

PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR SALEM – 636011

DEGREE OF MASTER OF SCIENCE CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR M.SC. BOTANY

(SEMESTER PATTERN) (For Candidates admitted in the Colleges affiliated to Periyar University from 2017-2018 onwards)

PERIYAR UNIVERSITY

S.No.	Title	Page No.
1.	Aim	4
2.	Rules and Regulation of Course	5
3.	Course structure	8
4.	First semester papers	10
5.	Second semester papers	23
6.	Third semester papers	35
7.	Fourth semester papers	45
8.	Extra disciplinary course	55
9.	Model question paper -Theory	59
10.	Model question paper- Practical	72
11.	Model question paper -Extra disciplinary course	77

CONTENTS

M.Sc. BOTANY

REGULATIONS

AIM

- 1. Aims at providing skills in critical thinking and evaluation of information.
- 2. To install knowledge across wide areas of plant science.
- 3. Help to understand the evolution of land plants from simple ancestors.
- 4. Providing an opportunity to familiarize with life cycles and mode of Reproduction in different plant groups.
- 5. As the course includes units from related branches like Biochemistry, Biophysics, Microbiology, and Biotechnology, Bioinformatics, and Nanobiotechnology an opportunity is provided to understand the relationship between Botany and other related branches.
- 6. Appreciating the importance of Ecology of population and communities, the dynamics of Ecosystem, the Biosphere, and future of the Biosphere.
- 7. Identifying different flowering plants based on their characters.
- 8. The topics included in different units of different papers aim to enable the Students to develop technical skills and innovative approach in Botanical and Related branches.

SCOPE

- This course considers the patterns of plant diversity and the processes that generate and maintain plant diversity. It is an interdisciplinary approach in which major groups of plants are overviewed in holistic manner.
- This course also considers the Biology of plants. Different branches of Botany are given due importance us they deserve. Practical are framed with an aim to improve skills in microcopy, observation, drawing, and laboratory exercise. During field trips the students are exposed to basic ecological principles and interactions.
- Students who complete this course will have better understanding on the types and sources of plants by diversity and the role of human and non human factors in plant diversity. Students will better understanding plants and their importance in Biosphere as life sustaining components.
- Students who complete this course can pursue research. As topics from relevant course are included there is a scope for the student to have opportunity in employment in state and central governments. Also the student has a scope for self employment.

04

PERIYAR UNIVERSITY

REGULATIONS OF PG COURSE FOR BOTANY OFFERED IN THE AFFILIATED COLLEGES

1. CONDITION FOR ADMISSION

A candidate who has passed Br. V in Botany or Br. V (a) Botany Vocational -Biotechnology or any of the above degree of any other University accepted by the

syndicate as equivalent, there to subject to such condition as may be prescribed therefore shall be permitted to appear examination and qualify for M. Sc. degree in Botany at this University after a course of study of two academic years.

2. DURATION OF THE COURSE

The course for the degree of Master of Science shall consist of two academic years divided in to four semesters. Each Semester consists of 90 working days. Practical examinations will be at the end of even semesters

3. PASSING MINIMUM

Theory

University Examination (EA)	Internal Assessment (CIA)
75 Marks	25 Marks

Classification of Internal Assessment Structure

Mai	IT O			
Test	-	10 Marks		
Seminar	-	5 Marks		
Assignment	-	5 Marks		
Attendance	-	5 Marks		
Total Marks	-	25 Marks		
Passing minimum (CI	A) 5	0%	-	12 Marks
Passing minimum (EA	1) 50	%	-	38 Marks
Total Passing minimu	ım		-	50 Marks

M.Sc. BOTANY

PRACTICAL

University Examination (EA)	Internal Assessment (CIA)
60 Marks	40 Marks

Classification of Internal Assessment Structure

INIALE				
Submission	-	10 Marks		
Test	-	10 Marks		
Attendance	-	10 Marks		
Continueous assessmen	ıt			
in Practical class	-	10 Marks		
			-	
Total Marks	-	40 Marks		
			-	
Passing minimum (CIA) 509	%	-	20 Marks
Passing minimum (EA)	50%	0	-	30 Marks
Total Dessing minimum	2			50 Mortza
Total Passing minimum	.1		-	JU Marks

- 1. The candidate shall be declared to have passed the examination if the candidates secure not less than 38 marks out of 75 marks in the University examination in each theory paper and 12 marks out of 25 marks in the Internal Assessment and in total not less than 50 marks.
- 2. For the practical paper 30 marks out of 60 marks in the University examination and the record notebook taken together and 20 marks out of 40 marks in the Internal Assessment and in total 50 marks. There is no passing minimum for the record notebook. However submission of a record notebook is a must.
- 3. For the project work and viva-voce a candidate should secure 50% of the marks for pass. The candidate should compulsorily attend Viva-voce examination to secure pass in that paper.

4. CLASSIFICATION OF SUCCESSFUL CANDIDATES

- Candidates who secure not less than 60% of the aggregate marks in the whole Examination shall be declared to have passed the examination in First class.
- All other successful candidates shall be declared to have passed in the Second class. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.
- Candidates who pass all the examinations prescribed for the course in the first Instance and within a period of two academic years from the year of admission to the course only are eligible for University Ranking.

5. MAXIMUM DURATION FOR THE COMPLETION OF THE PG PROGRAMME

The maximum duration for completion of the PG Programme shall not exceed eight semesters.

6. COMMENCEMENT OF THIS REGULATION

These regulations shall take effect from the academic year 2017 18, i.e., for students who are to be admitted to the first year of the course during the academic year 2017 2018 and thereafter.

7. TRANSITORY PROVISION

Candidates who were admitted to the PG course of study before 2017 shall be permitted to appear for the examinations under these regulations for a period of three years i.e., upto and inclusive of the examinations of May 2020. Thereafter, they will be permitted to appear for the examination only under the regulation then in force.

07

M.Sc. BOTANY

COURSE OF STUDY AND SCHEME OF EXAMINATION

			Ø	University Examination			ts
S.No	Paper Code	Paper Subject Title Code		Internal (25%)	External (75%)	Total	Credit
		I SEMESTER					
1	Core - I	Biodiversity of Plants-I	6	25	75	100	5
2	Core - II	(Algae, Fungi, Lichen and Bryophytes) Biodiversity of Plants-II (Pteridophytes, Gymnosperms and Paleobotany)	6	25	75	100	5
3	Core - III	Taxonomy of Angiosperms (Taxonomy Practical	5	25	75	100	5
		Assessment and credit carried to Core Course-VIII)	3				
4	Core - IV	PRACTICAL-I (Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms and Paleobotany)	6	40	60	100	4
5	Elective I	Plant resources and utilization Total	4 30	25 140	75 360	100 500	4 23
		II SEMESTER					
6	Core - V	Microbiology and Plant Pathology	5	25	75	100	4
	Core - VI	Anatomy of Angiosperms, Plant micro -techniques and Embryology of Angiosperm	5	25	75	100	5
8	Core - VII	Cell biology, Genetics and Molecular biology	6	25	75	100	5
9	Core - VIII	PRACTICAL - II					
		(Taxonomyof Angiosperms, Microbiology and Plant Pathology)	3	40	60	100	4
10	Core IX	PRACTICAL - III (Anatomy of Angiosperms, Plant	5	40	60	100	4
		micro-techniques, Embryology of Angiosperms, Cell biology, Genetics					
11	(EDC)	Extra Disciplinary Course	4	25	75	100	2
12	Common	(Other than Botany major Subject) Human Rights	2	25	75	100	2
	гарсі	Total	30	180	420	600	26

PERIYAR UNIVERSITY

•			Ś	University Examination			ts
S.No	Paper Code	Subject Title		Internal (25%)	External (75%)	Total	Credit
		III SEMESTER					
1 2 3	Core - X Core - XI Core - XII	Plant Physiology and Biophysics Ecology and Phytogeography PRACTICAL IV (Plant physiology, Biophysics, Ecology and Phytogeography)	6 6 6	25 25 40	75 75 60	100 100 100	5 4 4
4 5	Elective II Elective III	Herbal Technology Plant Biotechnology and Genetic engineering TOTAL	6 6 30	25 25 140	75 75 360	100 100 500	4 4 21
		IV SEMESTER					
6 7 8 9 10	Core - XIII Core - XIV Core - XV Elective IV Core XVI	Biochemistry and Nanobiotechnology Bioinstrumentation, Biostatistics and Bioinformatics PRACTICAL V (Biochemistry, Nanobiotechnology, Bioinstrumentation, Biostatistics and Bioinformatics) Horticulture and Forestry Project and dissertation work Total Grand Total	6 6 6 30 120	25 25 40 25 40 155 615	75 75 60 75 60 345 1485	100 100 100 100 500 2100	4 4 4 4 20 90
		Extra disciplinary course	e				
		(Other than Botany major stu	dents)		1	
11	EDC paper-I EDC paper-II	Horticulture Herbal botany	4	25 25	75 75	100 100	4

M.Sc. BOTANY SEMESTER - I CORE I - BIODIVERSITY OF PLANTS-I (ALGAE, FUNGI, LICHENS AND BRYOPHYTES)

UNIT I : Algae

Phycology – Introduction – Definition – History and Development of Phycology. Classification of algae (Fritsch, 1945) – Phylogeny and interrelationship – Range of thallus structure- Pigmentation, Reproduction and life cycle patterns of Cyanophyceae, Chlorophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae.

UNIT II

Ecology of Algae: Freshwater algae, marine algae, soil algae, symbiotic algae, parasitic algae and toxic Algae. Economic importance of Algae, Fossil algae, Algae as pollution indicators, Algal blooms, Algicides, Culture and cultivation of fresh water and marine algae.

UNIT III Fungi

Classification of fungi (J. Alexopoulos and C.W. Mims 1979) - Cell wall composition, mode of nutrition, range of structure, reproduction and interrelationship of Oomycetes, Zygomycetes, Myxomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes. Heterothallism, Ecology of fungi (Habit and Habitat). Parasexuality in fungi. Economic importance of fungi.

UNIT IV Lichens

Classification of Lichens (Hale, 1969) – Origin and Evolution of Lichens. Occurrence and Inter-relationship of Phycobionts and Mycobionts - Structure and Reproduction in Ascolichens, Basidiolichens and Deuterolichens – Lichens as indicators of Pollution – Ecology of lichens, Economic importance of lichens.

UNIT V Bryophytes

Classification (Rothmaler, 1951) - Origin - Distribution - Structure - Reproduction and life cycle of Hepaticapsida (Marchantia, Porella, Fossombronia), Anthocerotopsida (Anthoceros, Notothylus) and Bryopsida (Sphagnum, Polytrichum). Evolution of gametophytes and sporophytes. Economic importance of bryophytes. Bryophytes as indicators of Pollution.

ALGAE

TEX T BOOKS

- 1. Kumar, H.D and Singh, H.N. (1982). A text book of Algae. Affiliated East West Press, New Delhi.
- 2. Kumar, H.D. (1985). Introductory Phycology East West Press, New Delhi.
- 3. Sharma, O.P. (2011). Diversity of microbes & Cryptogams Algae, Tata McGraw Hill Education Private Limited, New Delhi.

REFERENCE BOOKS

- 1. Bold, H.C. and Wyne M.J. (1978). Introduction to algae Structure & reproduction. Prentice hall, New Jersey
- 2. Chapman, V.J and Chapman. (1973). The algae ELBS & MacMillan, London.
- 3. Fritsch, F.E. (1935).The Structure & Reproduction of The Algae (Vol1&2) Cambridge University press, England.
- 4. Ian Morris (1967). An Introduction to the Algae. Hutchinson University Library, London.
- 5. Lee, R. E. (2008). Phycology IV Edition, Cambridge University Press, New Delhi.
- 6. Round, F.E. (1982). The Ecology of algae, Cambridge University press, London
- 7. Venkataraman, G.S. et al., (1974). Algae form and Function Today and Tomorrow Publishers, New Delhi.

FUNGI

TEXT BOOKS

- 1. Alexopoulus, C.J. Mims, CW. (1979). Introductory Mycology, Wiley Eastern Ltd., New Delhi
- Dube, H.C (1983). Introduction of Modern Mycology. Blackwell Science Publication. Oxford
- 3. Dube, H.C. (1990). An Introduction of Fungi. Vikas Publication House Ltd, New Delhi.
- 4. Sharma, O.P. (2011). Fungi and allied microbes. The McGraw-Hill companies, New Delhi.
- 5. Sharma, P.D. (2003). The Fungi. Rastogi Publications, Meerut.

- 1. Bessey, E.A (1979). Morphology and Taxonomy of fungi, Vikas publishing House Pvt. Ltd, New Delhi.
- 2. Burnett, J.H. (1971). The fundamentals of Mycology. ELBS Publication, London.
- 3. Mehrotra, R. S. and Aneja K.R. (1990). An Introduction to Mycology, New Age International Pub, New Delhi.
- 4. Sundararajan, S. (2004). Practical manual of fungi, Anmol publications Pvt. Ltd. New Delhi.

LICHENS

REFERENCE BOOKS

- 1. Dharani Dhar Awasthi. (2000). A Handbook of Lichens. Vedams eBooks (P) Ltd. New Delhi.
- 2. Hale, M.E. (1983). The Biology of Lichens. Edward Arnold, London.
- 3. Hale, M.E. (1983). Biology of Lichens. Edward Arnold, Maryland.
- 4. Muthukumar, S. and Tarar, J.L. (2006). Lichen Flora of Central India, Eastern book Corporation, New Delhi.
- 5. Nash, T.H. (1996). Lichen Biology. Cambridge University Press, London.

BRYOPHYTES

TEXT BOOKS

- 1. Chopra.R.N., 1998.Biology of Bryophytes. New Age International Pvt. Ltd., New Delhi.
- 2. Gangulee, H.C. and Kar. A.K. 1989. College Botany. Vol. II. New Central Book Agencies Ltd., Kolkata.
- 3. Parihar, N.S. 1967. An Introduction to Embryophyta Vol: I Central Book Depot, Allahabad.
- 4. Puri, P. 1970. Bryophytes- A broad perspective, Atma Ram & Sons, New Delhi.
- 5. Reddy, S.M. 1996. University Botany. I: Algae, Bryophyta and Pteridophyta. New Age International Publishers, New Delhi.
- 6. Singh, S.K. 2006. Text Book of Bryophyta, Campus Books, New Delhi.
- 7. Vashishta, B.R., Sinha, A.K. and Kumar, A. 2005. Botany for degree Students, Bryophyta. S.Chand and Co. Ltd, New Delhi.

REFERENCE BOOKS

- 1. Alain Vanderpoorten and Bernard Griffin.(2009). Introduction to Bryophytes. Cambridge University Press. London.
- Foster, A.S. and Gifford, E.M. (1973). Comparative Morphology of Vascular Plants. W.H. Freeman and Co.
- 3. Frank Cavers. (1981). The Inter Relationship of the Bryophyta, S.R.Technico Book house.
- 4. Prempuri, (1986). Bryophytes: Morphology, Growth and Differentiation. Atma Ram and Sons.
- 5. Tuba, Z. Nancy, G. Slack and Lloyd, R. Stark. (2011). Cambridge University Press. New York.
- 6. Watson, E.V. (1971). The Structure and Life of Bryophytes. B.I. Publications, New Delhi.

12

M.Sc. BOTANY SEMESTER - I CORE II - BIODIVERSITY OF PLANTS- II

(PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

UNIT I

Pteridophytes – Introduction – Vascular cryptogams – General features and origin of Pteridophytes, Habit and Habitat of Pteridophytes – Lifecycles – Evolution of Sporophyte and gametophytes-Classification of Pteridophytes (Sporne, K.R. 1956) – Economic Importance of Pteridophytes.

UNIT II

Range of Morphology, structure, Reproduction and Evolution of gametophytes and sporophytes of following families Isoetaceae, Equisetaceae, Ophioglossaceae, Osmundaceae, Gleicheniaceae, Pteridaceae, and Azollaceae. Stelar evolution and sorus evolution of Pteridophytes. Telome theory - Heterospory and origin of Seed habit.

