VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

ELAYAMPALAYAM, THIRUCHENGODE (Tk.), NAMAKKAL (Dt.) - 637 205

(Affiliated to Periyar University, Approved by AICTE & Re-Accredited with "A" by NAAC)

DEPARTMENT OF BOTANY

MASTER OF SCIENCE

SYLLABUS & REGULATIONS

CANDIDATES ADMITTED FROM 2017 -18 ONWARDS
UNDER AUTONOMOUS AND CBCS PATTERN

VIVEKANANDHA EDUCATIONAL INSTITUTIONS

ANGAMMAL EDUCATIONAL TRUST

ELAYAMPALAYAM, THIRUCHENGODE (Tk.), NAMAKKAL (Dt.) - 637 205

VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN

ELAYAMPALAYAM, TIRUCHENGODE

Reaccredited "A" Grade by NAAC

Affiliated to Periyar University – Salem.

(AUTONOMOUS – 2017-2018)

M.Sc., Botany - Branch V

For Candidates Admitted from 2017 - 2018 Onwards Under CBCS Pattern

1. Scope of the Department

Botany is classical science dealing with not merely about morphology of plants but also their functional aspects and economic importance. Further, the study helps us to understand the role of plants in maintaining the environment besides, saving as a renewable energy sources. Plants are most valuable in treating the ailments of mankind. It has several branches such as Plant Morphology, Taxonomy, Anatomy, Embryology, Mycology, Pathology, Physiology, Ecology, Plant Diversity, Ethno Botany etc., besides serving as the basis for several other biosciences. It is a basic science with several research disciplines like modern transgenic biology.

2. Objectives of the course

This course will enable the students

- To gain knowledge of the importance of plants in conserving food and fuel.
- To acquire skills in drawing by actual observation at its original and natural condition.
- To know the nutritive value of food and maintain 'Health and Care Problems'.
- To create awareness in the understanding of extinct plants.
- To create awareness of natural resources and methods of conservation.
- To develop skill in students of growing various horticultural plants thereby to raise a nursery.
- To train in techniques of Vegetative propagation and gardening.
- To motivate for self-employment by knowledging and practicing in the preparation of bio-fertilizers.
- 'Earn while learn' can be done with the acquirement of basic knowledge in growing some medicinal plants.

- ❖ To gain knowledge for exploration of new plants unknown value and known plants of unknown value of their secondary metabolites.
- ❖ To gain a knowledge of the techniques of producing desirable plants through the study of molecular biology and genetic engineering.

3. Conditions for Admission:

A candidate who has passed B.Sc., Examination with Botany as main subject of any university or an examination accepted as equivalent thereto or as per norms said by the Government of Tamilnadu is permitted to appear and qualify for M.Sc., Degree examination of this university after a course of study of two academic years.

4. Duration of the Course:

The course for the degree of Master of Science in Botany shall consist of two academic years divided into four semesters.

5. Course of Study:

The course of study shall comprise of instruction in the following subjects according to the syllabus and books prescribed from time to time.

Semester I

1. Core Course I - Biodiversity of Plants – I
2. Core Course II - Biodiversity of Plants – II
3. Core Course III - Taxonomy of Angiosperms and Economic Botany
4. Core Course IV - Practical I, Comprising Core Course I (Examination at the end of second semester)
5. Elective I - Herbal Botany/Environmental Biotechnology

Semester II

6. Core Course V - Anatomy of Angiosperms, Embryology of Angiosperms and Plant Micro technique
7. Core Course VI - Cell and Molecular Biology and Genetics
8. Core Course VII - Practical II (Comprising Core Course II & III)
9. Core Course VIII - Practical III (Comprising Core Course V & VI)

10. Elective II - Fundamentals of Computers/Mushroom Biotechnology

17. Elective III - Plant Bio-technology and Bioinformatics/Plant Resource Utilization and Biodiversity Conservation

Semester III

15. Core Course IX - Plant physiology and Biophysics

13. Core Course X - Environmental Biology and Resource Management

17. Core Course XI - Microbiology and Plant Pathology.

15. Core Course XII - Practical IV Comprising Core Course IX, X & XI (Examination at the end of fourth semester)

16. EDC Paper - Herbal Botany

Semester IV

17**.** Core Course XIII - Biochemistry and Biostatistics

18. Core Course XIV - Instrumentation Techniques

19. Core Course XV - Practical V (Comprising Core Courses XIII & XIV)

20. Elective IV - Pharmacognosy and Phytochemistry/Horticulture and Landscaping

21. Project Work

6. Examinations:

The theory examination shall be of three hours duration to each paper at the end of the semester. The candidates failed in any subject will be permitted to appear for each failed subject or subjects in the subsequent examination. The practical examination is of four hours duration at the end of even semester. However in the final semester examination in the failure of one or two subjects they can appear for a supplementary exam within a month.

The examination consists of Continuous Internal Assessment (CIA) and External Assessment (EA).

Internal Assessment Marks for Theory papers are as follows

Attendance	- 5	Marks
Assignment	- 5	Marks
Seminar	- 5	Marks
Test	- 5	Marks
Model	- 5	Marks
Total	- 25	Marks

Internal Assessment Marks for Practical papers are as follows

Attendance	-10	Marks
Observation	-10	Marks
Test	- 20	Marks
Total	- 40	Marks

7. Distribution of Marks for Attendance:

Percentage	Marks	
	Theory	Practical
75 - 80	1	2
81 - 85	2	4
86 - 90	3	6
91 - 95	4	8
96 - 100	5	10

Note:

Minimum 75 % of attendance is compulsory to sit for the exam. A condonation can be permitted between “65 %” to “74.9 %”.

8. Scheme of Examination:

The scheme of Examinations for different semesters shall be as follows.

Vivekanandha

College of Arts and Sciences for Women, Elayampalayam, Tiruchengode (Autonomous)

M. Sc., Botany - Choice Based Credit System

(For the candidates admitted from the Academic year 2017 - 2018 Onwards)

Sem	Course	Code	Course Title	Inst. Hrs.	Credit	Exam Hrs.	Marks		
							CIA	EA	Total
I	Core Course I	17P1BO01	Bio Diversity of Plants I	6	5	3	25	75	100
	Core Course II	17P1BO02	Bio Diversity of Plants II	5	5	3	25	75	100
	Core Course III	17P1BO03	Taxonomy of Angiosperms and Economic Botany	5	5	3	25	75	100
	Core Course IV (Practical I)	17P2BOP01	Comprising Core Course I & II (Examination at the end of II Semester)	6	4	4	40	60	100
	Core Course V (Practical II)	17P2BOP02	Comprising Core Course III (Examination at the end of II Semester)	3	4	4	40	60	100
	Elective I	17P1BOE01A/B	Herbal Botany/Environmental Biotechnology	5	4	3	25	75	100
	Total			**30**	**27**		**180**	**420**	**600**
II	Core Course VI	17P2BO04	Anatomy of Angiosperms, Embryology of Angiosperms and Plant Micro technique	6	5	3	25	75	100
	Core Course VII	17P2BO05	Cell and Molecular Biology and Genetics	6	5	3	25	75	100
	Core Course VIII (Practical III)	17P2BOP03	Comprising Core Course VI & VII	6	4	4	40	60	100
	Elective II	17P2BOE02A/B	Fundamentals of Computers/Mushroom Biotechnology	6	4	3	25	75	100
	Elective III	17P2BOE03A/B	Plant Biotechnology and Bioinformatics/Plant Resource Utilization and Biodiversity Conservation	6	4	3	25	75	100
	Total			**30**	**22**		**170**	**360**	**500**

III	Core Course IX	17P3BO06	Plant Physiology and Biophysics	6	5	3	25	75	100
	Core Course X	17P3BO07	Environmental Biology and Resource Management	6	4	3	25	75	100
	Core Course XI	17P3BO08	Microbiology and Plant Pathology	6	4	3	25	75	100
	Core Course XII(Practical IV)	17P4BOP04	Comprising Core Course IX, X & XI(Examination at the end of IV Semester)	8	4	4	40	60	100
	EDC	17P3BOED01	Herbal Botany	4	4	3	25	75	100
			Total	**30**	**21**		**170**	**360**	**500**
IV	Core Course XIII	17P4BO09	Biochemistry and Biostatistics	6	4	3	25	75	100
	Core Course XIV	17P4BO10	Instrumentation Techniques	6	4	3	25	75	100
	Core Course XV (Practical V)	17P4BOP05	Comprising Core Course XIII & XIV	6	4	4	40	60	100
	Elective IV	17P4BOE04A/B	Pharmacognosy and Phytochemistry/Horticulture and Landscaping	6	4	3	25	75	100
	Project Work	17P4BOPR01	-	6	4	-	40	60	100
			Total	**30**	**20**		**155**	**345**	**500**
							615	**1785**	
Total No. of Hours and Credits				**150**	**90**		**2100**		

Question Paper Pattern for M. Sc. Botany Course

Time: 3 Hrs **Max. Marks: 75**

PART – A (5 x 5 = 25 Marks)

(*Answer all questions*)

(One question from each unit with internal choice)

PART – B (5 x 10 = 50 Marks)

(*Answer all questions*)

(One question from each unit with internal choice)

9. Format to be followed in dissertation

The formats / certificate for dissertation to be submitted by the students are given below:

1) Format for the preparation of project work

(a) Title page

(b) Bonafide certificate

(c) Acknowledgement

(d) Table of contents

Contents

Format of the title Page

TITLE OF THE DISSERTATION

Dissertation Submitted in partial fulfillment of the

requirement for the award of the Degree of

Master of Science in Botany

to the Periyar University, Salem 636017

By

Student Name

Register Number

Under the Guidance of

Guide Name

College / University Department

Year

Format of the Certificate

CERTIFICATE

This is to certify that the dissertation entitled …….(title of the dissertation)…..submitted by ……. (name of the candidate)…. in partial fulfillment of the requirement of the degree of Master of Science in Botany to the Periyar University, Salem is a bonafide record of independent research work done by her during the period …. (Year)… of her study in the Department of Botany at Vivekanandha College of Arts and Sciences for Women, Elayampalayam, under my supervision and guidance. This dissertation has not formed the basic for the award of any Degree, Diploma, similar titles or associate ship to any candidates of this University.

Viva –Voce Examination Date:

Signature of Head **Signature of the Guide**

Examiners: 1.

2.

10. Passing Minimum:

The Candidate shall be declared to have passed the examination if the candidate secures not less than 38 marks out of 75 marks in the university examination in each theory paper. There is no passing minimum for internal assessment. For the practical paper, a minimum of 30 marks out of 60 marks in the University practical examination and the record notebook taken together. There is no passing minimum for internal assessment and record note book. However submission of a record note book is a must.

