.A. 1940. Plant Microtechnique. MC Graw Hill Co., New York.

Nagarajan, P. and Senthilkumar, N. 2001. Molecular biology principles and methods a practical approach, Sree Narmatha Printers, Coimbatore.

Sharma, R.K. and S.P.S. Sangha. 2009. Basic Techniques in Biochemistry and Molecular Biology. I.K. International Pvt. Ltd, New Delhi.

Keith Wilson and John Walker.2010. Principles and Techniques of Biochemistry and Molecular biology. Cambridge University Press, New York.

Palanichamy, S. and M. Shunmugavelu. 1997. Research methods in Biological Sciences. Palani Paramount Publications, Palani.

P.R. Yadav and Rajiv tyagi, 2006. Biological Technicques, Discovery Publishing House, New Delhi.

Susan carson, Heather B. Miller and D. Scottwitherow, 2012. Molecular biology techniques, Elesiver.

Bajpai P.K. 2006. Biological instrumentation and Methodology. S Chand Publishers, New Delhi.

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Ananta Swargiary. 2017. Biological tools and Techniques. Kalyani Publishers, New Delhi.

Sabari Ghosal and Srivastava A. K. 2009. Fundamentals of Biological Techniques and Instrumentation. PHI Learning Private Ltd. New Delhi.

Gurumani. N. 2006. Research Methodology for biological sciences. MJP Publishers, Chennai.

Skoog, Holler and Crouch.2007. Instrumental Analysis. Cengage Learning Pvt.Ltd. New Delhi.

Department of Botany

Periyar University

Semester II

Paper Code

18PBOTCP03

Core Course – XI

Marks

40 +60 = 100

Practical – 03

Credits
02

Plant Ecology, Phytogeography, Cell Biology,

Hours/Week

04

Genetics and Molecular Biology

PLANT ECOLOGY:

Determination of linear changes in vegetation by using line and belt transect methods.

Determination of frequency, density, abundance, dominance, FICC, dominance index, similarity index and diversity index by using quadrat frame.

To find out the bulk density of a given soil sample

To study soil density and porosity

PHYTOGEOGRAPHY:

To determine the vegetational cover in a given area

To prepare list of Endangered, Endemic and Threatened species in a selected

areas.

CELL BIOLOGY

Phase Contrast Microscope

Fluorescence Microscope

Karyotyping of monocot (mitosis)

Karyotyping of dicot (mitosis)

Induced aberration of chromosomes

GENETICS

Genetic cross analysis monohybrid and dihybrid

Test cross and back cross

MOLECULAR BIOLOGY

Isolation of plant genomic DNA and RNA

Analysis of nuclear DNA by agarose gel electrophoresis

Demonstration of PCR

Department of Botany

Periyar University

Semester II

Core Course – XII

Paper Code
18PBOTCP04

Marks
40 + 60 = 100

Practical – 04

Credits
02

Plant Physiology, Biochemistry and Biological

Hours/Week
04

Techniques

PLANT PHYSIOLOGY & BIOCHEMISTRY

Extraction and estimation of chlorophyll a, b and carotenoids in C3 and C4 plants by Arnon (1949).

Leaf anatomy of C3 and C4 plants

Preparation of buffers – Phosphate and Citrate buffers.

Preparation of the standard curve of protein (BSA).

Estimation of reducing and non reducing sugars by Nelson's method (1994).

Estimation of soluble starch by Hansen and Moller (1975).

Estimation of soluble protein by Lowry’s method (1951).

Estimation of free amino acids by Bates and Waldren (1973).

Estimation of lipid by volumetric method.

Determination of catalase and peroxidase activity by Chance and Maehly (1955).

Separation of amino acids by Paper and Thin Layer Chromatography.

BIOLOGICAL TECHNIQUES

Hands on experience in the use of instruments like Calorimeter, Spectrophotometer, pH meter, Centrifuge, Thin layer chromatography, Agarose gel electrophoresis, PAGE and PCR

Demonstration of Rotary evaporator, Autoclave, Laminar air flow chamber, Laboratory freezer, Hot air oven, Incubator, Magnetic stirrer, Water bath, Shakers, Distillation Unit, Photo flame meter, Ultrsonicator, Transilluminator, Soxhlet apparatus and Lyophilizers

Analysis the data from FTIR, XRD, LCMS, NMR, MALDI-TOF – PCR (Thermocycler and Real Time PCR) – ELISA – Flow Cytometry

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Semester - III

Core Course - Theory

Taxonomy of Angiosperms and Economic Botany

Plant Biotechnology and Genetic Engineering

Nanobiotechnology

Core Course - Practical - 05

PG Syllabus (Revised) -2018-2019 Onwards

Department of Botany

Periyar University

Semester III

Paper Code

18PBOTCT09

Core Course – XIII

Marks

25 + 75 = 100

Taxonomy of Angiosperms and Economic

Credits
04

Botany

Hours/Week

06

Course Outcomes:

To learn the major patterns of diversity among plants, and the characters and types of data used of classify plants.

Unit – I

Systems of classification: Artificial system: Linnaeus: Natural system: de Candolle, Bentham & Hooker: Phylogenetic system: Engler and Prantl, Hutchinson and Takhtajan and Dahlgren. ICBN, types and typification – Principles of priority and their limitation– problems in nomenclature, Herbarium and its potential role in teaching and research. Preparation of key, Flora, Monographs – Botanical Gardens, Botanical survey of India- – and it's role, Taxonomical hierarchy.

Unit – II

Chemotaxonomy – micromolecules - primary and secondary metabolites. Macromolecules – protein, nucleic acids, polysaccharides. Numerical Taxonomy – cladistics. Biosystematics - Taxonomy relation to anatomy, embryology, palynology, ecology, cytology and serology. Molecular taxonomy – RFLP – APG.

Unit – III

Study of diagnostic characters of the following family Magnoliaceae, Menispermaceae, Polygalaceae, Caryophyllaceae, Oxalidaceae, Meliaceae, Rhamnaceae, Vitaceae, Sapindaceae, Combretaceae, Lythraceae, Aizoaceae. Portulacaceae and Tiliaceae

Unit – IV

Study of diagnostic characters of Oleaceae, Gentianaceae, Boraginaceae, Bignoniaceae, Casuarinaceae, Amaryllidaceae, Podestemaceae, Loranthaceae, Orchidaceae, Liliaceae, Commelinaceae, Musaceae, Arecaceae, Cyperaceae and Poaceae.

