VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

M.Sc. Part – I

BOTANY

IN FORCE FROM JUNE – 2003

Master of science examination in the Subject of Botany shall consist of two parts – M.Sc. –I and M.Sc. – II. For each examination there shall be four written papers and three practicals Each theory paper shall be of 75 marks and 3 hours duration and three practicals of 140 marks, each of 5 hours duration. 20 marks are for Botanical excursions, records, Submission and Viva-Voce examination. Students haveto attend the botanical excursions tour as and when scheduled by the department and have to submit the tour report. (For the final examination)

M.Sc.Part – I. (In force from June 2003)

Theory	External Evaluation	Internal Evaluation	Total
Paper-I	52	22	75
Paper-II	52	22	75
Paper-III	52	22	75
Paper-IV	54	24	75
	210	90	300

Practicals : M.Sc. Part – I

Practical-I.	Biology and Diversity of lower plants. (Algae, fungi, Microbes & Plant Pathology)
Practical-II.	Biology and Diversity of lower planets. (Bryophyta, Pteridophyta, Fossils and embryology)
Practical-III.	Seed plants-Angiosperms, gymnosperms, Fossils & Anatomy.

Evaluation (M.Sc. Part – I) Practical

External Evaluation	Internal Evaluation	Total
140	60	200

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PAPER-I

(Biology and Diversity of lower plants-Microbes, Algae, Fungi, Plant Pathology)

(1) MICROBES :

(A) BACTERIA :

Archaebacteria and eubacteria, General account, Ultra structure, nutrition, reproduction and economic importance.
Study of Azobacter, E.Coli, Bacillus and Nocardia.

(B) CYANOBACTERIA :

General account, classification, Ultrastructure of the cell, range of thallus structure, reproduction and affinities
Study of structure of the thallus and reproductive bodies in the following types, classification with reasons :

Gloeocapsa, Microcystis, Spirulina, Lyngbya, Anabaena, Cylindrospermum, Tolypothrix.

(C) VIRUSES :

Characteristics and ultrastructure of various isolation and purification of viruses, chemical nature, replication, transmission of viruses, economic importance.
Study of TMU, Bacteriophage, Cyanophage.

(D) PHYTOPLASMA :

General characteristics and role in causing plant diseases.

(E) PHYCOLOGY:(ALGAE)

Algae in diversified habitats (terrestrial, freshwater, marine), thallus organization, cell ultrastructure, reproduction (vegetative, asexual, sexual), life cycle Patterns and alternation of generations, criteria for classification of algae, Pigments, reserve food, flagella.

General account of Chlorophyta, Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta, and Rhodophyta, economic importance of Algae, phylogeny.
Study of the structure of the thallus and reproductive bodies in the following types, classification with reasons :

Chlorophyta : *Chlamydomonas, Pandorina, Eudorina. Pediastrum, Hydrodictyon, Ulothrix, Tetraspora, Acetabularia, Ulva Sirogonium, Enteromorpha, Cladophora, Pithophora, Chaetophora, Stigeoclonium, Mougeotia, Closteruim, Cosmarium, Valonia.*

Charophyta: *Nitella*

Phaeophyta : *Cutleria, Laminaria, Padina.*

Rhodophyta : *Gelidium, Corallina, Porphyra.*

(F) MYCOLOGY : (FUNGI)

General characters of fungi, cell ultrastructure, unicellular and multicellular organization, cell wall composition, nutrition (saprobic, biotrophic, symbiotic), reproduction (Vegetative, asexual, sexual), heterothallism, Heterokaryosis, Parasexuality, recent trends in classification, phylogeny of fungi.

General account of phycomycetes (mastigomycotina, zygomycotina) Ascomycetes, Basidiomycetes and Deuteromycetes, spores in fungi, economic importance of fungi.

Study of the structure of thallus and reproductive bodies of the following types, classification with reasons:

PHYCOMYCETES:	*Synchytrium, Saprolegnia, Albugo, Peronospora, Sclerospora, Pilobolus.*
ASCOMYCETES :	*Taphrina, Erisiphe, Saccharomyces, Neurospora, Xylaria, Morchella.*
BASIDIOMYCETES:	Clavaria, Geaster, Cyathus. *Sclerotium, Ustilago.*
LICHENS :	Occurrence, classification, forms, structure, nature of association, ecological and economic importance. Parmelia, Lecanora, Cladonia, Usnea.

PLANT PATHOLOGY:

Classification of plant diseases, Agents of infection of diseases, Agents of non-infectious diseases, Enzymes, Toxins and Plant diseases.

General knowledge about some important plant diseases.

1. Rots : Red rot sugar cane
2. Mildews :
   Downy mildews – Alfalfa, sugarbeet, onion, cucurbits, soyabean, sugarcane.
   Powdery Mildews – Cereals and grasses, cucurbits, Roses, Grapes.
3. Smut and Rust diseases.
4. Bacterial diseases: Blight leaf spot of mango.
5. Viral diseases: Mosaic, Leaf curl of Tomato, Bunchytop of Banana and Papaya, Little leaf of Brinjal.

- Control of plant diseases.
- Diseases resistance in plants
- General account of noninfectious diseases.
- Plant disease management,
  Chemical, Biological and IPM systems, plant disease clinics.

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PAPER-II

(Biology and Diversity of lower plants – Bryophyta, Pteridophyta including Fossils)

I. BRYOPHYTA:

General characters, Distribution, Diversity, Classification, Reproduction (Vegetative, asexual, Sexual), General account of Hepaticopsida, Anthocerotopsida and Bryopsida, Origin of Bryophytes, Evolution of sporophytes in Bryophytes, ontogeny of sex organs in Bryophytes, comparative account of gametophytes in Bryophytes, Alternation of generation in Bryophytes, Fossil Bryophytes.