For the project work and viva – voce the candidate should secure 30 marks out of 60 marks for pass. There is no passing minimum for internal assessment. The candidate should compulsorily attend viva-voce examination to secure pass in that paper. Candidate who does not obtain the required minimum marks for a pass in a paper / project report shall be required to appear and pass the same at a subsequent appearance.

11. 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.

12. Maximum duration for the completion of the PG Programme

The maximum duration for completion of the PG Programme shall not exceed 4 semesters.

13. 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 2017-18 and thereafter.

14. Transitory Provision

Candidates who were admitted to the PG course of study before 2017-18 shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of April / May 2018. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester I – Core Course I (Paper code: 17P1BO01)

DIVERSITY OF PLANTS - I (ALGAE, FUNGI, LICHENS AND BRYOPHYTES)

Max. Marks: 75
Credits : 5
Total hours : 75

Objectives:

- To understand the general characters, classification, ecology and economic importance of Algae
- To study the structure and reproduction of selected genera of algae
- To understand the general characters, classification, ecology and economic importance of Fungi
- To study the occurrence, structure and reproduction of selected genera of fungi
- To study about the lichens, history and classification of selected genera of Bryophytes

UNIT-I (15 hrs)

Algae: General characteristics with reference to thallus structure, pigmentation and life cycle. Classification of algae (Bold and Wynne, 1978). Criteria used in algal classification. Ecology of algae. Economic Importance of algae.

UNIT-II (15 hrs)

Structure and reproduction of the following genera of algae: *Lyngbya*, *Nostoc*, *Cladophora*, *Codium*, *Padina*, *Batrachospermum* and *Gracilaria*.

UNIT-III (15 hrs)

Fungi: General characteristics of Fungi with reference to their occurrence, thallus structure and reproduction. Classification of Fungi by Alexopolous & Mims (1979). Nutrition in Fungi. Heterothallism- Parasexuality. Phylogeny and affinities of fungi Importance of Fungi.

UNTI -IV (15 hrs)

Detailed study of the occurrence, thallus structure and reproduction of the following genera of fungi: *Pernospora*, *Aspergillus*, *Polyporus* and *Fusarium.*

UNTI-V **(15 hrs)**

A general account of Lichens with special reference to their structure and reproduction. Life history and classification of Bryophytes (Watson, 1963). Ecology and evolution of Bryophytes. Fossil Bryophytes. A detailed study of *Targionia, Dumortiera* and *Funaria.*

Text Book

1. Sharma, P. D. 2003. The Fungi. ELBS Publication, London
2. Alexopolous, C. J and Mims, C. W. 1979. Introductory Mycology. Wiley Eastern Publication, New Delhi.
3. Chopra, R. N. & Kumar, P. K. 1988. Biology of Bryophytes. John Wiley, New York.
4. Smith, A. J. E. 1982. Bryophyte ecology. Chapman and Hall, London.
5. Dube, H. C. 1990. An introduction to Fungi. Vikas publishing House, New Delhi.

References

1 .*Sohan Sharma, 2012. Advances In Mycology,* Random Publications Publishers and Distributors, New Delhi.

2. Fritsch, F.E.1945, 1955. The structure and reproduction of Algae, (Vol-I and II). Cambridge University Press, London.

3. Lewin, R.A.1972. Physiology and Biochemistry of Algae. Academic Press, NewYork.

4. Burnett, J.H. 1971. The fundamentals of Mycology. ELBS Publications, London

5. Hale Jr.M.E.1983. Biology of Lichens. Edward Arnold, Mary land.

6. Watson, E.V.1970. Structure and Life of Bryophytes. Hutchinson and Co., London.

7. Watson, E. V. 1968. British Mosses and Liverworts. Hutchinson and Co., London.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester I – Core Course II (Paper code: 17P1BO02)

DIVERSITY OF PLANTS - II

(Pteridophytes, Gymnosperms and Palaeobotany)

Max. Marks : 75
Credits : 5
Total hours : 75

Aim:

- To enable the students to study the higher group of non flowering plants

Objectives:

- To study the classification, structure of sporophytes and gametophytes of Pteridophytes
- To understand the structure, reproduction and affinities of the sporophyte and gametophytes of selected genera of Pteridophytes
- To understand the general characters, classification of orders in Gymnosperms
- To study the morphology and anatomy of the vegetative and reproductive structure of selected genera of Gymnosperms
- To study important fossils of both Pteridophytes and Gymnosperms

UNIT-I **(15 hrs)**

Classification of Pteridophytes (Sporne, 1976). Evolution of Sorus in ferns. Range in morphology, structure of gametophytes and sporophytes of the following orders - Psilotales, Isoetales, Equisetales, Filicales and Salviniales. Stelar evolution in Pteridophytes. Heterosporyand Seed habit.

UNIT-II **(15 hrs)**

Detailed study of range in structure, reproduction and affinities of the gametophytes and sporophytes with special reference to *Psilotum*, *Isoetes*, *Equisetum*, *Angiopteris*, *Pteris*, *Osmunda* and *Salvinia*.

UNIT-III **(15 hrs)**

Classification of Gymnosperms (Sporne, 1967). General account of Pteridospermales and Bennettitales. Comparative morphology and phylogeny of Cycadales, Coniferales and Gnetales. Evolution of male and female gametophyte.

UNTI -IV **(15 hrs)**

Study of morphology and anatomy of the vegetative and reproductive structures of *Araucaria*, *Podocarpus* and *Cupressus.*

UNTI-V **(15 hrs)**

Fossils and fossilization- methods, types of fossils. Study of morphology and anatomy of the vegetative and reproductive structure in the following fossil forms: *Sphenophyllum*, *Lyginopteris* and *Cordaites.*

Learning outcome:

- Importance and conservation of plant diversity.

Text Book:

1. Sharma, O.P. 2012. Pteridophyta, Tata McGraw Hill Publishing Company, New Delhi.
2. Biswas, C. and Johri, B. M. 2004. The Gymnosperms. Narosa Publishing House, New Delhi.
3. Sporne, K. R. 1965. The Morphology of Gymnosperms. Hutchinson University Press, London.
4. Sporne, K. R. 1965. The Morphology of Pteridophytes. Hutchinson University Press, London.
5. Shukla, A. C. and Sharma, M. 1992. Plant fossils - A link with the past, Birbal Sahni Institute of Palaeobotany, Lucknow, India.
6. Vashishta, B. R. 1987. Pteridophyta. S. Chand and Company, New Delhi.
7. Smith, G. M. 1935. Cryptogamic Botany. Vol. 11. Tata McGraw Hill Publishing Company, New Delhi.
8. Parihar, N. S. 1965. The Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.
9. Rashid, A. 1979. An Introduction to Pteridophyta. Vikas Publishing House, New Delhi.

Reference books:

1. Foster and Gifford, Jr., 1962. Comparative Morphology of Vascular Plants. Allied Pacific Private Limited, Mumbai.
2. Beek, G. E., 1988. Origin and Evolution of Gymnosperms. Colombia University Press.
3. Bhatnagar and Moitra, 1996. Gymnosperms. New age International Publishers, New Delhi.
4. Chamberlain. J. 1934. Gymnosperms: Structure and Evolution. Chicago Publisher. (Reprinted 1950), New York.
5. Arnolds, C. A., 1947. An Introduction to Paleobotany, McGraw Hill Book Company, New York.
6. Surange, K. R., 1966. Indian Fossil Pteridophytes. CSIR, New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester I – Core Course III (Paper code: 17P1BO03)

Taxonomy of Angiosperms and Economic Botany

Max. Marks : 75

Credits : 5

Total hours : 75

Objectives:

- To study the important systems of classifications of Angiosperms
- To understand the modern trends in classification
- To study the plant identification methods and ICBN
- To study the vegetative and reproductive characters of selected families of Angiosperms

Unit I **(15 hrs)**

History and principles of classification. Detailed account of the system of classification proposed by Bentham and Hooker, Bessey, Hutchinson and Cronquist (Including merits and demerits). Herbarium techniques.

Unit II **(15 hrs)**

Modern trends in classification. Taximetrics, Chemotaxonomy and Biosystematics. BSI-Organization, function and contribution. Taxonomic literature – Taxonomic index, Monographs and Revisions.

Unit III **(15 hrs)**

Plant identification – Methods of identification. Keys: Types of keys, rules for construction of keys, advantages and disadvantages. Nomenclature, ICBN, Typification, Priority, Publication, Author citation and retention, Choice and rejection of names.

Unit-IV **(15 hrs)**

A detailed account of the following families and their economic importance-Menispermaceae, Magnoliaceae, Caryophyllaceae, Oxalidaceae, Meliaceae, Sapindaceae, Polygalaceae, Lythraceae, Aizoaceae and Moringaceae.

Unit-V **(15 hrs)**

Boraginaceae, Bignoniaceae, Rhizophoraceae, Oleaceae, Moraceae, Orchidaceae, Dioscoriaceae, Loranthaceae, Aristolochiaceae, Cactaceae, Cypraceae and Poaceae.

Text Book:

1. T.Pullaiah ,2007 Text Book of Angiosperms , Regency Publications
2. Annie Roland, 2005. Taxonomy of Angiosperms, Saras Publication, Nagercoil.
3. Lawrence, G.H.M.1955. The taxonomy of vascular plants (Vol.I-IV).Central Book Depot. Allahabad.
4. Singh,V and Jain,V.K.1989.Taxonomy of Angiosperms. Rastogi Publication, Meerut.
5. Sivarajan, V. V. 1989. Introduction to principles of plant Taxonomy.Oxford and IBH, New Delhi.
6. Subramaniyam, N.S.1995. Modern plant taxonomy.Vikas publishing house,New Delhi.

References:

1. Davis, P.H. and Heywood, V.M. 1965. Principles of Angiosperm Taxonomy. Oliver and Boyd Edinburgh.
2. Gamble, J.S. and Fisher, L.E.F. 1967. The flora of the Presidency of madras (volume I. III). BSI, Calcutta.
3. Grant, E.F. 1984. Plant Biosystematics. Academic Press Inc., Canda.
4. Heywood, V.H. 1967. Plant taxonomy. Edward Arnold, Great Britain.
5. Hutchinson, J. 1973. The families of flowering plants. Oxford University Press, London.
6. Mathew, K.M. 1983. The flora of Tamil Nadu Carnatic. The Rapinet Herbarium, Trichy.
7. Santapau,H and Henry, H.D.1994. A dictionary of flowering plants of India. C.S.N., New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Elective –I Herbal Botany (Paper code: 17P1BOE01A)

Max. Marks: 75

Credits : 5

Total hours : 75

Objectives:

- To understand the traditional medicinal systems and classification of natural drugs
- To study the drug adulteration, drug evaluation and phytochemical investigations
- To study the cultivation, collection and preparation of natural drugs from selected medicinal plants
- To understand the cultivation and utilization of selected medicinal plants
- To understand the drugs containing primary and secondary metaboites

UNIT-I (15 Hrs)

Traditional Medicinal system: Ayurvedha, Siddha, Unani and Naturopathy. Definition of Drug- Classification of natural drugs (Alphabetical, Morphological, Pharmacological, Chemical and Chemotaxonomical classifications). Traditional and Folklore medicines – Native medicines.

