

M.G.S. UNIVERSITY,

BIKANER

SYLLABUS

**SCHEME OF EXAMINATION AND COURSES OF
STUDY**

FACULTY OF SCIENCE

M.Sc. BOTONY

M.Sc. PREVIOUS EXAMINATION – 2021

M.Sc. FINAL EXAMINATION - 2022



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FACULTY OF SCIENCE

M.Sc. BOTANY

M.Sc. PREVIOUS BOTANY—2020-21

Scheme

Total marks of Msc Previous = 450 Four papers of three hours duration.

Maximum marks of each paper = 75 Minimum Passing Marks of each Paper= 19

Total Passing Marks of all four papers = 108 Max. marks of Practical =150

I Practical include Paper-I and IV of maximum 75 marks

Minimum Passing Marks=27

II Practical include Paper-II and III of maximum 75 marks

Minimum Passing Marks=27

Duration of each practical = 5 hours

Pattern of Theory Paper

Each paper is divided into 3 sections

Section A :- Consists of 10 compulsory Questions of 2 (two) mark each.

Word limit Max 50 words.

Selection of question of Examiner- Maximum 2

from each unit (10X2=20)

Section B :- Consists of 5 Questions of 5 (five) mark each with internal choice. Students are required to

Attempt all five questions.

Word limit Max 200 words.

Selection of question of Examiner- Maximum 2

from each unit (5X5=25)

Section C :- Consists of 5 Essay type Questions of 10 (ten) marks each.

Students are required to

Attempt any 3 questions.

Word limit Max 500 words.

Selection of question of Examiner-

Maximum one from each unit (3X10=30)

PAPER I :
MICROBIOLOGY, PHYCOLOGY,
MYCOLOGY AND PLANT PATHOLOGY

TIME 3 Hrs.

75 Marks

Unit- I

Microbiology: Archaeobacteria and Eubacteria : General account, ultra structure, nutrition and reproduction, biology and economic importance. Cyano bacteria- Salient features and biological importance.

Viruses: Characteristics and ultra structure of virions, chemical nature, replication, transmission of viruses, economic importance. **Phytoplasma;** general characteristics and role in causing plant diseases.

General account of immunity, types of immunity, allergy and types of allergies, properties of antigens and antibodies, serology, types of vaccines.

Unit- II

Phycology: Algae in diversified habitats (terrestrial, fresh water, marine); Range of thallus organization, cell structure, reproduction, sexuality in algae. Criteria for classification of algae; pigments, reserve food, flagella,

classification, salient features of Protochlorophyta, Chlorophyta, Charophyta, Xanthophyta, Bacillariophyta, Phaeophyta and Rhodophyta with reference to following genera:—

Cyanophyta—Anabaena, Rivularia

Chlorophyta – Gonium, Nitella, Bulbochaete, Closterium, Acetabularia

Xanthophyta—Botrydium,

Bacillariophyta—Cyclotella, Navicula

Phaeophyta—Padina , Sargassum

Rhodophyta –Liagora, Ceramium

Unit- III

General characteristics of Euglenophyta, Dinophyta, Chrysophyta and Cryptophyta.

Nitrogen fixation in algae, algal biofertilizers, algal blooms, fossil algae, algae as food, feed and uses in industry.

Mycology: Present criteria used in classification of fungi with reference to vegetative and reproductive structures. Comparative study of following divisions and subdivisions :

.Plasmodiogyomycotina: Stemonities, Physarum

Haplomastigomycotina: Synchytrium, Plasmodiopora

Diplomastigomycotina: Peronospora, Plasmopara

Zygomycotina: Syncephalastrum, Piloboulus

Unit- IV

Ascomycotina: Taphrina, Phyllactinia, Chaetomium

Basidiomycotina: Puccinia, Melampsora, Ustilage Deuteromycotina: Fusarium, Cercospora, Colletotrichum Heterothallism, Heterokayrosis, Parasexual cycle

Role of fungi in industries with reference to production of alcohol, organic acids, antibiotics, food and fodder. Mushroom cultivation, Mycorrhiza application in agriculture and plant growth.

Plant Pathology: Symptomatology and identification of diseases with reference to fungal, bacterial and viral infections.

Unit- V

Etiology and control of the following crop diseases:-Paddy: Blast, Bacterial leaf blight, Tungro virus Wheat: Bunt., Tundu disease

Bajra: Ergot and Smut Sugarcane: Red rot

Potato: Early blight, Virus-X,Y Cotton: Angular leaf spot

Grapes: Downy mildew, Powdery mildew Groundnut: Tikka

Tomato: Tomato Mosaic Virus

Disease control by physical, chemical and biological methods, resistant varieties, crop rotations, plant quarantine.

