VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

Biosciences

M.Sc.-II
PLANT SCIENCE

PAPER - V (B) Biology of Non-Vascular Plants

Section – I (Algae)

Unit-I (20 hrs.)

Taxonomy, salient features, phylogeny, interrelationships of the taxa

- **i.** Cyanophyta
- **ii.** Chlorophyta
- **iii.** Charophyta
- **iv.** Chrysophyta,
- **v.** Phaeophyta
- **vi.** Rhodophyta.
- **vii.** General account of Diatoms
- **viii.** Euglenophyta
- **ix.** Dinoflagellates.

Unit-II (15 hrs.)

- **i.** Cyanobacterial toxins, extracellular products and antimicrobial substances of cyanobacteria.
- **ii.** Physiology, Biochemistry and genetics of nitrogen fixation in heterocystous and non heterocystous forms.
- **iii.** Nitrogen metabolism in algae
- **iv.** Hydrogen metabolism in algae
- **v.** Structure and phylogeny of chloroplast.

Unit-III (10 hrs.)

Applied algalogy :

- **i.** Spirulina- single cell protein.
- **ii.** Algae as biofertilizer.
- **iii.** Biotechnology of micro algae
- **iv.** Seaweed cultivation and their commercial industrial products
- **v.** Role of algae in pollution control
- **vi.** Culturing of algae.

Section – II

Unit IV (20 hrs.) (Fungi)

Taxonomy, salient features, reproduction and phylogeny of the taxa

- **i.** Myxomycotena,
- **ii.** Eumycotena,
- **iii.** Chytridiomycetes,
- **iv.** Hypochytridiomycetes,

v. Oomycetes,

vi. Plasmodiphoromycetes,

vii. Zygomycetes,

viii. Trichomycetes,

ix. Ascomycetes,

x. Basidiomycetes,

xi. Deuteromycetes

Unit –V (10 hrs.) (Fungi)

i. Pathological and economic importance of Fungi.

ii. Ultra structure of fungal cells

iii. Heterothallism in fungi.

iv. Antibiotics produced by fungi

v. Fungi in Symbiosis.

Unit –VI (15 hrs.) (Bryophyta)

Classification, Salient features and life histories of the taxa

i. Hepaticopsida,

ii. Anthocerotopsoda

iii. Bryopsida.

iv. Phylogeny and interrelationships in bryophyta

v. Origin and evolution in Bryophyta

vi. Bryology in India.

References

1. Introduction to the algae – structure and function- H.C.Bold & M.J.Wyne
2. The Algae V.J.Chapman & D.J.Chapman
3. Cryptogamic botany Vol.-I G.M.Smith
4. Biology of Rhodophyta P.S.Dixon
5. Phycotalk Vol.-I & II Ed. H.D.Kumar
6. Biochemistry of the algae and Cyanobacteria L.J.Rogers & J.R.Gillan
7. Phykos Vol.28 G.S.Venlatraman volume
8. Algal cell biology H.D.Kumar
9. Systematic of the green algae D.E.C. Irvine & D.M.John
10. Morphology & Taxonomy of fungi E.A. Bessey
11. Introductory mycology C.J.Alexopolus
12. The fungi Vol.-II & III G.C.Ainsworth & A.C. Suassman
13. Physiology of fungi Vincent W.Cochrane
14. Practical mycology manual for identification of fungi Sigurd funder
15. Bryophytes B.R.Vashistha
16. An introduction to embryophyta Bol.-I Bryophyta Parihar N..

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Biosciences

M.Sc.-II
PLANT SCIENCE

PAPER - VI (B) Biology of Vascular Plants (Non-Flowering) and Anatomy

Section - I

Unit – I (20 hrs) (Pteridophyta)

Classification, Salient features, phylogeny and interrelationships of extinct and extant members of the taxa:

- **i.** Psilopsida,
- **ii.** Lycopsida,
- **iii.** Sphenopsida
- **iv.** Pteropsida.
- **v.** Stelar organization in pteridophyta
- **vi.** Range of Sporangia in pteropsida
- **vii.** Morphology of spore bearing organs in Lycopsida and sphenopsida
- **viii.** Telome theory
- **ix.** Heterospory and seed habit
- **x.** Gametophytes in pteridophyta

Unit – II (15 hrs) (Gymnosperms)