UNIT-II (15 Hrs)

Pharmcognosy – Definition and Scope. Drug adulteration. Drug evaluation - Chemical evaluation, Physical evaluation and Biological evaluation. Phytochemical investigations.

UNIT-III (15 Hrs)

Cultivation, collection and preparation of natural drugs- Macroscopic characters (Physical and Organoleptic characters), therapeutical and pharmaceutical uses of the following medicinal plants: *Adadhoda vasica, Centella asiatica, Datura metal, Piper nigrum, Azadiracta indica, Ocimum sanctum* and *Catharanthus roseus*

UNIT-IV (15 Hrs)

Cultivation and utilization of selected medicinal plants – *Bacopa monnieri, Cassia senna, Gloriosa superba, Phyllanthus amarus* and *Rauwolfia serpentina.*

UNIT-V **(15 Hrs)**

A Brief account of the following drugs

Drugs containing carbohydrates- *Isapgo*l.

Drugs containing tannins- *Myrobalan*.

Drugs containing lipids- *Arachis oil*.

Drugs containing resin and resin combination-*Cannabis*

Drugs containing alkaloids- *Cinchona.*

Text book:

1. Agarwal, 1985. Drug plants in India. Kalyani Publishers, Ludhiyana.
2. Agarwal, S.S. and Paridhave, M, 2007. Herbal Drug Technology. University Press, 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. Chopra,R.N. 1980. Glossary of Indian Medicinal plants. CSIR, New Delhi.

References:

1. Anonymous, 1999. Pharmacognosy of Indigenous Drug (Vol. I-III). Cental 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. Jaibala,S. and Balakrishnan, G. 1975. Ahand book of common remedies based on Siddha system of Indian medicines. St. Louis institute press, Chennai.
4. John Jothi Prakash, E. 2003. Medicinal Botany and Pharmacognosy. JPR Publication, Valliyur, Tirunelveli.
5. Dhavan, B.N. Ayurvedic Research on Medicinal plants in India. INSA, New Delhi.
6. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. 2003. Pharrmacognosy. Nirali Prakashan, Pune.
7. Hanada, S.S. and V.K. Kapoor,1993. Pharmacognosy. Vallabh Prakashan. New Delhi.
8. Harbourne, J.B. 1998. Phytochemical methods: A Guide to Morden Techniques of Plant Analysis (3rd edition). Chapman and Hill Co., New York.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester I – Elective Course - I (Paper code: 17P1BOE01B)

Environmental Biotechnology

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- To understand the concept and scope of environmental biotechnology.
- To understand the various methods of bioremediation.
- To learn the importance solid waste management and disposal.

Unit – I **(12 Hours)**

Environmental Biotechnology - Concept of environmental biotechnology, its scope and achievement. Thuringenesis toxin as natural pesticides. Biotechnology for pollution abatement: Bioscrubber, Biofilter, Biochips and Biosensor.

Unit – II **(12 Hours)**

Bioremediation - Concept of bioremediation, hyperaccumulators, phytoextraction, rhizofilteration, phytoestabilization, phytodegradation. Bioremediation of polluted water, air and soil. Advantages of bioremediation over conventional techniques.

Unit – III **(12 Hours)**

Waste water treatment - Introduction, sources of water pollution; technology of waste water treatment-chemical and biological treatment. Vermitechnology, Bioplastics and Biomass from waste.

Unit – IV **(12 Hours)**

Sources, generation, classification and composition of solid wastes. Solid waste management methods - Sanitary land filling, Recycling, Composting, Vermi composting, Incineration, energy recovery from organic waste. Solid Waste Management Plan, Waste minimization technologies.

Unit – V **(12 Hours)**

Hazardous Waste Management, Sources and classification, physicochemical properties, Hazardous Waste Control & Treatment. Hospital Waste Management, Hazardous Waste Management & Handling rules, 1989 & 2000 (amendments). Disaster Management, Fly ash generation & utilization, Primary, secondary & tertiary & advance treatment of various effluents.

Text Books:

1. Dubey, R.C. 2001. A text book of biotechnology. S. Chand and Company Private Limited, New Delhi.
2. Gupta, P.K. 1994. Elements of Biotechnology. Rastogi Publications, Meerut.
3. Kumar, H. D. 1998. A Text book of Biotechnology. EWP, New Delhi.
4. Kumaresan, P. 2007. Biotechnology. Saras Publications, Nagercoil.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester II – Anatomy of Angiosperms, Embryology of Angiosperms and Plant Micro technique

(Paper code: 17P2BO04)

Max. Marks: 75
Credits : 05
Total hours : 75

Objectives:

- To study the meristems types, theories on meristems, anomalous secondary growth and nodal anatomy.
- To study the microsporogenesis, megasporogenesis, polyembryony, apomixsis, agamospory, apospory and parthenocarpy.
- To understand the light and electron microscopy and microtechnique steps.

Unit - I **(15 Hours)**

Cell wall- pits, plasmodesmata and functions. Meristems – types - theories on shoot and root apical meristems. Procambium - cambium, vascular cambium - structure and function – Seasonal activity, role in wound healing and grafting.

Unit - II **(15 Hours)**

Complex tissues - secondary xylem and secondary phloem - structure and functions. Tyloses, heart wood and sap wood and growth rings. Leaf - structure – types. Secondary thickening in stem and root and periderm formation - lenticels. Anomalous secondary growth in dicot and monocot stems. Nodal anatomy- uni, tri and multilacunar nodes.

Unit – III **(15 Hours)**

Microsporogenesis and Megasporogenesis. Sexual incompatibility - genetic basis, barriers to fertilization, physiology and biochemistry of incompatibility. Endosperm and embryo- structure, types and development. Polyembryony – causes – types. Apomixis, Agamospermy, Apospory and Parthenocarpy.

Unit – IV **(15 Hours)**

Light microcopy - optical principles, resolution, magnification and aberrations. Phase contrast microscopy - Dark field illumination. Electron microscope Transmission Electron Microscope and

Scanning Electron Microscope - Principle and operation techniques. Maceration, Squashes, Smears and Clearing techniques.

Unit – V **(15 Hours)**

Microtechnique steps - fixation and fixatives, dehydration, clearing, infiltration, embedding block making and sectioning. Microtomes types and operating mechanism – Rotary and Sledge microtome. Stains and staining techniques. Camera lucida – types – principle and use. Micrometry

Text Books:

1. Bhojwani, S. S. and Bhatnagar, S. P. 2013. The Embryology of Angiosperms. Vikas Publishing House Private Limited, New Delhi.
2. Dwivedi, J. N. 1988. Embryology of Angiosperms. Rastogi and Company, Meerut.
3. Pandey, B. P. 2010. Plant anatomy, S. Chand and Company Private Limited, New Delhi.
4. Pandey, B. P. 2012. A Textbook of Botany: Angiosperms - Taxonomy, Anatomy, Embryology and Economic Botany, S. Chand and Company Private Limited, New Delhi.
5. Singh, V. 2010. Plant Anatomy and Embryology of Angiosperms, Global Media Publications, Delhi.

Reference Books:

1. Cutter, E. G. 1978. Plant Anatomy: Experimental and Interpretation. Edward Arnold Publishing Limited, London.
2. Esau, K. 1972. Plant anatomy, Wiley Eastern Private Limited, New Delhi.
3. Esau, K. 1977. Anatomy of Seed plants. Wiley Publications, New Delhi
4. Fahn, A. 1989. Plant anatomy. Macmillan Publication Private Limited, Singapore.
5. Fatin, A. 1982. Plant Anatomy (3rd Edition). Pergoman Press, Oxford.
6. Maheswari, P. 1976. An introduction to the Embryology of angiosperms, Tata Mc Graw Hill Publishing Company Limited, New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester II – Cell and Molecular Biology and Genetics

(Paper code: 17P2BO05)

Max. Marks: 75

Credits : 05

Total hours : 75

Objectives:

- To study the structure and functions of cell organelles.
- To understand the DNA structure and RNA and protein synthesis.
- To study understand the linkage, chromosome mapping, mutation and Hardy-Weinberg law.

Unit - I **(15 Hours)**

Plasma membrane- structure models and functions. Cell wall, Chloroplast, Mitochondria, Golgi apparatus, Lysosomes, Endoplasmic Reticulum, Nucleolus and Nucleus - structure and functions. Apoptosis and programmed cell death.

Unit - II **(15 Hours)**

DNA structure – A, B, C and Z forms – replication, damage and repair. Chromosomes – morphology, ultra structure, types – lamp brush, polytene, isochromosome and B-chromosome. Structural and numerical variations in chromosomes. Modern concept of gene – introns, extrons and their significance.

Unit III **(15 Hours)**

RNA types and biosynthesis of mRNA - Eukaryotic transcription – RNA polymerase - General and specific transcription factors - regulatory elements and mechanism of transcription regulation- transcriptional and post transcriptional gene splicing. Translation- initiation, elongation and termination.

Unit IV **(15 Hours)**

Gene interaction and modified Mendel's F_2 ratio. Multiple alleles and pseudo alleles. Polygenic inheritance. Linkage- recombination chromosome mapping. Sex determination- sex linked inheritance – cytoplasmic inheritance.

Unit V **(15 Hours)**

Mutation- types and its role in evolution. Molecular basis of mutation. Mutagens- physical and chemical mutagens. Population genetics. Hardy – Weinberg law and its applications. Cis-trans effects. Regulation of gene expression in prokaryotes. Signal transduction – signaling molecules – signal receptors – signaling pathways.

Text Books:

1. Gupta, P. K. 2008. Cytology, Genetics and Genetic Engineering,. Rastogi Publication, Meerut.
2. Mohan, P. Arora. 1992. Evolutionary Biology, Himalaya Publishing House, New Delhi.
3. Sambamurthy, A. V. S. S. 1999. Genetics. Narosa Publishing House, New Delhi.
4. Sen, S., Kar, D. K. and Johri, B. M. 2005. Cytology and Genetics, Narosa Publishing House, New Delhi.
5. Sharma, A. K. and Sharma, 1965. Chromosome Technique. Theory and Practice Oliver and Boyd, London.

