



VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - II
BOTANY PAPER – 2001
(BRYOPHYTES AND PTERIDOPHYTES)

(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	2	60

➤ <u>Course Outcome:</u>
➤ Understand the diversity and affinities among Bryophytes and Pteridophytes.
➤ Understand the morphology, anatomy, reproduction and life cycle across Bryophytes and Pteridophytes and their ecological and evolutionary significance.
➤ Obtain laboratory skills/explore non-flowering plants for their commercial.

<u>BOT 2001 : (BRYOPHYTES AND PTERIDOPHYTES)</u>		
	Content of Theory Course	60 Hours
<u>Unit – I:</u>	<u>Bryophytes</u>	15
	1. General characters of Bryophytes 2. Origin of Bryophytes 3. Classification of Bryophytes by Royhmalder and Proskauer 4. Thallus structure and reproduction of Bryophytes 5. Affinities of Bryophytes 6. Evolution of sporophytes in Bryophytes 7. Alternation of generation in Bryophytes 8. Comparison of Liverworts and Mosses 9. Economic importance of Bryophytes	
<u>Unit – II :</u>	<u>General Features, Structure and Reproduction</u>	15
	1. Principal characters of following classes (a) Hepaticopsida (b) Anthocerotopsida (c) Bryopsida 2. Study of classification and life history of the following types (a) Pellia (b) Polytrichum (c) Plagiochasma	
<u>Unit – III :</u>	<u>Pteridophytes</u>	15
	1. General characters of Pteridophytes 2. Classification of Pteridophytes 3. Affinities of Pteridophytes 4. Heterospory and seed Habit 5. Telome theory 6. Stellar system and evolution of stele in Pteridophytes	

	7. Apospory and Apogamy	
Unit – IV :	Principal Characters and Life Cycle	15
	1. Principal characters of following subdivision (a) Psilophytopsida (b) Psilotopsida (c) Lycopsida (d) Sphenopsida (e) Pteropsida 2. Study of classification and life history of the following types (a) Isoetes (b) Lycopodium (c) Pteris	

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 SYLLABUS FOR M.Sc. SEMESTER - II
BOTANY PRACTICAL – IV BASED ON PAPER 2001
(BRYOPHYTES AND PTERIDOPHYTES)
 (Effective from June 2022)

➤ Course Outcome:	
1) Studies on plant taxonomy will develop their knowledge on identification of plant species such as bryophytes and pteridophytes.	
2) Understand the morphology, anatomy, reproduction and life cycle across Bryophytes and Pteridophytes	

	Content of Practical Course : List of Experiments to be conducted	60 Hours
Practical :1	Study of morphology, classification, reproduction and life-cycle of <i>Lunularia</i>	
Practical :2	Study of morphology, classification, reproduction and life-cycle of <i>Plagiochasma</i> .	
Practical :3	Study of morphology, classification, reproduction and life-cycle of <i>Targionia</i>	
Practical :4	Study of morphology, classification, reproduction and life-cycle of <i>Pellia</i>	
Practical :5	Study of morphology, classification, reproduction and life-cycle of <i>Fimbriaria</i>	
Practical :6	Study of morphology, classification, reproduction and life-cycle of <i>Polytrichum</i>	
Practical :7	Study of morphology, classification, reproduction and life-cycle of <i>Pogonatum</i>	
Practical :8	Study of morphology, classification, reproduction and life-cycle of <i>Lycopodium</i>	
Practical :9	Study of morphology, classification, reproduction and life-cycle of <i>Salvinia</i>	
Practical :10	Study of morphology, classification, reproduction and life-cycle of <i>Adiantum</i>	
Practical :11	Study of morphology, classification, reproduction and life-cycle of <i>Lygodium</i>	
Practical :12	Study of morphology, classification, reproduction and life-cycle of <i>Isoetes</i>	
Practical :13	Study of morphology, classification, reproduction and life-cycle of <i>Botrychium</i>	
Practical :14	Study of morphology, classification, reproduction and life-cycle of <i>Pteris</i>	
Practical :15	Study of permanent slide of Bryophytes: 1 Andrea fertile plant 2 Andrea veg plant 3 Fimbriaria Rep 4 Fimbriaria Veg. 5 Lunularia fertile. 6 Lunularia gemma cup 7 Lunularia veg 8 Pellia antheridia 9 Pellia archegonia	