Unit – V

Economic importance of Cereals: Wheat, Rice, Maize, Sorghum, Barley. Legumes: Black gram, Red gram, Chick pea, Pigeon pea. Fruits: Banana, Grapes, Citrus, Mango. Spices and Condiments: Ginger, Pepper, Cardamom, Clove. Beverages from plants: Tea, Coffee and Cocoa. Fibres- Cotton, Jute, Sun hemp. Timber: Teak, Rosewood, Ebony, Sal and Mahogany. Vegetable Oil: Sun flower, Peanut, Palm Oil, Coconut and Sesame. Plants used as avenue trees for shade, pollution control and aesthetics.

References

Text Books

Nalk, V.N.., 1984. Taxonomy of Angiosperms. Tata McGraw-Hill Publishing Company Ltd., New Delhi. 304pp.

Singh, G 1999. Plant Systematics – Theory and Practice. Oxford and IBH Publishing Co. Pvt Ltd., New Delhi. 35pp.

Sharma, O.P. 1958. Plant Taxonomy. Tata McGraw Hill Publishing Company Ltd., New Delhi. 482pp.

Gurucharan Singh. 2008. Plant Sytematics – Theory and Practices. Oxford and IBH Publishing Co. Pvt. Td. New Delhi.

Michael G. Simpson. 2010. Plant Systematics. Elsevier Academic Press. USA.

Pandey S.N. and Mishra. S.P. 2009. Taonomy of Angiosperms. Ane Books Pvt. Ltd. New Delhi.

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Reference Books

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Davis, P.H. and Heywood , V.M.1963. Principles of Angiosperm Taxonomy. Oliver & Boyed – London.

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Nomenclature, Today & Tomorrow's Printers & Publishers, Delhi.

Lawerence, G.H.M. 1961, Taxonomy of Vascular Plants. MacMillan and Co., New Delhi.

Street, H.E., 1978. Essay in Plant Taxonomy, Academic press, London.

Bentham, G. 1988. Handbook of British Flora. (7th Ed., revised by A.B. Rendle in 1930). Ashford, Kent.

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Hutchinson, J. 1973. The Families of Flowering Plants. (3rd Ed.) Oxford Univ. Press.

Lawerence, G.H.M. 1951. Taxonomy of Vascular Plants. MacMillan, New York.

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Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd Ed.). Edward Arnold. London.

Takhtajan, A.L. 1997. Diversity and Classification of Flowering Plants. Columbia Univ. Press. New York, 642 pp.

Woodland , D.W. 1991. Contemporary Plant Systematics. Prentice Hall. New Jersey.

Pullaiah, T. 2007. Plant Taxonomy. Regency Publications, New Delhi.

PG Syllabus (Revised) -2018-2019 Onwards

Department of Botany

Periyar University

Semester III

Paper Code

18PBOTCT10

Marks

25 + 75 = 100

Core Course – XIV

Credits
04

Plant Biotechnology and Genetic Engineering

Hours/Week

06

Course Outcomes:

The subject provides knowledge about different techniques of biology and Gene

level.

Unit I

Biotechnology as Inter and Multidisciplinary approach -Plant Tissue Culture – Introduction - Objectives and Goals – Laboratory organisation – Nutrient medium – Sterilization Techniques – Types of Cultures (seed, embryo, Root, callus, organ, cell, protoplast and axillary bud cultures) – Cell suspension culture, types and in-vitro secondary metabolites production and application - Plant micropropagation - Somatic embryogenesis and organogenesis – Protoplast Isolation and Fusion.

Unit II

Application of tissue culture in agriculture, horticulture, forestry and Conservation of plant genetic resources – Application in development of Genetically Modified Crops (Fruits, Vegetables, Crops and Cereals) – recent trends in Genomics and Genetics of *Arabidopsis thaliana* – Biofertilizers – Cultivation and applications of Biofertilizers (Nitrogeous and phosphatic biofertilizers) – Organic farming (Vermicompost)

Unit III

Intellectual Property (IP) - Definition – Intellectual Property Rights (IPR) – Intellectual Property Protection – Plant Genetic Resources – Patent Systems – Sources of patent Information – Patenting Methods – Patenting of higher plants, genes and DNA sequences – Plant Breeders Rights and Farmers Rights – A brief account on Geographical Indication (GI).

Unit IV

Tools of Genetic engineering – Restriction Enzymes (Exo and Endo nucleases) – Enzymes used in Genetic engineering (Methylase, SI nuclease, Ligase, Alkaline Phosphatse, Reverse transcriptase, T4 kinase, Terminal transferase, adopters and Linkers) – Vectors and their types – Plasmid (pBR 322, pUC Vectors), *Agrobacterium* based Plasmids, Bacteriophage vectors, Cosmids, Phagemids, YAC, CaMV, Gemini Virus, Shuttle and Expression vectors.

Unit V

Gene transfer methods - Cloning Strategies – rDNA technology – Genomic and cDNA library construction – Hybridization techniques – Labeling methods –Nucleotide sequencing methods – Application of genetic engineering in various fields.

References:

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Advancements and Developments Springer.

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Huang .P.C., 2012. Genetic Engineering Techniques: Recent Developments. Elsevier.

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Department of Botany

Periyar University

Semester III

Paper Code

18PBOTCT11

Marks

25 + 75 = 100

Core Course – XV

Credits
04

Nanobiotechnology

Hours/Week

06

Course Outcomes:

The student should be able to on completion of the course:

Understand the basic concepts of nanotechnology principles and applications

Know different biomedical applications of nanoparticles

Unit I

Nanobiotechnology: Definition – History, Scope and Recent scenario in nanotechnology – Nanoparticles and its significance – Challenges and Future Prospects of Nanoparticles.

Unit II

Basic introduction of Biomaterials – First, Second and Third generation of Biomaterials – in Tissue Engineering and Nanotechnology – Microfabrication and Microtechnology - Nanofabrication and Nanotechnology.

Unit III

Synthesis routes of Nanomaterials – Synthesis of different Nanoparticles - Unique properties and characterization of Nanoparticles.

Unit IV

Applications of Nanomaterials: Nanoelectronics – Micro and Nano Electrochemical Systems (MEMS/NEMS) – Nano sensors and catalyst. Biomedical, Food and Agricultural

applications of Nano particles – Nanomedicine and Novel drug delivery systems – Health and Environmental impacts of Nanotechnology.

Unit V

Nanostructured materials with high application potential: Quantum Dots – Carbon Nanotube – GAN Nano wires – Nanocrystalline – Zinc Nitrate, Non Crystalline - Titanium Oxide and Multilayered Films – Role of Nanotechnology in plant science research.

References:

Murty BS, Shankar P, Baldev Raj, Rath BB and James Murday. 2013. Textbook of Nanoscience and Nanotechnology. Springer. University Press (India) PVT LTD.

Subbiah Balaji. 2010. Nanobiotechnology. MJP Publishers, Chennai.

Jeremy Ramsden, 2016.Nanotechnology: An Introduction. William Andrew.