Apogamy and Apospory. Alternation of generation – Affinities of various classes of Pteridophytes.

UNIT III

Classification of Gymnosperms (Sporne, K.R. 1956). Comparative study of vegetative, anatomical and reproductive characteristics of major families Araucariaceae, Podocarpaceae, Cupressaceae and Cycadaceae.

UNIT IV

Comparative study of vegetative, anatomy and reproductive structure of Ginkgoales and Gnetales. Economic importance of Gymnosperms. Living fossils - Affinities of

Gymnosperms with Angiosperms and Pteridophytes.

UNIT V

Geological time scale – fossilization and Fossil types: Compressions, incrustation, casts, molds, petrifactions, coal balls and compactions, carbon dating –Role of fossil in oil exploration -Fossil Bryophytes - Fossil Pteridophytes - *Rhynia, Sphenophyllum, Lepidocarpon, Cladoxylon, Pentoxylon, Botryopteris - Fossil Gynmosperms-Lyginopteris - Lagenostoma - Cordaites.*

PTERIDOPHYTES

TEXT BOOKS

- 1. Johri, R.M. Snehlata and Sandhya Sharma, (2004). A Textbook of Pteridophyta. Vedams Books (P) Ltd., New Delhi
- 2. Rasheed, A. (1999). An Introduction to Pteridophyta, Vikas Publishing Co., NewDelhi.
- 3. Sharma, O.P. (1990). Textbook of Pteridophyta, MacMillan India Ltd., New Delhi.
- 4. Smith,G.M (1955). Cryptogamic Botany Vol. II, Tata Mcgraw Hill Publishing Co., Ltd., New Delhi.
- 5. Vashishta , P.C , Sinha and Anilkumar (2010). Pteridophytes, S.Chand & Company Ltd, New Delhi.
- 6. Vashishta.P.C.(1990). Pteridophyta, S.Chand& Co. Ltd, New Delhi.

REFERENCE BOOKS

- 1. Bower. F. O (1939). The Ferns (Vol. I,II&III), Today & tomorrow's Printers, New Delhi.
- Eames, A.J.(1936). Morphology of Vascular Plants Lower groups, Tata Mcgraw Hill Publishing company Ltd., New Delhi.
- 3. Sporne, K.R. (1970). The morphology of Pteridophytes (The structure of Ferns and Allied Plants) Hutchinson University, London.
- 4. Sporne, K.R. (1972). The Morphology of Pteridophytes, B.I. Publications, Madras.

GYMNOSPERMS

TEXT BOOKS

- 1. Bhatnagar and Moitra, (1996). Gymnosperms. New age International Publishers, New Delhi.
- 2. Biswas, C. and Johri, B.M. (2004). The Gymnosperms. Narosa Publishing House, New Delhi.
- 3. Johri , RM, Lata S , Tyagi K (2005). A text book of Gymnosperms, Dominate pub and Distributer, New Delhi.
- 4. Sharma, O.P. (1997). Gymnosperms, Pragati Prakashan, Meerut, India.
- 5. Vashista P.C. (1990). Gymnosperms, S. Chand & Co. Ltd., New Delhi.

REFERENCE BOOKS

- 1. Bierhost, D.W. (1971). Morphology of Vascular plants. McMillan Company, New York.
- 2. Chamberlain, C.J. (1934). Gymnosperms: Structure and Evolution. Chicago Reprinted (1950) New York.
- 3. Delveloryas, T. (1962). Morphology and evolution of fossil plants.
- 4. Doyle, W.T. (1970). Non Vascular Plants: Form and function. Belmont, California.
- 5. Foster and Gifford, Jr., (1962). Comparative Morphology of Vascular Plants. Allied Pacific Pvt. Ltd., Bombay.

PALEOBOTANY

- 1. Arnold C.A. 1972. An introduction to Paleobotany. New York, McGraw-Hill Publishers.
- 2. Arora M.P. (1990). Evolutionary biology, Himalaya Publication House, Delhi.
- 3. Atchlay W.R. & Woodnuff D.S. (1981).Evolution and speciation, Cambridge University Press, Cambridge.
- 4. Kimura, M. (1983). The natural theory of molecular evolution, Cambridge University Press, Cambridge.

M.Sc. BOTANY SEMESTER - I

CORE III - TAXONOMY OF ANGIOSPERMS

(Tazonomy Practical Assessment and Credit carried to Core Course VIII)

UNIT I

Taxonomy and its importance. Systems of Classification: Linnaeus, Bentham and Hooker, Takhtajan, Bessy dicta, APG I, II,III systems –Merits and demerits. International code of Botanical Nomenclature, Botanical Gardens and Botanical survey of India

UNIT II

Taxonomy in relation to Anatomy, Embryology, Palynology, Ecology, Palaeobotany, Cytology, Phytochemistry. Chemotaxonomy and Numerical Taxonomy.

UNIT III

Biosystematics - Aim and scope. Phenotypic Plasticity. Turreson's work. Modern trends in Taxonomy- Computerized Systematics- collecting data, converting and documenting characters of plants in computers - Molecular taxonomy- DNA Fingerprinting and Barcoding in plants.

UNIT IV

A detailed study of vegetative, floral features and economic importance of Magnoliaceae, Menispermaceae, Polygalaceae, Meliaceae, Sapindaceae, Rosaceae, Combretaceae, Lythraceae, Onagraceae, Rubiaceae and Sapotaceae.

UNIT V

Oleaceae, Gentianaceae, Boraginaceae, Bignoniaceae, Pedaliaceae, Nyctaginaceae, Aristolochiaceae, Casuarinaceae, Commelinaceae, Cyperaceae and Orchidaceae.

TEXT BOOKS

- 1. Bennet, S.S.R. (1989). An Introduction to Plant Nomenclature. International Book Distribution, India.
- 2. Heslop J. Herrison, (1970). New Concepts in Flowering Plants Taxonomy. Heinemann Educational Books, India, Revised Edition.
- 3. Heywood VH. (1967). Plant Taxonomy, Edward Arnold, London.
- 4. Jeffery C. (1982). An introduction to Plant Taxonomy, J& A Churchill Ltd., London
- Lawrence, GHM. (1995). The Taxonomy of Vascular Plants (Vol I-IV) ,Central Book, Dept., Allahabad
- 6. Mathew, K.M. (1983). The Flora of Tamil Nadu Carnatic, The Rapinat Herbarium, Trichy.
- 7. Pandey, B.P. (1997). Taxonomy of Angiosperms, S.Chand & Co., New Delhi.
- 8. Pandey, S.N. and Misra, SP. (2008). Taxonomy of Angiosperms, Ane Books India, New Delhi.
- 9. Rendle A.R. (1979). A Classification of Flowering Plants. Vol. I and II., Cambridge University Press.
- Sambamurty AVSS. (2005). Taxonomy of Angiosperms, I.K. International Pvt. Ltd., New Delhi.
- 11. Saxena NB. and Shamindra Saxena (2001). Plant Taxonomy, K.K. Mittal for Pragati Prakasham, Meerut.
- 12. Sharma OP. (2009). Plant Taxonomy-Tata McGraw-Hill Education Private Limited, New Delhi.
- 13. Singh, V. & Jain, K.K. (1989). Taxonomy of Angiosperms Rastogi, Meerut
- 14. Sivaraajan, V.V. (1989). Introduction to Principles of Plant Taxonomy, Oxford and IBH, New Delhi.
- 15. Sokal S.R. and Sneath P.H. (1977). Principles of Numerical Taxonomy, N.H. Freemen & Co.
- 16. Solbig. (1985). Principles and methods of Plant Biosystematics, The MacMillan Company, Delhi.
- 17. Stace Clive A. (1989). Plant Taxonomy and Biosystematics, Edward Arnold, London, Second Edition.
- 18. Vashista, P.C. (1990). Taxonomy of Angiosperms S.Chand & Co., New Delhi.

- 1. Davis, P.H and Heywood, V.M. (1965). Principles of Angiosperm Taxonomy, Oliver and Boyd Edinburgh.
- Gamble, J.S, Fisher, L.E.F. (1967). The Flora of The Presidency of Madras (Vol-III) BSI, Calcutta
- 3. Hutchinson, J. (1973). The Families of Flowering plants, Oxford University press, London
- Kress J.W, Wurdack, K.J., E.A C., Zimmer, L.A. Weigt and Janzen D.H. (2005). Use of DNA bar codes to identify flowering plants. Proc. Natl. Acad. Sci. USA 102, 8369-8374.
- 5. Simpson M.G.(2006). Plant systematics, Elsevier Academic Press, USA
- 6. Stoeckle, M.(2003).Taxonomy, DNA and the barcode of life.Bioscience 53: 796-797.
- 7. Takhtajan, A.L. (1969). Flowering Plants Origin and dispersal Oliver & Boyd
- 8. Takhytajan A.L. (1991). Evolutionary trends in flowering plants, Bishen Singh Mahendra Pal Singh, Dehra Dun.

PERIYAR UNIVERSITY

M.Sc. BOTANY SEMESTER - I CORE IV

PRACTICAL-I

(COVERING THE CORE COURSES I & II) (ALGAE, FUNGI, LICHENS, BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

Study of the Morphology and Anatomy of the vegetative and Reproductive parts of the following:

I. Algae

- a) Cyanobacteria : Gloeocapsa, Spirulina , Nostoc , Scytonema
- b) Chlorophyeace : Dunanella, Pandorina ,Cladophora, Spirogyra, Codium, Caulerpa, Nitella,Coleochiaete
- c) Bacillriophyeace : Cyclotella and Navicula (Diatoms)
- d) Phaeophyecea : Padina , Turbinaria, Sargassum
- e) Rhodophyceae : Batrchospermum, Gracillaria

II. Fungi

- a) Oomycetes : Saprolegenia
- b) Zygomycetes : Pilobolus , Rhizopus, Mucor
- c) Myxomycetes : Plasmodiophora
- d) Ascomycetes : Neuropspora, Tapharina, Penicillium
- e) Basdiomycetes: Pleuerotus , Lycoperdon
- f) Duteromycetes : Cercospora ,Fusarium ,Colleterotrchum

III. Lichens

Usnea, Parmelia

VI. Bryophytes

- a) Hepaticapsida: Marchantia, Porella, Fossombronia
- b) Anthocerotopsida: Anthoceros, Notothylus
- c) Bryopsida: Sphagnum, Polytrichum

VII. Pteridophytes

- a) Isoetaceae : Isoetes
- b) Equisetaceae : Equisetum
- c) Ophioglossales : Ophioglossum
- d) Osmundaceae : Osmunda
- e) Gleicheniaceae : Gleichenia (Dicrynopteris)
- f) Pteridaceae : Pteris
- g) Azollaceae: Azolla

V. Gymnosperms

- a) Araucariaceae: Araucaria
- b) Podocarpaceae: Podocarpus
- c) Cupressaceae: Cupressus
- d Cycadaceae: Cycas

VI. Fossil

- a) Pteridophytes- Rhynia, Sphenophyllum, Lepidocarpon, Cladoxylon, Pentoxylon, Botryopteris
- b) Gymnosperms Lyginopteris, Lagenostoma, Cordaites

Note

Submission of 20 herbarium sheets from Algae /Fungi /Lichens /Bryophytes/ Pterdiophytes / Gymnosperms

Field trip to hill stations and Coastal area for a minimum period of Five days for the Collection of herbarium specimens and to observe and study the lower plants in their Natural habitat.

Certified record work done in the laboratory during practical classes

* Practical examination at the end of Second semester

M.Sc. BOTANY SEMESTER - I ELECTIVE I - PLANT RESOURCES AND UTILIZATION

UNIT I

Plant Biodiversity: concepts and status in India - World centers of primary diversity of domesticated plants – Plant introduction and secondary centers - Useful aspects of lower plants: Algae, Fungi and Lichens.

UNIT II

Binomial, Cultivation and uses of food crops: cereals (Rice, wheat and Ragi); Pulses [Gram and Black gram]; Vegetables - [Cabbage, Beetroot]; Fodder crops [Natural grass and cultivated fodder]. Fiber and fiber plants: Nature of fibers. Binomial and uses of Cotton and Jute.

UNIT III

Medicinal plants: Classification of drugs, drugs from various parts of plants -chemical constituents- therapeutic uses. Binomial, cultivation, medicinal properties and uses of: *Centella asiatica*, *Piper nigrum*, *Curcuma*, *Asafoetida*, *Adathoda vasica*, *Solanum nigrum*, *Piper betel*, *Phyllanthus emblica*, *Aegle marmelos*, *Trigonella foenumgraceum*, and *Catharanthus roseus*

UNIT IV

A Brief account of the following drugs Drugs containing carbohydrates- *Isapgol.* Drugs containing tannins- *Myrobalan.* Drugs containing lipids- *Arachi*s oil. Drugs containing resin and resin combination-*Cannabis* Drugs containing alkaloids- *Cinchona.*

UNIT V

Vegetable oil yielding plants: Classification of vegetable oils - chemical constituents, nature of vegetable oils. Binomial classification and uses of palm oil, sunflower oil, Vegetable fat - *Cocos nucifera*. Forest resources: Wood - its importance and structure - types, properties, uses. A brief account of bio - diesel plants. Paper industry - raw materials, manufacturing process. Gums, tannins, dyes, resin yielding plants and their uses.

TEXT BOOKS

- 1. Sambamurthy, A.V.S.S. and Subramanyam, N.S. (2010). A Text Book of Economic Botany, Wiley Eastern Limited, New Delhi.
- 2. Sharma, O.P. (2009) .Economic Botany. Tata McGraw Hill Co. Ltd., New Delhi.
- 3. Youngken. Natural Drugs: Morphological and Taxonornic Consideration. Tirumalai Book House, Triplicane, Chennai.

- 1. Agarwal, (1985). Drug Plants in India. Kalyani Publishers. Ludhiana.
- 2. Anonymous. (1980). Forest Research Institute. Indian Forest Utilization, Vols. I&II. The Manager of publications, Government of India Press. New Delhi.
- 3. Council of Scientific and Industrial Research, (1986). The Useful Plants of India.
- 4. Frankel, D.H. and Benneth, E. (1970). Genetic Resources in Plants: The Exploitation.
- 5. Gupta, P.K. (1996). Transgenic Plants: Some Current issues. Current. Sci. 70:
- 6. Kumar, U. (2004). Biodiversity: Principles and Conservation, Agrobios. Jodhpur.
- 7. Maiti and Singh. (2006) .Modern Economic botany, Agrobios (india), Jodhpur.
- 8. Mohamed Ali (2008). Pharmacognosy (Vol1&II). B.S. Pub. & Distributer Pvt. Ltd, New Delhi.
- 9. Resources (Booklet). National Bureau of plant Genetic Resources. New Delhi.
- 10. Shani, K.C. (2000). The Book of Indian Trees. Oxford University Press, Mumbai.
- 11. Trivedi, P.C. (2005). Biodiversity Assessment and Conservation, Agrobios, Jodhpur.
- 12. Tyagi, B.K. (2009). Biodiversity and conservation of medicinal plants, Swashik Pub. New Delhi

M.Sc. BOTANY SEMESTER - II CORE V - MICROBIOLOGY AND PLANT PATHOLOGY

UNIT I

General microbiology

History, Scope and branches of microbiology-Microbial stains- staining methodssimple, differential and special stains and confirmatory test, Growth Curve, Sterilization techniques -Establishment of pure culture, Culture media - (Chemical, complex and special media), Decimal dilution techniques. Synchronous, Batch and continuous culture, chemostate and turbidostate – preservation of microbes.

UNIT II

Microorganism – sources and types - air and water- source and types. Water and air sample techniques. Food spoilage.