Classification (with reason) and structure of the thallus and reproductive bodies of the following Bryophytes:

(A) HEPATICEAE : *Targionia, Cyathodium,*
Reboulia, Plagiochasma,
Fimbriaria, Dumortiera,
Lunularia, Fossombryonia,
Pallavicinia.

(B) ANTHOCEROTOPSIDA : Notothylas

(C) BRYOPSIDA (MUSCI): Andrea
Polytrichum
Pogonatum.

II. PTERIDOPHYTES:

Classification, general characters, Morphology, Anatomy and Reproduction, Evolution of stele, Heterospory and origin of seed habit, Evolution of sori and Sporophylls, Apogamy, Apospory, Parthenogenesis, Telome theory, Gametophytes of pteridophytes, Phylogeny and affinities of pteridophytes, alternation of generations.

Classification, general characters and reproduction of Filicopsida.

III. FOSSIL – Pteridophytes:

(1) Geological time table.
(2) Types of fossils and their significance
(3) Detailed study of the following fossils

(a) **PSILOPHYTOPSIDA :**
Psilophyton
Asteroxylon
Horneophyton

(b) **LYCOPSIDA :** *Protolepidodendron*
Miadesmia
Sigillaria
Stigmaria

(c) **SPHENOPSIDA:** *Hyenia*
Calamophyton

(d) **FILICOPSIDA:** *Stauropteris*
Zygopteris
Botryopteris
Cladoxylon.

IV. Classification with reasons, External morphology, anatomy and Reproductive structures of the following types:
Botrychium, Lygodium, Gleichenia, Cyathea, Alsophila, Pteris, Adiantum, Actinopteris, Pleopeltis, Cheilanthes, Blechnum, Asplenium, Polypodium, Salvinia.

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PAPER-III

(TAXONOMY & DIVERSITY OF SEED PLANTS INCLUDING FOSSILS)

I. GYMNOSPERMS :

(A) Classification, Distribution, General characters, External and internal morphology, Reproduction of the following:

[1] CYCADOFILICALES : *Medullosa, Pachytesta, Calamopitys, Glossopteris, Caytonia.*

[2] PENTOXYLALES : General account

[3] CORDAITALES : General account

[4] CYCADALES : Zamia, Nilssonia.

[5] GINKGOALES : Ginkgoites

[6] CONIFERALES : General account.
Structure of reproductive and vegetative organs of *cryptomeria, Cupressus, Thuja, Juniperus, Podocarpus.*

[7] WELWISTSCHIALES : *Welwitschia* (only for theory)

(B) EVOLUTION OF GYMNOSPERMS.

II. ANGIOSPERMS :

[1] Aims and objectives of plant Taxonomy.

[2] Taxonomic hierarchy, Species, Genus, family and other categories, Principles used in assessing relationship, delimitation of taxa and attribution of rank.

[3] Botanical nomenclature – Need for scientific names, History of Botanical nomenclature, Principles of ICBN, Name of taxa (Genus, special and intraspecific categories)

[4] History and systems of classification.
Phenetic versus Phylogenetic systems, cladistics in taxonomy, Current systems of classification –

1. Bentham and Hooker
2. Engler-Prantl
3. Bessey
4. Hutchinson
5. Takhtajan
6. Cronquist

Salient features, Merits and Demerits.

[5] Phylogeny and floral variations in parietals, Tubiflorae, Geraniales, Scitaminales.

[6] Taxonomical studies of the following families with reference to their geographical distribution, systematic position, floral variations and economic importance (if any).
Dilleniaceae, Berberidaceac, Violaceace, Guttiferae, Linaceae, Ternstromiaceae, Malpighiaceae, Geraniaceae, Oxalidaceae, Balsaminaceae, Meliaceae, Balanitaceae, Celastraceae, Rhizophoraceae, Turneraceae, Begoniaceae, Ficoideae, Molluginaceae, Cactaceae, Plumbaginaceae, Oleaceae, Salvadoraceae, Gentianaceae, Chenopodiaceae, Santalaceae, Orchidaceae, Dioscoreaceae, Commelinaceae, Pandanaceae, Lemnaceae.

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PAPER-IV

(PLANT DEVELOPMENT AND REPRODUCTION)

Unit I - Anatomy

1. Cell wall: Formation, Primary – secondary cell Wall, components and ultrastructure.
2. Shoot apex: Structure and organization.
3. Root apex: Structure and organization.
4. Floral apex: Its transformation.
5. Xylem: Structure of elements, development and phylogeny..
6. Phloem: Structure of sieve elements, development and phylogeny, P-proteins, sieve elements, plastids, callose.
7. Sclereids: Origin, development, structure and classification.
8. Nodal anatomy: Structure, types and ontogeny.
9. General anatomy of flowers
10. Leaf growth and differentiation :

Determination, Phyllotaxy, Control of leaf form, differentiation of epidermis (with special reference to stomata and trichomes) and mesophyll.

Unit II – Embryology.

1. Mitosis in pollengrains, viability and germination of pollens, male sterlity, Pollen-pistil interaction.
2. Embryosac: polarity, ultrastructural aspect of embryosac, Types of embryosac.
3. Endosperms: Types of endosperm, Ruminate endosperm, cytology of endosperm, function of endosperm morphogenetic studies.
4. Embryo: Zygote, Proembryo, Embryogeny in dicotyledons; eg. *Ceratoscephalus falcatus. Lactuca sativa, Lobelia amoena, Sagina procumbens,* Embryogeny in monoclotyledons (Sagittaria) Role of Suspensor.
5. Polyembryony
6. Apomixis

Unit – III: Experiment and applied embryology:

Anther culture – A technique for haploid production, Embryo culture, Nucellus culture, Parthenocarpy, Parasexual hybridization.