Geoffrey Hunt, Michael Mehta, 2013. Nanotechnology: Risk, Ethics and Law Taylor & Francis.

Jo Anne Shatkin, 2012. **Nanotechnology:** Health and Environmental Risks, Second

Edition CRC Press.

- Jesus M. de la Fuente, V. Grazu. 2012.**Nanobiotechnology:** Inorganic Nanoparticles Vs Organic Nanoparticles Elsevier.

Michael R. Hamblin, Pinar Avci, Tarl Prow, 2016. Nanoscience in Dermatology. Academic Press.

Makio Naito, Toyokazu Yokoyama, Kouhei Hosokawa, Kiyoshi Nogi 2018. Nanoparticle Technology Handbook, Elsevier.

- Monique A. V. Axelos, Marcel Van de Voorde, 2017. Nanotechnology in Agriculture and Food Science, John Wiley & Sons.

Claudia Atavilla, Enrico Ciliberto, 2017. Inorganic Nanoparticles: Synthesis, Applications, and Perspectives CRC Press.

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Semester III

Paper Code
18PBOTCP05

Core Course – XVI

Marks
40 + 60 = 100

Credits
03

Practical - 05

Hours/Week
06

Taxonomy of Angiosperms, Economic Botany,

Plant Biotechnology, Genetic Engineering and Nanobiotechnology

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TAXONOMY OF ANGIOSPERMS:

Study the taxonomical descriptions for all plant parts Root, Stem, Leaves, Flowers, Fruits and seeds.

Study of the morphological and floral characteristic and economic importance of Magnoliaceae, Menispermaceae, Polygalaceae, Caryophyllaceae, Oxalidaceae, Meliaceae, Rhamnaceae, Vitaceae, Sapindaceae, Combretaceae, Lythraceae, Aizoaceae, Rubiaceae, Oleaceae, Gentianaceae, Boraginaceae, Bignoniaceae, Podestemaceae, Loranthaceae, Orchidaceae, Liliaceae, Commelinaceae, Musaceae, Arecaceae, Cyperaceae, Poaceae.

Preparation of Artificial keys

Herbarium techniques, preparation and submission of 50 herbarium

Floristic studies of selected area

ECONOMIC BOTANY

To study the economic importance of Cereals, Legumes, Fruits, Spices and Condiments, Fibres, Timber and Vegetable Oil.

PLANT BIOTECHNOLOGY:

Preparation of basal media for plant tissue culture

Sterilization, inoculation and incubation of explants

Isolation of protoplasts

Isolation of nitrogen fixing bacteria from soil

Callus induction

Preparation of vermicompost/vermiwash

Study the effect of biofertilizer on different crop cultivation

Collection and preparation of table regarding different Geological Indication of India

GENETIC ENGINEERING:

Isolation of DNA from Plants

NANOBIOTECHNOLOGY:

Synthesis of silver/gold/Zinc/Titanium nanoparticles from plant extract

Study the characterization of nanoparticles with UV, FTIR, XRD, TEM, SEM, EDAX and ZETA

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Semester - IV

Core Course - Theory

- Research trends in Botany

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Department of Botany

Periyar University

Paper Code

18PBOTCT12

Semester IV

Marks

25 + 75 = 100

Core Course – XVII

Credits
04

Research Trends in Botany

Hours/Week

06

Course Outcomes:

On the successful completion of this course students will able to know recent trends in plant science and its applications.

Unit I

Plant Genomics and Proteomics – Introduction – Plant Genome - Structural genomics - genome sequencing strategies - Functional genomics – genome annotation, gene expression study using microarrays functional annotation of genes – Introduction to proteomics – Applications to plant biology – General view of proteomics – Analytical tools in proteomics – subcellular proteomics – plant with biotic and abiotic factors interaction with proteomics.

Unit II

Bioinformatics and Computational Biology – Introduction, aim and importance of bioinformatics – Database and Mining – Genomics, Transcriptomics and Metabolomics - primary and secondary databases - DNA sequence databases - Gen bank: a practical approach – Phylogenetic analysis (PHYLP, TREE) DNA databank, Nucleotide sequence databank (EMBI Bank) -Sequence alignment.

Unit III

Phytochemistry– Introduction to Phytochemicals – Antioxidants – Alkaloids – Anthocyanins – carotenoids – flavonoids – Hydroxycinnamic acids – Xanthophylls – plants with phytochemicals – Production of Phyto chemicals from medicinal plants – Extraction of phytochemicals – Developing new drugs from Ethnomedicines - Molecular docking.

Unit IV

Pharmacognosy – Introduction – history – Indian System of medicine – natural sources of Drugs – Crude drugs – Classification of crude drugs – Collection and Processing of crude drugs – Phytoconstituents of therapeutic value – Histochemical tests for phytochemicals – Drugs containing carbohydrates/glycosides/lipids/Volatile oils/Resin/Alkaloids/Tanninis – Analytical pharmacognosy – Anatomical features of selected medicinal plants (Senna leaf, Datura leaf, Cinchona bark, Nuxvomica seed).

Unit V

Biostatistics - Methods of collection and classification of data; Primary and secondary data, qualitative and quantitative data. Frequency distribution, graphical representation, normal distribution - Mean - Median and Mode - Mean deviation, Standard deviation, variance (ANOVA), standard error, co-efficient of variation - Linear regression and correlation (simple and multiple) – t-test – X^2 test – Chi-square test. Role of software in Biostatistics (SPSS)

References:

RanjithaKumari, B.D. 2008. Plant Proteomics. APH Publishers, New Delhi.

Sanaj.J. and Thelen, J.J. 2007. Plant proteomics. Springer, New York.

Agarwal, G.K. and Rakwal, R. 2008. Plant Proteomics Technologies; Strategies and Applications. John Wiley & Sons, Inc, USA.

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Agarwal, B.L. 1988. Basic Statistics. New Age International Publishers. New Delhi.

Sahu, P.K. 2013. Research Methodology: A Guide for Researchers in Agricultural Science, Social Science and other related fields. Springer, New Delhi.

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John M. Archibald, 2018. **Genomics: A Very Short Introduction** Oxford University Press.

Dhavendra Kumar, 2012. Genomics and Health in the Developing World.OUP USA.

Richard M. Twyman, 2013. Principles of Proteomics, Garland Science.

- Devarajan Thangadurai, Jeyabalan Sangeetha, 2015. Genomics and Proteomics: Principles, Technologies, and Applications, CRC Press**.**

Supratim Choudhuri, 2014. Bioinformatics for Beginners: Genes, Genomes, Molecular Evolution, Databases and Analytical Tools, Elsevier.

Michael Agostino 2012. Practical Bioinformatics, Garland Science.