Microbes of milk and milk products. Viruses – general characters, structure, plant viruses- types. Bacteriophage, Cyanophage, Mycophages and Mycoplasma. Viroids and Interferons. Biopesticide - *Pseudomonas putida, Bacillus thuringiensis,* viral insecticides, fungal insecticides – *Trichoderma* sp., *Gliocladium virens*

UNIT III

Waste as a resource; organic compost – factor affecting composting – Sewage treatment –microbial leaching – biodegradation: biodegradation of petroleum, Xenobiotics; biosorption of heavy metal – biofiltration – bio deterioration of leather, paper, metal, plastics, safe practices. Agricultural microbiology - Biofertilizer - mass cultivation of *Rhizobium, Azotobacter* production of mycorrhizal bio fertilizer - phosphate solublizing bacteria.

UNIT IV

Plant pathology

Introduction to plant pathology – disease – concept, component and causes – classification of disease, brief account on general symptoms of Plant disease – modes of Infection and dissemination – defense mechanisms in plants – phytoalexin – pathogen related protein, Systemic Acquired Resistance (SAR)- Plant diseases forecasting – Plant disease management – plant quarantine, chemical, cultural and biological control.

M.Sc. BOTANY

UNIT V

Study of the disease symptoms, causal organism, and transmission and control Measures of the following plant diseases.

- 1. Damping off of Pythium.
- 2. Little leaf of Brinjal (Mycoplasma).
- 3. Bacterial Blight of Paddy.
- 4. Bunchy top of Banana (Virus).
- 5. Citrus canker (Bacteria).
- 6. Blight of potato (Early Late blight).
- 7. Tobacco mosaic disease (TMV).

TEXT BOOKS

- 1. Bilgrami, K.S. &H.C. Dube (2010) A text book of Modern Plant Pathology Vikas Publishing House (P) Ltd., New Delhi
- 2. Dubey RC, Maheswari DK (2014). A text book of Microbiology, S.Chand & company, New Delhi.
- 3. Freifelder, D. (1990). Microbial genetics. Narosa Publishing House, New Delhi
- 4. Powar, C.B. and Dagniwala, H.F. (2008). General Microbiology. Himalaya Publishing House, Bombay.
- 5. Sharma, P.D. (2012). Microbiology Rastogi & Co, Meerut

- 1. Agrawal, A.K, Parihar, P. (2006). Industrial microbiology, Student Edition, Jodhpur.
- 2. Alexander, (1978). Introduction to soil Microbiology, Wiley Eastern Private Ltd., New Delhi.
- 3. Carpenter, P.L. (1977). Microbiology, W.B. Saunders Co., London.
- 4. Darglos, J. (1975). Bacteriophages. Chapman & Hall Ltd., London.
- 5. Gardner E.J, Simmons M.J, Snustad D.P.(2010) Principle of Genetics (VIII Edition), WSE India Pvt. Ltd, New Delhi.
- 6. Ganisms and Plant growth. Oxford &IBH Publishing Co. Pvt. Ltd., New Delhi.

- 6. Gunasekaran, P. (1995).laboratory manual in Microbiology, New age (P) Ltd Publisher.
- 7. Ketchum, Paul, A. (1988). Microbiology: Concepts and application, John Wiley and Sons, New York
- 8. Mandahar, C.L. (1978). An Introduction to Plant Viruses. S. Chand & Co., New Delhi.
- 9. Mehrotra R.S. and Ashoka Agarwal. (2010). Plant Pathology. TATA McGraw-Hill Publishing Co., Ltd., New Delhi.
- 10. Pelezar Jr. M.J., Chan, E.C.S. and Krieg, N.R. (2014). Microbiology. TATA McGraw-Hill publishing Co., Ltd., New Delhi.
- 11. Prescott, Harley and Klein' S. (2008). Microbiology 7th edition, McGraw hill International Edition, New York.
- 12. Rangasami, G. (1972). Diseases of Crop Plants in India. Prentice Hall India (Pvt.) Ltd., New Delhi.
- 13. Singh, R.S. (1980). Plant Diseases. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

14. SubbaRao, N.S. (1977). Soil Microor

M.Sc. BOTANY SEMESTER - II

CORE VI - ANATOMY OF ANGIOSPERMS, PLANT MICRO TECHNIQUES AND EMBRYOLOGY OF ANGIOSPERMS

UNIT I

Meristems – Types (shoot and root). Procambium-Cambium, Vascular cambium origin, types, structure and etiology. season activity, role in wound healing and grafting. Complex tissues-Secondary xylem - ontogeny, structure and function - wood - diffuse and porous - Sap and heart wood - compression and tension wood-

Arrangement of vessels in secondary.

Xylem, Growth rings. Secondary phloem - structure and function and ontogeny. periderm formation-lenticels.

UNIT II

Anomalous secondary thickening in dicot and monocot stems. *Aristolochia*, *Boerhaavia*, *Bignonia*, *Achyranthes*, *Nyctanthes* and *Dracaena*. Secondary structure and vascular differentiation of root, Shoot and root transition – Ontogeny of Dorsiventral and Isobilateral leaf. Nodal anatomy-uni, tri and multilacunar nodes.

UNIT III

Plant Microtechnique

Light microscopy –optical principle, resolution, magnification, aberration. Phase contrast microscopy – Dark field illumination. Electron microscope (TEM&SEM) – Principle and preparation techniques. Special techniques– Maceration, Squashes, Smears, Whole mount and clearing techniques.

UNIT V

Micro techniques –Fixation and fixatives, dehydration, clearing, infiltration, embedding, block making and sectioning. Microtome – Types –Principles and operating mechanisms, Stains and Staining techniques, Camera Lucida – Types, Principles and their uses. Micrometry.

UNIT V

Embryology

Anther – Development and morphology. Tapetum – types and functions. Male gametophyte development, Female gametophyte – types – ultra structure – development – Synergids, Nutrition of embryosac – Fertilization and double fertilization. Sexual incompatibility– genetics basis, barrier to fertilization, physiology and Biochemistry of Incompatibility. Endosperm – types and development – endosperm haustoria – Development of Monocot and Dicot embryo - Polyembryony, Apomixis and Parthenocarpy. Plant diseases forecasting – Plant disease management – plant quarantine, chemical, cultural and biological control.

ANATOMY

TEX T BOOKS

- 1. Eames, A.J., and Daniel, M.C. (1976). An Introduction to Plant Anatomy, TATA McGraw-Hill Publishing House Ltd.
- 2. Pandey, B.P. (1978). Plant Anatomy, S. Chand & Co., New Delhi.
- 3. Pijushroy, (2010). Plant Anatomy, New central Book Agency, Pvt Lit, New Delhi.
- Singh, V. Pande, P.C. & Jain D.K. (1987) Anatomy of seed plants Rastogi Publications, Meerut.

REFERENCE BOOKS

- 1. Cutter, E.G. (1970). Plant Anatomy: Experimental and Interpretation. Edward Arnold Pub. Ltd., London.
- 2. Cutter, E.G. (1971). Plant Anatomy, Edward Arnold Pub. Ltd., London.
- 3. Cutter, E.G. (1978). Plant Anatomy, Experimental and Interpretation. Edward Arnold Pub. Ltd., London
- 4. Esau, K. (1960). Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.
- 5. Esau, K. (1977). Anatomy of seed plants. Wiley Eastern Publication, New Delhi.
- 6. Fahn, A. (1989). Plant Anatomy. Macmillan Publication (P) Ltd, Singapore.

EMBRYOLOGY

TEXT BOOKS

- 1. Bhojwani, S.S. and Bhatnagar, S.P. (1981). The Embryology of Angiosperms. Vikas, Publishing House Pvt. Ltd., New Delhi.
- 2. Maheswari, P. (1976). An introduction to the Embryology of Angiosperms. TATA McGraw-Hill Publishing Co., Ltd., New Delhi.

- 1. Bessey, E.A (1979). Morphology and Taxonomy of fungi, Vikas publishing House
- 1. Austin, (1968). Fertilization. Prentice Hall of India, New Delhi.
- 2. Davis, G.L. (1966). Systematic Embryology of the Angiosperms.
- 3. Dwivedi, J.N. (1988). Embryology of Angiosperms. Rastogi & Co., Meerut.
- 4. Johri, B.M. (1984). Experimental Embryology of Vascular plants
- 5. Rahavan, V. (1976). Experimental Embryogenesis in Vascular plants, Academic Press, London
- 6. Shivanna, K.R. and B.M. Johri. (1985). The Angiosperm pollen structure and functions. Wiley-Eastern Ltd.
- Sporne, K.R. (1972). The Evolution of pollen types in Dicotyledons. New Phytol.71: 181-185

MICROTECHNIQUES

TEX T BOOKS

- 1. Marimuthu R. (2011) Microscopy and Microtechnique. MJP publishers Chennai.
- 2. Patki L.R, Bhalchandra B.L, Jeevaji I.H. (1987). An introduction to Microtechnique, S.Chand and company (Pvt) Ltd, New Delhi.

- 1. Johansen, D.A. (1940). Plant Microtechnique, TATA McGraw Hill Book Co., Ins., New Delhi.
- 2. Peter Gray, (1964). Hand book of Basic Microtechnique. McGraw hill publication, New York
- 3. Steven Ruzin, (2005). Plant Microtechnique and Microscopy. Oxford university press, London

M.Sc. BOTANY SEMESTER - II CORE VII - CELLBIOLOGY, GENETICS AND MOLECULAR BIOLOGY

UNIT I:

Cell biology

Cell structure, organization of prokaryotic and eukaryotic cell. Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, structure and function of cytoskeleton and its role in motility.

UNIT II

Nucleosome organization, chromosome Structure in prokaryotes and eukaryotes, Structure of model membrane, lipid bilayer and membrane protein diffusion, osmosis, ion channels, active transport, electrical properties of membranes. Cell division and cell cycle: Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control.

UNIT III

Genetic

Mendelian principles-Dominance, Segregation and independent assortment, Genetic interaction- Complementary genes, Epistasis, Lethal genes, Multiple factor hypothesis. Linkage and crossing over – kinds of linkage, significance of linkage. Types of crossing over mechanism, models for homologous recombination. Construction of genetic map. Two point test cross, three point test cross.

UNIT IV

Sex Determination and differentiation - Types, mechanism and significance. Sex linked inheritance Population genetics- Hardy- Weinberg Law.

Cytogenetics: Mutation- types, spontaneous, induced mutation. Numerical changes in chromosomes- Euploidy, polyploidy. Structural changes in chromosomes-deletion, Duplication, Inversion and Translation.

UNIT V

Molecular Biology: The central dogma and structure of DNA & RNA; DNA Replication- mechanism, models of replication. Transcription: in prokaryotes and

Eukaryotes, post transcriptional modification, genetic code, Translation – synthesis and processing of protein. post- translational modification. Organization of gene-

regulation of gene, Operon concept, regulation of gene expression in prokaryotes -Lactose, Tryptophan, gene expression in eukaryotes. Heat shock proteins.

TEXT BOOKS

- 1. Ajoy Paul, (2009). Text book of Cell and molecular biology, Books and Allied (p) Ltd Kolkata.
- 2. David Freifelder, (1985). Essentials of Molecular Biology. Narosa Publishing House, New Delhi.
- 3. Freifielder, D. (1995). Microbial Genetics. Narosa Publication, New Delhi.
- 4. Gupta, P.K (2009). Genetics, Rastogi publications, Meerut, New Delhi.
- 5. Kumar, H.D. (1999). Molecular Biology. Vikas Publishing House Pvt. Ltd. New Delhi.
- 6. Satyesh Chandra Roy and Kalyan Kumar De. (1999). Cell Biology. New Central Book Agency (P) Ltd. Calcutta.
- 7. Verma P.S. and Agarwal V.K. (2007) cell biology, Genetics, molecular biology and evolution, S.Chand and company Ltd, New Delhi.
- 8. Verma P.S. and Agarwal V.K. (2010) Genetics, S.Chand and Company Ltd, New Delhi.

- 1. De Robertis and De Robertis, (1998). Cell and Molecular Biology. B.I. Waverly Pvt. Ltd. New Delhi.
- 2. Geoffrey M. Cooper. (1997). The Cell A Molecular approach. ASM Press, Washington.
- 3. Grierson, D. and Covey, S.N. (1984). Plant Molecular Biology. Blackie and sons, London.
- 4. Karp.G. (2008) Cell and Molecular Biology. 5th Edn. John Wiley & sons, London.
- 5. Lewin (2007). Gene IX. Jones and Barlett Pub. ISBN. O 7637 5222 3
- 6. Lodish, et al. (2000). Molecular and Cell Biology. W.H. Freeman & Co. New York.
- 7. Strickberger, M.W. (2010). Genetics (3rd edition) PHI Learning Pvt. Ltd
- 8. Walker J.M and Rapley, R (2006). Molecular biology and biotechnology (4th Edn) Panima publishing corporation, New Delhi.
- 9. William, D. Stansfield, et al., (1996). Schaun's outline of theory and problems of Molecular and Cell biology. McGraw Hill, New York.

M.Sc. BOTANY

SEMESTER - II

PRACTICAL –II (COVERING THE CORE COURSE III &V) [TAXONOMY OFANGIOSPERMS, MICROBIOLOGY AND PLANT PATHOLOGY]

Taxonomy

45hrs

Identification of Specimen at family, generic and specific level belonging to the following families:

- 1. Magnoliaceae
- 2. Menispermaceae
- 3. Polygalaceae
- 4. Meliaceae
- 5. Sapindaceae
- 6. Rosaceae
- 7. Combretaceae
- 8. Lythraceae
- 9. Onagraceae
- 10. Rubiaceae
- 11. Sapotaceae
- 12. Oleaceae
- 13. Gentianaceae
- 14. Boraginaceae
- 15. Bignoniaceae
- 16. Pedaliaceae
- 17. Nyctaginaceae
- 18. Aristolochiaceae
- 19. Casuarinaceae
- 20. Commelinaceae
- 21. Cyperaceae
- 22. Orchidaceae.
- Economic importance of families mentioned above
- Familiarity with the use of Flora
- Preparation of Dichotomous artificial key using locally available plants
- A field trip of not less than four days to a place of luxuriant vegetation to study. The flora and to study the different types of vegetation.
- Submission of a tour report and 25 herbarium sheets (Specimens collected from Tour collection / locally available plants during the internal practical Examination.
- Certified record work done in the laboratory during practical classes

Microbiology

Experiments

- 1. Isolation and identification of bacteria and fungi from spoiled food.
- 2. Preparation of culture media (Bacteria).
- 3. Gram's staining of bacteria found in milk, curd and root nodules.
- 4. Testing quality of milk by Methylene blue reduction test (MBRT)

Demonstration

- 1. Media preparation and culturing of *Cyanobacteria*.
- 2. Preparation of spawn for cultivation of edible mushroom.
- 3. Mass cultivation of *Rhizobium*, *Azotobacter*.
- 4. Microbiological test for soil fertility (Phosphate solubilizing Bacteria).
- 5. Production of citric acid using *Aspergillus niger*.
- 6. Fermentation Solid state, submerged.

Note: visit to nearby leading laboratories / industries.

Phytopathology

Study of the disease symptoms, causal organism, transmission and control measures of the following plant diseases:

- 1. Damping off of *Pythium*.
- 2. Little leaf of Brinjal (Mycoplasma).
- 3. Bacterial Blight of Paddy.
- 4. Bunchy top of Banana (Virus).
- 5. Citrus canker (Bacteria).
- 6. Blight of potato (Early Late blight).
- 7. Tobacco mosaic disease (TMV).