Reference Books-

1. An introduction to Algae – Morris, Cambridge Univ. Press U.K.
2. Introductory Phycology – H.D. Kumar, Affiliated East West Press Ltd., New Delhi.
3. Phycotalk Vol. I and II - H. D. Kumar Rastogi Publ., Meerut.
4. Recent Advances in Phycology - H.D. Kumar Rastogi Publ., Meerut.
5. Aquatic Biology in India - Kachroo P. Bishan S. Mahendra Pal.Dehradoon

6. The structure and reproduction in the Algae –Vol. I & II , F.E. Fritsch, Cambridge4 Uni. Press.
7. Cryptogamic Botany –Vol. I , G.M. Smith,Tata Mac Graw Hill Publication ,New Delhi
8. Advances in Phycology— edited by B.N. Verma, APC Publication India.
9. Phaeophyceae in India –J.N. Mishra, ICAR Publication ,New Delhi.
10. Sea weeds and their uses –V.J.Chapman
11. Introductory Mycology – Alexopolus, John Wiley and Sons Ind.
12. An Introduction to Mycology – Mehrotra and Aneja, New Age Intermediate Press.
13. Diseases of India – Rangaswami and Mahadevan, Prentice Hall of India Pvt. Ltd., New Delhi.
14. Introduction to Fungi – Webster, Cambridge Univ. Press.
15. Plant Diseases - R.S. Singh, Oxford and IBH Publishing.
16. Plant Pathology – Agrios, Academic Press, London
17. Plant Pathology – Mehrotra, Tata McGraw Hill,New Delhi.
18. Microbiology and Pathology – P.D. Sharma, Rastogi Publication, Meerut
19. Fundamentals of Plant Pathology – V.N. Pathak Agro Botanica, Jodhpur.
20. Microbiology and Pathology – S.S. Purohit, Agro Bot. Jodhpur.
21. Microbiology – Palezar, Chand and King, McGraw Hills, London.
22. A text book of modern Plant Pathology – Bilgrami and Dubey, Vikas Publication, New Delhi.

PAPER II :

BRYOLOGY, PTERIDOLOGY AND GYMNOSPERMS

3 Hrs.

75 Marks

Unit- I

Bryophytes: Origin of Bryophytes (including fossil record), primitive versus advanced features, evolutionary lines, classification, comparative study of gametophytes and sporophytes of

Takakiales, Calobryales, Jungermanniales, Sphaerocarpales, Marchantiales, Anthocerotales, Sphagnales, Andreales and Bryales with reference to following genera: Takakia, Calobryum, Fossombronia, Pellia, Sphaerocarpus Monoclea, Dumortiera, Targionea, Asterella, Notothylas, Anthoceros, Sphagnum, Andreaea, Busxbaumia.

Unit- II

Economic importance of Bryophytes with special reference to Ecology, pollution indicators and monitoring geobotanical prospects. **Pteridophytes:** Life cycle with reference to alternation of generation, colonization of terrestrial environment, soral evolution. Apomictic life cycle: Apogamy, apospory, vegetative apomixis. Evolution of stele, Heterospory and seed habit..

Systematic, Reproduction and Phylogeny of the following: Rhyniopsida- Rhynia, Horneophyton

Zosterophyllopsida - Zosterophyllum Trimerophytosida – Psilophyton

Unit- III

Systematic, Reproduction and Phylogeny of the following: Psilopsida- Tmesipteris

Lycopsida- Isoetes, Lepidodendron Sphenopsida- Sphenophyllum Pteropsida- Ophioglossum Osmundales - Osmunda Gleicheniales- Gleichenia Polypodiales- General account Salviniiales – Salvinia, Azolla

Unit- IV

Gymnosperms: Introduction, classification of Gymnosperms . Morphology, anatomy, reproduction and interrelationship of: Pteridospermales – Glossopteris

Bennettitales – Cycadioidea, Williamsonia Pentoxylales – General account Ginkgoales – Ginkgo

Unit- V

Coniferales – General account Taxales – Taxus
Welwitschiales – Welwitschia Gnetales – Gnetum

Distribution of living and fossil Gymnosperm in India. Origin & evolution of Gymnosperms. Geological time scale.