	<ul style="list-style-type: none"> 10 Pellia sporophyte 11 Pellia veg 12 Plagiochasma sexual 13 Plagiochasma sporophyte 14 Plagiochasma thallus 15 Pogonatum antheridia 16 Pogonatum archegonia 17 Pogonatum sporophyte 18 Pogonatum veg. 19 Polytrichum antheridia 20 Polytrichum archegonia 21 Polytrichum veg. plant 22 Polytrichum with capsule 23 Targionia female 24 Targionia Male 25 Targionia sporophyte 26 Targionia veg 	
Practical :16	<p>Study of permanent slide of Pteridophytes:</p> <ul style="list-style-type: none"> 1 Adiantum Rachis T.S. 2 Adiantum Root T.S. 3 Botrychium rhizome T.S. 4 Botrychium Root TS. 5 Botrychium Stipe T.S. 6 Isoetes entire each plant 7 Isoetes Megasporophyll 8 Isoetes Microsporophyll 9 Isoetes Root T.S. 10 Lycopodium cone 11 Lycopodium root T.S. 12 Lycopodium stem T.S. 13 Lycopodium strobilus 14 Lygodium Rachis T.S. 15 Lygodium Rachis T.S. 16 Pteris leaf T.S. with sori 17 Pteris Rachis T.S. 18 Salvinia leaf V.S. 19 Salvinia root T.S. 20 Salvinia veg 21 Salvinia fertile sporocap V.S. 	

References:

1	Smith, G.M. (1955): Cryptogamic Botany Vol. II. (2nd Edition) (Bryophytes & Pteridophytes) Tata McGraw Hill Publishing Co., New Delhi.
2	Parihar, N.S. (): An Introduction to embryophyta – Vol.II. Bryophyta Central Book Depot, Allahabad.
3	Watson, E.V. (1968): British Mosses & Liverworts Cambridge University Press, U.K
4	Parihar, N.S. (19) : An Introduction to Embryophyta Vol.II Pteridophyta Central Book Depot., Allahabad.
5	Smith, G.M. (1955) : Cryptogamic Botany Vol.II (2nd Edn.,) (Bryophytes & Pteridophytes) Tata McGraw Hill Publishing Co., New Delhi.
6	Sporne, K.R. (1970) : The Morphology of Pteridophytes (The Structure of Ferns and Allied Plants) Hutchinson University Library, London
7	Sharma, O.P., 2017, Algae Singh-Pande-Jain 2004-05. A Text Book of Botany. Rastogi Publication, Meerut.
8	Rashid, A. 1998. An Introduction to Pteridophyta. II ed., Vikas Publishing House, New Delhi.
9	Sundarajan, S. 1997. College Botany Vol. I. S Chand & Co. Ltd., New Delhi.
10	Vashista, B.R. 1978. Bryophytes. S Chand & Co. Ltd., New Delhi.
11	Vanderpoorten, A. and Goffinet, B. 2009, Introduction to Bryophytes, Cambridge University Press, Cambridge.
12	Stewart, W.M. 1983. Paleobotany and the Evolution of Plants, Cambridge University Cambridge.
13	Vashishta, P.C., Sinha, A.K., Kumar, A., (2010). Pteridophyta, S. Chand. Delhi, India.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - II
BOTANY PAPER – 2002
Title: Plant Anatomy

(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	2	60

➤ <u>Course Outcome:</u>
➤ Studying plant anatomy allows to conceptually integrate organismal structure and function.
➤ The study of plant anatomy helps to understand the structural adaptations of plants with respect to diverse environmental conditions
➤ It helps to reveal the relationships between structure, function, taxonomy, ecology, and developmental genetics.

BOT 2002 : Plant Anatomy		
	Content of Theory Course	60 Hours
Unit - I:	<u>Anatomy-I</u>	15Hours
1	Apical Organization in vascular plants	
2	Floral apex	
3	Vascular cambium	
4	Theories of structural development & differentiation	
Unit - II:	<u>Anatomy-II</u>	15Hours
1	Xylem	
2	Phloem	
3	Evolutionary Significance Of Nodal Anatomy	
4	Floral anatomy: General account	

Unit - III :	<u>Botanical Microtechniques</u>	15Hours
1	Fixatives, Dehydration	
2	Infiltration, Microtomy	
3	Stains, Histochemistry	
4	Microscopy and photography of plant anatomy	
Unit - IV : 4	<u>Physiological Plant - Anatomy</u>	15Hours
1	Dermal tissue system	
2	Absorbing tissue system	
3	Storage tissue system	
4	Secretory or glandular system	

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SYLLABUS FOR M.Sc. SEMESTER - II
BOTANY PRACTICAL – V- BASED ON PAPER 2002
Title: Plant Anatomy

(Effective from June 2022)