M.Sc. BOTANY SEMESTER - II

PRACTICAL -III

(COVERING THE CORE COURSE VI &VII)

[ANATOMY OF ANGIOSPERMS, PLANT MICRO TECHNIQUES, EMBRYOLOGY OF ANGIOSPERMS, CELL BIOLOGY, GENETICS AND MOLECULAR BIOLOGY]

ANATOMY OF ANGIOSPERMS AND PLANT MICRO TECHNIQUE

Preparation of hand sections, maceration and clearing

- 1. Temporary and permanent mounting of whole specimens and Sections using different types of mountants.
- 2. Calibration of microscope and micrometry
- 3. Microtomy and microtome sectioning
- 4. Examination of different cell and tissue types with help of suitable techniques
- 5. Structure of (primary and or secondary) leaf, root, stem and floral parts (including fruits)
- 6. Examination of vascular cambium and study of its activity
- 7. Examinations of Anomalous secondary thickening mentioned in syllabus
- 8. Examination of Structural and identification of Wood of some common Indian Timbers such as *Prunus*, *Mangifera indica*, *Terminalia*, *Tectona grandis*, *Swietenia*, *Mahagoni*, *Azadirachta indica*, *Lagerstroemia* and *Pterocarpus*.

EMBRYOLOGY OF ANGIOSPERMS

- 1. Organization of anthers and pollens, pollen wall patterns, pollen germination and Pollen tube growth.
- 2. Study on ovary, ovules and their modification.
- 3. Isolation of plant embryos and embryonic tissues

Note

- 1. A minimum of 10 double stained permanent sections to be submitted.
- 2. Record and observation note book.
- 3. Wax blocks and slides mounted with wax ribbons.
- 4. Group report on ontogenetic change in a selected plant.

CELL BIOLOGY

- 1. Squash and smear techniques –Onion root tip (mitosis) Rheo flower bud (Meiosis).
- 2. Microscopic view of cell organelles in plant cells viewing Cystolith & Raphides, Chloroplast (*Hydrilla* leaf).
- 3. Isolation of plant organelles by centrifugation techniques (Demonstration).
- 4. Separation of giant chromosome (*Chironomus* larvae).

GENETICS

- 1. Evaluation of Genetic concept by solving problem of Mendelian hypothesis.
- 2. Genetic Interaction (Mendelian modified ratios) complementary, supplementary, duplicate factor, Multiple alleles.
- 3. Population genetics- Hardy Weinberg law.
- 4. Three point test cross –chromosome map.
- 5. Isolation of auxotrophs by UV mutatgenesis (Demonstration).
- 6. Isolation of spontaneous mutations in bacteria by gradient plate technique (Demonstration)

MOLECULAR BIOLOGY

- 1. Colorimetric estimation of DNA & RNA.
- 2. Regulation of gene expression (With the help of models /Charts /Book diagram.)
- 3. Protein biosynthesis with the help of models /chart/ Book diagram.

M.Sc. BOTANY SEMESTER - III

CORE X - PLANT PHYSIOLOGY AND BIOPHYSICS

UNIT I

Water relations of plants: Water potential, osmotic potential and pressure potential their relationships. Stomatal physiology, antitranspirants. Source sink - relationships in translocation of solutes. Mineral nutrition: Hydroponics prospects and problems, nutrient solutions. Modern concepts of mineral salt absorption and translocation. Donnan's potential, role of H+ AT Pase as a carrier, co transport (symport), counter transport (antiport), ATPase pump.

UNIT II

Photosynthesis: Photophysical and photochemical phase; Light reactions; sequence of photosynthetic pathway - Electron Transport Chain, Photophosphorylation. Photosynthetic carbon reduction cycles (PCR cycles): C3, C4 and CAM pathway, Classification of C4 plants and their significance. Pathways of CO2 fixation. Respiration: Photorespiration and dark respiration. Cycles of respiration, Oxidative Phosphorylation, Gluconeogenesis.

UNIT III

Nitrogen fixation: Types, Nitrogenase, nif gene, Assimilation of nitrate and ammonium ion NR, NIR, GDH and GS/GOGAT pathways. Applications of auxins, gibberellins, cytokinins in agriculture and horticulture, Physiology of growth retardants - ethylene and abscisic acid, phytochrome mediated processes. Physiology of flowering and fruit ripening.

UNIT IV

Dormancy of seeds, causes and methods of breaking dormancy. Ageing and senescence -types. Physiological and biochemical changes. Physiology of seed germination.

Stress Physiology: definition, types and resistance mechanisms of water, drought, salt, stresses. Secondary metabolites: Biosynthesis of terpenes, phenols and nitrogenous compounds and their roles.

UNIT -V

Bioenergetics, Energy and work. Laws of Thermodynamics. Energy transductions in biological systems. Redox potential, Redox couples, ATP bioenergetics, Order of reactions.

Photobiology: Dual nature of light, characteristics of solar radiation, solar energy - Efficiency of atoms - Absorption spectra in molecules, energy states, De-excitation.

TEXT BOOKS

- 1. Pandey, S.N and Sinha, B .K (2001). Plant Physiology. Third revised edition, Vikas Publishing House Pvt. Ltd, New Delhi
- 2. Devlin, RM., (1974), Plant Physiology, Affiliated East West Press Pvt. Ltd
- 3. Noggle, GR. and Fritz, G.J., (1976). Introductory Plant Physiology, Prentice Hall, India.
- 4. Jain, V.K (2007).Fundamentals of plant physiology, S. Chand & Company ltd, New Delhi.
- 5. Nobel, PS (1970) Introduction to Biophysical Plant Physiology. W. H. Freeman and Company, San Francisco
- 6. Verma, V.(2008). Text book of plant Physiology, Ane's student edition, New Delhi

- 1. Beevers, L. (1976). Nitrogen metabolism in plants. William & Sons Ltd. London.
- 2. Bidwell RGS (1979). Plant Physiology, Mac Millan Publishing Company. New Delhi.
- 3. Bray, CM. (1983). Nitrogen Metabolism in Plants, Longman.
- 4. Casey, E.J. (1962). Biophysics: Concepts and Mechanics. Van Nostrand Reinhold Co. and East-West Press, New Delhi.
- 5. Hess, D. (2012). Plant Physiology: Molecular, Biochemical, and Physiological Fundamentals of Metabolism and development. Springer Science & Business Media, New York.
- 6. Kramer, PJ, (1969). Plant and soil water relationship, A Modern Synthesis.
- Lehninger, A.L. (1971). Bioenergetics: The Molecular Basis of Biological Energy Transformation. Addison Wiley. Salil Bose, S. (1982). Elementary Biophysics. Vijaya Printers, Madurai.
- 8. Levitt, (1972). Responses of plants to environmental stress, Academic press, New York.
- 9. Salisbury, F, B and Ross, C.W (1986). Plant Physiology. Third edition, CBS Publishers and Distributors, New Delhi
- 10. Taiz, L and Zeiger, E (1991) Plant physiology. The Benjamin/Cummings Publishing company, Inc., California, New York.
- 11. Taiz, L. and Zeiger, E. (2010). Plant Physiology. Sinauer Associates, India.
- 12. Fang, F. K. (1982). Light Reaction Path of Photosynthesis. Vol. 35. Molecular Biology, Biochemistry and Biophysics. Springer Verlag.
- 13. Casey, E. J. (1962). Biophysics: Concepts and Mechanics. Van Nostrand Reinhold Co. and East-West Press, New Delhi.
- 14. Lehninger, A. L. (1971). Bioenergetics: The Molecular Basis of Biological Energy Transformation. Addison Wiley.
- 15. Salil Bose, S. (1982). Elementary Biophysics. Vijaya Printers, Madurai.
37

M.Sc. BOTANY SEMESTER - III

CORE XI - ECOLOGY AND PHYTOGEOGRAPHY

UNIT I

History and scope of ecology. Concept, structure and functions of ecosystem. Structure and functions of some ecosystems: Forest, grassland, Fresh water and Marine. Biogeochemical cycling (C,N,P). Food chains, Food webs, Ecological pyramids and energy flow. Methods of studying plant community - edges and ecotones. Ecological succession - Types, mechanisms, changes involved in succession; Concept of climax - Ecological indicators.

UNIT II

Species interactions: Types of interactions, Inter specific competition, herbivory, carnivory, pollination, symbiosis. Ecological Niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; Population ecology - characteristics of a population; population growth curves; age structural populations. Population regulations; life history strategies (r and k selection).

UNIT III

Environmental pollution - Air, Water, Soil, Thermal, Radiation, Noise, E-waste. Ozone depletion - Global warming and climate change - consequence - Rio de Jeneiro summit (1992) - Kyoto protocol (2005) - El Nino. Disaster management: Floods, Earth quake, Cyclone, Tsunami and Landslides.

UNIT IV

Environmental education - Principles, Environmental education programmes. Environmental education in India. Environmental organization and agencies, Man and Biosphere programme (MAB), WWF, UNESCO, FAO and UNEP. Biological monitoring programme. Principles and applications of Remote Sensing.

UNIT V

Phytogeography - Principles and importance of plant geography- Phytogeographic regions of India. Willis - Age and Area hypothesis. Continuous range, cosmopolitan circum polar, circum boreal and circum austral, Discontinues distribution - Wagener theory - continental drift hypothesis, endemism. Biodiversity and Conservation Biology: Types, benefits, and conservation of Biodiversity, Biodiversity Hotspots.

TEXT BOOKS

- 1. Ambasht, R.S. (1988). A text books of plant ecology. Students, Friends & Co., Varanasi
- 2. Kumar, H.D. (1997). General ecology, Vikas Publication company, New Delhi
- Pandey, K. and Shukla, J.P. (2009). Elements of toxicology, Wisdom press, New Delhi
- 4. Sharma, P.D. (2009). Ecology and Environment, Rastogi Publishers, Meerut.

REFERENCES BOOKS

- 1. Edward J. Kormondy, (1996). Concept of Ecology, Prentice Hill of India Pvt, Ltd. New Delhi.
- 2. Emil T. Charlett. Environmental Protection Tata McGraw Hill New Delhi.
- 3. Gangopadhyay, A. (2007). Plant diversity, Gene tech book, New Delhi.
- 4. George L. Clarke (1954). Elements of Ecology. John Wiley & sons. Inc., New York.
- 5. Gupta, P.K (2009). Soil, plant, water and fertilizer analysis. Agrobios (India), Jodhpur.
- Jadhar, H.V, Purohit, S.H. (2008).Global pollution and environment monitoring, Himalaya Publishing house ,New Delhi
- 7. Michael. P. (1984). Ecological methods for field and laboratory investigations, Tata McGraw Hill publishing company Ltd., New Delhi.
- 8. Misra K.C. (1980). Manual of plant ecology (second edition) Oxford and IBH Publishing Co., New Delhi.
- 9. Misra, R. (1986). Ecology work book, Oxford and IBH publishing company, New Delhi.
- 10. Myers A.A, Giller, P.S (1988). Analytical biogeography, Chapman & Hall, London.
- 11. Odum E.P. (1971). Fundamentals of ecology, W.B. Saunders Co., Phiadephia, London.
- 12. Perkins H.C. (1974). Air pollution, McGraw Hill Kongotusta Ltd, Tokyo.
- 13. Robert Smith, (1977). Elements of ecology and field biology, Harper and Raw Publishers, New York, London.
- 14. Russell, P.J Wolfe, S.L, Hertz P.E Starr, C McMillan, B. (2008). Ecology, Brooks and Cole cengage learning, U.S.

PERIYAR UNIVERSITY

M.Sc. BOTANY

SEMESTER - II

CORE COURSE XII: PRACTICAL -IV (COVERING THE CORE COURSE X & XI) (PLANT PHYSIOLOGY, BIOPHYSICS, ECOLOGY AND PHYTOGEOGRAPHY)

PLANT PHYSIOLOGY AND BIOPHYSICS

- 1. Determination of water potential (Shardakov's method)
- 2. Determination of solute potential
- 3. Estimation of Chlorophyll
- 4. Estimation of Carotenoids.
- 5. Estimation of anthocyanin
- 6. Estimation of Leg -hemoglobin content
- 7. Estimation of starch by perchloric method.
- 8. Estimation of nitrogen by Nessler's method
- 9. Estimation of proline and phenols in plant tissues under different environmental and physiological conditions.
- 10. Calculation of stomatal index of upper and lower epidermal peelings of Moringa.
- 11. Determination of km-value, V-max, M

DEMONSTRATION

- 1. Plant physiology experiment
- a) Demonstration experiment on aerobic respiration.
- b) Demonstration of photosynthetic experiment.
- c) Demonstration of transpirational water loss by using Ganong's Photometer.
- 2. In vivo assay of NR, NiR.
- 3. Estimation of IAA
- 4. C3 and C4 anatomy, C4 subtypes

39

PLANT ECOLOGY AND PHYTOGEOGRAPHY PRACTICALS

- 1. Analysis of vegetation by using quadrat / line transect to find out frequency, Density and abundance of different species.
- 2. Garden soil experiment to make texture.
- 3. Capillary water.
- 4. Field capacity.
- 5. Wilting coefficient.
- 6. pH of the soil/water
- 7. Chemistry of the soil $(NO_3 PO_4 \& SO_3)$
- 8. Water analysis for dissolved oxygen.
- Estimation of primary production in the given water sample by the Light-Dark bottle Method.
- 10. Estimation of carbonate, bicarbonate and chloride content in water samples.

PHYTOGEOGRAPHY

11. A study of plant distribution maps - continuous, discontinuous, circum polar, circum tropical, endemic distribution

Note

- Field study of an area (not less than a period of 4 days) to document environmental assets and study the ecosystems and different types of vegetation (Forest / Grassland / Mountain / National parks / Sanctuary /Botanical garden / Lake / Pond / River / Waterfalls / Estuary / Mangrove / Sea coast) submit a tour report (during the internal practical examination).
- 2. Certified record of work done in the laboratory during practical classes

M.Sc. BOTANY SEMESTER - III ELECTIVE II - HERBAL TECHNOLOGY

UNIT I

History, definitions and scope of Herbals. Traditional Medicinal systems: Ayurvedha, Unani, Homeopathy, Siddha, Naturopathy and Yoga. Definition of Drug -Classification of natural drugs, (Alphabetical, Morphological, Pharmacological, Chemical and Chemo taxonomical).

UNIT II

Pharmacognosy - Definition and Scope. Drug adulteration, Drug evaluation, Chemical evaluation, Physical evaluation and Biological evaluation. Phytochemical investigations, standardization and quality control of herbal drugs.

UNIT III

Cultivation, collection and preparation of natural drugs - Detailed study of the following medicinal plants: *Plantago ovata, Hypericum perforatum, Digitalis purpurea, Terminalia chebula, Saraca indica, Oleaeu ropoea, Strychnosnux vomica.* Women entrepreneurship development, marketing cultivated medicinal plants -National

Medicinal Plants Board of India.

UNIT IV

Neutraceuticals-classification, Antioxidants, Probiotics, Prebiotics, *Spirulina*, Royal jelly, Soya beans, Garlic and Cosmeceuticals. Natural Pesticides- *Pyrethrum*, Neem, *Derris*; Antiobiotics, Allergenic extracts.

UNIT V

Ethnobotany -definition-Traditional and Folklore medicines- Native medicine. Major tribes of South India and their ethnobotanical and ethnobiological heritage. Ethno Medicines. Ethnobotany and conservation of plants with special reference to India - mythology and conservation of ecosystems, conservation of selected plant species: sacred groves, forestry and unique ecosystems and their ethnobiological values, plants and animals in art, tradition and ethnography: Ethnobotanical field methods.

41

TEXT BOOKS

- 1. John JothiPrakash, E. (2003). Medicinal Botany and Pharmacognosy. JPR Publication, Vallioor, Tirunelveli.
- 2. Kokate, C.K. Gokhale, S.B., and Purohit, A.P. (2003). Pharmacognosy. Nirali Prakashan, Pune.
- 3. Kumar, N.C. (1993). An Introduction to Medical Botany and Pharmacognosy.
- 4. Kumaresan, V. and Annie Regland (2004). Taxonomy of Angiosperms systematic Botany, Economic Botany, Botany & Ethnobotany.
- 5. Prajapathi, Purohit, Sharma and Kumar. (2003). A Hand book of Medicinal plants. Agrobios Publications, Jodhpur.

