

VEER NARMAD SOUTH GUJARAT UNIVERSITY

M.Sc. II

BIOSCIENCES

Plant Science

Paper V (B) : Biology of Non-Vascular Plants

Section – I (Algae)

Unit — I

Taxonomy, salient features, phylogeny, interrelationships, and life histories of the taxa.

- Cyanophyta
- Chlorophyta
- Charophyta

Unit –II

Taxonomy salient features, phylogeny, interrelationships, and life histories of the taxa.

- Chrysophyta
- Phaeophyta
- Rhodophyta
- General Account of Diatoms
- Euglenophyta
- Dinoflagellates

Unit – III

- Cyanobacterial toxins, extracellular products and antimicrobial Substances of cyanobacteria.
- Physiology, Biochemistry and genetics of nitrogen fixation in Heteroeystous and non heteroeystous forms.
- Nitrogen metabolism in algae.
- Hydrogen metabolism in algae.
- Structure and phylogeny of chloroplast.

Unit — IV

Applied algalogy :

- Spirulina — single cell protein.
- Algae as bio fertilizer.
- Biotechnology of micro algae
- Seaweed cultivation and their commercial industrial products.
- Role of algae in pollution control,
- Importance of primary productivity by phytoplankton
- Culturing of algae.

SECTION — II

Unit V (Fungi)

Taxonomy salient features, reproduction and phylogeny of the taxa.

* Myxomycotena	* Zygomycetes
* Eumycotena	* Trichomycetes
* Chytridiomycetes	* Ascomycetes
* Hypochytridiomycetes	* Basidiomycetes
* Oomycetes	* Deuteromycetes
• Plasmodiophoromycetes.	

Unit — VI (Fungi)

- Pathological and economic importance of Fungi.
- Ultra structure of fungal cell
- Heterothallism in fungi
- Antibiotics produced by fungi
- Fungi in Symbiosis.

Unit — VII (Bryophyta)

Classification, Salient fetures and life histories of the taxa.

- Hepaticopsida.
- Anthocerotopsida
- Bryopsida.

Unit — VIII (Bryopayta)

- Phylogeny and interrelationships in bryophyta.
- Origin and evolution in Bryophyta.
- Bryology in India

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PAPER VI (B)

BIOLOGY OF VASCULAR PLANTS (Non-Flowering) and Anatomy

SECTION — I

Unit — I (Pteridophyta)

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

- Psilopsida.
- Lycopsidea.
- Sphenopsida
- Pteropsida.

Unit — II (Pteridophyta)

- Stellar organization in pteridophyta
- Range of Sporangia in pteropsida
- Morphology of spore bearing organs in Lycopsidea and sphenopsida
- Telome theory
- Heterospory and seed habit
- Gametophytes in pteridophyta

Unit — III (Gymnosperms)

Classification, Salient fetures and phylogeny of extinct and extant members of the taxa.

- Cycadopsida
- Coniferopsida
- Chlamydospermopsida

Unit — IV (Gymnosperms)

- Origin, evolution and interrelationships in Gymnosperms.
- Affinities of Gymnosperms.

Unit — V Anatomy

- Apical organisation in vascular plants
- Floral apex

Unit — VI Anatomy : Vascular fissues

- Xylem
- Phloem
- Vascular Cambium

Unit — VII Anatomy

- Evolutionary Significance of Nodal Anatomy
- Floral Anatomy : General Account

Unit — VIII Anatomy

- Dermal tissue system
- Absorbing tissue system
- Storage tissue system.
- Secretory or glandular tissue system

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PAPER VII (B)

Biology of Vascular Plants (Angiosperms) Embryology and Botanical Micro techniques

Section — II

Unit — I

Modern trends in taxonomy:

- Aims and principles of taxonomy
- Concept and importance of character in taxonomy
- Discussion on morphological and ontogenetical neglected characteristics.
- Concept of taxonomical categories

Unit — II

Omega taxonomy:

Importance of

- Embryological
- Palynological
- Anatomical
- Phyto Chemical Characters As and aid to angiosperm taxonomy.

Unit — III

- Classification and salient features of the angiosperm taxa (Bentham & hooker System).
- "International Code of Botanical Nomenclature".
- History, importance and knowledge of some important rules.
- Fossil angiosperms
- Systems of classification of angiosperms
- Herbarium methodology
- World herbaria and botanical gardens
- Origins of Angiosperms

Section — III

Unit — IV

- Evolutionary morphology of vegetative organs.
- Ontogeny, evolutionary morphology and phylogeny of Floral organs.

Unit — V

Embryology:

- Microsporogenesis
- Megasporogenesis
- Types of Embryosacs and Endosperms
- Process of Fertilization
- Embryogenesis
- Experimental embryology and tissue culture technique.

Unit — VI

Botanical Microtechniques :

- Fixatives
- Stains
- Microtomy
- Histochemistry

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Paper – VIII (B-I)

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 and fossils

Unit - V

Marine algae physiology:

- Light relationship
- Temperature relationship
- 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.