	Content of Practical Course : List of Experiments to be conducted	60 Hours
Practical :1	To prepare permanent slides from given stems by double staining methods	
Practical :2	To study Nodal Anatomy	
Practical 3.	Study of various types of cells in wood by maceration techniques	
Practical :4 & 5	Histochemical study to find out various metabolites like Starch, Lipid, Suberin, Tenin, Lignin	
Practical : 6, 7 & 8	Abnormal structure and abnormal secondary growth activities of Achyranthes, Chenopodium, Amaranthus,	
Practical : 9, 10 & 11	Study of Raphides, Spheraphides, Cystolith in the plants.	
Practical:12	To study latex gland, latex cells, Oil gland, Lipids, Resin ducts of plants.	
Practical :13	To study the different types of Glandular, Non Glandular trichomes.	
Practical :14	To Studies of stomata from plant grows on polluted and nonpolluted zones.	
Practical :15	To study structure of the leaf venation.	

REFERENCES :

1	College Botany Vol.I	Ganguly, Das & Dutta	
2	Botanical microtechnique	J.E Sass	
3	Botanical Histochemistry	Jansen W.A	
4	Plant Microtechnique	Johansen D.A	
5	Plant anatomy	Fahn A	
6	Practical Plant Anatomy	Fosta A.	
7	Plant Anatomy	K. Esau	
8	Comparative plant anatomy	Carlquist T.S	
9	Paleobotany	Arnold	
10	A Text Book Of Plant Anatomy	Dr.P.C. Vasishta	
11	An Introduction to plant Anatomy	Rajni Sharma	
12	Physiological Plant Anatomy	Dr.G. Haberlandt	
13	Anatomy of seed plants	Katherine Easu	
14	Plant Anatomy	Susheela M.Das	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - II
BOTANY PAPER– 2003
(Biostatistics, Botanical technique and Computer Application)
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	2	60

➤ <u>Course Outcome:</u>	
➤ Define the principal concepts about biostatistics.	
➤ Recognize the definition of statistics, its subject and its relationship with the other sciences.	
➤ Restate the principal concepts about biostatistics.	
➤ Define the principal concepts of probability.	
➤ Know the details of Microtome sectioning.	
➤ Understand the Ecological methods of floristic survey.	
➤ Understand & perform Chromatography and Physiological techniques in Botany.	

BOT 2003 : <u>Biostatistics, Botanical technique and Computer Application</u>			
	Content of Theory Course	60 Hours	
<u>Unit – I:</u>	Biostatistics –I	12	
1	<ul style="list-style-type: none"> ➤ Introduction, Scope and History of Biostatistics ➤ Data types, Collection of data, Processing of data and Presentation of data 	3	
2	<ul style="list-style-type: none"> ➤ Measures of central tendency <ul style="list-style-type: none"> (a) Mean (Arithmetic, Geometric and Harmonic) (b) Median (c) Mode 	3	
3	<ul style="list-style-type: none"> ➤ Measures of dispersion <ul style="list-style-type: none"> (a) Standard Deviation (b) Standard Error 	3	
4	<ul style="list-style-type: none"> ➤ Probability Definitions, Basic concept, Types of events and Theorems of Probability	3	
<u>Unit – II:</u>	Biostatistics –II	12	
1	<ul style="list-style-type: none"> ➤ Test of statistical significance <ul style="list-style-type: none"> (a) Chi-Square test (b) T-test 	5	

2	<ul style="list-style-type: none"> ➤ Correlation analysis: Definition, Types of correlation, Degree of correlation and uses, methods of studying and calculation of Co-efficient of correlation 	4	
3	<ul style="list-style-type: none"> ➤ Regression analysis: Definition, Types and uses of regression analysis and methods of studying 	3	
<u>Unit – III :</u>	Botanical technique	12	
1	<ul style="list-style-type: none"> ➤ Cytogenetic Technique (A) Banding techniques such as C-Banding, G-Banding and Q-Banding, R-Banding (B) Karyotype analysis, C-metaphase, Conventional FISH, (C) Array-CGH Technique 	4	
2	<ul style="list-style-type: none"> ➤ Ecological technique (a) Methods of floristic survey (b) Quadrates and transect methods 	4	
3	<ul style="list-style-type: none"> ➤ Physiological technique (a) Spectrophotometry and colorimetry (b) Paper Chromatography (c) Centrifugation 	4	
<u>Unit – IV :</u>	Computer Application	12	
1	<ul style="list-style-type: none"> ➤ Introduction to computer (a) History of computer (b) Characteristics of computer (c) Use of computer 	3	
2	<ul style="list-style-type: none"> ➤ Generation of computer ➤ Classification of computer ➤ Processor 	3	
3	<ul style="list-style-type: none"> ➤ Part of computer ➤ Hardware, software and Operating system of computer 	3	
4	<ul style="list-style-type: none"> ➤ Internet (a) Introduction (b) Types of networks (c) Resources for internet (d) World Wide Web (www.) 	3	