Reference Books:

1. Ayala and Kiegr, 1980. Modem Genetics. Benjamin Publishing Company, Amsterdam.
2. Bodmer, W. F., Cavalli – Sforza, L. L. 1976. Genetics, Evolution and Man. W. H. Freeman and Company, New York.
3. De Robertis. 1975. Cell Biology. W.C. Sander's Company, Philadelphia.
4. Dobzhansky, T. H. 1970. Genetics of the evolutionary process. Columbia University Press, New York.
5. Dupraw, E. J. 1969. Cell and Molecular Biology. Academic Press, New York.
6. Freifelder, 2008. Molecular Biology. Narosa Publishing House, New Delhi.
7. Harvey Lodish. 2008. Molecular Cell Biology. W. H. Freeman Publication, New York.
8. Lewin. 1994. Genes: (Vol. VII). Oxford University Press, London.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester II – Fundamentals of Computer Technology

(Paper code: 17P2BOE02A)

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- To study the classification, language, number system, computer software, MS Office, MS Excel, MS Power Point and MS Access.

Unit I **(12 Hours)**

Introduction to computers – Classification – Anatomy of a Digital Computer – Computer Architecture – Language – Number System – Logic gates (AND, OR, NOT, NAND, NOR).

Unit II **(12 Hours)**

Computer software – operating system – programming languages – Computer networks – Internet and www. Electronic mail: Introduction – e-mail – Domain name and addresses – advantages and disadvantages of internets.

Unit III **(12Hours)**

Introduction to Microsoft Office – MS Word – Creating and Editing Documents – Formatting Document – Creating Tables. MS – Excel: Spreadsheet Overview – Creating Worksheets –Editing and Formatting – Excel Formulas and Functions – Creating a Chart Data Forms, Sorts, Filter.

Unit IV **(12 Hours)**

MS Power Point – Introduction – Menus – Toolbars – Text and Formats – Animations – Arts and Sound – Making the Presentation templates.

Unit V **(12 Hours)**

MS – Access: Database Overview – Creating a Database – Modifying Tables and Creating Forms – Query – Creating Reports – Mailing Labels.

Text Books:

1. Alexis Leon and Mathews Leon, Fundamentals of Information Technology, Vikas Publishing House Private Limited.
2. Peter Norton, Introduction to Computer, 2nd Edition, TMH.

3. Sanjay Saxena. MS Office 2000 for Every One. Vikas Publishing House Private Limited.
4. June Slton. MS Office 2000 Professional Fast and Easy. BPB Publications.

Reference books:

1. Rajagopalan, S. P. Computer Applications in Business, Vikas Publishing House Private Limited.
2. Alexis Leon and Mathews Leon. Fundamentals of Computer Science and Communication Engineering. Vikas Publishing House Private Limited.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester II – Elective Course - II (Paper code: 17P2BOE02B)

Mushroom Biotechnology

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- To understand the various aspects of mushroom technology.
- To understand the effective methodology to cultivate Oyster, Button and Milky mushrooms.
- To learn the importance and application of Mushrooms and its products.

Unit – I **(12 Hours)**

Introduction to mushroom biology: characteristics, importance of mushrooms - as food, tonics and medicines. Different parts of a typical mushroom. Key to differentiate edible from poisonous mushrooms: Fungal characteristics, habitat, morphology, nutrition and reproduction of fungi.

Unit – II **(12 Hours)**

General principles of production of mushrooms and mushroom products: Contributing fields - microbiology, mycology and environmental engineering; phases of mushroom technology - pure culture, spawn, preparation of compost, mushroom development, management and marketing.

Unit – III **(12 Hours)**

Mushroom biotechnology: Applications of commercial and Wild mushrooms: food, fodder, soil conditioner and fertilizer, nutriceuticals, pharmaceuticals and medicinal properties.

Unit – IV (12 Hours)

Prospects of tropical mushroom cultivation technology: Oyster mushroom technology, paddy mushroom technology, milky mushroom and button mushroom technology, post harvest technology. Mushroom farming and prospects.

Unit – V **(12 Hours)**

Nutrient profile; Protein, aminoacids, calorific values, carbohydrates , fats, vitamins & minerals. In therapeutic diets for adolescence, for aged persons & diabetes mellitus. Health benefits:

Antiviral value, antibacterial effect, antifungal effect, anti-tumour effect, haematological value, cardiovascular and renal effect.

Reference Books:

1. Philip G. Miles, Shu-Ting Chang, 1997. Mushroom biology, World Scientific, Singapore.

2. Kaul, T.N. 1999. Introduction to mushroom science, Oxford & IBH Co., Pvt. Ltd.,New Delhi.

3. Bahl, N. 1988. Handbook on mushrooms. Oxford & IBH Publishing Co., Pvt. Ltd., New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester II – Elective Course - III (Paper code: 17P2BOE03A)

Plant Biotechnology and Bio-informatics

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- To study the scope, potentialities and application of biotechnology.
- To understand the DNA recombinant technology, genetic engineering, enzymes and cloning.
- To understand the basic knowledge of bio-informatics.

UNIT I **(12 Hours)**

Biotechnology - scope and potentialities. Plant tissue culture – concept of totipotency – organization of tissue culture laboratory. Sterilization methods – Plant tissue culture media (MS) and plant hormones, Surface sterilization, callus culture, Micro-propagation, Organogenesis –Application of plant tissue culture in agriculture and crop improvement.

UNIT II **(12 Hours)**

Somatic embryogenesis –encapsulated seeds. Production of haploids plants through anther culture –Protoplast isolation, culture and regeneration, methods of fusing protoplasts, somatic hybridization. Introduction to plant secondary metabolites. DNA transfer by particle bombardment, micro and macro injection methods – lipofection and electroporation.

UNIT III **(12 Hours)**

Recombinant DNA technology – gene transfer in plants – aims, strategies for development of transgenic plants — organization of Ti plasmid, *Agrobacterium tumifaciens* mediated gene transfer. Transgenic plants with stress tolerance for drought and salinity, crop improvement, herbicide resistance, insect resistance, virus resistance, plants as bioreactors.

UNTI IV **(12Hours)**

Genetic engineering – enzymes – nucleases, polymerases, ligases, alkaline phosphatase, reverse transcriptase – SI nucleases – vectors – use of plasmids, cosmids, phage and transposans as vectors – gene cloning – cloning in eukaryotes. Amplification of genes by PCR. cDNA and construction of cDNA libraries. Germplasm storage – Cryopreservation.

UNTI V **(12 Hours)**

Introduction to bio-informatics, Classification of biological databases, Biological data formats, application of bioinformatics in various fields. Sequence alignment, Substitution matrices, Scoring matrices-PAM and BLOSUM. Local and Global alignment concepts, dot plot, dynamic programming methodology, multiple sequence alignment- progressive alignment. Database searches for homologous sequences- Fasta and Blast Version.

Text books:

1. Dubey, R.C. 2001. A text book of biotechnology. S. Chand and Company Private Limited, New Delhi.
2. Gupta, P.K. 1994. Elements of Biotechnology. Rastogi Publications, Meerut.
3. Ignacimuthu, S. J. 2003. Plant Biotechnology. Oxford and IBH Publishing, New Delhi.
4. Kalyankumar, 1992. Plant tissue culture. New Central Book Agency, Calcutta.
5. Kumar, H. D. 1998. A Text book of Biotechnology. EWP, New Delhi.
6. Kumaresan, P. 2007. Biotechnology. Saras Publications, Nagercoil.
7. Shanmugavel, P. 2005. Principles of Bioinformatics, Pointer Publishers, Jaipur, India.

Reference Books:

1. David W. Mount. 2001. Bioinformatics Sequence and Genome Analysis. Cold Spring Harbor Laboratory Press, New York.
2. Levin. 2000. Genes (Vol. I-VII). Oxford University Press, London.
3. Nicholl, D. S. T. 1994. Introduction to Genetic Engineering. Cambridge University Press, London.
4. Old, R. N. and Primrose. 1994. Principles of Gene Manipulation. Blackwell Scientific Publications, Oxford.
5. Pennigton, S. R. and Dunn, M.J. 2002. Proteomics. Viva Books Private Limited, New Delhi.
6. Purohit, S. S. 2003. Biotechnology – Fundamentals and Applications. Agrobios, New Delhi.
7. Satyanarayana, U. 2005. Biotechnology. Books and Allied Private Limited, Kolkata.
8. Singh, B. D. 2003. Biotechnology. Kalyani Publishers, New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester II – Elective Course - III (Paper code: 17P2BOE03B)

Plant Resource Utilization and Biodiversity Conservation

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- To understand the economic importance of different plants.
- To understand the origin and diversity of domesticated plants.
- To understand the various threats of biodiversity and the strategies forconservation.

Unit – I **(12 Hours)**

Botanical name, family, morphology of useful part and uses of Cereals - Paddy, wheat, maize; Millets - Sorghum, Ragi, rye; Legumes - Blackgram, pigeon pea, green gram; Nuts - Ground nut, cashew nut, almond; Vegetables - Tomato, carrot, cabbage; Fruits - Apple, mango, date palm; Fibers - Cotton, jute.

Unit – II **(12 Hours)**

Botanical name, family, morphology of useful part and uses of Wood - Teak, rose wood; Essential oil - Sunflower oil, Groundnut oil, Sesame oil; Spices and condiments - Cinnamon, Pepper, Cardamom, Nut-meg, Clove, Turmeric, Chillies; Beverages - Coffee, Cocoa; Tannin - Myrobalan; Latex - Rubber; Dyes - Indigo, Henna; Gum - Gum arabic; Sugars - Sugarcane; Fumigatory and mastigatory – Tobacco, Areca nut.

Unit – III **(12 Hours)**

Biodiversity: status, monitoring and documentation; major drivers of biodiversity change; biodiversity management approaches. Conservation Biology: Principles of conservation, major approaches on management, Indian case studies on conservation and management trategies (Project Tiger, Biosphere reserves). Environmental pollution; global environmental change.

Unit – IV **(12 Hours)**

Biogeography of India; Biodiversity of India: Species diversity, Genetic diversity and Ecosystem diversity; Loss of biodiversity; IUCN red list categories; International and Indian initiatives on Biodiversity Conservation.

Unit – V **(12 Hours)**

Conservation of Biodiversity: Current practices of biodiversity conservation - *In situ* conservation (Biosphere reserve, Wildlife sanctuaries, National parks); *Ex situ* conservation (Botanic garden, Gene banks, Agroforestry, Pollen bank, Seed bank, Cryopreservation); Role of biotechnology in the conservation of biodiversity; Biodiversity information and communication, Indigenous knowledge systems, Biopiracy,IPR.

Text Books:

1. Kochhar, S.L. 2011. Economic Botany in the Tropics. IV edition. MacmillanPublishers India Pvt. Ltd. New Delhi.
2. Bawa K.S., Primack, R.V. and Oommen, M.A. 2011. Conservation biology: APrimer for South Asia, ATREE, Bangalore.
3. Krishnamurthy, K.V. 2003. An advanced text book on Biodiversity, Oxford and IBHPublishing Co. Pvt. Ltd. New Delhi.
4. Swaminathan, M.S. and Cocchar S.L. (Eds) 1999. Plants and society. MacMillienPublications Ltd. London.
5. Sambamurthy, A.V.S.S. and Subramanian, N.S. 1999. A text Book of EconomicBotany, Wiley Eastern Limited, New Delhi.

