M.J.P. ROHILKHAND UNIVERSITY, B.Sc. I, II & III Exams

BOTANY

B.Sc. Part-I


There shall be three theory papers and a practical examination.

Paper-I  Fungi and Microbiology    Max M.  33

Paper-II  Algae and Bryophytes     Max M.  33

Paper-III Pteridophytes, Gymnosperms and Palaeobotany Max M.  34

Practical Examination based on paper I, II and III  Max M.  50


There shall be three theory papers and a practical examination.

Paper -I  Plant Taxonomy and Economic Botany.  Max M.  33

Paper -II  Plant Anatomy and Embryology  Max M.  33

Paper -III  Plant Physiology  Max M.  33

Practical Examination based on paper I, II and III  Max M.  50

B.Sc. III (2004-05)

There shall be three theory papers and a practical examination.

Paper -I  Cytology, Genetics and Plant Breeding  Max M.  33

Paper -II  Biochemistry, Biotechnology and Molecular Biology  Max M.  33
Paper-III  Plant Ecology  Max M. 34

Practical Examination based on paper I, II and III Max M. 50

BOTANY
B.Sc. Part-I

There shall be three theory papers and a practical examination.

Paper-I  Fungi and Microbiology  M. M. 33

Paper-II  Algae and Bryophytes  M. M. 33

Paper-III  Pteridophytes, Gymnosperms and Palaeobotany.  M. M. 34

Paper-I  Fungi and Microbiology

Unit - I Fungi

1. Outline classification of fungi with particular reference to Alexopolous & Mims classification.

2. Systematic position, occurrence, structure and mode of reproduction in fungi based on the following genera: Albugo, Aspergillus, Puccinia, Agaricus, Alternaria

3. Economic importance of fungi
4. Lichens - a general account.

Unit - II Microbiology

1. Classification and distribution of micro-organisms in nature.

2. Elementary knowledge of isolation and culture of micro-organisms.

3. Structure, nutrition and reproduction in Bacteria & Mycoplasma.

4. Structure and multiplication of viruses with particular reference to T.M.V. & Bacteriophage

5. Applications of microbiology.

Practical

Fungi:- Study of fungal types by preparing suitable slides of the materials prescribed in theory course.

Microbiology:- Study of types of bacteria with the help of prepared slides and photographs, Gram Staining technique of bacteria.

Paper- II . Algae & Bryophytes

Unit - I (Algae)


2. Organisation of thallus in algae.

3. Systematic position, occurrence, structure and mode of
reproduction in the following genera: Chalmydomonas, Volvox, oedogonium, Vaucheria, Chara, Ectocarpus, Polysiphonia, Nostoc.

4. Economic importance of algae.

Unit II (Bryophytes)


2. Systematic position, occurrence, morphology, anatomy and reproductive structures in:
   Riccia, Marchantia, Pellia, Anthoceros & Sphagnum

3. Envolution of sporophyte in bryophytes - a general account.

4. Economic importance of bryophytes.

Practical

Algae:

Study of algal types with the help of temporary preparations prescribed in the theory course.

Bryophytes:

Study of the types with the help of suitable preparation, section cutting and mounting based on theory syllabus.
Unit I (Pteridophytes)

1. Outline classification and importance of Pteridophytes with special reference to Sporne’s classification.

2. Systematic position, occurrence, morphology, anatomy and reproductive structures in the following genera: Rhynia, Selaginella, Equisetum, & Marsilea.


4. Heterospor and seed habit.

Unit II (Gymnosperms)

1. General characteristics, affinities and classification of gymnosperms as given by Sporne.

2. Systematic position, occurrence, morphology, anatomy and structure of reproductive parts of the following genera: Cycas, Pinus, Ephedra.

3. Economic importance of gymnosperms.

Unit III. (Palaeobotany)

1. A general account of palaeobotany with special reference to types of fossils and methods of fossilization and geological time scale.
Practical

Study of the following types with the help of specimens, photographs, section cutting and temporary slide preparations.