Michael Heinrich, Joanne Barnes, Simon Gibbons, Elizabeth M. Williamson 2012. Fundamentals of Pharmacognosy and Phytotherapy. Elsevier Health Sciences.

Biren Shah, Avinash Seth 2012. Textbook of Pharmacognosy and Phytochemistry - E-Book. Elsevier Health Sciences.

A.N.M. Alamgir, 2017 Therapeutic Use of Medicinal Plants and Their Extracts: Volume 1: Pharmacognosy, Springer.

Simone Badal McCreath, Rupika Delgoda, 2017. Pharmacognosy: Fundamentals, Applications and Strategies, Academic Press.

Belavendra Antonisamy, Prasanna S. Premkumar, Solomon Christopher, 2017. Principles and Practice of Biostatistics Elsevier India.

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Clemens Posten, Christian Walter, 2013. Microalgal Biotechnology: Potential and Production, Walter de Gruyter.

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Elective Courses

Herbal technology

Fungal Biotechnology

Mushroom technology

Cytogenetics and Plant breeding

Biofertilizer Technology

Marine Botany

Photobiology

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Department of Botany

Periyar University

Paper Code

18PBOTE01

Elective Course - I

Marks

25 + 75 = 100

Herbal Technology

Credits
03

Hours/Week

03

Course Outcomes:

Be able to navigate the current healthcare environment, empower clients to make informed choices and refer when appropriate.

To create a comprehensive assessment of health inputs and processes.

Unit I

Historical background, Present status, Scope of Medicinal Botany – Indigenous medical system – Bioprospecting, Indigenous Knowledge system, Ayurveda, Siddha, Unani, Homeopathy, Tibetian and Folklore system of medicine. Pharmacopeia- Indian and WHO's Pharmacopoeia

Unit II

Distribution of Indian medicinal plants; Introduction, Important medicinal plants, ecodistribution, mapping distribution in different biogeographic zones. Diversity hot spots – Endemism – rare, endangered and threatened species.

Unit III

General methods of phytochemical and biological screening – Natural sources – Extraction – Purification and isolation of plant constituents – Alkaloids – Flavonoids-Phenols - glycosides – Volatile oils – Study of some herbal formulation techniques as drug cosmetics. Economic Importance of herbal Food and Medicine.

Unit IV

Post harvest technology of medicinal plants: Importance of post harvest technology in medicinal crops: factors responsible for deterioration of medicinal

produce – pre and post harvest factors. Maturity indices for harvesting medicinal plants and pre harvest treatments. Systems of storage of harvested produce – packaging principles and methods of processing. Important medicinal products – essential oils, volatile and non volatile oils, oleo resins – active principles.

Unit V

Conservation of medicinal plants – in-situ and ex-situ conservation. Centers of medicinal plant conservation in India – IBPGRI, CIMAP, CDRI, NBGRI, MSSRF, KFRI, TAMPCOL, TBGRI, TKDL and FRLHT.

References:

Natesh, S. 2001. The changing scenario of herbal drugs: Role of Botanists. Phytomorphology. (Golden Jubilee Issue)., Pp.75-97.

Jonne Bernes – Herbal Medicines, Pharmaceutical Press, London.

Sushil Kumar – Medicinal Plants in Skin care, CIMAP, Lucknow.

Swaminathan, M.S. and Kochar, S.L. 1989. Plants and Society. McMillan Publishers, London.

Muthchelian, K. 2013. Yuirvirimam. Monisha Publishers, Madurai. (Tamil Version).

Swain, T. 1963. Chemical Plant Taxonomy, Academic Press, London.

Stace, C.A. 1985. Plant Taxonomy and Biosystematics, Edward Arnold, London.

Akerele, O.O. Heywood,V. and Singe, H. 1991. Conservation of medicinal plants. Cambridge University Press, U.K.

Cutler, S.J. and Cutler, S.H.G. 2000. Biologically active natural Products – Pharmaceuticals. CRC Press, USA.

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Elective Course - II

Paper Code
18PBOTE02

Marks

25 + 75 = 100

Fungal Biotechnology

Credits
03

Hours/Week
03

Course Outcomes:

At the end of the course, students will be able to

Introduce the students to the various concepts of fermentation.

Introduce the students to the role microorganism (Fungi) play in fermentation process.

Provide the students with the skills to produce some foods and drinks resulting from either alcoholic or acidic fermentation processes.

Get aquainted with the industrial aspect of the field of Fungal Biotechnology and also learn about growth pattern of microbes in different industrial systems.

Acquire experimental know how of microbial production of various industrial products such as alcohol, antibiotics, enzymes, etc.

Develop an understanding of process control, upstream and downstrem process.

Know the differences between aerobic and anaerobic fermentation

Understand the growth of microorganism and their role in producing foods and agricultural Biotechnology

Unit-I

Fungi a inimitable kingdom – Fungal taxonomy and phylogeny – Fungal nutrition, growth and nutrition - Architecture of fungal cell – Reproduction of fungi – Pathological agents in plants, animals and man Fungi History of Biotechnology – Scope of fungi in Biotechnology.

Unit-II

Fermentation technology – Bioprocess technology – Introduction to bioreactors - Batch and Fed batch bioreactors – Continuous bioreactors – Immobilized cells – Media Design and sterilization – aseptic inoculation – Downstream processing.

Unit-III

Fungi in Medical Biotechnology - Production of antibiotics (Penicillin, Cephalosporin, Streptomycin) - Other medically useful products - Antitumour and antiviral agents from fungi - Immunoregulators - Ergot alkaloids - Fungal transformations of steroids - Biotransformations - Medical applications of fungal enzymes – Biosensors - Medicinal value of higher fungi.

Unit-IV

Industrial production of Alcohols, Ethanol (Fuel), acetone, Butanol, Methane Organic Acids, Citric acid. Production of industrial enzymes – Cellulase, Amylase - Amino acids, Polysaccharides, Lysine, Vitamins, Lactic acids, Glutamic acid.

Unit-V

Role of fungi in Agriculture and environment – Bioremediation - Fungi as agents of biodeterioration and Biodegradation – Biodegradation of lignin – Biomass – Biofertilizers

– Biopesticides from fungal sources – Recent applications of Fungal Biotechnology.

REFERENCES (FUNGAL BIOTECHNOLOGY)

Michael Shuler and FikretKargi. “Bioprocess Engineering: Basic Concepts”, 2nd

Edition, Prentice Hall, and Englewood Cliffs, NJ, 2002.

Pauline Doran. “Bioprocess engineering principles”, Academic Press, 1995.

Colin Ratledge, Bjorn Kristiansen, “Basic Biotechnology”, 2nd Edition, Cambridge

University Press, 2001.

Roger Harrison et al., “Bioseparation Science and Engineering”, Oxford University

Press, 2003.