REFERENCE BOOKS

- 1. Anonymous, (1999). Pharmacognosy of Indigenous Drugs (Vol.I-III). Central Council for Research in Ayurvedha and Siddha, New Delhi.
- 2. Anonymous, (2004). Cultivation of Selected Medicinal Plants. National Medicinal Plants Board, Govt. of India, New Delhi.
- 3. Bhattacharjee, S.K. (2004). Hand Book of Medicinal plants. Pointer Publishers, Jaipur.
- 4. Biswas, P.K. (2006). Encyclopedia of Medicinal plants (Vol. I-VII). Dominant Publishers, New Delhi.
- 5. Chaudhuri, A.B. (2007). Endangered Medicinal Plants. Daya Publishing House, New Delhi.
- 6. Chopra, R.N. (1980). Glossary of Indian Medicinal plants. CSIR, New Delhi.
- 7. Handa, S. S. and V. K. Kapoor, (1993). Pharmacognosy. VallabhPrakashan. New Delhi.
- 8. Harbourne, J. B. (1998). Phytochemical methods: A Guide to Modern Techniques of Plant Analysis (3rd edition). Chapman and Hill Co., New York.
- 9. Jaibala, S. and Balakrishnan, G. (1975). A Hand book of common remedies based On Siddha system of Indian medicines. St. Louis Institute Press, Chennai.
- 10. Johnson, T (1999). CRC Ethnobotany desk Reference, CRC press, New York.
- 11. Natkarni, K.M. (1998). Indian Materia Medica (Vol.I-III). Popular Prakasam, New Delhi.
- 12. Raychaudri, S.P. (1991). Recent advances in Medicinal, Aromatic and Spice crops (Vol.I). Today & Tomorrow publication, New Delhi.

M.Sc. BOTANY SEMESTER - III

ELECTIVE III - PLANT BIOTECHNOLOGY AND GENETIC ENGINEERING

UNIT I

Plant Biotechnology - History, scope and potentialities. Global impact of biotechnology in agriculture. Conservation of plants using biotechnology, Germplasm conservation and Cryopreservation. Plant genome organization and plant gene structure.

UNIT II

Plant tissue culture: concept of totipotency - organization of tissue culture laboratory. Sterilization methods - callus induction, subculture and maintenance. Cell suspension culture, somatic embryogenesis, micro-propagation, protoplasts isolation, culture and fusion. Somatic hybridization. Anther culture, production of haploids. Secondary metabolites in plant culture.

UNIT III

Genetic Engineering: Brief history, Principles of Recombinant DNA technology, molecular tools of genetic engineering- Restriction endonucleases, DNA ligases, alkaline phosphatase, SI nucleases and polymerases. Cloning vectors - plasmids, cosmids, Bacteriophages. Basic techniques- Blotting techniques (Southern, northern and western blotting), DNA sequencing, Micro array. Construction of DNA library, polymerase chain reaction (PCR), molecular markers (RFLP, AFLP and RAPD).

UNIT IV

Genetic engineering of plants: gene transfer methods -specific and non-specific methods. Vector mediated gene transfer *Agrobacterium* mediated gene transfer. Ti plasmid derived vector system. Vectorless (Direct) gene transfer - micro and macro injection methods- lipofection-electroporation, particle bombardment. Transgenic plants - Aims, strategies for development. Creation of Insect resistance (Bt cotton and Btbrinjal), - Antisense RNA(flavrsavr) technology.

UNIT V

Biotechnology and Society: Benefits, ethical, legal and social implications (ELSI) aspects. Genetic modification and food consumption. (GMOs patenting- patent, Intellectual Property Rights (IPRs), Plant breeders Rights (PBR), TRIPS, WTO and Farmer's rights. Patenting research, International guidelines and regulations. Biotechnology and the developing countries.

TEXT BOOKS

- 1. Dubey, R.C., (2001). A text book of biotechnology. S. Chand & Co., New Delhi.
- 2. Gupta, P.K. (1994). Elements of Biotechnology. Rastogi Publications, Meerut.
- 3. H.K. Dass. 2005, Text book of Biotechnology, Second edition, Wiley Dreamtech, India (P) Ltd.
- 4. Ignacimuthu, S.J. (2003). Plant Biotechnology. Oxford & IBH Publishing, New Delhi.
- 5. Kalyankumar De, (2008). Plant tissue culture. New Central Book Agency, Calcutta.
- 6. Kumar H.D. (1993). Molecular Biology and Biotechnology. Vikas Publishers, New Delhi.
- 7. Sathyanarayana, U, (2005). Biotechnology, Books and allied (P) Ltd, Kolkata.
- 8. T.A. Brown-2001. Gene cloning and DNA analysis: An introduction, sixth edition Wiley- Blackwell publication.

REFERENCE BOOKS

- Bhojwani, S.S. & Razdan, M.K. (2004). Plant Tissue Culture, Read Elsevier India Pvt. Ltd.
- 2. Glick, B.R. & J.J. Pasternak. (2009). Molecular biotechnology, Panima Pub. Co.
- 3. Hammond, J.C. McGarvey and V. Yusibov, (2009). Plant Biotechnology, Springer Verlag, New York
- 4. Islam, A.S. (1996). Plant tissue culture. Oxford & IBH Publ.
- 5. Lewin, (2007). Genes IX, Oxford University press.
- 6. Purohit S.S.(2010). Plant tissue culture, Student edition, Jodhpur.
- Sambrook J and Russel DW, (2001). Molecular Cloning A laboratory Manual. Cold Spring Harbour Publ.

M.Sc. BOTANY SEMESTER - IV

CORE XIII - BIOCHEMISTRY AND NANOBIOTECHNOLOGY

UNIT I: Basics of chemistry

Structure of atoms, molecules and chemical bonds. Stabilizing interactions – Vander waals, electrostatic, hydrogen bonding, hydrophobic interaction. Water – structure, properties, ionization of water. Acid and bases. pH concept – buffer solutions –Types of Solutions-Percentage, PPM, Molarity, Molality and Normality.

UNIT II : Carbohydrate and Nucleic acids

Definition, classification, Structure and properties. Metabolism of Carbohydrate -Glycolysis, pyruvate metabolism, TCA Cycle, Gluconeogenesis and Glycogen metabolism.Hexose monophosphate shunt.

Nucleic acids: Nomenclature, Nucleosides, Nucleotides, polynucleotides, Types of Nucleic acids- biosynthesis, regulation of biosynthesis and breakdown.

UNIT III : Amino acids, Proteins and Enzyme Metabolism

Amino acids – classification, properties of amino acid, amino acid metabolism – Transamination, Deamination. Metabolism of Ammonia, Urea cycle, Non- protein amino acids.

Proteins- classification, structure – primary, secondary, tertiary and quaternary. Conformation of proteins - Ramachandran Plot, secondary structure, domains, motif and folds.

Enzymes-Classification, Enzyme catalysis, specificity of enzyme action-Factors affecting enzymes activities, feedback and allosteric inhibition, reversible and irreversible inhibition, bi substrate reaction-Chemical kinetics and order of reactions, Michaelis and Menten equation, V max and Michaelis constant. Coenzymes.

UNIT IV : Lipids and Secondary metabolism

Lipids and secondary metabolism-Lipids-Structure, classification, and properties, Biosynthesis of membrane lipids - Steroids - Steroid metabolism. Biosynthesis of major fatty acids, Fatty acid oxidation and energy production. Secondary metabolism in plants: polyamines, phenols- Isoprenoids - Cyanogen glycosides and Glucocyanulades- Alkaloids, Terpenoids, Flavonoids, Tannins - biochemical importance.

UNIT V: Nanobiotechnology

Introduction to Nano particles: Definition, types and size of Nano particles, mechanism of nano particles, synthesis and characterization. Nano arrays, Nano wire, Bio sensors and their applications. Principles of nanosized drug delivery system (Liposome, Fluorocarbons). Applications of Nano particles in agriculture, Environment and Medicine. Impact of Nano science and Nano technology on society.

TEXT BOOKS

- 1. Jain J.L. et al., (2008). Fundamentals of Biochemistry, Chand, New Delhi.
- 2. Mahadevan, A. and Sridhar R.(1986) Methods in Physiological plant Pathology. Sivakami Publications, Madras.
- 3. Pradeep.T (2007), NANO: The Essentials Understanding Nanoscience and Nanotechnology, TATA McGraw Hill Education.
- 4. Rastogi, S.C. (2003). Outlines of Biochemistry, CBS Publishers & Distributors, New Delhi.
- 5. Satyanaryana, U. Chakrapaani U. (2006). Biochemistry. Books and Allied (P) Ltd.
- 6. Stryer, L., (1988). Biochemistry. WH Freeman & Co., NY.

REFERENCE BOOKS

- Abdel Hamid Elaissari, (2008). Colloidal Nanoparticles in Biotechnology, John Wiley& Sons, Inc., Hoboken, New Jersey.
- 2. Brechignac C, Houdy P and Lahmani M, (2007). Nanomaterials and Nanochemistry.
- 3. Caret et al., (1993). Inorganic, Organic and Biological Chemistry, WMC Brown Pub.USA.
- 4. Charles, P.P. and Frank, J.O., (2006). Introduction to Nanotechnology, Wiley India Ed.
- 5. Kewal K. Jain MD, (2008). The Handbook of Nano medicine. Humana Press, USA.
- Lehninger, A.C. (2005). Principles of Biochemistry. 4th Edition, W.H. Freeman, New York.
- 7. Nelson D.L, Cox M.M. (2005). Lehninger Principle of Biochemistry, W.H. freeman and Company, New York.
- 8. Rawn, D. (1989). Biochemistry, Neil Patterson.
- 9. Voet. D. and Voet. J.G. (2004), Biochemistry. 3rd Edition, John Wiley and sons, Inc.
- 10. Zuley G.L., (1998). Biochemistry, Wm. C. Brown Publishers, USA.

47

M.Sc. BOTANY SEMESTER - IV

CORE XIV - BIOINSTRUMENTATION, BIOSTATISTICS AND BIOINFORMATICS

UNIT I : Analytical techniques based on optical principles

Microscopy – Principles and applications of light, dark field, fluorescence, scanning and transmission microscopy. Spectroscopy: Principles, Beer Lambert's Law, components and working mechanism - Colorimetric principles, UV visible, Infra Red (IR), Flame photometer-atomic absorption spectroscopy (AAS).

UNIT II : Quantitative procedures based on physical principles

Centrifugation: Principles, components, mechanism and application of clinical, refrigerated and ultra centrifuges. Chromatography: Principles (absorption – partition – ion exchange – affinity), components, methodology and applications of the different types of chromatography-Thin layer, GC, HPLC. Radiometry: Isotopes, radioactivity, measurement of radioactivity- radioactive counters, (GM & Scintillation counter), applications of radioisotopes, autoradiogram.

UNIT III : Methods targeting the electrolytic behavior:

pH metry-pH concept, electrodes, standardization and buffers - acetate phosphate-Tris Glycine. Electrophoresis: Principles, equipment, methodology and applications-PAGE, AGE, SDS-PAGE, 2 D electrophoresis, isoelectrofocusing.

UNIT IV : Research methodology

Choosing the problem for research –literature collection – Primary, secondary and tertiary sources – Bibliography – indexing and abstracting – Reporting the results of research in conferences – Oral and Poster presentation. Thesis writing – Research journals – National and International –monographs – reprints – proof correction – Full paper – Short Communication – Review paper-Research publications, LCD preparations.

UNIT V : Biostatistics and Bioinformatics

Biostatistics: Collection – classification, Tabulation and presentation of data (Diagrammatic and graphical). Measures of central tendency- Arithmetic mean – median and mode. Measures of dispersion- Standard deviation and Standard error. Probability analysis, correlation- types of correlation, correlation co efficient, Regression- simple, Linear. Test of significance, parametric- student's t test, ANOVA. Non parametric tests- Chi-square test.

Bioinformatics: Introduction to bio informatics, NCBI, Database similarity searching-BLAST N, BLAST P. Biological data bases- structural, sequence data bases for nucleic acid, proteins. Sequence alignment – Pairwise and multiple. Gene sequence submission format-FASTA.

TEXT BOOKS

- 1. Attwood T K and Parry Smith D J, (1999).Introduction to Bioinformatics Addison Wesley Longman Limited, England.
- 2. Khan, I.A., and Khannum, A., (1994). Fundamentals of Biostatistics, Vikas, Pub., Hyderabad.
- 3. Marimuthu, R. (2008). Microscopy and Microtechnique. MJP Publishers, Chennai.
- 4. Moorthy. C.S.V. (2004). Bioinformatics, Himalaya publishing house.
- 5. Sree Ramulu, V.S., (1988). Thesis Writing, Oxford& IBH Pub. New Delhi.
- 6. Wilson K, Walker, J. (1994). Principle and techniques of practical Biochemistry, 4thEdn.) Cambridge university press, Cambridge.

REFERENCE BOOKS

- 1. Bryan Bergeron, M.D. (2006). Bioinformatics Computing, Prentice Hall of India. New Delhi.
- 2. Connor and Peter Woodford (1979). Writing Scientific Paper in English Pitman. Medical Publishing Co. Ltd., England.
- 3. Cooper, T.G. (1991). The Tools of Bio chemistry, John Wiley & sons, London.
- 4. Dheenadayalu, R. (1987). Computer Science (Vol. I). Tata McGraw Hill Publishing Co. Ltd., New Delhi.
- 5. Gupta, S.P. (1990). Statistical Methods. S. Chand & Co. Ltd., New Delhi.
- 6. Gurumani, N., (2006). Research methodology for Biological Sciences. MJP Publishers, Triplicane, Chennai.
- 7. Harisha S (2007). Fundamentals of Bioinformatics. IK International Publishing House, Pvt. Ltd. New Delhi.
- 8. Jayaraman, J. (1972). Techniques in Biology. Higginbotham's Pvt. Ltd., Madras.
- 9. Jayaraman, J. (1985). Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
- 10. Kothari, C.R. (1991). Research Methodology: Methods and Techniques. Wiley Eastern Ltd., New Delhi.
- 11. Pavel A. Pevzner (2005). Computational molecular biology Algorithmic approach. Prentice- Hall of India. Pvt. Ltd.
- 12. Plummer D.T (2003). An introduction to practical Biochemistry. 3rd Edn. Tata McGraw Hill Publishing Company Ltd. New Delhi
- 13. Rastogi, V.B. (2006). Fundamentals of Biostatistics. Ane Book India, New Delhi.
- 14. Sree Ramulu, V.S. (1988). Thesis Writing. Oxford & IBH Publishing Co.Pvt. Ltd., New Delhi.
- 15. Stephen Misener and Stephen A. Krawetz. (2000). Bioinfromatics Methods and Protocols. Humana Press, Totowa, New Jersey.
- 16. Theil T., Bissen S. and Lysons E.M. (2002). Biotechnology DNA to protein. A Laboratory project in molecular biology, Tata McGraw Hill publishing company, New York.
- 17. Zar, J.H. (1984). Biostatistics Analysis. Prentice Hall International, New Jersey.

PERIYAR UNIVERSITY

M.Sc. BOTANY SEMESTER - IV CORE XV – PRACTICAL - V

(BIOCHEMISTRY, NANO BIOTECHNOLOGY, BIOINSTRUMENTION, BIOSTATISTICS AND BIOINFORMATICS)

BIOCHEMISTRY

- 1. Preparation of Phosphate and Citrate buffers
- 2. Estimation of reducing sugars by DNS Method (Dinitrosalicylic acid).
- 3. Estimation of Carbohydrate by Anthrone method.
- 4. Estimation of proteins by Lowry's method
- 5. Estimation of DNA by Diphenylamine method
- 6. Estimation of free fatty acid by titration
- 7. Catalase assay from plant source
- 8. Peroxidase assay from plant source
- 9. Qualitative test for Protein, lipid and carbohydrates.
- 10. TLC separation of dyes.