Reference Books:

1. Pandey, B.P. 1998. Economic Botany, S. Chand & Co., New Delhi.
2. Frankel, O.H.Brown and Burdon, J.J. 1995. The conservation of plant diversity.Cambridge University Press, Cambridge.

Core Practical

For Students Admitted from the academic year 2017 – 2018

Core Major Practical I – Core Course IV (For Core Course I)

(Paper Code 17P2BOP01)

Algae, Fungi, Lichens and Bryophytes

Algae:

Study of morphology and anatomy of the vegetative and reproductive organs of *Lyngbya, Nostoc*, *Cladophora, Codium, Padina, Batrachospermum* and *Gracilaria.*

Fungi:

Study of morphology and anatomy of the vegetative and reproductive organs of *Peronospora, Aspergillus, Polyporus* and *Fusarium.*

Lichens:

Study of vegetative structures and structure of apothecium.

Bryophytes:

Study of morphology and anatomy of the vegetative and reproductive organs of *Targionia, Dumortiera* and *Funaria*.

Note:

1. Submission of 15 Herbarium sheets from Algae, Fungi, Lichens and Bryophytes.
2. Field trip to a hill station 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.
3. Certified record work done in the laboratory during practical classes.

Practical examination at the end of second semester.

For Students Admitted from the academic year 2017 – 2018

Core Major Practical I – Core Course IV (For Core Course I & II)

(Paper Code 17P2BOP01)

Pteridophytes, Gymnosperms and Palaeobotany

Pteridophytes:

Study of morphology and anatomy of the vegetative and reproductive organs of *Isoetes, Equisetum, Angiopteris, Pteris, Osmunda* and *Salvinia.*

Gymnosperms:

Study of morphology and anatomy of vegetative and reproductive organs of *Araucaria, Podocarpus* and *Cupressus.*

Palaeobotany:

Study of the fossil forms: *Sphenophyllum, Lyginopteris* and *Cordaites.*

Certified record work done in the laboratory during practical classes

Practical examination at the end of second semester.

Core Practical

Model Practical Question Paper M. Sc., Botany Degree Examination

For Students Admitted from the academic year 2017 – 2018

Core Major Practical I – Core Course IV (For Core Course I & II)

(Paper Code 17P2BOP01)

Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms & Palaeobotany

Practical : 50

Record : 5

Viva-voce : 5

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

1. Make suitable micro preparations of **A, B, C, D** and **E.** Draw labeled sketches. Identify giving reasons. Submit the slides for valuation. **(5 x 4 = 20 Marks)**

2. Make suitable micro preparation of **F & G.** Draw labeled sketches identify giving seasons. Submit the slides for valuation. **(2 x 5 = 5 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.** **(2x2=4 Marks)**

5. Draw diagrams and notes of interest on **K, L**, **M** and **N.** **(4x3=12 Marks)**

Key:

A, B, C, D and **E** - Materials one each from Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms. (Preferably Vegetative)

F and **G -** Reproductive part one each from Pteridophytes and Gymnosperms.

I and **J -** Macroscopic structure one each from Pteridophytes and Gymnosperms.

K, L, **M** and **N -** Materials one each from Algae, Fungi, Bryophytes, Lichens and Fossils.

Note:

1. Submission of 15 Herbarium sheets from Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms.
2. Field trip to a hill station 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.
3. Certified record work done in the laboratory during practical classes.

Core Practical

For Students Admitted from the academic year 2017 – 2018

Core Major Practical II – Core Course V (For Core Course III)

(Paper Code 17P2BOP02)

Taxonomy of Angiosperms and Economic Botany

Taxonomy of Angiosperms

Identification of the specimens at family, Genera and species level belonging to the following hierarchy:

Dicotyledons:

1. Thalamiflorae – Menispermaceae, Magnoliaceae, Oxalidaceae, Caryophyllaceae and Polygalaceae
2. Disciflorae – Meliaceae and Sapindaceae
3. Calyciflorae – Lythraceae, Aizoaceae and Moringaceae
4. Bicarpellatae - Boraginaceae, Bignoniaceae, Oleaceae, Dioscoriaceae and Rhizophoraceae,
5. Monochlamydeae – Cactaceae, Loranthaceae and Aristolochiaceae

Monocotyledons

6. Orchidaceae, Cyperaceae and Poaceae

Economic Importance

7. Economic importance of families mentioned above.
8. Familiarity with the use of Floras.
9. Preparation of dichotomous artificial keys using locally available plants.
10. A field trip of not less than 3 days to a place of luxuriant vegetation to study the flora and to study the different types of vegetation.
11. Submission of tour report and 25 Herbarium sheets (specimens collected from tour collection/ locally available plants) during practical examination.

- Certified record work done in the laboratory during practical classes.
- **Practical examination at the end of second semester.**

Core Practical

Model Practical Question Paper M. Sc., Botany Degree Examination

For Students Admitted from the academic year 2017 – 2018

Core Major Practical II – Core Course V (For Core Course III)

(Paper Code 17P2BOP02)

(Taxonomy of Angiosperms and Economic Botany)

Practical : 50
Record : 5
Viva-voce : 5

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

1 Find out the binomials of **A** and **B.** **(2x3=6)**

2. Refer specimens **C, D** and **E** to their respective families giving reasons at each level of hierarchy. **(3x3=9)**

3. Construct key using **F, G, H, I, J,** and **K.** **(6 Marks)**

4. Dissect and the following **L**- Pollinium**, M**-Monocot Flower **(5 Marks)**

5. Mention the Family, Genus and Species of **N, O** and **P**. **(3 x 3=9)**

6. Write short notes on Taxonomic Literature on **Q** and **R.** **(2 x 3 = 6)**

7 . Write Economic importance of **S, T** and **U.** **(3 x 3=9)**

Key:

A, B, C, D and **E** - Flowering plants from families prescribed in the syllabus

F, G, H, I, J and **K** - Flowering Twigs.

L and **M** - Dissection from Flowering plants.

N, O and **P** - Flowering plants from the families given in the syllabus.

Q and **R** - Taxonomic literature mentioned in the syllabus

S, T and **U** - Economic Botany.

Note:

- A field trip of not less than 4 days to a place of luxuriant vegetation to study the flora and to study the different types of vegetation.
- Submission of tour report and 25 Herbarium sheets (specimens collected from tour collection/ locally available plants) during practical examination.
- Certified record work done in the laboratory during the practical classes.

Core Practical

For Students Admitted from the academic year 2017 – 2018

Core Major Practical III – Core Course VIII (For Core Course VI & VII)

(Paper Code 17P2BOP03)

Anatomy of Angiosperms, Embryology of Angiosperms and Plant Micro technique

Anatomy:

1. Study of the anatomical characters and anomaly of *Nyctanthus.*
2. Study of the anatomical characters and anomaly of *Bignonia.*
3. Study of the anatomical characters and anomaly of *Boerhaavia.*
4. Study of the anatomical characters and anomaly of *Leptadenia.*
5. Study of the anatomical characters and anomaly of *Bougainvillea.*
6. Study of the anatomical characters and anomaly of *Cucurbita.*
7. Study of the anatomical characters and anomaly of *Achyranthus.*
8. Study of the anatomical characters and anomaly of *Dracaena.*

Embryology:

9. With the help of suitable examples, to illustrate the features of the theory syllabus by whole mounts, embryo mounting and permanent micro-slides.

Plant micro-technique

10. Knowledge of functioning of rotary and sledge microtome.
11. Demonstration of section cutting using a rotary microtome and staining.
12. Measurement and calculation of macerated elements by micrometry.

Note:

- Submission of five double stained permanent slides as follows: Microtome section- 2 (or) Free hand sections- 2, Peel-1, Cleared material- 1, Maceration- 1
- Certified record work done in the laboratory during practical classes.

Core Practical

For Students Admitted from the academic year 2017 – 2018

Core Major Practical III – Core Course VIII (For Core Course VI & VII)

(Paper Code 17P2BOP03)

Cell and Molecular Biology and Genetics

1. Study of squash with suitable materials.
2. Study of smear with suitable materials.
3. Observation of electron micrographs of sub-cellular structures.
4. Simple problems on monohybrid cross
5. Simple problems on monohybrid test cross
6. Simple problems on Dihybrid cross
7. Simple problems on Dihybrid test cross
8. Physical basis of monohybrid cross
9. Physical basis of Dihybrid cross
10. Simple problems on genetic interaction
11. Chromosome mapping from three point test cross – data, Calculation & Interference (Linkage & Crossing over Percentage).
12. To study the population genetics problems applying Hardy-Weinberg law.

- Certified record work done in the laboratory during practical classes.

Core Practical

Model Practical Question Paper M.Sc., Botany Degree Examination

For Students Admitted from the academic year 2017 – 2018

Core Major Practical III – Core Course VIII (For Core Course VI & VII)

(Paper Code 17P2BOP03)

(Anatomy of Angiosperms, Embryology of Angiosperms and Plant Micro technique, Cell and Molecular Biology and Genetics)

Practical : 50
Record : 5
Viva-voce: 5

Time: 4Hrs. **Max. Mar: 60**

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

Key:

A, B, C, D and **E**	- Material given in the practical class.
F	- Chromosome map data
G & H	- Genetic problem given in the practical (Mono & Dihybrid ratio)
I, J & K	- Spotters from Anatomy, Micro technique and Embryology (Slide/ Chemical/instrument)
L	- Spotter from molecular Biology

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.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester III –Plant Physiology and Biophysics

(Paper code: 17P3BO06)

Max. Marks: 75

Credits : 04

Total hours : 75

Objectives:

- To study the water and plant relation, photosynthesis, mechanism of respiration, role of plant growth regulators and bioenergetics.

UNIT - I **(15 Hours)**

Water and plant relations - Absorption of water and its mechanism – Apoplast – symplast and Trans membrane transports. Mechanism of ascent of sap. Stomatal physiology, transpiration flux, antitranspirant. Mechanism of mineral absorption - passive and active uptake and transport, H+ ATPase as carrier, Nernst equation, donnan's potential and phloem transportation. Hydroponics. Environmental stress: Types of stress. Effect of water stress on crop plant.

UNIT - II **(15 Hours)**

Photosynthesis: pigment system I and II – Emerson's enhancement effect. Photochemical reactions. Cyclic, non-cyclic and pseudocyclic Photophosphorylation. Oxygen Evolving Complex (OEC), Kok's model. C3 and classification of C4 pathways. Photorespiration, CAM pathway.