Harrison R.G. Todd P., Rudge S.R. “Bioseparation Science and Engineering”, Oxford Press 2003.

Biochemical Engineering by S Aiba, A E Humphery and N F Millis, University of Tokyo Press

Bioprocess Engineering Basic Concepts by M.L. Shuler and F. Kargi, Prentice Hall

Bioprocess Engineering by B.K. Lydersen, K.L. Nelson, B.K. Lyderson and N. D’Elia, John Wiley and Sons Inc.

Kelvin Kavanagh, 2011. Fungi: Biology and Applications. John Wiley & Sons, London.

Biotechnology. A Textbook of Industrial Microbiology by W. Crueger and a. Crueger, Sinauer Associates.

Principles of Fermentation Technology by P.F. Stanbury and A. Whitaker, Pergamon Press

Tkaez, J.S. and Lange, L. 2004. Advances in Fungal Biotechnology for Industry, Agriculture and Medicine. Academic/ Plenum Publications, New York.

Arora, D.K. 2004. Hand book of Fungal Biotechnology. Marcel dekker Inc., USA.

Wainwright. 1992. An introduction to fungal biotechnology. John Wiley & Sons, New York.

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Department of Botany

Periyar University

Paper Code

18PBOTE03

Elective Course - III

Marks

25 + 75 = 100

Mushroom Technology

Credits
03

Hours/Week

03

Course Outcomes:

To able to produce of spawn.

To know the marketing level and self-help entrepreneurship.

Unit –I

Introduction – History – scope of edible Mushroom cultivation – Types of edible mushroom

available in India – Medicinal and other uses, Different parts of a typical mushroom & variations in mushroom morphology. Key to differentiate Edible from Poisonous mushrooms. *Calocybe indica, Volvariella volvacea, Pleurotus citrinopileatus*, *Agaricus biosporus.*

Unit – II

Pure culture – preparation of medium (PDA and Oatmeal Agar medium) Sterilization – preparation of test tube slants- mother spawn in saline bottle – cultivation of white button mushroom (*Agaricus bisporus*). Breeding conditions of mushroom strains: temperate conditions, Isolation of spawn, growth media nuclear behaviour and ultra structural changes during the development of the mushroom fungi.

Unit – III

Morphological and Microscopically identification of mushrooms. Cultivation of paddy straw mushroom (*Volvariella volvacea*) and oyster mushroom (*Pleurotus spp.*) with details of bed and spawn preparation, cultivation and harvest. Low cost mushroom farm design of production. Diseases of Mushrooms: Brown black disease, yellowing of oyster mushrooms, Bacterial soft root, fungal brown blotch, wet bubble, dry bubble, cob web, green blotch.

Unit – IV

Storage and nutrition: short-term storages, long term storages, drying, storages in salt solution, Nutrient Profile of Mushroom: Protein, aminoacids, calorific values, carbohydrates, fats, vitamins & minerals. Identification of Mushroom compounds: Antimicrobial, Flavonoids, Pharmaceutical compounds. Separation and Purification of Compounds. TLC analysis of amino acids, UV – spectrophotometric analysis of DNA and protein samples. GC & HPLC analysis.

Unit – V

Insects and pest attacking mushroom – fungal, bacterial, viral diseases. Food preparation from mushroom; soup, cutlet, omelette, somasa, pickles, curry. Cost benefit ration – marketing in India and abroad, export value. Processing and preservation of mushrooms and Economic importance of Mushroom - Pharmaceutical application and in industries.

References

Handbook of cultivation, Processing and packing, published by Engineers India

Research Institute, 4449, Nai Sarah, Main Road, Delhi 110006. Tewari, Pankaj Kapoor S.C. 1988. Mushroom cultivation. Mittal Publicatiion, New Delhi.

Nita Bhahi 1984-1988. Hand book of Mushrooms, II editioin, Vol-1 and II. Atkinson G.F. 1961. Mushroom, edible, poisonous, et., Hafner Publishers, New York.

Pandey, B. P. 1996. A textbook of fungi. Chand and Company New Delhi.

Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur.

Mushroom Production and Processing Technology, Pathak Yadav Gour (2010) Published by Agrobios (India).

Kannaiyan, S. Ramasamy, K. (1980). A hand book of edible mushroom, Today & Tomorrows Printers &Publishers, New Delhi.

Tripathi, D.P. (2005.) Mushroom Cultivation. Oxford and IBH Publishing Co. Pvt.Ltd,NewDelhi.

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Elective Course - IV

Paper Code
18PBOTE04

Marks

25 + 75 = 100

Cytogenetics and Plant breeding

Credits
03

Hours/Week
03

Course Outcomes:

The course is to provide increased practical knowledge of plant breeding theories, chromosome techniques, crop improvement and its techniques and advanced molecular breeding technologies.

Unit I

Introduction to Cytogenetics. Mitotic and meiotic cell division. Meiosis: modes of meiosis, chromosomes disjunction. Mechanism and theories of crossing over, Synaptonymal complex.

Unit II

Structural variations in chromosomes, their cytological consequences, Gene mapping and other uses, Structural hybrids, B-chromosomes its orgin and consequences. Numerical variation in chromosomes, sources and consequences, euploidy and aneuploidy, classification, natural and induced polypoids.

Unit III

Cytogenetics of wheat, Cotton, Tobacco, Triticale (Karyotyping) Incompactibility and male sterility, their types, mechanisms and applications in plant breeding.

Unit IV

Genetic diversity in plants, importance of genetic diversity in crop improvement and its erosion. Hybridization: inter and intra varietal crosses. Heterosis, Apomixis: types of apoxmies in higher plants, significance in plant breeding.

Unit V

Concepts, classification of mutation, physical and chemical mutagens, their mechanism of action , molecular of action, molecular basis of gene mutations, Role of mutations in plant breeding.

References

Text books

Ram J.Singh. 2017. Plant Cytogenetics. Third Edition. Traylor and Francis group, CRC Press.

Hank W. Bass and James A. Birchler .2012. Plant Cytogenetics, genome structure and chromosome function .Springer New York Dordrecht Heldelberg London. ISBN: 978-0-387-70868-3.

Mahabal Ram. 2010. Fundamentals of Cytogenetics and Genetics . Published by PHI Learning Private Limited , New Delhi.

Gupta P.K. 1999. Vytogenetics. Rastogi Publication Meerut.

Prasad G. 1998. Introduction to cytogenetics. Kalyani Publishers, New Delhi

Sinha U and Sinha S. 1998. Cytogenetics, Plant Breeding and Evolution . Vikas Publishing house Pvt.Ltd.New Delhi.

Swaminathan M.S., Gupta P.K and Sinha U 1974. Cytogenetics to Crop Plants . MacMillan Ltd. New Delhi.