Classification, Salient features and phylogeny of extinct and extant members of the taxa

- Cycadopsida
- Coniferopsida
- Chlamydospermopsida

Unit – III (10 hrs) (Gymnosperms)

- Life cycle of gymnosperms
- Origin, evolution and interrelationships in Gymnosperms.
- Affinities of Gymnosperms
- Ecological adaptations of *Welwitschia*
- Spore bearing organs of Cycadopsida, Coniferopsida and Chlamydospermopsida

Section - II

Unit – IV (15 hrs)

- **i.** Apical organization in vascular plants
- **ii.** Floral apex
- **iii.** Vascular cambium

Unit – V (15 hrs)

- **i.** Xylem
- **ii.** Phloem,
- **iii.** Nodal anatomy
- **iv.** Floral anatomy: General account.

Unit – VI (15 hrs)

Physiological Plant-Anatomy:

- **i.** Dermal tissue system
- **ii.** Absorbing tissue system
- **iii.** Storage tissue system.
- **iv.** Secretary or glandular system

References:

1. An introduction to Pteridophyta	A.Rashid
2. The morphology of Pteredophytes	K.R.Sporne
3. Cryptogamic botany Vol.II	G.M.Smith
4. College Botany Vol.I	Ganguly, Das & Dutta
5. An introduction to Gymnosperms	Trivedi & Singh
6. Gymnosperms	P.C.Vashista
7. Economic botany	Hill A.F.
8. Economic botany	P.P.Pandey
9. Botanical microtechnique	J.E.Sass
10. Botanical Histochemistry	Jansen W.A.
11. Plant microtechnique	Johansen D.A.
12. Plant anatomy	Fahn A.
13. Practical plant anatomy	Fosta A.
14. Plant anatomy	K.Esau
15. Comparative plant anatomy	Carlquist T.S.
16. Paleobotany	Arnold

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Biosciences

M.Sc.-II
PLANT SCIENCE

PAPER - VII (B)
Biology of Vascular Plants (Angiosperms)
Embryology and Botanical Micro techniques

Section - I

Unit – I (15 hrs)

Modern trends in taxonomy:

i. Aims and principles of taxonomy

ii. Concept and importance of character in: taxonomy

iii. Discussion on morphological and ontogenetical neglected characteristics.

iv. Concept of taxonomical categories

Unit – II (15 hrs)

Omega taxonomy:

Importance of

- Embryological
- Palynological
- Anatomical
- Phyto chemical characters

as an aid to angiosperm taxonomy.

Unit-III (15 hrs)

i. Classification and salient features of the angiosperm taxa (Bentham & Hooker System).

ii. "International Code of Botanical' Nomenclature",

iii. History, importance and knowledge of some important rules.

iv. Systems of classification of angiosperms

v. Origins of Angiosperms

Section - II

Unit – IV (15 hrs)

i. Evolutionary morphology of vegetative organs.

ii. Ontogeny, evolutionary morphology and phylogeny of Floral organs.

Embryology :

i. Microsporogenesis

ii. Megasporogenesis

iii. Types of Embryosacs and Endosperms

iv. Process of Fertilization

v. Embryogenesis

vi. Experimental embryology and tissue culture technique.

Unit – V (15 hrs)

Botanical Microtechniques:

i. Fixatives

ii. Dehydration

iii. Infiltration

iv. Microtomy

v. Staines

vi. Histochemistry

Unit VI (15 hrs) Economic Botany

Economically important plants of India with special reference to

- Cereals
- Pulses
- Fibers
- Beverages
- Medicinal plants
- Gums
- Resins and
- Rubber

References :

1. Pollen — Robert Stanley
2. Pollen morphology of angiosperms — P.K.Nair
3. Advances in pollen research — Naire & Lawrence
4. Morphology of pollen grains in relation to plant classification — Wodehouse
5. Pollen morphology and plant taxonomy — G.Erdtman
6. Principles of angiosperm taxonomy — Davis & Hey Wood
7. Angiosperm taxonomy — Hey Wood
8. Plant taxonomy — V.M.Naik
9. Taxonomy of plants — B.D.Sharma
10. Taxonomy of angiosperms — Tyagi & Kshetrapal
11. College Botany Vol.II — Gangulee
12. An introduction to numerical classification — Clifford & Stephenson
13. International code of botanical nomenclature
14. Plant diversification
15. Flowering plants – origin & dispersal — Takhtajan
16. Genera of flowering plants — Hutchinson

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Biosciences

M.Sc.-II
PLANT SCIENCE

PAPER - VIII (B-1)
Special Paper
MARINE BOTANY

Section – I

Unit – I

- Oceans and seas of the world.
- Ecology and zonation of the oceans
- Factors affecting oceanic environment
- Continental drift and its influence on the marine life.