UNIT-III **(15 Hours)**

Respiration- mechanism of respiration – Glycolysis – oxidation of Pyruvic acid – Krebs'cycle - Electron transport system – Hexose Monophosphate shunt – Enter- Doudoroff pathway – Respiratory quotient. Nitrogen Metabolism: Asymbiotic and symbiotic nitrogen fixation. Nitrogenase, Leghamoglobin, nod and nif genes. Nitrate and Nitrite reduction. NR and NIR–assimilation of ammonia. Transamination interrelation between photosynthesis and nitrogen fixation.

UNTI - IV **(15 Hours)**

Physiological effects of plant growth regulators- Auxins, Gibberellins. Cytokinins, Ethylene, Abscisic acid, Morphatins, Cycocel (CCC) and Malic hydrazide (MH).

Phytochrome – role and mode of action. Photoperiodism and mechanism of flowering. Vernalaization – Senescence – Dormancy. Physiology of seed germination.

UNTI - V **(15 Hours)**

Bioenergetics – laws of thermodynamics. Enthalpy, Entropy, free energy. Mitochondrial bioenergetics, chloroplast bioenergetics, ATP bioenergetics, NADP / NADPH redox couple bioenergetics. Photobiology – light characterization of solar radiation. Absorption spectrum, action spectrum and emission spectrum in molecules Fluorescence and Phosphorescence. Bioluminescence.

Text Books:

1. Noggle, GR. and Fritz, GJ. 1976. Introductory Plant Physiology, Prentice - Hall, India.
2. Verma, S. K., Mohit Verma. 2008. A Textbook of Plant Physiology, Biochemistry and Biotechnology, S. Chand and Company Private Limited, New Delhi.
3. Pandey, S.N and Sinha, B .K (2001). Plant Physiology. Third revised Edition, Vikas Publishing House Private Limited, New Delhi.
4. Jain, V. K. 2007. Fundamentals of Plant Physiology, S. Chand and Company Limited, New Delhi.

Reference Books:

1. Devlin, RM. 1974. Plant Physiology, Affiliated East West Press Private Limited.
2. Noggle, GR. and Fritz, GJ. 1976. Introductory Plant Physiology, Prentice - Hall, India.
3. Nobel, PS. 1970. Introduction to Biophysical Plant Physiology. W. H. Freeman and Company, San Francisco.
4. Beevers, L. 1976. Nitrogen Metabolism in Plants. William and Sons Limited, London.
5. Bray, CM. 1983. Nitrogen Metabolism in Plants, Longman.
6. Salisbury, F. B. and Ross, C.W. 1986. Plant Physiology. Third edition, CBS Publishers and Distributors, New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester III – Environmental Biology and Resource Management

(Paper code: 17P3BO07)

Max. Marks: 75

Credits : 04

Total hours : 75

Objectives:

- To study the ecology, ecosystem, environmental pollution, biodiversity, threats to biodiversity, endemism, vegetation and afforestation.

UNIT - I **(15 Hours)**

Aim and scope of Ecology. Autecology – Population ecology – characteristics of Population. Positive and negative interactions between species (Plant and animal interactions) – Synecology - Qualitative and Quantitative characters of community. Niche – definition and types. Methods of studying plant community.

UNIT - II **(15 Hours)**

Ecosystem: Kinds and structure – trophic levels. Food chain, Food webs and Ecological pyramids. Energy flow in the ecosystem. Characteristic features, structure and functions of forest, Grassland, Pond, Estuary and Manmade Ecosystem (Crop land). Biogeochemical cycles – Hydrological, Carbon and Nitrogen and Phosphorus cycles.

UNIT - III **(15 Hours)**

Environmental pollution – Air, Water, Soil, radiation and noise pollution – Ozone depletion – global warming and climate change – consequence –Rio de Janeiro summit (1992), Kyoto protocol (2005). Disaster management – floods, earth quake, cyclone, Tsunami and Landslides. Dams and their effects on forest and tribal people.

UNTI - IV **(15 Hours)**

Biodiversity: Definition - Genetic, species and ecosystem diversity. Value of biodiversity, consumptive use, productive use, social, ethic, aesthetic values. Biodiversity - at global and national levels. Hot – spots of biodiversity. Threats to biodiversity – IUCN. Red data book. Ecosystem approaches – species based approaches – social approaches – Chipko movement – *insitu* and *exsitu* conservation. Ecological indicators.

UNTI-V **(15 Hours)**

Endemism – Continuous and discontinuous distribution of vegetation. Phytogeographical regions of World – Types of vegetation in India. Deforestation and

Afforestation - Age and area hypothesis – Remote sensing – Principle, tools and application in agriculture and forestry.

Text books:

1. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publishers, Meerut.
2. Ambasht, R. S. 1988. A text books of plant ecology. Students, Friends & Co., Varanasi.
3. Shukla, R. S. and Chandel, P. S. 2006. A Text Book of Plant Ecology, S. Chand and Company Limited, New Delhi.
4. Mishra, D. D. 2009. Fundamental Concepts in Environmental Studies, S. Chand and Company Limited, New Delhi.

Reference books:

1. Edward J. Kormondy. 1996. Concept of Ecology, Prentice Hill of India Private Limited, New Delhi.
2. George L. Clarke. 1954. Elements of Ecology. John Wiley and sons. Inc., New York.
3. Mishra, K. C. 1980. Manual of Plant Ecology (Second edition), Oxford and IBH Publishing Company, New Delhi.
4. Odum E. P. 1971. Fundamentals of Ecology, W. B. Saunders Company, Philadelphia, London.
5. Mishra, D. D. 2009. Fundamental Concepts in Environmental Studies, S. Chand and Company Limited, New Delhi.
6. Asthana, D. K. and Meera Asthana. 2010. Environment Problems and Solutions. S. Chand and Company Limited, New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester III – Microbiology and Plant Pathology

(Paper code: 17P3BO08

Max. Marks: 75

Credits : 04

Total hours : 75

Objectives:

- To study the microbes classification.
- To understand the biopesticide, viral insecticide and fungal insecticide.
- To understand the concept, causes and components of plant diseases.

Microbiology

Unit - I **(15 Hours)**

Microbiology – Definition – Sterilization techniques. Culture media (Chemical, complex and special media). Decimal dilution techniques. Soil and rhizosphere microorganisms. Microbial stains - staining methods - simple, differential and special stains.

Unit - II **(15 Hours)**

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 **(15 Hours)**

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 biofertilizer - phosphate solublizing bacteria.

Plant Pathology

Unit - IV **(15 Hours)**

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 – bioformulation – integrated disease management.

Unit - V **(15 Hours)**

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).

Text Books:

1. Powar, C. B. and Dagniwala, H. F. 1986. General Microbiology, Himalaya Publishing House, Bombay.
2. Singh, R. S. 1980. Plant Diseases. Oxford & IBH Publishing Co., Pvt., Ltd., New Delhi.
3. Subba Rao, N. S. 1977. Soil Microorganisms and Plant growth. Oxford & IBH Publishing Co., Pvt., Ltd., New Delhi.
4. Annadurai, B. 2008. A text book of Immunology and Immunotechnology. S. Chand & Co., Ltd. New Delhi.
5. Kuby, J. 2000. Immunology. 4th ed. W. H. Freeman & Co., New York.
6. Dubey, R. C. and Maheswari, D. K. (2010). A text book of Microbiology. S. Chand & Co. Ltd.
7. Rangasami, G. 1972. Diseases of Crop Plants in India. Prenticen Hall India (Pvt.) Ltd., New Delhi.
8. Pelezar Jr. M. J. Chan, E.C.S. and Krieg, N. R. 1986. Microbiology (5th edn.). Tata Mc Graw Hill Publication.

Reference Books:

1. Alexander, 1978. Introduction to soil microbiology, Willey Eastern.
2. Carpenter, P. L. 1977. Microbiology, W. B. Saunders Co., London.
3. Darglos, J. 1975. Bacteriophages, Chapman and Hall.
4. Freifelder, D. 1987. Microbial Genetics. Narosa Publishing House.
5. Ketchum, Paul, A. 1988. Microbiology: Concepts and Application, John Wiley and Sons.
6. Mandahar, C. L. 1978. An introduction to Plant Viruses. S. Chand & Co., New Delhi.
7. Mehotra, R. S. and Ashok Agarwal, 2003. Plant Pathology. Tata Mc. Graw-Hill Publication.
8. Microbes in action: A laboratory manual of Microbiology. W. H. Freeman & Co., New York.
9. Smith, K. M. Viruses. Cambridge University Press, London.
10. Nandhini Shetty. 2008. Immunology introductory text book. New age International Publishers, New Delhi.
11. Wein and Stewart, J. 1997. Immunology, Churchill Livingston, New York.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester III – Extra Disciplinary Course – Herbal Botany

(Paper code: 17P3BOED01)

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- To study the various Indian systems of medicines and classification of crude drugs, drug adulteration, drug evaluation and phytochemical investigation.
- To understand the therapeutical and pharmaceutical uses and cultivation and utilization of selected medicinal plants.
- To understand the drugs containing carbohydrates, tannins, lipids, resin and resin combinations and alkaloids.

Unit - I **(12 Hours)**

Traditional medicinal system: Ayurveda, Siddha. Unani and Naturopathy. Definition of Drug- Classification of natural drugs (Alphabetical, Morphological, Pharmacological, Chemical and Chemotaxonomical classifications). Traditional and folklore medicine – native medicine.

Unit - II **(12Hours)**

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 **(12Hours)**

Therapeutical and pharmaceutical uses of the following medicinal plants: *Adadhoda vasica, Centella asiatica, Piper nigrum, Ocimum sanctum* and *Vinca rosea.*

Unit - IV **(12Hours)**

Cultivation and utilization of selected medicinal plants – *Bacopa monnieri, Aloe vera, Gloriosa superba, Phyllanthus amarus* and *Rauwolfia serpentina.*

Unit – V **(12Hours)**

A Brief account of the following drugs - Drugs containing carbohydrates- *Isapgol* and Indian gum, Drugs containing resin and resin combination-*Cannabis* and Drugs containing alkaloids- *Cinchona.* Natural pesticides – Neem.

Text Books:

1. Arumugam, K. R. and Murugesh, N. 1990. Text book of Pharmacognosy. Sathya Publishers, Chinnalapatti, Tamil Nadu.\
2. Bhattacharjee, S. K. 2004. Hand Book of Medicinal plants. Pointer Publishers, Jaipur.
3. Biswas, P. K. 2006. Encyclopedia of Medicinal plants (vol. I-VII). Dominant Publishers, New Delhi.
4. Gokhale, S.B., Kokate, C.K. and Purohit, A.P. 2003. Pharrmacognosy. Nirali Prakashan, Pune.
5. John Jothi Prakash, E. 2003. Medicinal Botany and Pharmacognosy. JPR Publication, Valliyur, Tirunelveli.