Reference Books-

1. Economic importance of gymnosperms Bryophyta – N.S. Parihar, Central Book Depot, Allahabad
2. Bryophyta – N.S. Parihar, Central Book Depot, Allahabad.
3. Biology and Morphology of Pteridophytes, N.S. Parihar ,Central Book Depot, Allahabad.
4. Bryophytes – P. Puri , Atma Ram & Sons, Delhi.
5. The Morphology of Pteridophytes – Sporne, B.I. Publishing Pvt. Ltd. Bombay.
6. Paleobotany and the evolution of Plants – Stewart and Roth Well, Cambridge Univ. Press.
7. Gymnosperms – Bhatnagar and Moitra, New Age International Pvt. Ltd., New Delhi.
8. Gymnosperms – O.P. Sharma, Pragati Prakshan, Meerut.
9. The interrelationships of the Bryophyta-Frank Cavers, Folkestone, Kent England.
10. Morphology of Gymnosperme – Coulter and Chamberlain, Central Book Depot., Allahabad.
11. Gymnosperms Structure and Evolution - C.J. Chamberlain Dover Pub., New York.
12. Cryptogamic Botany Vo. I and II - Smith McGraw Hill Book Comp., New York.
13. An introduction to Pteridophyta -A. Rashid, Vikas Publ. House, New Delhi.
14. Paleobotany and Plant evolution- Iqbal Hussain ABD Publ. Jaipur.

PAPER III : ECOLOGY, PHYTOGEOGRAPHY, ETHNOBOTANY

AND ECONOMIC BOTANY

3Hrs.

75 Marks.

Unit- I

Ecology: Definition and scope, concept of habitat and ecological niches. Composition and structure of an ecosystem, plant succession, energy flow, food chain, food web and trophic levels, ecological pyramids and recycling of N, P, C and S cycles in nature.

Unit- II

Sources, causes and control of air, water, soil noise pollution, effects of environmental pollution on plants, animals and human beings, Environmental impact assessment (EIA).

Brief account of the following: Afforestation and people's involvement, social forestry, agroforestry, silviculture, wind break. International biological programme (IBP). Man and

Biosphere (MAB). International Union for conservation of Nature and Natural resources (IUCN), United Nations Environmental Programme (UNEP), wild life resources, Endangered plants and their conservation . Nature Resources , National

Parks, Wild life sanctuaries. Biosphere reserves. Green belt. Wild life preservation Act (1972) and Indian forest conservation Act.(1980).

Unit- III

Phytogeography: Plant dispersal and migration, continuous and discontinuous distribution of plants and geographical barriers, types and areas of natural distribution, factors affecting distribution, main habitat and vegetational types of the world. Major types of biomes and their characteristics, classification of vegetation of India and Rajasthan.

Ethnobotany: Aims, objective and scope, methods of study of ethnobotany, ethnobotany of Rajasthan and India. Ethic groups of Rajasthan, major tribes and their life syles. Shifting cultivation and consequential damage to forest ecosystem.

Unit- IV

Economic Botany: Centers of origin of cultivated plants and gene diversity utilization of cereals, cultivation and improvement of Wheat, Rice, Maize, Bajra.

Pulses and forage legumes – a general account

Oil seeds – Mustard, Sesame, Groundnut, Soybean, Sunflower Fiber- Cotton, jute, Coir

Starch and Sugar- Potato, Sugarcane, Sugar beet

Species and Condiments- Cinnamomum, Clove, Fennel, Cumin, Coriander, Saffron, Cardamom, Fenugreek, Akarkara.

Unit- V

Industrial Plant: Gwar, Rubber, Tea, Coffee Narcotics: Cannabis, Opium, Tobacco

General account of local plants of medicinal importance along with

Digitalis, *Terminalia*, *Commiphora*, *Ocimum*, *Convolvulus* (Sankh Pushpi), *Catharanthus roseus*, *Aloe*, *Centella* (Brahmi Booti) ,*Chlorophytum*

(Safed musli), *Tylophora indica*. Unexploited plants of potential economic value with reference to Rajasthan.

Reference Books-

1. Ecology and Field Biology - R.L. Smith, Harper Collins, New York

2. Fundamentals of Ecology - Odum, Saunders, Philadelphia
3. Basic Ecology— Odum, Saunders, Philadelphia
4. Ecology, Principles and Applications Chapman and Reiss, Cambridge Univ. Press, Cambridge, U.K.
5. Concepts of Ecology - Kermondy, Prentice Hall of India Pvt. Ltd., New Delhi.
6. Modern Concepts of Ecology - H.D. Kumar, Vikas Publishing House.
7. Aims and Methods of Vegetation Ecology-Muller Dombois and Ellenberg.
8. Economic Botany- Hill, Mac Graw Hill Book Comp.
9. Economic Botany- Pandey, S. Chand and Com., New Delhi.
10. Ecology- Ambushta, CBS Publication.
11. Global Environmental agreements- Asha Joshi, Gunilla Reisch Pub.
12. Forest Ecology in India- Neena Ambre, Foundation Books.