Unit – II

- Ocean basins and continental shelves
- Waves-currents and dynamism of the oceans
- Chemistry and chemical cycles of the oceans

Unit –III

- Thalasso-palaeoecology and its bearing on modern period, (Temperature, sea level, diurnal rhythm)
- Energy flow and food web of oceans
- Oceanographic study centers in India

Section – II

Unit – IV

Plant life of oceans:

- Marine bacteria
- Fungi
- Plankton
- Blue green algae
- Benthic algae
- Calcareous algae & fossils

Unit – V

Marine algae physiology:

- Light relationships
- Temperature relationships
- Responses to osmotic changes
- Responses to pH
- Mineral nutrition in the sea water environment
- Pneumatocyst gases

Unit – VI

- Marine angiosperms:
- Spermatophytes
- Mangrove associations
- Salt marshes
- Ecological importance
- Economic importance of marine algae
- Practical aspects

References :

1. Marine Botany — Yale Dawson
2. Oceanography : Physics, Chemistry and Gen.Biology — Swedrup H.G, Johnson M.W. and Fleming R.H.
3. Readings in earth sciences – Scientific American Vol. I, II & III
4. Marine botany — Dawes C.
5. Marine plants — Desikachary T.V.
6. Biology of algae — Round F.E.
7. Sea weeds and their uses — Chapman V.J.
8. The Biology of Rhodophyta — Dixon P.S.

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Biosciences

M.Sc.-II
PLANT SCIENCE

PAPER - VIII (B-2) Special Paper -FOREST BOTANY

Section - I

Unit-I (15 hrs.)

- **i.** Main types of forests of India, with special reference to forests of Gujarat.
- **ii.** Forest composition – Tropical and Subtropical

Unit – II (20 hrs)

- **i.** Forest climate and soil
- **ii.** Floristic components of forests of Gujarat
- **iii.** Forest – productivity and utilization
- **iv.** Exploitation – rejuvenescene ratio and protection

Unit – III (10 hrs.)

- **i.** Conservation and protection of forests
- **ii.** Social forestry, its impact on socio-economic life of people

Section – II

Unit – IV (15 hrs.)

- **i.** Important forest product –

Timber

- Its revenue value
- Species yielding high quality wood, method of its conservation and high production.
- Streucture of wood
- Chemical composition of wood
- Defects and abnormalities of wood

Unit –V (15 hrs.)

- **i.** Biological deterioration of wood
- **ii.** Wood preservation
  - Steaming and seasoning
  - Poisoning

iii. Uses of wood:

- Other wood products
- General account
- Principles and practice

Unit- VI (15 hrs.)

i. Minor forests products

ii. Silviculture

iii. Forest ecology

References :

1. Flora of Gujarat state	G.L.Shah
2. Forest products	Panshim et.al.
3. Wood science	Kollman & Cote
4. Agro forestry in India	Tejwani
5. Forest types of India	Champion & Seth

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Biosciences

M.Sc.-II
PLANT SCIENCE

PAPER - VIII (B-3) Special Paper PALYNOLOGY

Section – I

Unit-I (25 hrs)

i. Historical and prospects of Palynology

ii. Ontogeny and developmental morphology of pollen et spores

iii. Spore morphology of cryptogams

iv. Pollen morphology of spermophytes

Unit-II (10 hrs)

- Physiology and biochemistry of germinating pollen and fertilization

Unit- III (10 hrs)

- Evolutionary morphology of pollen et spore and its impact in explaining the origin, phylogeny and interrelationships of various taxa.

Section - II

Unit –IV (20 hrs)

Applied Palynology:

- Clinical Palynology
- Forensic Palynology
- Mellito Palynology
- Paleo-palynology
  - Spore dispersae
  - Application of Palynology in economic geology
  - Palynology in relation to phytogeography.