Reference Books:

1. Agarwal, S.S. and Paridhave, M, 2007. Herbal Drug Technology. University Press, New Delhi.
2. Anonymous, 2004. Cultivation of selected Medicinal Plants. National Medicinal Plant Board, Govt. of India, New Delhi.
3. Chaudhuri, A. B. 2007. Endangered Medicinal plants. Daya Publishing House, Delhi.
4. Chopra, R. N. 1980. Glossary of Indian Medicinal plants. CSIR, New Delhi.
5. Hanada, S.S. and Kapoor, V.K. 1993. Pharmacognosy. Vallabh Prakashan. New Delhi.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester IV – Biochemistry and Biostatistics

(Paper code: 17P4BO09)

Max. Marks: 75

Credits : 04

Total hours : 75

Objectives:

- To understand the basic concepts of atoms and molecules.
- To study the occurrence, structure and properties of carbohydrates.
- To study the occurrence, structure and properties of proteins.
- To study the occurrence, structure and properties of lipids.
- To study the methods of sampling, collection and tabulation data.

UNIT - I **(15Hours)**

Basic concepts of atoms and molecules – chemical bonds – covalent bonds, hydrogen bond, electrostatic interactions, hydrophobic interactions, Vander Waals forces. Optical isomerism, pH and its significance, isoelectric point. Buffer systems, Redox potential, Molarity, Molality and Normality.

UNIT - II **(15Hours)**

Carbohydrates: Occurrence, structure and properties of monosaccharides, oligosaccharides and polysaccharides. Biological significance of carbohydrates. Protein: Classification, structure – primary, secondary, tertiary and quaternary. Properties and purification of protein.

UNIT - III **(15Hours)**

Amino acids – classification and peptide bonds, Ramachandran plots, properties of amino acids, non-protein amino acids, amines and the role in cell function- amino acids metabolism. Enzymes: Chemistry of Enzymes- Classification – Mechanism of action – Factors affecting enzyme activity. Michaelis – Menten model of enzyme kinetics. Co-enzymes, isoenzymes allosteric enzymes, ribozymes and abzymes.

UNIT - IV **(15Hours)**

Lipids: Components of lipids – classification of fatty acids. Simple lipids, compound lipids and derived lipids (Steroids) – properties of lipids. Secondary metabolites -

Biosynthesis and function of terpenoids, tannins, alkaloids and flavanoids. Vitamins: Structure, type, source and their role.

UNTI - V

Methods of sampling, classification and tabulation of data. Histograms – frequency polygon, frequency curve, Measures of central tendency – mean median and mode. Measures of dispersion – standard deviation and standard error. Student 't' test, Chi-square test and analysis of variance.

Text Books:

1. Rastogi, S. C. 2003. Outlines of Biochemistry, CBS Publishers and Distributors, New Delhi.
2. Stryer, L. 1988. Biochemistry, WH Freeman and Company, New York.
3. Jain, J. L., Sanjay Jain and Nitin Jain. 2009. Fundamentals of Biochemistry, S. Chand and Company, New Delhi
4. Conn, E. E., Stump, Bruening, G. and Doi, R. H. 2005. Outlines of Biochemistry 5th Edition, Wiley and Sons Private Limited, New York.
5. Satyanarayana, U. and Chakrapaani, U. 2009. Essential of Biochemistry, Books and Allied Private Limited, Kolkata.

Reference Books:

1. Richard, A., Harvey, Richard A. Harvey and Denise R. Ferrier. 2011. Biochemistry, Lippincott Williams and Wilkins, Philadelphia.
2. Nelson, D. L. and Cox, M. M. 2005. Principles of Biochemistry, W.H. Freeman and Company, New York.
3. Zuley, G. L. 1998. Biochemistry, Wm. C. Brown Publishers, United States of America.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester IV – Instrumentation Techniques

(Paper code: 17P4BO010)

Max. Marks: 75

Credits : 04

Total hours : 75

Objectives:

- To know the principle, components, working mechanism and uses of biological instruments.
- To understand the centrifugation basic principles and types chromatography.
- To understand the basic principle and measurement of pH meter.
- To study the radiation dosimetry.
- To understand the choosing the problem for research, types of sources, presentation and thesis writing.

UNIT - I **(15Hours)**

Spectroscopy- Principle, components and working mechanism of Colorimeter, UV and Visible Spectrophotometer. Principle, construction, working mechanism and applications of Flame photometer, Atomic Absorption Spectrophotometer (AAS) and Nuclear Magnetic Resonance Spectrometry (NMR).

UNIT – II **(15Hours)**

Centrifugation – Principles, types of centrifuges- low speed, high speed and ultra centrifuges - preparative and analytical centrifuges. Types of centrifugation- Differential centrifugation and Density gradient centrifugation– operations and uses. Chromatography – basic principles and types – Paper Chromatography, Thin Layer Chromatography (TLC), Ion – exchange Chromatography, Gas Chromatography (GC) and High Performance Liquid Chromatography.

UNIT – III **(15Hours)**

Basic principles, types of electrodes, working mechanism, standardization of pH meter and measurement of pH. Electrophoresis – Principles and types- Agarose Gel Electrophoresis, SDS - PAGE. Isoelectric focusing- principles and applications.

UNTI - IV **(15Hours)**

Radiation dosimetry- Radioactive isotopes and half life of isotopes - Effects of radiation on biological system– G.M. counter and Scintillation counter – Autoradiography and Application of tracer technique in Biology. Photomicrography: Digital camera types – shutter speed – aperture – depth of field- digital imaging, transfer of digital signals to computer.

UNTI – V **(15Hours)**

Choosing the problem for research –literature collection – Primary, secondary and tertiary sources – information from internet – indexing and abstracting – Reporting the results of research - in conferences: Oral and Poster presentation. Thesis writing - proof correction – Bibliography – Journals – types – Full paper – Short Communication – Review paper - monographs.

Text Books:

1. Kothari, C. R. 1991. Research Methodology – Methods and Techniques, Wiley Eastern Limited, New Delhi.
2. Sree Ramulu, V. S. 1988. Thesis Writing, Oxford and IBH Publishing Company Private Limited, New Delhi.
3. Marimuthu, R. 2008. Microscopy and Microtechnique. MJP Publishers, Chennai.
4. Sivasankar, B. 2009. Bioseparations - Principles and Techniques. PHI Learning Private Limited, Delhi.

References Books:

1. Dey, P. M. and Harborne, J. B. 2000. Plant Biochemistry, Harcourt Asia Private Limited, New Delhi.
2. Plummer, D. T. 2003. An Introduction to Practical Biochemistry. 3rd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.
3. Palanivelu, P. 2009. Analytical Biochemistry and Separation Techniques, Kalaimani Printers, Madurai.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester IV – Pharmacognosy and Phytochemistry

(Paper code: 17P4BOE04A)

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- To study about scope and development of pharmacognosy.
- To study the extraction methods, types and methods of isolation.
- To understand the classification, nomenclature, source, importance, structure and chemistry of steroids, terpenoids and flavonoids.
- To understand the classification, nomenclature, source, importance, structure and chemistry of alkaloids and cardiac glycosides.
- To study the problems involved in standardization of herbal medicine.

UNIT – I **(15Hours)**

Definition, history, scope and development of pharmacognosy. Importance of pharmacognosy with special reference to herbal drug industry. Sources of natural medicinal products.

UNIT - II **(15Hours)**

Extraction - Introduction, definition, factors influencing the choice of extraction, principles of extraction methods, types of extraction (extraction of plant drugs). Selection and purification of solvents for extraction. Methods of isolation, (including industrial methods), purification and characterization.

UNIT – III **(15Hours)**

Introduction, definition, classification, nomenclature, source, importance, structure and chemistry of Steroids, Terpenoids and Flavonoids.

UNIT – IV **(15Hours)**

Introduction, definition, classification, nomenclature, source, importance, structure and chemistry of alkaloids - quinine, morphine, atropine, reserpine and ergot alkaloids and cardiac glycosides.

UNIT – V **(15Hours)**

Importance of standardization and problems involved in the standardization of herbs. Standardization of single drugs and compound formulations. WHO guidelines for quality standardized herbal formulations. Estimation of the parameter limits used for standardization.

Text Books:

1. Agarwal, 1985. Drug Plants in India. Kalyani Publishers, Ludhiana.
2. Agarwal, S.S. and Paridhave, M, 2007. Herbal Drug Technology. University Press, New Delhi.
3. Bhattacharjee, S. K. 2004. Hand Book of Medicinal Plants. Pointer Publishers, Jaipur
4. Biswas, P. K. 2006. Encyclopedia of Medicinal Plants (Volume I - VII). Dominant Publishers, New Delhi.
5. Chopra, R. N. 1980. Glossary of Indian Medicinal Plants. CSIR, New Delhi.
6. Wallis, T. E. 2005. Text Book of Pharmacognosy. CBS Publishers and Distributors Private Limited, Bengaluru.
7. Sujata, V. Bhat, Nagasampagi, B. A. and Meenakshi, S. 2009. Natural Products - Chemistry and Applications. Narosa Publishing House, New Delhi.
8. Horborne, J. B. 1973. Phytochemical Methods: A guide to Modern Techniques of Plant Analysis. Chapman and Hall Limited, London.
9. Gokhale, S. B., Kokate, C. K. and Purohit, A. P. 2009. Pharmacognosy. Nirali Prakashan, Pune.

Reference Books:

1. Anonymous, 1999. Pharmacognosy of Indigenous Drug (Volume I - III). Central Council for Research in Ayurvedha and Siddha, New Delhi.
2. Anonymous, 2004. Cultivation of Selected Medicinal Plants. National Medicinal Plants Board, Government of India, New Delhi.
3. Jaibala, S. and Balakrishnan, G. 1975. A Hand Book of Common Remedies Based on Siddha System of Indian Medicines. St. Louis Institute Press, Chennai.
4. John Jothi Prakash, E. 2003. Medicinal Botany and Pharmacognosy. JPR Publication, Valliyur, Tirunelveli.
5. Dhavan, B.N. Ayurvedic Research on Medicinal Plants in India. INSA, New Delhi.
6. Gokhale, S. B., Kokate, C. K. and Purohit, A. P. 2003. Pharrmacognosy. Nirali Prakashan, Pune.

M.Sc., Botany – CBCS Pattern

For Students Admitted from the academic year 2017 – 2018

Semester IV – Elective Course - IV (Paper code: 17P4BOE04B)

Horticulture and Landscaping

Max. Marks: 75

Credits : 04

Total hours : 60

Objectives:

- Highlight the aesthetics of horticulture and post-harvest handling of techniques and marketing.
- Evaluate and analyze plant growth environment in relation with soil, nutrients, fertilizers and nursery techniques.