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BIOSCIENCE

Paper VIII (B-2) Special Paper

FOREST BOTANY

SECTION – I

Unit – I

- Main types of forests of India, with special reference to forests of Gujarat.
- Forest Composition – Tropical and Subtropical.

Unit – II

- Forest Climate and Soil
- Floristic Components of Forests of Gujarat
- Forest-productivity and utilization
- Exploitation – rejuvenescence ratio and protection

Unit – III

- Conservation and protection of forests
- Social forestry, its impact on Socio-economic life of people.

Section – II

Unit – VI

Important forest Product

TIMBER

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

Unit – V

- Biological deterioration of wood
- Wood preservation
 - Steaming and Seasoning
 - Poisoning
- Use of Wood :
 - * Other wood products
 - * General Account
- Principles and Practice

Unit — VI

- Minor forest products.
- Silviculture.
- Forest ecology

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Paper – VIII (B-3)

Special Paper

PALYNOLOGY

Section – I

Unit - I

- History and prospects of Palynology
- Ontogeny and developmental morphology of pollinet spores
- Spore morphology of cryptogams
- Pollen morphology of spermatophytes

Unit - II

- Physiology and biochemistry of germinating pollen and fertilization.

Unit - III

- Physiology and biochemistry of germinating pollen and fertilization.

Unit - IV

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

Section – II

Unit – IV

Applied Palynology

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

Unit V

Importance of study of Palynology in agriculture

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

Unit – VI

Aeropalynology

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

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BIOSCIENCE SYLLABUS OF SPECIAL PAPER MEDICINAL PLANTS (B-4) M.Sc. II BIOSCIENCES (Plant Science)

Section – I

Unit – I

History of Herbalism :

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

Unit – 2

Status of medicinal plants

- Diversity in Gujarat.
- Threats to diversity.
- Conservation strategy.
- Methods of identifying medicinal plants.

Unit – 3

Collection and processing of medicinal plants.

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

Section — II

Unit — 4

Methods of studying medicinal plants.

- Phytochemical methods of analysis.
- Pharmacognosy as a tool for quality control of crude drugs.

Unit — 5

Introduction to major Phytochemicals.

- Alkaloids.
- Glucosides.
- Saponins.
- Flavonols.

Unit — 6

- Problems and processes of drug production.
- Procurement of crude drugs.
- Standardization of herbal products.
- Classical methods of drug presentation and administration.
- Importance of elegance and dispensability of herbal drugs in marketing.
- International acceptability of drugs.
- Globalization, Intellectual property rights, Common property resource management and Patenting with special reference to medicinal plants.

Literature recommended :

Wallis, An Introduction to pharmacognosy.

Nadkarni, Indian Materia Medica.

Oser, B.L.Hawk's Physiological Biochemistry, 1979.

Nelson and Coz, Lehninger Principles of Biochemistry, 2000.

Bapalal Vaidya, Nighantu Adarsh, 1965.

Fumiss, Hannaford, Smith and Tatchell, Vogel's Textbook of Practical Organic Chemistry, 1994.

Kothari, Parabia and Ramanarao, Perspectives of Research in Medicinal Plants. Kirtikar and Basu, Indian Medicinal Plants, Vol 1, II, III, IV.

Mehrotra and Ghosh, Compendium of Indian Medicinal Plants Vol I, II, III, IV. Hands S.S. and M.K Kaul, Cultivation and Utilization of Medicinal Plants, 1997. CHEMEXCIL, Monograph of Medicinal Plants, 1992.

Chopra R.N. Indigenous Drugs of India, 1958.

Bahl and Bahl A Textbook of Organic Chemistry, 2001.

Chatwal G. Organic Chemistry of Natural Products Vol I, II, 1998.

Satoskar R.S.S.D. Bhandarkar and S.S. Aina pure Pharmacology and Pharmacotherapeutics, 1998.

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PRACTICALS PROPOSED FOR SPECIAL PAPER IN MEDICINAL PLANTS

Comparison of methods of processing raw materials (shade and Sun drying, pulverizing)

Taxonomy of medicinal plants of Gujarat.

Non-destructive methods of collection.

Drug yielding herbs and herbal resources – roots, bark, stem, leaves, fruits, seeds, flowers, buds, gums and resins, exudates etc. Their identification and pharmacognosy (of selected drugs).

Methods of propagation : conventional as well as based on Biotechnological advances.

Drug testing and quality control methods for the production of standardized herbal drugs.

Phytochemical methods to estimate Alkaloids, Glycosides, Saponins, inorganic salt content.

Designing and creating herbal garden for homes and institutions.

(A student may opt for dissertation in lieu of practical).

NOTE : It is expected that a student goes for an off campus practical training with some pharmaceutical company/instrumentation center in consultation with his/her teacher.