Unit- V (10 hrs)

Importance of study of Palynology in agriculture

- Pollination
- Pollen viability
- Pollen germination and its utility in hybridization

Unit – VI (10 hrs)

Aeropalynology

- Distribution of air borne pollen and spatial dispersion
- Seasonal variation & Periodicity
- Air-borne pollen flora of an area

<u>References</u> :

1. Pollen — Robert Stanley
2. Pollen Morphology of angiosperms — P.K.Nair
3. Advances in pollen spore research — Naire and Lawrence
4. Pollen spores
5. Morphology of pollen grains in relation to plant classification — Wodehouse
6. Pollen morphology and plant taxonomy — G.Erdtman

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Biosciences

M.Sc.-II
PLANT SCIENCE

PAPER - VIII (B-4) Special Paper Medicinal Plants

Section - I

Unit-1. (15 hrs.)

History of Herbalism:

- **i.** Origins and development in India.
    - Contributions of Charak, Shushrut , Sharangdhar, Bapalal Vaidya and Pandit Priyavrat Sharma.
- **ii.** Development abroad.
    - Contributions of Adanson, Dioscorides and others.
- **iii.** Centres of research in medicinal plants in India and abroad.
- **iv.** Ethno medicines:
    - History of ethnomedicinal studies.
    - Protocols for studying ethno medicines.
    - Present scenario in India and Gujarat.

Unit-2. (15 hrs)

Status of medicinal plants:

- **i.** Diversity in Gujarat.
- **ii.** Threats to diversity.
- **iii.** Conservation strategy.
- **iv.** Methods of identifying medicinal plants.

Unit-3 (15 hrs)

Collection and processing of medicinal plants.

- **i.** Nondestructive methods of collections.
- **ii.** Use of different processing method and their effects on the quality of drugs.
- **iii.** On the spot value addition as strategy for marketing.
- **iv.** Biotechnology and medicinal plants.
    - Micro propagation of rare and endangered plants.
    - Cultivation methods.

Section - II

Unit-4. (15 hrs)

Methods of studying medicinal plants.

- **i.** Phytochemical methods of analysis.
- **ii.** Phrmacognosy as a tool for quality control of crude drugs.

Unit- 5. (15 hrs)

Introduction to major Phytochemicals.

- **i.** Alkaloids.
- **ii.** Tanins
- **iii.** Glucosides.
- **iv.** Saponins.
- **v.** Flavonols.

Unit-6. (15 hrs)

- **i.** Problems and processes of drug production.
- **ii.** Procurement of crude drugs.
- **iii.** Standardization of herbal products.
- **iv.** Classical methods of drug presentation and administration.
- **v.** Importance of elegance and dispensability of herbal drugs in marketing.
- **vi.** International acceptability of drugs.
- **vii.** Globalization, Intellectual property rights, Common property resource management and patenting with special reference to medicinal plants.

Literature recommended :

1. Wallis, An Introduction to pharmacognosy.
2. Nadkarni, Indian Materia Medica.
3. Oser, B. L. Hawk's Physiological Biochemistry, 1979.
4. Nelson and Cox, Lehninger Principles of Biochemistry, 2000.
5. Bapalal Vaidya, Nighantu Adarsh, 1965.
6. Furniss, Hannaford, Smith and Tatchell, Vogel's Textbook of Practical Organic Chemistry, 1994.
7. Kothari, Parabia and Ramanarao, Perspectives of Research in Medicinal Plants.
8. Kirtikar and Basu, Indian Medicinal Plants, vol I, II, III, IV, 1998(Reprinted).
9. Mehrotra and Ghosh, Compendium of Indian Medicinal Plants vol I, II, III, IV.
10. Handa S. S. and M. K. Kaul, Cultivation and Utilization of Medicinal Plants, 1997.
11. CHEMEXCIL, Monograph of Medicinal Plants, 1992.
12. Chopra R. N. Indigenous Drugs of India, 1958.
13. Bahl and Bahl A Textbook of Organic Chemistry, 2001.
14. Chatwal G. Organic Chemistry of Natural Products vol I, II, 1998.
15. Satoskar R. S., S. D. Bhandarkar and S. S. Ainapure Pharmacology and Pharmacotherapeutics, 1998.