Unit I **(12 Hours)**

Importance of scope of horticulture – Divisions of horticulture famous gardens in world & India; Tools & Implements used in horticulture. Plant Propagation: Vegetative Propagation -Cutting, Layering, Grafting & Budding and pruning. Cultural practices: Thinning, Training, Trimming & Pruning.

Unit – II **(12 Hours)**

Micropropagation techniques: Role of tissue culture in Horticulture; Hydroponics. Nursery: definition, objectives and scope and building up of infrastructure for nursery, Preparation of Nursery beds, Transplantation – steps and Methods. Techniques of Bonsai. Terrarium and topiary.

Unit – III **(12 Hours)**

Cultivation Crops: Cardamom, pepper, ginger, and turmeric, Post-Harvest and Conservation management**,** IPR issues and Import and export marketing. **Floriculture:** Cultivation of commercial flower crops – Rose, Orchids and Anthurium– economic important vegetable and fruit crops; citrus, banana, and cucurbits. Flower decoration – Dry and wet decoration.

Unit – IV **(12 Hours)**

Gardening – definition, objectives and scope – different types of gardening. Principles, methods and types of gardens and garden implements, designing outdoor gardens, hedges, edges, fences, trees, climbers, rockeries, arches, Roof garden, Indoor gardening and kitchen garden. flowering plants, hanging basket establishment, Plant protection measures.

Unit –V **(12 Hours)**

Lawn making and maintenance – water garden – cultivation of water plants-common water plants, glass house, Parks: components; Types of Parks; Xeriscaping. Field Visit to Horticultural station.

Text Books:

1. Subba Rao, N. S. 1997. Biofertilizers in Agriculture and Forestry. India Book House Limited,Oxford and IBH publishing Co. Pvt. Ltd, New Delhi.
2. Bose, T. K., Maiti, R. G., Dhua, R. S. and Das, P. 1999. Floriculture and Landscaping.NayaProkash, Calcutta.
3. Acquaah, G. 2002. Horticulture principles and practices (2nd.ed.), Pearson Education (Singapore) Pvt. Ltd. M. Sc. Botany (UD)-2017-18 onwards Annexure No: 51A Page 30 of 37 SCAA Dated: 03. 07. 2017
4. Tolanus, S. 2006. Soil fertility, Fertilizer and Integrated Nutrient management. International Book Distributory Co.

Project Work – 17P4BOPR01

4 Credits /6hrs/week

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.

Allocation

- Student may select their broad research area during the end of the second 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 o 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 paper and be subjected to peer review.

Evaluation

- Interim reports should be submitted by the students during the mid of fourth semester to the Head of the Department. This interim report should form the basis for the final project report. (Change in project work after the submission of interim report may be carried out only with prior permission of the HOD).
- Even at instances where research is carried out as a group, individual students will be evaluated.
- Evaluation will be based on the norms that will look into nature of the project work, the content of the dissertation, presentation duly summed up by a viva-voce examination.
- Attendance of the student for presentation and viva-voce is a must.

Dissertation format

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

Core Practical - Syllabus

For Students Admitted from the academic year 2017 – 2018

Core Major Practical IV – Core course - XII (For Core Course IX, X & XI)

(Plant Physiology, Biophysics, Environmental Biology, Resource Management and Microbiology and Plant Pathology – 17P4BOP04)

Plant Physiology and Biophysics

1. Measurement of stomatal index and frequency.
2. Measurement of membrane permeability as affected by chemicals and temperature.
3. Separation of photosynthetic pigments by paper chromatography.
4. Estimation of photosynthetic pigments by Arnon's method.
5. Estimation of leghaemoglobin content of root nodules.
6. Estimation of total nitrogen by Microkjeldhal method.
7. Seed viability - Tetrazolium chloride test.
8. Measurement of Hill reaction.

Demonstrations

9. Determination of relative water content of leaf material.
10. Preparation of knops' solution - Hydroponics study.
11. Warburg manometer - principle and application.
12. Absorption spectrum of chlorophylls.

Environmental Biology

1. Estimation of soil moisture content.
2. Determination of soil pH.
3. Study the plant community by Quadrat method by determining frequency, density and abundance of different species.
4. Determination of minimum size of the quadrats by species area curve method.
5. Determining minimum number of quadrats required to study vegetation.
6. Line transects method to study vegetation.
7. Belt transect method to study vegetation
8. Measuring the transparency level of an aquatic system using Secchi disc.
9. Spotting of Phytogeographical regions of India in maps - Soil
10. Spotting of Phytogeographical regions of India in maps - Vegetation
11. Spotting of Phytogeographical regions of India in maps - Botanical.
12. Study the Ecological interest of Ecosystems / Ecological tools / Photographs / Models / Plants - studied in the theory syllabus (spotters).

Microbiology:

1. Cleaning and sterilization methods. (Laminar air flow chamber, Autoclave and Oven)
2. Preparation of culture media -agar slant- agar plate.
3. Isolation of Microbes by streak and pour plate method.
4. Isolation of microbes by soil dilution techniques.
5. Isolation and identification of Bacteria and fungi from spoiled food.
6. Gram staining of Bacteria.
7. Simple staining of Bacteria (Ethylene blue/ crystal violet)
8. MBRT of milk (Phosphates test)

Plant Pathology:

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

9. Damping of Pythium
10. Little leaf of Brinjal (Mycoplasma)
11. Bacterial blight of Paddy.
12. Bunchy top of Banana (Virus)

Note:

1. 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.

Core Practical Syllabus

Core Course - XV: Practical -V – (Covering the Core Courses XIII & XIV)

(Biochemistry, Biostatistics and Instrumentation techniques) - 17P4BOP05

Biochemistry and Biostatistics

1. Preparation of solutions - percent - PPM, molal, molar and normality concentrations.
2. Preparation of buffers (phosphate & citrate)
3. Estimation of reducing sugars (Nelson - Somogyi method, 1952)
4. Estimation of total free amino acids (Moore & Stein, 1948).
5. Estimation of proline (Bates et al., 1973).
6. Estimation of protein (Lowry's Method, 1951).
7. Estimation of phenol (Mahadevan, 1996)
8. Analysis of a sample (leaf/fruit/seed) covering Mean, Median and Mode, Histograms, Frequency curve, Standard deviation and Standard error.
9. Estimation of ascorbic acid (Titration method)

Demonstration experiments

10. Estimation of oil in oil seeds.
11. Assay of amylase (or) Peroxidase.
12. Study the spotters from the theory syllabus in Biochemistry and Biostatistics (Instruments/ Apparatus / Chemicals / Photographs / Charts / Figures/ Graphs / Tables / Diagrams / Models).

Instrumentation techniques

1. Measurement of conductivity of water sample.
2. Verification of Beer’s law using $CuSO_4$ / $K_2Cr_2O_7$ Solution
3. Preparation of standard graph for Amino acid
4. Estimation of dissolved Oxygen (Winkler’s method)..
5. Separation of photosynthetic pigments by TLC.
6. Separation of sugars by TLC.
7. Quantitative separation of any three standard amino acids by paper chromatography method.

Demonstration Experiments

8. Analysis of minerals K, Ca, Na from soil / water / plant samples using flame photometer.
9. Separation of proteins by Electrophoresis.
10. Isolation of DNA from plant tissue.
11. Study the spotters from the theory syllabus in Research methodology (Instruments /Apparatus / Chemicals)
12. Study the spotters from the theory syllabus in Research methodology (Photographs Charts / Figures/ Graphs/ Tables / Diagrams / Models).

Note:

1. Submit a data collection (not less than 20 pages) using internet for Literature Review / References to any one topic in the theory syllabus of Biochemistry / Biostatistics / Research Methodology (during the Internal practical examination).
2. Certified record work done in the laboratory during practical classes.

Model practical question paper for M. Sc., Botany Degree Examination

Core Major Practical IV - Core course XII (For Core Course IX, X & XI)

(Plant Physiology, Biophysics, Environmental Biology, Resource Management and Microbiology and Plant Pathology) – 17P4BOP04

Practical : 50

Record: 5

Viva-voce: 5

Time: 4 Hrs

1. Set up the experiment **A** assigned to you. Record your observation and interpret the results. Leave the set up for valuation. (1X10=10)

2. Write notes on Physiological interest of **B, C** and **D.** **(**3X3= 9)

3. Construct a meter quadrat **E**. Study the plant community by determining frequency, density and abundance of different species. Analysis the vegetation. (1X10=10)

4. Write notes of Ecological interest of **F and G.** **(**3X2=6**)**

5. Determine whether the given sample **H** is contaminated with bacteria or not. Leave the sample for valuation. (1X5=5)

6.Name the causal organism, disease symptoms and control measures of the given material **I.** (1X4=4)

7. Write notes on J**& K.** (3 X 2=6)

Keys:

A - Plant Physiology experiment given in the syllabus (Selected by each student by lot)

B, C & D - Charts / Figures / Graphs/ Tables / Instruments / Apparatus / Chemicals / Models/ Photographs

E - Simple quadrat

F&G - Ecological tools / Chemicals / Graphs / Photographs / Maps of Phytogeographical regions / Vegetations of India

H - Samples given in the practicals

I - Pathological material specified in the syllabus

J&K - Spotters from Microbiology (Equipments / Instruments/ Chemicals / Culture media/ Stains/ Photographs /Slides)

Model practical question paper for M. Sc., Botany Degree Examination

Core Course - XV: Practical -V (For Core Courses XIII & XIV)

(Biochemistry, Biostatistics and Instrumentation Techniques)

17P4BOP05

Practical : 50

Record: 5

Viva-voce: 5

Time: 4 Hrs

1. Conduct the experiment **A** assigned to you. Record your results. Leave the set up for valuation. (10)
2. From the given material **B**, find out the mean and calculate the standard deviation with reference to its length. Present your data in the form of a graph. (07)
3. Determine the dissolved oxygen of the given sample **C** by Winkler's method**.** (08)

   (Or)

   Prepare a standard graph of the given amino acid **D.** (08)
4. Separate and identify the photosynthetic pigments from the given sample **E** using thin layer chromatography. (10)

   (Or)

   Separation of amino acid from the given sample **F** by Paper Chromatography method. (10)

5. Write notes on **G, H, I, J** and **K.** (5x3=15)

Keys:

A - Biochemistry experiment from the syllabus (Selected by each student by lot)

B - Leaf / Fruit (anyone – 50 numbers)

C - Given Sample

D - Glycine

E - Leaves

F - Given Sample

G & H - Biochemistry (Equipments / Apparatus / Chemicals / Photographs / Charts/ Diagrams)

I - Biostatistics (Charts/ Diagrams)

J & K - Instrumentation techniques (Charts/ Figures/ Graphs/Tables/ Instruments/ Apparatus / Chemicals /Models / Photographs)