Reference books

Khush G.S. 1973. Cytogenetics of aneuploides. Academic Press New York. USA

Burnham C.R. 1962. Discussion in Cytogenetics. Burgess Publishing Co.Minnesota.

Harti D.L and Jones E.W. 1998 Genetics: principles and analysis . 4th Edition . Jones and Barew Publishers Massachusetts. USA.

Karp G. 1999. Cell and Molecular Biology: Concepts andExperiments, John wiley and Sons inc USA.

Fikui K. and Nakayama S. 1996. Plant chromosomes: Laboratory Methods . CRC Press Boca Ration Florida.

Swanson C.P., Merz T and Young J. 1973. Cytogenetics. Prentice Hill of India Private Ltd. New Delhi.

Marks
25 + 75 = 100

Elective Course - V

Biofertilizers Technology

Credits
03

Course Outcomes:

Paper Code
18PBOTE05

Hours/Week
03

The course provides knowledge about different biofertilizers and their applications, involving microorganisms, Soil fertility, fermentation, organic farming and organic fertilizers.

Unit I

Biofertilizers – Introduction – Types of Biofertilizers – Applications of Biofertilizers - Nitrogen fixation – Nitrogen fixing microorganisms (symbiotic and asymbiotic) – Phosphate solubilising microorganisms -Fungi, Mycorrhizae (AM Fungi).

Unit II

Application and Evaluation techniques of crop response to biofertilizers – Simplified anaerobic digester for Biofertilizers – Modified anaerobic Fermenter for Biofertilizer – Operation condition for anaerobic digestion of Biofertilizers.

Unit III

Soil fertility and fertilizers – Soil Microbiology and Biofertilizers - Biogas production from organic biofertilizers – Biogas from liquid biofertilizers derived from Banana and Coffee processing

Unit IV

Vermiculture and Vermitechnology – Introduction – Advantages of vermicomposting – Earthworms – Ecological types of Earthworms – Vermicomposting and their application in organic culture – Compost making.

Unit V

Organic farming – Organic manures – Methanogenesis – Pest and disease management systems in agriculture – Biopesticides – Sustainable agriculture – Production – marketing of Biofertilzers.

References:

The Complete technology book on biofertilizers and organic farming. NIIR, New Delhi.

Somani, L.L., P. Shilpkar and D. Shilpkar. 2011. Biofertilizers commercial production technology and Quality control. Agrotech Publishers Academy, Udaipur.

The complete technology book on Vermiculture and vermicompost. NIIR, New Delhi.

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Department of Botany

Periyar University

Elective Course - VI

Paper Code
18PBOTE06

Marks

25 + 75 = 100

Marine Botany

Credits
03

Hours/Week
03

Course Outcomes:

On the successful completion of this course, the student will be able to

understand marine plants especially marine angiosperms and their physiology, biochemistry, applications and conservation strategies

Unit I

Marine plant groups and Organisms – Brief account on Marine Phytoplankton – Seaweeds, Seagrasses and Mangroves – Marine fungi, Actinomycetes, Lichens, Bacteria, Corals and Fossil Mangroves.

Unit II

Marine Ecology – Abiotic factors (Chemicals, Physical and Geological) – Biotic factors – floral and faunal components- Types of coasts and Estuaries – Impact of climate Change in marine ecosystem – Algal blooms – Red tide. Ecological significance of Algae (Seaweeds), Mangroves, Seagrasses and Corel reefs.

Unit III

Photosynthesis of algae (Micro and macro) in sea – algal plastids – Photosynthetic pigments – carbon fixation – Photosynthetic rate – C_3 and C_4 characters in algae. Photosynthesis of mangroves – carbon fixation – Photosynthetic enzymes – accumulation of free aminoacids – photorespiration – Nutrition – Salinity regulation and Metabolism of Seaweeds and Mangroves and their methods of regeneration – Biogeochemical role of algae.

Unit IV

Seaweed Polysaccharides – Commercial and economical products of Seaweed (Agar, Algin and Carrageenan) and Low molecular weight compounds in algae – Methods of collection and preservation of Marine algae – Commercial cultivation of seaweeds (Traditional and Recent methods) – Application and uses of Seaweeds - Economic importance of seaweeds.

Unit V

Seaweed, Seagrasses, Mangroves and Coral reefs research in India and World. Marine Pollution – human Impact - Conservation strategies of Marine vegetation - Use of Remote sensing techniques in mapping of marine vegetation with GIS.

References:

Laura Barsanti and Paolo Gudtier. 2006. Algae- anatomy, Biochemistry and Biotechnology. CRC Taylor and Francis, New York.

Jackson, D.F. 1972. Algae and Men. Plenum Press.

Kannupandi, T. 1998. Coral reefs of India. State of Art report. ENVIS Publication Series 2/98.

Krishnamurthy, V. 1985. Marine Plants. Seaweed Research and utilization Association, madras.

Stein, J.R. 1973. Hand book of Phycological methods. Cambridge University Press.

Swaminathan, M.S. 2003. Bioresources status in Selected Coastal Location. DBT.

Chapman, V.J. 1976. Coastal Vegetation. Pergamon press. New York.

Daves, C.J. 1985. Marine Botany Physiology and Ecology of Seaweeds.

Dawson. 1960. Marine Botany.

Naskar, Kumundrajan and Rathindranath mandal.1999. Ecology and biodiversity of Indian mangroves. Vol.I and II.

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Department of Botany

Periyar University

Elective Course - VII

Paper Code
18PBOTE07

Marks
25 + 75 = 100

Photobiology

Credits
03

Hours/Week
03

Course Outcomes:

The subject provides knowledge about photosystem of plants and their physiology and ecology. In addition, light responses in leaf morphogenesis, Energy production and their significant factors.

Unit I

What is light – Principles of photochemistry – What is photobiology – Plant photosensory biology – Plants and their light environment – the light signals – The photoreceptors – Cellular transduction chains – Whole plant responses to light – Plant populations and their ecology.

Unit II

Photosynthesis as Energy conversion – Energy conversion in chloroplast – Pigment systems of Red and BGA – Photosynthetic Electron Transport –Protection Mechanisms Against Photo-Oxidative destruction of the Photosynthetic Apparatus – Mechanism of Photophosphorylation – Biochemical process – Anoxygenic photosynthesis of phototropic bacteria.

Unit III

The leaf as photosynthetic system - Measurement of the Rate of Photosynthesis - Gross and Net Photosynthesis - Limiting Factors of Net Photosynthesis - Ability of Leaves to Adapt Photosynthetically - Temperature Dependence of Net Photosynthesis - Influence of Oxygen on Net Photosynthesis - Regulation of CO_2 Exchapge by Stomata

Unit IV

Photomorphogenesis - Action Spectra – Pigments - Phytochrome - Mode of Action of Phytochrome in Photomorphogenesis - Four Case Studies on the Effects of Phytochrome - Cooperation Between Photosensors - A Positive UV-B Effect: Synthesis of Flavone Glycosides in Cell Suspension Cultures - Photomorphogenesis of Fungi.