PAPER-IV: BIOCHEMISTRY AND PLANT PHYSIOLOGY

3 Hrs.

75 Marks

Unit-I

.Biochemistry : Carbohydrates : Classification, occurrence, structure and functions of monosaccharides, oligosaccharides, polysaccharides including starch, cellulose, pectin and chitin.

Proteins : Occurrence, structure-primary, secondary, tertiary and quaternary, properties and functions.

Lipids : Structure, synthesis of saturated and unsaturated fatty acids, lipid biosynthesis , á and â oxidations.

Enzymes : Structure, classification and mode of action.

Unit-II

Secondary metabolites : Definition, distribution and classification. Biosynthesis and functions of secondary metabolites with special reference to alkaloids, tannins and steroidal compounds.

Physiology : Water relations of plants : Unique physicochemical properties of water, solute potential , water potential in the plant, apparent free space, bulk movement of water. Soil Plant

Atmosphere Continuum (SPAC). Stomatal regulation of transpiration, anti transpirants, internal water deficit and its physiological implications.

Unit-III

Uptake of minerals : Active and passive uptake of minerals, Donnan's equilibrium, Cytochrome pump mechanism and carrier hypothesis, role of calmodulin. Importance of foliar nutrition and use of chelates.

Photosynthesis : Energy pathway in photosynthesis, chloroplast as an energy transducing organelle, composition and characterization of photosystems I and II, electron flow through cyclic , non cyclic and pseudocyclic photophosphorylations , pathway of CO₂ fixation, difference between C3 and C4 photosynthesis, different kinds of C4 pathways, CAM pathway, regulation of photorespiration.

Unit –IV

Respiration : Concepts of free energy and entropy. Types of respiratory substrates and their utilization in respiration. Glycolysis and TCA cycle with emphasis on enzyme system, ATP synthesis through oxidative electron-transfer chain (cytochrome system), Chemo-osmotic regeneration of ATP, glyoxalate cycle.

Nitrogen Metabolism : Sources of nitrogen to plants. Biological nitrogen fixation, reduction of nitrates, synthesis of amino acids by reductive and transamination, Glutamate Oxaloacetate Transaminase (GOT) and Glutamate Pyruvate Transaminase (GPT) system.

Unit- V

Growth Regulators : Auxins, Gibberellins, Cytokinins , Abscissic acid and ethylene, their chemical nature, biosynthesis, bioassay, physiological effects and mode of action.

Physiology of Flowering : Photoperiodism and Vernalization.

Reference Books-

1. Introduction to Plant Physiology - Hopkins, John Wiley and Sons, New York, USA.
2. Plant Physiology. Salisbury and Ross, Wadsworth Publ. Co., California, USA.
3. Plant metabolism Dennis, Turpin, Lefebure and Layzell, Longman Essex, England.
4. Plant Physiology Taiz and Zeiger, Sinauer Associates, Inc Pub. Massachusetts, USA.
5. Biochemistry and Physiology of Plant Hormones Moore, Springer Verlag, New York, U.S.A.
6. Biochemistry. Lubert Stryer, W.H. Freeman and Comp., New York.

Total 75

II Practical (Paper-II and III)

Time 5 hours

Max. Marks 75

1. Gymnosperms	10
2. Pteridophytes	6
3. Bryophytes	6
4. Ecology (Field study-Quantitative and Analytical characters)	10
5. Ecological Anatomy-Adaptation	6
6. Phytogeography (India/world)	5
7. Economic Botany	48.
three-Paper-III	7. Spot (6) three-Paper-II 12
9. Viva-voce	8
10. Records	8
Total	75

M.Sc. FINAL BOTANY—2021-22

Scheme

Total marks of M.sc Final = 450

Four papers of three hours duration (2 compulsory + 2 special).

Maximum marks of each paper = 75

Minimum Passing Marks of each paper = 19

Total Passing Marks of all four papers = 108

Maximum marks of Practical = 150

I Practical include Paper-V and VI of maximum 75 marks (compulsory) Minimum Passing Marks = 27