Demonstration

- 1. Determination of km value, V max, Michaelis constant for amylase or phosphorylase
- 2. Estimation of oil in oil seed by Soxhlet extraction
- 3. Preparation of Silver nanoparticles

BIOINSTRUMENTATION

- 1. Verification of Beer's law using CuSO4 / K2Cr2O7 Solution
- 2. Separation of sugar/Amino acid by paper chromatography
- 3. Separation of photosynthetic pigments by Paper/TLC chromatography.
- 4. Measurement of pH from fruit juice.

Demonstration

- 1. Separation of plant pigments by Colum chromatography
- 2. Electrophoretic separation of Nucleic acid / protein
- 3. Separation of lipids by TLC

BIOSTATISTICS

- 1. Collection and tabulation of data (Continuous and discrete)
- 2. Construction of Bar diagrams, Pie Diagrams.
- 3. Construction of Histogram, Frequency polygon, Frequency curve.
- 4. Calculation of Measures of central tendency (Mean, Median and Mode)
- 5. Calculation of measures of Dispersion (Standard Deviation and standard error).
- 6. Calculation of correlation and regression significance test of correlation coefficient significance test for regression coefficient.
- 7. Calculation of Chi square test (To test the goodness of fit, to test the detection of linkage).
- 8. Calculation of student's 't' test. Comparison of means of two samples-('t' test for paired samples).
- 9. Calculation of One factor and two factor analysis of variance (ANOVA).

BIOINFORMATICS

- 1. Exploring NCBI database system,
- 2. Querying the PUBMED and GenBank databases,
- 3. EBI server and searching the EMBL databases,
- 4. Exploring & querying SWISSPROT & UniProt KB.
- 5. Structural Visualization of DNA, Proteins by using rcsb website.

REFERENCE BOOKS

- 1. Jeyaraman, J. (1998). Laboratory Manual in Biochemistry, New Age International Publishers Ltd
- 2. Khan, I.A., and Khannum, A., (1994). Fundamentals of Biostatistics. Vikas, Pub., Hyderabad.
- 3. Moorthy, C.S.V. (2004). Bioinformatics, Himalaya Publishing house.
- Palanivelu, P. (2009). Analytical biochemistry and separation techniques A Laboratory manual for B.Sc. and M.Sc. students. 21st Century Publications, Madurai.
- 5. Rajan, S. 2010. Experimental procedures in life sciences. ANJANAA book house, Chennai.
- 6. Sadasivam, S. and Manicam, A.(2008). Biochemical Methods, New Age International Publishers, New Delhi

Important websites for bio informatics;

- 1. http://www.ncbi.nim.nlh.gov./Entrez/nucleotide html.
- 2. http://www.ddbi.nig.ac.jp./
- 3. www...ncbi.nlm.gov/blast/db/
- 4. http://www.rcsb.org/pdb/indea.html

M.Sc. BOTANY SEMESTER - IV

ELECTIVE IV - HORTICULTURE AND FORESTRY

UNIT I : Horticulture

Brief History of Horticulture - Divisions of Horticulture - Plant growth environment soil and its preparations - organic manures and substrate - Farmyard manure, compost, Leaf mould, oil cake, Meat meals, Blood meal, Horn and Hoof meal - Liquid Manure, Peat Moss. Biofertilizers and Plant growth regulators in root initiation, flowering, fruit setting and development. Irrigation Types- Sprinkler Irrigation, Trickle Irrigation-Surface, Furrow, Surge, Pitcher.

UNIT II

Plant Propagation - Seed propagation; Vegetative propagation- Cutting, Budding, Grafting and Layering. Nursery techniques - Preparation of soil bed - method of digging - bed size, types, spacing, rotation. Green house, Glass house, Poly house construction and related equipments.

UNIT III

Gardens types - formal, informal and kitchen - principle and design, landscaping. Aftercare of plants: weeding, Pruning, Garden adornments, garden designing, garden components- lawns, shrubs and trees, borders, hedges, edges, drives, walks, topiary, trophy, rockery., Gardening - Garden tools and implements, types of garden ornamental gardens, indoor gardens, kitchen gardens, terrestrial and aquatic gardens. Famous gardens of India.

UNIT IV:

Floriculture - cut flower, harvesting and marketing. Terrarium culture, Vegetable andfruit gardens, Hedge Plants, Hydroponics, Bonsai and Bonsai techniques. Flower Arrangement - Containers and requirements for flower arrangements Free style, Shallow and Mass arrangement - Japanese-Ikebana- Bouquet and garland making-Dry flower arrangement.' Production technology-Olericulture-Cultivation of Brinjal and Cauliflower. Pomology - Cultivation of Apple and Pineapple. Commercial floriculture – Cultivation of jasmine and rose. Commercial horticulture - Extraction of Jasmine concrete and Papain.

UNIT V : FORESTRY

Forest topography and stratification - top canopy, mid-section, ground flora and fauna. Vegetation of western and Eastern Ghats and Eastern Himalayas. Agro and Social forestry. Silviculture - concept, scope and practices. Deforestation causes: natural calamities, human interference, denudation, invasion of Alien species, tree felling, cattle grazing and exploitation of forest products, quarrying and mining - effects and control measures –Do's and Don'ts inside forest area. Man and animal conflicts. Afforestation and Reforestation.

TEXT BOOKS

- 1. Dwivedi, A.P. (1992) Agroforestry Principle and practices. Oxford and IBH Publishing Co., New Delhi.
- 2. Edmond Senn, Arews, Halfacre. (1987). Fundamentals of Horticulture, Tata McGraw Hill book Co., Ltd. New Delhi.
- 3. Khanna, l.S. (1984) Principles and practices of Silviculture. KhannaBhandu, Dehra Dun.
- 4. Kumar.N (1977) Introduction to Horticulture, Rajalakshmi Publications, Nagercoil, India.
- 5. Lal, J.B., (1989) India's Forests Myth & Reality. Nataraj Publishers, Dehra Dun.
- 6. ManibhushanRao K 1991, Text Book of Horticulture, Macmillan Publications, Hyderabad.
- 7. Negi, S.S., (1994). India's Forests, Forestry and Wildlife, Indus publishing Co., New Delhi.
- 8. Prasad, S. and Kumar, U. (2010). Principles of Horticulture. Agrobios (India). Jodhpur.
- 9. Ramprakash. (1986). Forest management.IBD Publishers, Debra Dun.

REFERENCE BOOKS

- 1. Arora J.S. (1990). Introductory Ornamental Horticulture, Kalyani Publications.
- 2. Bailey L.H. (1901). The Standard Cyclopaedia of Horticulture Volume 1,2 and 3, Macmillan Publications
- 3. Benu Singh, (2010). A Modern Book on Forestry and Horticulture, Vista International.
- 4. Bor, N.L (2010). A Manual of Indian Forest Botany, (Second Edition) Asiatic pub., New Delhi
- 5. Bose, T.K. and Mukherjee, D (1972). Gardening in India, Oxford & 1BH Publishing Co., Kolkatta, Mumbai, New Delhi.
- 6. Chauhan V.S, Vegetable Production in India, RamPrasad & Sons.
- 7. Donald Bruce and Grancis X. Schumacher. (1950). Forest menturation, McGraw Hill Book Co. NY.
- 8. Frederick S. Backer, (1950). Principles of silviculture, McGraw Hill Book Co. NY
- 9. Pratibha, P. Trivedi. (1987). Home gardening, ICAR Publication, New Delhi.
- 10. Randhawa (1997). Ornamental Horticulture in India, Today & Tomorrow Publishers, New Delhi.
- 11. Shujnrnoto, (1982), The Essentials of Bonsai, David & Charles

52

M.Sc. BOTANY SEMESTER - IV

CORE - XVI: PROJECT AND DISSERTATION WORK

Project is a component of the active learning module that teaches approach and research techniques. Students would have hands on experience in investigating a selected research problem where he/she shall be trained in framing and testing hypothesis through suitable research design. Students are required to select their research topic in the one of the following domain.

BROAD RESEARCH AREAS

- Plant diversity and Systematic
- Plant physiology and Biochemistry
- Plant Molecular Biology and Biotechnology
- Microbiology and Plant pathology
- Environmental biology

Allocation

- Student may select their broad research area during the end of the third semester and will be guided by a suitable research supervisor in the area allotted by the HOD.
- Each research supervisor may be allotted with one or two students based on the Number of students
- Summer vacation may be used by the students to initiate their project work.

Objective of the study

- Topic investigated will have defined area of study.
- Project students will have hands on experience in all the instruments and techniques conduct his/her original research.
- Minimum of 5-10 yrs of literature will be added in the review with recent publication of the year.
- Standard of the project work should be high enough to be presented in conferences or to communicate as a papers and be subjected to peer review.

Evaluation

Internal Assessment mark based on (40marks)

- 1. Literature collection 10 marks
- 2. Data collection 10 marks
- 3. Methodology 10marks
- 4. Presentation of result Statistical analysis/tabulation/Thesis writing /Reference Citing 10 marks.

External marks 60 marks

- i) Dissertation 40marks
- ii) Viva voce 20marks

Dissertation format

- Introduction
- Review of literature
- Materials and methods
- Results
- Discussion
- Summary
- Bibliography

M.Sc. BOTANY SEMESTER - II

EXTRA DISCIPLINARY COURSE - PAPER I: HORTICULTURE

UNIT I

Importance of scope of horticulture – Divisions of horticulture – Climate, soil and nutritional-Nursery techniques. Needs – Water irrigation – Plant propagation method

– Cutting, layering, grafting, budding, Stock – Scion relationship, micro propagation, induction of rooting. Advantages and disadvantages of vegetative propagation; micropropagation.

UNIT II

Gardening - Garden tools and implements, Types of garden - formal, informal and kitchen , Indoor gardening – House plants – flower garden (outdoor) hedges, edges, fences, trees, climbers, Rockeries, Arches, terrace garden – Lawn making and maintenance – Water garden, cultivation of water plants. Aftercare of plants: weeding, Pruning, Top dressing and Topiary. Famous gardens of India.

UNIT III

Classification of horticultural crops – Fruits and Vegetables. cultivation of important crops – Tomato, Brinjal, Bhendi, *Dolichos lablab*, Snake guard. Storage, transport and Marketing of vegetables. Growth regulators in horticulture. Preservation of fruits and vegetables.Storage of fruits and vegetables.

UNIT IV

Fruit crops – Pomology -Cultivation of important fruit crops – Mango, Banana, Brinjal Cauliflower and Apple. Storage and preservation of fruit. Floriculture –Cut flowers. Flower arrangements - basic styles-upright and slanting. Japanese – ikebana and dry flower arrangement. Flower decoration – Dry and wet decoration Cultivation of Commercial floriculture –jasmine and rose. Commercial horticulture - Extraction of Jasmine concrete and Papain.

UNIT V

Nursery - definition, types; management strategies- planning, layout, budgetingproduction unit, sales unit. Types of soils and preparation of fields – Manures organic and inorganic. Pots and containers – tools and implements – watering – types. Plant protection measures for horticulture.

TEXT BOOKS

- 1. Adams, C.R. and Early, M.P. (2004). Principles of Horticulture. Elsevier, New Delhi.
- 2. Barton West, R. (1999). Practical Gardening in India. Discovery Publishing House, New Delhi.
- 3. Chadha, K.L. (2001). Hand Book of Horticulture, ICAR Publications, New Delhi.
- 4. George Acquaah.(2009). Horticulture Principles and Practices. PHI Learning Private Limited, New Delhi.
- 5. Kumar, N. (2014). Introduction to Horticulture. Rajalakshmi Publications, Nagercoil.
- 6. Manibhushan Rao, K. (2009) Text book of Horticulture. Macmillan India Ltd.
- 7. Mazundar, B.C. and Mukhopadhyay, P.M. (2006). Principles & Practices of Herbal Garden. Daya Publishing House, New Delhi.
- 8. Percy Lancasher. (2004). Gardening in India. Oxford IBH Publishing Company Private Limited, New Delhi.
- 9. Sadhu, M.K. (1996). Plant Propagation. New Age International Publishers, New Delhi.
- 10. Sheela, V. L. (2011). Horticulture. MJP Publishers, Chennai.

REFERENCE BOOKS

- 1. Randhava, G.S. (1973). Ornamental horticulture in India. Today and Tomorrow Printers and Publishers, New Delhi.
- 2. Williams, C.N., Uzo, J.O. and Peregrine, W.T.H. (1991). Vegetable production in Tropics. Longman Scientific & Technical, Essex (UK).
- 3. Yawalkar, K.S. (1961). Vegetable crops of India. Agri Horticultural Publishing House, Dharmapath, Nagpur

M.Sc. BOTANY SEMESTER - II

EXTRA DISCIPLINARY COURSE - PAPER II: HERBAL BOTANY

UNIT I

Brief history of medicinal plants. Indian systems of Medicine: Siddha. Ayurvedha and Unani and Naturopathy. Traditional and Folklore medicine- Native medicine. Definition of Drug - Classification of natural drugs: Alphabetical, Morphological, Pharmacological and Chemical

UNIT II

Drug adulteration, Drug evaluation, Chemical evaluation and Biological evaluation of drugs, Phytochemical investigations. Chemistry of drugs (Alkaloids, Flavanoids, Glycosides and Tannins) Quality control of herbal drugs.

UNIT III

Cultivation, macro and microscopic characters, chemical constitutions and therapeutic uses of drugs from root (*Vinca rosea* and *Rauwolfia serpentina*), drugs from bark (*Cinchona officinalis*), drugs from stem of wood (Ephedra sp) and drugs from underground stem (*Zingiber officinale*).

UNIT IV

Cultivation, micro and macrostructure, chemical constitutions and therapeutic uses of leaves (*Aloe vera* and *Ocimum sanctum*), flower (*Eugenia jambolana*), fruits and seeds (*Feronia elephantum and Coriandrum sativum*).

UNIT V

Pharmacognosy - Definition and scope. A brief account on drugs acting on central nervous system (CNS stimulants, CNS depressants and Hallucinogenics). Drugs used in disorders of gastrointestinal tract (Carminatives, Bulk laxatives and Purgatives) and cardio vascular drugs (Cardiotonics, Cardia depressants and Antihypertensives).

TEXT BOOKS

- 1. Amruth, The Medicinal plants Magazine (All volumes) Medplant Conservatory Society, Bangalore.
- 2. Arumugam, K.R. and Murugesh, N. (1990). Text book of Pharmacognosy. Sathya Publishers, Chinnalapatti (Tamilnadu) 624 201.
- 3. Bhattacharjee, S.K. 2004. Hand Book of Medicinal plants. Pointer Publishers, Jaipur.
- 4. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. (2003). Pharmacognosy. Nirali Prakashan, Pune.
- 5. GuhaBakshi, D.N. Sen Sharma, P. and Pal, d.C. (1996). A Lexicon of Medicinal Plants in India. Naya Prakash, Calcutta.
- 6. Handa, S. S. and V. K. Kapoor, (1993). Pharmacognosy. Vallabh Prakashan. New Delhi.
- 7. Harbourne, J. B. (1998). Phytochemical methods: A Guide to Modern Techniques of Plant Analysis (3rd edition). Chapman and Hill Co., New York.
- 8. Jain, (2001). Medicinal plants. National Book Trust, New Delhi.
- 9. John JothiPrakash, E. (2003). Medicinal Botany and Pharmacognosy. JPR Publication, Vallioor, Tirunelveli.
- 10. Joshi, S.G. (2001). Medicinal plants. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- 11. Medicinal Plants Source Book India, (1996). International Library Association, Switzerland.
- 12. Prajapathi, Purohit, Sharma and Kumar. (2003). A Hand book of Medicinal plants. Agrobios Publications, Jodhpur.
- 13. Purohit and Vyas, (2004). Medicinal Plants Cultivation. Agrobios Publications, Jodhpur.
- 14. Thirugnanam, (1995). Muligaimaruthuvam (Tamil). Selvipathipakam, Trichy.

Max. Marks: 75

MODEL QUESTION PAPER SEMESTER - I CORE COURSE-I: BIODIVERSITY OF PLANTS-I (ALGAE, FUNGI, LICHEN AND BRYOPHYTES)

Time: 3 Hrs.