Unit V

Effects of Ionising Radiation - Exciting and Ionising Radiation - Types of Ionising Radiation - Process of Ionisation - Some Thoughts on the Target Theory - Effect of Ionising Radiation on Cell Components - Repair of Radiation Damage in DNA - Effect of Ionising Radiation - on Higher Level Organisation in Cells.

References

Pedro J. Aphalo, Andreas Albert, Lars Olof Björn, Andy McLeod, T. Matthew Robson and Eva Rosenqvist. 2012. Beyond the visible A handbook of best practice in plant UV photobiology. Europian Coopoartion in Science and Technology.

Hans Mohr and Peter Schopfer. 1995. Plant Physiology. Springer, UK.

Pedro J. Aphalo. 2006. Light signals and the growth and development of plants – a gentle introduction. University of Helsinki, Finland.

Mukjerjee S. and Ghosh A.K. (2009) Plant Physiology**.** New Central Book Agency; 3rd Revised edition edition.

Jain, A. K. (2003), “Textbook of Physiology”, Arichal Publishing Company. New Delhi.

Salisbury F.F. and Ross C.W. 1992. Plant Physiolgy. (IV edition) Wordsworth Publishing Company. California, USA.

Hopkins W.G. 1995. Introduction to plant physiology, John Wiley and Sons, new York, USA.

Moore T.C. 1989. Biochemistry and physiology of plant hormones, Springer Verlag. New York, USA.

Taiz L. And Zieger E. 1998. Plant physiology, Sinauer Associates Inc. and publishers, USA.

Supportive Courses

Bioremediation and Phytoremediation

Biodiversity and Forest Ecology

Horticulture and Gardening

Marine Natural Resources

Phytochemistry

Department of Botany

Periyar University

Paper Code

18PBOTS01

Supportive Course - I

Marks

25 + 75 = 100

Credits
03

Bioremediation and

Hours/Week

03

Phytoremediation

Course Outcomes:

This course provides knowledge about different bioremediation methods of water and metal contamination

Unit I

Bioremediation – In-situ and Ex-situ bioremediation – Constraints and priorities of bioremediation – evaluating bioremediation – Biodegradation – Factors affecting process of biodegradation – Methods in determining biodegradability – contaminant availability for biodegradation.

Unit II

Bioremediation of surface soils – biodegradation in soil ecosystems – types of soil treatments – bioreactors – Subsurface aerobic bioremediation – Bioremediation in fresh water and marine systems – Anoxic and anaerobic bioremediation – bioremediation of hydrocarbons, Phenols and Heterocyclic compounds.

Unit III

Biological treatment of sewage – Environmental pollution control – Bioaugmentation and Biostimulation – Biofilms in treatment of waste water – Aerobic biofilms – bioreactors for waste water treatment – reactors types and design – Waste water treatment using aquatic plants – Root zone treatment – Development of waste water biotechnology using new biocatalysts.

Unit IV

Sources of heavy metal pollution – microbial interaction with inorganic pollutants

– microbial metal resistance – microbial transformation – accumulation and concentration of metals – Biosorption – Biotechnology and heavy metal pollution – Oil field microbiology – Hydrocarbon degradation.

Unit V

Pathway construction – Biochemical background – Operon regulation – Vectors – hybrid path ways and enzymes – Non-catabolic genes for catabolic pathway construcutions. – Molecular probes – Bioluminescencec – fingerprinting – T-RLFP – PCR – Immunological techniques – Hybridization techniques – plasmid mediated Bioaugmentation.

References:

Alexander, M. 1999. Biodegradation and bioremediation. Academic Press.

Baker, K.H. and Herson, D.S. 1994. Bioremediation. Mc Graw Hill Inc, New York.

Bitton, G. 1999. Waste water Microbiology, Wiley – Liss.

Crawford, R.L. and Crawford, D.1996. Bioremediation: Principlea and Applications. Cambridge University Press, UK.

Singh, A. and Ward, O.P. 2004. Applied Bioremediation and Phytoremediation. Springer.

Wainwright, M. 1999. An introduction to Environmental Biotechnology, Kluwer Academic Publishers, Boston.

25 + 75 = 100

Supportive Course - II

Biodiversity and Forest Ecology

Credits
03

Paper Code
18PBOTS02

Hours/Week
03

Marks

Course Outcomes

The course will enable to understand the biodiversity in the environment, its structure, forest ecology and conservation.

Unit – I

Biodiversity – Introduction, Definition and concepts, types, significance of biodiversity: ecological, economical and aesthetic importance. Climate zone and biodiversity, Biodiversity in world megatrends: threats, identification, management, conservation and preservation as approaches to biodiversity.

Unit – II

Global biodiversity – major biodiversity areas of the world, biodiversity hotspots. Indian Biodiversity – Vegetation Zones, major protected areas and their importance. Forest ecosystem- distribution and types of forests, major tropical forest formations-vegetation dynamics- species richness of tropical forest- covers types. Forest soils: Physical and chemical properties, organic matter, nutrient dynamics, moisture, site index .

Unit – III

Forest environment: Effects of landform position, aspects, climate and hydrology. Strategies and adaptation of forest species; Forest development – natural regeneration: flowering and seed production, dispersal and seed predation, germination patterns, seed dormancy and seed Bank

Unit – IV

Holistic and Sustainable approach of eco-system management and conservation of biological diversity and its significance. Role of forests in protection of species regulation of climate and production of various produce. Depletion of biodiversity from forest and the world forest conservation policies. Molecular tools for developing disease resistance trees.

Unit – V

Conservation: principles, conservation strategies and legislation – Forest and Environment protection Acts, Wildlife protection Acts (1972), Indian Forest Acts, Biodiversity Act 2002 & 2004, Biosphere reserves, National parks and Wildlife Action Plan, Man and Biosphere programmes, Remote sensing application in measuring biodiversity. Forest genetic resources and gene conservation.

References

Dan Binkley and Richard F.Fisher (2013). Ecology and Management of Forest Soils. Published by John Wiley and sons limited.

Prabodh K Maiti and Paulami Maiti (2011). Biodiversity- Preception, Peril and Preservation. Published by Asoke K.Ghosh,PHI Learning Private Limited Delhi.

John M.Fryxell and Anthony R.E. Sinclair (2014). Wildlife Ecology, Conservation and Management. Published by John Wiley and sons limited

Fred Van Dyke (2008).Conservation Biology – Foundation, Concepts and Applications. Published by Springer Science and Business Media B.V. ISBN: 978-1-4020-6890-4

Biodiversity conservation in managed and protected areas Katwal/Banerjee Agrobios, India 2002.