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER -II
BOTANY PRACTICAL 6– BASED ON PAPER 2003
(Biostatistics, Botanical technique and Computer Application)
(Effective from June 2022)

	Content of Practical Course : List of Experiments to be conducted	60 Hours
Practical : 1	Statistical Problems (Probability)	
Practical : 2	Statistical Problems (Chi-Square)	
Practical : 3	Statistical Problems (Correlation analysis)	
Practical :4	To determine the minimum size of the quadrat.	
Practical :5	To determine the frequency of various species occurring in a given area.	
Practical :6	To determine the density/abundance of various species occurring in a given area.	
Practical :7	Chromosomal study by Squash preparation.	
Practical :8	Experiment to separate the leaf pigments by paper strip chromatography.	
Practical : 9	Thin layer chromatography.	
Practical : 10	To study different parts of computer.	
Practical : 11	To study different types of cable.	

References :

1	Biostatistics in theory and practice by T. K. Saha, Emkat publications, Delhi
2	Biostatistics by P. Ramakrishnan, Saras publication, Kanyakumari
3	Biostatistics by P. N. Arora and P. K. Malhan, Himalaya Publishing House, Mumbai
4	Botanical micro technique by J. E. Sass
5	Plant micro technique by Johansen D. A.
6	Basic Statistics: A Primer for the Biomedical Sciences by Dunn and Clark., 3rd Ed. John Wiley & Sons, Inc, New York

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
SYLLABUS FOR M.Sc. SEMESTER - II
BOTANY PAPER – 2004
Title: Pharmacognosy & Phytochemistry
(Effective from June 2022)

Number of Theory Credits	Number of Lecture hours/semester	Number of Practical Credits	Number of Practical hours/semester
4	60	2	60

➤ <u>Course Outcome:</u>	
➤ To study structures of the large number of secondary metabolites found in plants,	
➤ To enrich the students by providing knowledge of modern techniques for isolation, screening & utilization of phytochemicals.	
➤ To update the skills of students in identifying & characterizing the constituents of natural resources.	

BOT 2004 : Pharmacognosy & Phytochemistry

	Content of Theory Course	60 Hours
Unit - I:	<u>Traditional Medicinal System</u>	15Hours
1	History, definition and scope of pharmacognosy	
2	Alternative system of medicine ,Indian Treditional Indian,Chinese,Unani,Homeopathic system of medicine.	
3	Classification of Drugs of natural origin.	
4	Cultivation, Collection production and utilization of herbal drugs	
Unit - II:	<u>Cultivation, collection, Production, Utilizastion Of Herbal Drugs</u>	15Hours
1	Indian Trade in medicinal and Aromatic plants	
2	Role of medicinal plant on national economy	
3	Drug Adulteration	
4	Detailed study of traditional drugs of India	

Unit - III :	<u>General Biosynthesis Pathways Of Secondary Metabolites</u>	15Hours
1	Primary metabolismic pathways	
2	Biosynthesis of carbohydrates	
3	Biosynthesis of Glycosides	
4	Biosynthesis of Alkaloids	
Unit - IV : 4	<u>Pharmacognostical study of crude Drugs</u>	15Hours
1	Extraction, Isolation & Purification of herbal drugs	
2	Drug containing, Alkaloids-Datura herb, Rauwolfia, Glycosides-Brami,Shatavari	
3	Drug containing volatiles oils-Pudina,Clove, Drug containing Tannins-Bahera,Amla	
4	Ayurvedic pharmacy, Marine pharmacognosy, Natural colors and dyes	

REFERENCES :

1	A phytochemical Approach To Economical Botany S.D Sabnis, M. Daniel
2	Robinson,T.(1981). The organic constituents of Higher Plants,Cordus Press,Mass.
3	Stumpf, P.K. and Conn E.E (1980) The Biochemistry of plants Vol 1-14, Academic Press London.
4	Dantel M. (2005). Medicinal Plants. Chemistry and Properties Oxford & IBH Publishers, New Delhi.
5	Evans.W.C 2002. Tease And Evans Pharmacognosy.W.B.Saunders.London.
6	Harborne, J.B (1984) Phytochemicals Methods,AP.London.
7	Anonymous 2002 Quality control methods for medicinal plant materials, World Health Organisation, Geneva A.I.T.B.S Publishers & Distributors,Delhi.
8	Trease and Evans.