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Phycology
- 2. Pyrenoids
- 3. Agar agar
- 4. Algal bloom
- 5. Heterothallism
- 6. Coenocytic mycelium
- 7. Helotism
- 8. Saxicolus
- 9. Operculum
- 10. Antheridiophore

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write a short note on range of thallus structure in Chlorophyceae. (Or)b) List out the characteristic features of Cyanophyceae.
- 12. a) Briefly list out the general characters of Fresh water algae.(Or)b) Describe the cultivation methods of algae.
- 13. a) Briefly list out the general characters of Myxomycetes. (Or)
 - b) Write shorts on economic importance of Fungi.
- 14. a) Classification of lichens. (Or)
 - b) List out the economic importance of Lichens.
- 15. a) Describe the evolution of gametophytes in Bryophytes. (Or)
 - b) Describe the structure Marchantia thallus.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Give an account on Fritsch Classification of Algae. (Or)
 - b) Write an essay on economic importance of Algae.
- 17. a) Give an account on growth and mode of nutrition in fungi. (Or)
 - b) Describe the morphology and internal structure of lichen thallus.
- 18. a) Give an account on Reproduction and life cycle of Polytrichum. (Or)
 - b) Write an essay on economic importance of Bryophytes.

MODEL QUESTION PAPER

SEMESTER - I

CORE COURSE II: BIODIVERSITY OF PLANTS – II

(PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY

Time: 3 Hrs.

Part A (10x2=20 marks)

x2=20 marks)

Max. Marks: 75

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Leptosporangiate
- 2. Glossopodium
- 3. Heterospory
- 4. Protostele
- 5. Corraloid root
- 6. Megasporophyll
- 7. Resin canal
- 8. Canada balsam
- 9. Pseudofossil
- 10. Compression

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write a short notes on general features of Pteridophytes.(Or)
- b) List out the Economic importance of Pteridophytes.
- 12. a) Describe the cone of the Equisetaceae. (Or)
- b) Write short notes on Apogamy and Apospory
- 13. a) Classification of Gymnosperms. (Or)
 - b) Give an account of phylogeny of Cycadales.
- 14. a) "Ginkgo is a living fossil" Discuss. (Or)
 - b) Compare the Affinities of Pteridophyte with Gymnosperms.
- 15) a) Describe the method of fossilization. (Or)
 - b) Write short notes on fossil Pteridophytes.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Give the classification of Pteridophytes. (Or)
 - b) Write an essay on morphology and reproduction of Ophioglossaceae.
- 17. a) Write a essay on stelar Evolution in Pteridophytes. (Or)
 - b) Give a detailed account on life cycle of Cupressaceae.
- 18. a) Give general charterers of Ginkgoales. (Or)
 - b) Write an essay on fossil types.

PERIYAR UNIVERSITY

Max. Marks: 75

MODEL QUESTION PAPER

SEMESTER I

CORE III : TAXONOMY OF ANGIOSPERMS

Time: 3 Hrs.

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Bionomial nomenclature
- 2. Holotypes
- 3. Palynology
- 4. Paleobotany
- 5. Molecular taxonomy
- 6. Barcoding
- 7. Flower of polygala
- 8. Androphore
- 9. Epipetalous
- 10. Resupination

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Discuss the Linnaean principle of Classification (Or)
 - b) Give a short account on Botanical gardens.
- 12. a) Write notes on Chemotaxonomy. (Or)
 - b) Give an account on taxonomy in relation to embryology.
- 13. a) Briefly discuss the DNA finger printing and their application in Plant taxonomy (Or)
 - b) Give a short account on Phenotypic Plasticity.
- 14. a) Evaluate the characters of Menispermaceae in the light of the of its Phylogeny. (Or)
 - b) Give an account of floral characters of Onagraceae.
- 15. a) Give an account of floral characters of Aristolochiaceae (Or)
 - b) Describe the flowers in Cyperaceae.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Give an account of Bentham and Hookers system of classification and add a note on its merits. (Or)
 - b) Write an essay on principle and Priority of botanical nomenclature
- 17. a) Give a detail account on Chemotaxonomy. (Or)
 - b) Critically examine the classical experiments of Turresson
- 18. a) Explain the feature of taxonomic interest in Sapindaceae and example its Systematic position (Or)
 - b) Explain the floral feature of Oleaceae with its economic importance

MODEL QUESTION PAPER

SEMESTER I

ELECTIVE COURSE- I: PLANT RESOURCES AND UTILIZATION

Time: 3 Hrs.

Max. Marks: 75

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Acclimatization
- 2. Secondary center
- 3. Binomial of Rice
- 4. Natural fibres
- 5. Colchicum
- 6. Asafoetida
- 7. Cinchona
- 8. Myrobalan
- 9. Biodiesel
- 10. Name any two oil yielding plants

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 1. a) Discuss the biodiversity status in India (Or)
- b) Give short account on economic importance of lichens
- 12. a) Write short notes on Pulse and their importance (Or)
 - b) Give a brief account fodder crops
- 13. a) Write the Chemo-taxonomical classification of crude drug. (Or)

b) Explain the medicinal uses of Centella asiatica and Phyllanthus embilica.

- 14. a) Give brief an account on Isapgol. (Or)
- b) Write a brief note on Arachis oil.
- 15. a) Write a brief note on vegetable oil and their fat content. (Or)
 - b) Write short notes on gum yielding plants and their uses.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

Draw diagrams wherever necessary; each answer should not exceed 500 words.

- 16. a) Write an essay on plant introduction (Or)
 - b) Discuss the nutritional value and industrial application of certain widely exploited marine Algae
- 17. a) Give an account on cultivation of Rice. (Or)
 - b) Write about the botanical description, cultivation and medicinal properties of Catharanthus and Adathoda
- 18. a) Write an essay on Cannabis (Or)
 - b) Give a detailed account of the structure, types, chemical composition, Properties and uses of Wood

62

PERIYAR UNIVERSITY

Max. Marks: 75

MODEL QUESTION PAPER

SEMESTER -II

CORE COURSE - V: MICROBIOLOGY AND PLANT PATHOLOGY

Time: 3 Hrs.

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Growth curve
- 2. Synchronous
- 3. Mycophages
- 4. Interferons
- 5. Xenobiotics
- 6. Biofiltration
- 7. Phytoalexin
- 8. SAR
- 9. Citrus Canker
- 10. Damping off

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write a short notes on Scope of Microbiology (Or)
 - b) Explain the gram staining method.
- 12. a) Write a short notes on food spoilage. (Or)
 - b) Explain the structure of Bacteriophage.
- 13. a) Explain the mass cultivation method of Rhizobium. (Or)
 - b) Briefly explain the organic composting.
- 14. a) Give a brief account on general symptoms of Plant diseases. (Or)
 - b) Briefly explain the plant disease forecasting..
- 15. a) Briefly explain the Tobacco mosaic disease. (Or)
 - b) Explain Bunchy Top of Banana.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Give a detailed account on Batch and continuous culture methods. (Or)
 - b).Write an essay on Biopesticide.
- 17 a) Explain mass cultivations of Azotobacter in detail. (Or)
 - b). Describe the bio degradation of petroleum.
- 18. a) Write an essay on defense mechanisms in plants. (Or)
 - b) Explain i) Little leaf of Brinjal ii)Bacterial Blight of Paddy

MODEL QUESTION PAPER

SEMESTER -II

CORE COURSE -VI: ANATOMYOF ANGIOSPERMS, PLANT MICRO TECHNIQUE ANDEMBRYOLOGY OF ANGIOSPERMS.

Time: 3 Hrs.

Max. Marks: 75

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Diffuse porous wood
- 2. Tension wood
- 3. Medullary Vascular bundle
- 4. Unilacunar node
- 5. Numerical apertures
- 6. Smears
- 7. Simple stain
- 8. FAA
- 9. Endothelium
- 10. Polyembryony

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write the types and its functions of cambium. (Or)
 - b) Differentiate the Sap wood from Heart wood.
- 12. a) Give a detailed account on cortical inverted vascular bundle. (Or)
 - b) Diagrammatically describe Anomalous structure of Aristalochia stem
- 13. a) Write an principle and organization of light microscope (Or)
 - b) Write notes on clearing techniques.
- 14. a) Give an account on fixation and fixatives. (Or)
 - b) Give an account on micrometry.
- 15. a) Describe the various types of haustoria associated with cellular Endosperms (Or)
 - b) Discuss the development of pollen wall in angiosperms plant

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks, Draw diagrams wherever necessary; each answer should not exceed 500 words.

- 16. a) Give a detailed account on types of meristems (Or)b) Write the internal structure dorsiventral leaf.
- 17. a) Discuss the root and shoot transition (Or)
 - b) Explain principle and functions of TEM.
- 18. a) Give a detailed account on types, principles and uses of Camera lucida.(Or)
 - b) Describe the development of dicot embryo

64

Max. Marks: 75

MODEL QUESTION PAPER

SEMESTER -II

CORE COURSE VII CELL AND MOLECULAR GENETICS

Time: 3 Hrs.

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Nucleiod
- 2. Lysosomes
- 3. Active transport
- 4. Nucleosome
- 5. Epistatic gene
- 6. Linkage
- 7. Sex linked genome
- 8. Induced Mutation
- 9. Transcription
- 10. Heat Shock Proteins

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks; Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write a note on peroxisome. (Or)
 - b) Briefly explain about plastids.
- 12. a) Briefly explain about Lipid bilayer concept (Or)b) Explain the chromosome structure in prokaryotes.
- 13 a) What do you know about lethal gene. (Or)
 - b) Write a short note Complementary gene interaction.
- 14. a) Briefly explain the Hardy- Weinberg Law. (Or)
 - b) Briefly discuss the significance and role of polyploidy in Evolution.
- 15 a) Write a short note on RNA. (Or)
 - b) Write a note on Genetic code.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Describe the structure and function of mitochondria. (Or)
 - b) Write a detailed note on cell division and cell cycle
- 17. a) Give an account on Mendelian principles. (Or
 - b) Explain the mechanism and significance of sex determination.
- 18. a) Write an essay on mutation. (Or)
 - b) Explain the mechanism and significance of prokaryotic and eukaryotic transcription.

MODEL QUESTION PAPER

SEMESTER III

CORE COURSE X: PLANT PHYSIOLOGY AND BIOPHYSICS

Time: 3 Hrs.

Part A (10x2=20 marks)

Max. Marks: 75

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Define osmatic potential
- 2. Anti Transpirants
- 3. Photophosphorylation
- 4. Kranz type of anatomy
- 5. Nitrogenase
- 6. ABA
- 7. Terpenes
- 8. Proline
- 9. Redox potential
- 10. ATP bioenergetics

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Distinguish between active and passive absorptions. (Or)b) Describe the biological significance of Water
- 12. a) Describe the outline of CAM pathway (Or)
 - b) Write short notes on Gluconeogenesis.
- 13. a) Highlight the role of leghaemogolbin in nitrogen fixation. (Or)
 - b) Brief account on phytochrome in flowering.
- 14. a) Explain the drought tolerant mechanisms of higher Plant (Or)
 - b) Write short notes on Ageing and Senescence.
- 15. a) Explain the laws of thermodynamics. (Or)
 - b).Give an account on De excitation.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Explain the possible mechanisms of solutes and assimilates (Or)
 - b) Explain the regulatory mechanisms of stomatal behavior
- 17. a) Give an account on of Photorespiration and its significance (Or)
 - b).Write an essay on physiology of fruit ripening.
- 18. a) Explain causes and methods of breaking of dormancy. (Or)
 - b) Give an account on energy transductions in biological system.

MODEL QUESTION PAPER

SEMESTER III

CORE COURSE XI: PLANT ECOLOGY AND PHYTOGEOGRAPHY

Time: 3 Hrs.

Max. Marks: 75

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Food web
- 2. Ecotones
- 3. Herbivory
- 4. Symbiosis
- 5. Tsunami
- 6. E- waste
- 7. WWF
- 8. UNESCO
- 9. Hotspots
- 10. Endemism

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write a brief account on the aim and scope of ecology. (Or)b) Explain ecological indicators.
- 12. a) Discuss in brief the various factor that regulate the population growth. (Or)b) Give an account on species interactions.
- 13. a) Brief account on noise pollution. (Or)
 - b) Write short on Rio de janeiro summit.
- 14. a) Explain the principle and application of remote sensing (Or)
 - b) Discuss about environmental education programme
- 15. a) Explain the age and area hypothesis (Or)
 - b) Give a brief account on continental drift hypothesis.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

Draw diagrams wherever necessary; each answer should not exceed 500 words.

- 16. a) Describe the various method of study of communities .point out merits and Demerits of each method. (Or)
 - b) Define ecosystem. Give an account of the structure and function of an ecosystem
- 17. a) Define ecological niche. How this phenomenon is involved in completion between the organisms (Or)
 - b) Write about the causes, effect and control measures of air pollution.
- 18. a) Write an essay on principles and applications of remote sensing. (Or)
 - b) Describe the phytogeographical regions of India

67

MODEL QUESTION PAPER

SEMESTER III

ELECTIVE COURSE- III: PLANT BIOTECHNOLOGY AND GENETIC ENGINEERING Time: 3 Hrs. Max. Marks: 75

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Genome.
- 2. Germplasm.
- 3. Totipotency.
- 4. Callus.
- 5. S1 nucleases.
- 6. RAPD
- 7. Flavrsavr
- 8. Lipofection.
- 9. TRIPS
- 10. ELSI.

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks; Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Give a brief account on history and scope of Plant biotechnology. (Or)
 - b) Write a note on cryopreservation.
- 12. a) Write a short note on Cell suspension culture (Or)b) Briefly explain about Explant sterilization.
- 13. a) Briefly explain the principles of r DNA technology. (Or)
 - b) Write a note on cosmids.
- 14 a) Write a note on micro injection. (Or)
 - b) Briefly explain about Antisense technology.
- 15. a) Write about Farmers rights. (Or)
 - b) Write the current scenario of IPR in India.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Give an account on plant genome organization. (Or)
 - b) Write a detailed account on protoplast technology.
- 17. a) Explain the mechanism, principles of PCR. (Or)
 - b) Describe the Agrobacterium mediated gene transfer.
- 18. a) Write an essay on transgenic plants. (Or)
 - b) Discuss the ELSI impact on GMOs.

PERIYAR UNIVERSITY

Max. Marks: 75

MODEL QUESTION PAPER

SEMESTER III

CORE COURSE-XIII: BIOCHEMISTRY AND NANOBIOECHNOLOGY

Time: 3 Hrs.

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Atom.
- 2. Molarity.
- 3. Gluconeogenesis.
- 4. Nucleotide.
- 5. Transamination.
- 6. Coenzymes.
- 7. Simple Lipid.
- 8. Glycoside.
- 9. Nano array.
- 10. Biosensor.

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write the importance of pH in biological system. (Or)
- b) Write the Structure, properties of water.
- 12. a) Classify the Carbohydrates. (Or)b) Write a note on Nucleic acids.
- 13. a) Write a note on Urea cycle. (Or)
 - b) Explain Ramachandran plot.
- 14. a) Write a note on steroid metabolism. (Or)
 - b) Write short note on flavonoids.
- 15. a) Write briefly on Nanoparticles. (Or)
 - b) Write about biosensors and their applications.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Discuss about molecules and chemical bonds. (Or)
 - b) Describe the TCA cycle.
- 17. a) Give an account on the structural conformations of proteins. (Or)
 - b) Discuss Michaelis-Menton equation.
- 18. a) Explain the biosynthesis and biochemical importance of alkoloids. (Or)
 - b) Explain the applications of nano biotechnology in agriculture and medicine.

MODEL QUESTION PAPER

SEMESTER IV

CORE COURSE- XIII: BIOINSTRUMENTATION, BIOSTATISTICS AND BIOINFORMATICS

Time: 3 Hrs.