PG Syllabus (Revised) -2018-2019 Onwards

Department of Botany

Periyar University

Paper Code

18PBOTS03

Supportive Course - III

Marks

25 + 75 = 100

Credits
03

Horticulture and Gardening

Hours/Week

03

Course Outcomes

Appreciation and conservation of wildflowers, wildlife, forests, wilderness areas, and other natural resources and cooperate with other agencies promoting these interests.

Unit – I

Importance and scope of horticulture – Divisions of horticulture – climate, soil, nutritional needs – water irrigation – plant propagation method- cutting, layering, grafting , budding, stock-scion relationship. Frame work of marketing management-concept of marketing, management and analysis of marketing.

Unit – II

Fruit crops – Induction of flowering, flower thinning fruit setting, fruit developments – cultivation of important fruit crops – Mango, lime, and Guava – Veritable crops: classification, cultivation of important vegetable crops: Tomato, Brinjal and Dolichos lablab.

Unit – III

Storage of fruits and vegetables – preservation of fruits and vegetables nursery – micro propagation – Hardening and translation – Germ palm maintenance of sweet potato. Propagation of bulb plants: Scaling, Scooping, Bulbils, Division, Cutting

Unit – IV

Principles and methods of designing a flower garden badges, sedges, fence, tress, climbers – rookeries, terrace garden lawn making and maintenance, water garden

– cultivation of water plants

Unit – V

Garden desingn- scope, objective, types of garden,features, and ornamentation, Indoor gardening – house plant, light, humidity, watering, designing Bonsai plants, watering, pruning, dwarfing. Landscaping – principles, types of park. Elements and principles of flower design.

References

Manibushan Rao. K. (1991). Text book of horticulture. McMillan publication. References

Kumar. N. (1986). Introduction to horticulture. Rajalakshmi publication

Subbha Roa, N.S,1997. Biofertilizers in Agriculture and Forestry. Inda Book House Limited.

Trivedy . P.P. 1987. Home gardening. ECA Publication. New Delhi.

Philip Kotler, Marketing Management, Millennium edition, New Delhi, Prentice Hall of India.

Bose T K and Mukerjee D 1987, Gardening in India, Oxford Book House

Manibhushan Rao 1991. Text book of Horticulture, Macmillan Publications.

PG Syllabus (Revised) -2018-2019 Onwards

Department of Botany

Periyar University

Paper Code

18PBOTS04

Supportive Course - IV

Marks

25 + 75 = 100

Credits
03

Marine Natural Resources

Hours/Week

03

Course Outcomes:

This course provides knowledge about various marine natural resources and their biochemical compounds and applications.

Unit I

A brief account on Marine Environment – Biotic and Abiotic factors of marine Ecology – Types of coasts - Marine Natural Resources – Wild Bioresources - food, feed, fodder, fire wood. Timber, medicinal products, potential genetic resources – Ornamental – Domestic Bioresources – Crops, Cereals, pulses, oil crops, horticultural crops, live stock, aquaculture and apiculture.

Unit II

Bioactive Metabolites of Marine Algae, Fungi and bacteria – Introduction – Secondary metabolites of marine algae (Macro and Micro) – Bacteria and Fungi.

Unit III

Bioactivity of Marine Organisms – Introduction – bacteria and Fungi – phytoplanktons – Seaweeds and Seagrasses – Actinomycetes – Utilization and applications of seaweeds and seagrasses in livelihood activities.

Unit IV

Biosynthesis of Bioactive metabolites of marine organisms – Introduction – problems of biosynthesis studies – Biosynthesis of metabolites of algae, BGA and macro algae.

Unit V

Bioactive marine toxins – toxins from micro algae – dinoflagellates – bacteria and macro algae – Biological, toxicological and clinical evaluation of marine natural

resources – types of screening – screening models and activity – Anticancer screening – testing methods – toxicity evaluation – uses of animals in experiment – clinical trials.

References:

Bhakuni, D.S. and Rawal, D.S. 2005. Bioactive marine natural products. Springer, New York.

Marco Colazingari, 2013. Marine Natural Resources and Technological Development: An Economic Analysis of the Wealth from the Oceans, Routledge.

Karyn Morrissey, 2018. Economics of the Marine: Modelling Natural Resources, Rowman & Littlefield International Ltd.

PG Syllabus (Revised) -2018-2019 Onwards

Department of Botany

Periyar University

Paper Code

18PBOTS05

Supportive Course - V

Marks

25 + 75 = 100

Credits
03

Phytochemistry

Hours/Week

03

Course Outcomes:

This supportive course is exposure knowledge about important chemicals of medicinal plants and their significant role in drug discovery.

Unit I

Introduction to Phytochemicals – Types – Phytoconstituents and their therapeutic value – Polysaccharides in plants - Secondary metabolites in plants - Pharmaceutical proteins in plants – Plant hormones.

Unit II

Production of phytochemicals from medicinal plants – Histochemical studies for medicinal plants - Biopharmaceuticals in plants – Extraction, Isolation and purification methods of phytochemicals – Developing new drugs from ethnomedicines – Drug industries from India.

Unit III

Traditional herbal medicine – Natural sources of drugs – Classification of Crude drugs – Quality control of the crude drugs - Standaridization and Evaluation of herbal drug formulations – Pharmacognosy of medicinal and aromatic plants.

Unit IV

Indian Traditional Medicinal plants and their phytoconstituents; *Aloe vera, Withania Somnifera, Rowolfia serpentina, Emblica officinalis, Saroca asoca, Aegle marmelos, Tinospora cordifolia, Gloriosa superba, Solanum nigrum, Catharanthus roseus,*

Tribulus terrestris, Adhatoda vasica, Gymnema sylvestre, Andrographis paniculata, Momardica charantia, Syzygium cuminii and Pterocarpus marsupium.

Unit V

Marine phytochemistry – Definition – Marine plant products and their phytochemicals – Bioactive compounds – Isolation and purification methods – Seaweed and Seagrasses phytochemicals and their pharmacognosy.

References

Evans W.C. and Trease E. 2009. Pharmacognosy. Elsevier, New York.

Jarald E.E. and Jarald S. E. 2009. Text book of Pharmacognosy and Phytochemistry. CBS Publishers & Distributors, New Delhi

Nitin Suri. 2010. Phytochemical Techniques. Oxford Book Company, Rajasthan.

Atul Roy. 2012. Herbal Drug Industry. Oxford Book Company, Rajasthan.

Roseline. A. 2011. Pharmacognosy. MJP Publishers, Chennai.

Mishra. S.R. 2010. Plant Biochemistry. Discovery Publishing House, New Delhi.