Part A (10x2=20 marks)

Max. Marks: 75

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. IR.
- 2. AAS
- 3. Centrifugation.
- 4. HPLC.
- 5. AGE
- 6. Isoelectro focusing.
- 7. Monography.
- 8. Bibliography
- 9. Histogram.
- 10. NCBI.

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Give an account on fluorescence microscopy. (Or)
- b) Write short note on principle of Spectroscopy.
- 12. a) Briefly explain the principle of centrifuge. (Or)
 - b) Write short note on autoradiogram.
- 13. a) Write short note on PH meter. (Or)
 - b) Write short note on buffers.
- 14. a) Briefly explain oral and poster presentation. (Or)
 - b) Write notes on review paper.
- 15. a) Write a note on classification and tabulation of data. (Or)
 - b) Write briefly on sequence alignment.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

Draw diagrams wherever necessary; each answer should not exceed 500 words.

- 16. a) Describe the principle and mechanisms of UV visible spectrometer. (Or)
 - b) Explain the principles and applications of chromatography in biological research.
- 17. a). Explain the principles, applications of Electrophoresis. (Or)
 - b) Write an essay on literature collection.
- 18. a) Discuss the chi square test with suitable examples. (Or)
 - b) Give an account on biological data bases?

70

PERIYAR UNIVERSITY

Max. Marks: 75

MODEL QUESTION PAPER

SEMESTER IV

ELECTIVE COURSE- IV. HORTICULTURE AND FORESTRY

Time: 3 Hrs.

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Liquid manure
- 2. Pomology
- 3. Nursery Stock
- 4. Types of layering
- 5. Kitchen garden
- 6. Topiary
- 7. Jasmine concrete
- 8. Olericulture
- 9. Species invasion
- 10. Felling

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Write the divisions of horticulture (Or)
- b) Explain the different organic substrates
- 12 a) Write about types of Budding (Or)
- b) Explain nursery soil bed preparation
- 13. a) Write notes on Top dressing and Topiary (Or)
 - b) Write short notes on Garden adornments.
- 14. a) Explain Ikebana (Or)
 - b) Give an account on hydrophonics.
- 15. a) Write the scope and practices of Silviculture. (Or)
 - b) Describe the Social forestry.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

- 16. a) Explain different types of Irrigation. (Or)
 - b) Write about types of Grafting and its application
- 17. a) Define the designing of different types of gardens (Or)
 - b) Elaborate the types of flower arrangements
- 18. a) Write short notes on i) Afforestation and Reforestation ii) Silviculture (Or)
 - b) Discuss the drawbacks of Human interference in forest

MODEL QUESTION PAPER SSEMESTER -II CORE COURSE – IV. PRACTICAL I (COVERING THE CORE COURSES I & II) (ALGAE, FUNGI, LICHENS, BACTERIA, VIRUSES, BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERMS AND PALEOBOTANY)

Time: 4 Hrs.		Max. Marks: 60
Practical: 50 marks	Record: 05 marks	Viva - voce: 05 markss

- 1. Make suitable micro preparations of A, B, C, D and E. Draw labeled sketches. Identify and give the reasons. Submit the slides for valuation. (5 x 4 = 20 marks)
- 2. Make suitable micro preparations of F and G. Draw labeled sketches identify and give the reasons. Submit the slides for valuation. $(2 \times 5 = 10 \text{ marks})$
- 3. Identify any two algae from the given algal mixture H. Draw diagrams only. (4 marks)
- 4. Name the genus and group of the given specimens I and J. $(2 \times 2 = 4 \text{ marks})$
- 5. Draw diagrams and notes of interest on K, L, M and N. (4 x 3 = 12 marks)

Serial Number	Materials	Marks Numbers x No. of Questions	
A, B, C,	Algae, Fungi, Bryophytes, Pteridophytes	4 x 5	20 marks
D & E	and Gymnosperms.		
F & G	Reproductive parts one each from	5 x 2	10 marks
	Pteridophytes and Gymnosperms		
Н	Mixture of three micro algae	4 x 1	4 marks
I & J	Macroscopic structure of Bryophytes	2 x 2	4 marks
K, L, M	Materials one each from Fungi, Lichens and	3 x 4	12 marks
& N	Fossils, bacteria or Viruses		
	Practical - Total Marks		50 marks

Note:

- Submission of 15 herbarium sheets from Lichens / Bryophytes/Pteridophytes / Gymnosperms (during the internal practical examination).
- Field trip to a hill station and coastal area for a minimum period of five days for the Collection of specimens and to study the plants in their natural habitat.
- Certified record work done in the laboratory during practical classes.
PERIYAR UNIVERSITY

73

MODEL QUESTION PAPER SEMESTER-II CORE COURSE VIII. - PRACTICAL II

(COVERING THE CORE COURSES III & V)

[TAXONOMY OF ANGIOSPERMS, MICROBIOLOGY AND PLANT PATHOLOGY]

Time: 4 Hrs.		Max. Marks: 60
Practical: 50 marks	Record: 05 marks	Viva - voce: 05 marks

- 1. Find out the binomials of A and B. (3x2=6marks)
- 2. Refer specimens C and D to their respective families, give the reasons at each level of Hierarchy. (3x2=6marks)
- 3. Construct a key using E, F, G, H, I and J. (6 marks)
- 4. Determine whether the given sample K is contaminated with bacteria or not. Leave Sample for valuation. (4 marks)
- 5. Perform the gram staining to identify the given bacterial sample L -5 marks
- 6. Name the causal organism, disease symptoms and control measures of the given Material. (4marks)
- 7. Mention the family, genus and species of N,O and P (3x3=9marks)
- 8. Write notes on Q, R and S. (3x2=6marks)
- 9. Write economic importance of T and U. (2x2=4marks)

Serial Number	Materials	M Numbers x N	larks lo. of Questions
A & B	Families prescribed in the syllabus	3 x 2	6 marks
C & D	Flowering plants from families prescribed	3 x 2	6 marks
	in the syllabus		
E, F, G,	Flowering twigs	1 x 6	6 marks
H, I & J			
К	Samples given in the practical	4 x 1	4 marks
L	Samples given in the practical	5 x 1	5 marks
М	Pathological material specified	4 x 1	4 marks
	in the syllabus		
N, O & P	Plants given in practical syllabus	3 x 3	9 marks
Q, R & S	Spotters from microbiology (Equipment's/ Instruments/Chemicals/culture Media /stains/Photographs/Slides)	2 x 3	6 marks
T & U	Economic importance of families	2 x 2	4 marks
	Practical - Total Marks		50 marks

Note:

- Submission of a tour report and 25 herbarium sheets (Specimens collected from Tour collection / locally available plants during the internal practical Examination.
- Certified record work done in the laboratory during practical classes.

M.Sc. BOTANY

MODEL QUESTION PAPER SEMESTER -IV

CORE COURSE-IX: PRACTICAL-III(COVERING THE CORE COURSES VI&VII) (ANATOMY OF ANGIOSPERMS, PLANT MICRO-TECHNIQUES, EMBRYOLOGY, CELL BIOLOGY, GENETICS AND MOLECULAR BIOLOGY)

Time: 4 Hrs. Practical: 50 marks

Record: 05 marks

Max. Marks: 60 Viva - voce: 05 mark

- 1. Cut transverse section of "A". Identify the anomaly by giving reasons. Draw diagrams and submit the slides for valuation. -6 marks.
- 2. Macerate and identified the elements in the "B". Measure the length or breadth using Micrometer. 6 marks.
- 3. From the given material "C" dissect and mount any two stage of embryo. Draw diagrams. Submit the slides for valuation. 6 marks.
- 4. With the flower bud given in "D", identify any 2 developmental stages of microsporogenesis. Draw diagrams. Submit the slides for valuation. 6 marks.
- 5. Prepare a squash of "E". Display any 2 stages of cell divisions. Draw labeled sketches. 4 marks.
- 6. Construct a chromosome map; calculate interference and coefficient of variation from a three point test cross data given in F. 8 marks.
- 7. Solve the genetic problem "G" and "H". $(2 \times 3=6)$.
- 8. Write notes of interest on "I, J, K and L". (2 x 4=8)

Serial Number	Materials	Numbers x N	larks Io. of Questions
A, B, C	Material given in the practical class	6 x 4	24 marks
& D	and Gymnosperms.		
E	Material given in the practical class	4 x 1	4 marks
F	Construct a chromosome map /	8 x 1	8 marks
	Three point test cross data		
G & H	Genetic problem given in the practical	3 x 2	6 marks
	(Mono & Dihybrid ratio)		
I, J & K	Spotters from Anatomy, Micro technique &	2 x 3	6 marks
	Embryology (Slide/ Chemical/instrument)		
L	Spotter from molecular Biology	2 x 1	2 marks
	Practical - Total Marks		50 marks

Note:

Submission of 5 double stained permanent slides (Microtome or free hand sections – 2, Cleared material-1, Peel –1 and Maceration-1)

Certified record work done in the laboratory during practical classes.

PERIYAR UNIVERSITY

MODEL QUESTION PAPER SEMESTER -IV CORE COURSE-XII: MAJOR PRACTICAL IV (COVERING THE CORE COURSES X & XI) (PLANT PHYSIOLOGY, BIOPHYSICS AND PLANT ECOLOGY AND PHYTOGEOGRAPHY)

Time: 4 Hrs.Max. Marks: 60Practical: 50 marksRecord: 05 marksViva - voce: 05 mark

- 1. Set up the experiment A assigned to you. Record your observation and interpret the Results .Leave the set up for valuation. 10 marks.
- 2. Comment on the setup B. 5marks
- 3. Writes notes of physiological interest of C and D 3x2=6marks.
- 4. Construct a meter quadrat F. studies the plant community by determining frequency, Density and abundance of different species. Analyses the vegetation. Record your data and interpret the results. 10marks.
- 5. Determine the content of the given sample G. (pH/ dissolve oxygen/ bicarbonate Content/Primary productivity 7marks.

Serial Number	Materials	Marks Numbers x No. of Questions	
А	Plant physiology experiment given the	10 x 1	10 marks
	syllabus (Selected by each student by lot).		
В	Plant physiology experiment (Set up)	5 x 1	5 marks
C & D	Charts/Figures/Graphs/tables/	3 x 2	6 marks
	Instruments/Apparatus, Chemicals/		
	Models/photographs		
F	Meter quadrat	10 x 1	10 marks
G	Soil sample/water sample	7 x 1	7 marks
H, I, J,&K	Ecological tools/Chemicals/Graphs/	3 x 4	12 marks
	photographs/Maps		
	Practical - Total Marks		50 marks

6. Write notes of ecological interest of H,I,J and K 4x3=12marks

MODEL QUESTION PAPER

SEMESTER -IV

CORE COURSE-XV: PRACTICAL-V: (COVERING THE CORE COURSES XIII&XIV) (BIOCHEMISTRY, NANOBIOTECHNOLOGY, BIOINSTRUMENTATION, BIOSTATISTICS AND BIOINFORMATICS

Time: 4 Hrs.		Max.	Marks: 60
Practical: 50 marks	Record: 05 marks	Viva - voce:	05 mark

- 1. Conduct the experiment (A) assigned to you. Record your results. Leave the set up Valuation. (10 marks)
- 2. For the given data (B) perform students "t" test and prove the statements -(7 marks)
- 3. From the given material (C) find out mean and calculate the standard deviation with Reference to its length. Present your data in the form of a graph. (6 marks)
- 4. Verify Beers law using the given solution / Determine the pH of given sample by using pH meter and comment on it (D)- (7marks)
- 5. Separate and identify the given sample (E) using either TLC or Paper Chromatography (10 Marks)

Serial Number	Materials	M Numbers x N	larks lo. of Questions
А	Biochemistry experiment from the syllabus	3 x 2	6 marks
	(Selected by each student by lot)		
В	Statistical data and tables are to be	7 x 1	7 marks
	provided		
С	Leaves or Seed sample (50numbers)	6 x 1	6 marks
D	CuSO4 solution /K2Cr2 O7 solution/	7 x 1	7 marks
	Determine the pH		
Е	Amino acid / Sugar/ pigments	10 x 1	10 marks
F	Biochemistry(Equipment/Apparatus/	2 x 1	2 marks
	Chemicals/Photographs/Charts/Diagrams)		
G	Nanobiotechnology (Spotter)	2 x 1	2 marks
Н	Bioinstrumentaion(Equipment/Apparatus/	2 x 1	2 marks
	Chemicals/Photographs/Charts/Diagrams)		
Ι	Biostatistics	2 x 1	2 marks
J	Bioinformatics	2 x 1	2 marks
	Practical - Total Marks		50 marks

6. Write notes on F,G, H, I, and J (5x2=10 marks)

PERIYAR UNIVERSITY

Max. Marks: 75

77

MODEL QUESTION PAPER

SEMESTER II

EXTRA DISCIPLINARY COURSE I: HORTICULTURE

Time: 3 Hrs.

Part A (10x2=20 marks)

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Pomology
- 2. Layering
- 3. Kitchen garden
- 4. Topiary
- 5. IAA
- 6. Write the binomial name of any two vegetables.
- 7. Cut flowers
- 8. Jasmine concrete
- 9. Nursery
- 10. Spaghetti tube

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks; Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. a) Give a brief account on scope of horticulture. (Or)
 - b) Briefly explain the methods of layering.
- 12. a) Write a short notes on indoor gardening. (Or)
 - b) Describe the designing of garden.
- 13. a) Explain the role of growth regulators in horticultural crops. (Or)
 - b) Write short notes on cultivation of brinjal.
- 14. a) Explain Ikebana. (Or)
 - b) Describe the extraction of Papain.
- 15. a) Discuss about the management of nursery. (Or)
 - b) Write a note on types of soil.

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

Draw diagrams wherever necessary; each answer should not exceed 500 words.

- 16. a) Give a detailed account on stock scion relationship in horticultural crops. (Or)
 - b) Write an essay on components of garden.
- 17. a) Explain the preservation of fruits and vegetables. (Or)
 - b) Describe the cultivation methods of commercial flowers with two examples.
- 18. a) Briefly explain the cultivation methods of Mango. (Or)
 - b) Write an essay on organic and inorganic manures.

MODEL QUESTION PAPER

SEMESTER II

EXTRA DISCIPLINARY COURSE II: HERBAL BOTANY

Time: 3 Hrs.

Part A (10x2=20 marks)

Max. Marks: 75

Answer all questions; all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 50 words.

- 1. Siddha
- 2. Ayurvedha
- 3. Adulteration
- 4. Alkaloids
- 5. Cinchona
- 6. Serpentine
- 7. Aloe
- 8. Ocimum
- 9. Hallucinogenics
- 10. Carminatives

Part B (5x5=25 marks)

Answer all questions (either a or b); all questions carry equal marks;

Draw diagrams wherever necessary; each answer should not exceed 200 words.

- 11. (a)Briefly discuss about Unani system of medicine. (Or)(b)Discuss the history of medicinal plants.
- 12. (a)Explain the methods of biological evaluation of drugs. (Or)(b)Discuss the drug flavanoids.
- 13. (a)What are the medicinal uses of Ephedra (Or)(b)Explain the chemical constituents of Vinca.
- 14. (a) Explain the cultivation of Eugenia. (Or)(b) Write down the chemical constituents of Coriandrum.
- 15. (a) What are the drugs used for central nervous system? (Or)

(b)How will you cure the gastrointestinal disorders by using plant drugs?

Part C (3x10=30 marks)

Answer all questions (either a or b); all questions carry equal marks,

Draw diagrams wherever necessary; each answer should not exceed 500 words.

- 16. a) Explain the classification of crude drugs. (Or)
 - b) Briefly discuss the chemical structure of glycosides and tannins.
- 17. a) Explain the cultivation, microscopic, chemical constituents and uses of Rauwolfia. (Or)
 - b) Explain the cultivation, microscopic, chemical constituents and uses of Zingiber officinale.
- 18. a) Give a detailed account on wood apple. (Or)
 - b) Explain the drugs acting on the cardiovascular system.

78