Pteridophytes: Selaginella, Equisetum and Marsilea.

Gymnosperms: Cycas, Pinus & Ephedra

Palaeobotany: Study of the available specimens and fossil slides as prescribed in theory course.

Scheme of Examination

Time: 3.30Hr.  M.M.: 50

Q. 1 Section cutting, staining, mounting and identification of one gymnosperm and one pteridophyte materials. 6+5=11

Q. 2 Study and identification of one alga and one fungal material. 3+4=7

Q. 3 Study and identify one microbiological material. 3

Q. 4 Study and identify the material of Bryophyte. Prepare one slide of V.T.S. of thallus. 3

Q. 5 Spots 1-5 10

Q. 6 Viva Voce 5
Unit - I (Plant Taxonomy and Economic Botany)

1. Binomial nomenclature

2. Classifications of Benthem and Hooker: and Hutchinson.

3. Preservation of Plant Material and Herbarium Techniques; Herbaria and Botanical Gardens.

4. Systematic position, distinguishing characters and economic importance of the following families:

(A) Dicotyledons

(a) Polypetalae: Ranunculaceae, Papaveraceae, Caryophyllaceae, Rutaceae, Rosaceae and Apiaceae.

(b) Gamopetalae: Rubiaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Convolvulaceae, Acanthaceae, Lamiaceae and Asteraceae.

(c) Monochlamydae: Euphorbiaceae

(B) Monocotyledons: Arecaceae, Poaceae
Unit II (Economic Botany)

1. Economic importance with special reference to plants yielding:

(a) Food : Cereals (Rice, Wheat, Maize); Millets (Pearlmillet and Jowar); Potato; Sugarcane; Legumes (Soybean, Gram and Pea); Oil yielding plants (Mustad, Til, Groundnut and cotton); Fruits -( Apple, Guava and citrus)

(b) Common fibre yielding plants:

Cotton, Sunnhemp, Jute, Coir and Ramie

(c) Medicinal Plants:- (Poppy, Serpgandha, Neem and Belladona)

(d) Timber yielding plants:-

Shisham, Sal, Teak, Mahogany

Practical

1. **Taxonomy** : (a) Detailed description and indification of locally available wild plants of the families as prescribed in course.

   (b) Submission of Herbarium collection of atleast 25 local wild plants.

2. **Economic Botany** : Identification and comment on the Plant products as prescribed in theory course.
Paper - I (Plant anatomy & Embryology)

Unit I (Plant Anatomy)

1. Tissues, meristems, structure and function of permanent tissues.

2. Primary anomalous structures in dicot stems.

3. Normal secondary growth in dicot stem and dicot root including abnormal behaviour in stems of (a) Bignonia (b) Boerhaavia (c) Salvadoria (d) Leptadenia.

4. Secondary growth in Dracaena (Monocot stem)

5. Leaf abscission and healing of wounds.

Unit - II (Embryology)

1. Structure of anther, microsporogenesis and development of male gametophyte.

2. Structure and forms of ovule, mega=sporogenesis and development of female gametophyte.

3. Pollination, adaptation for self-pollination (autogamy) and cross-pollination (allogamy); Fertilization and double fertilization.

4. Endosperm and its types, development of nuclear endosperm haustoria, Xenia and metaxenia.

5. Development of Embryo:
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(a) Dicot (in Capsella sp.)

(b) Monocot (in Sagittaria)

6. Apomixis (Non Recurrent and Recurrent); Polyembryony and Parthenocarpy.

Practical

1. **Plant Anatomy**: Anatomy of the following stems:
   Nyctanthes, Bougainvillea, Capsicum, Bignonia, Boerhaavia, Salvadoria, Lepatdenia, Dracaena.

2. **Embryology**: (a) Study of pollinia in Calotropis flower (b) Study of permanent slides - L.S. of ovule types. T.S. of another; Germinating pollen, Embryosac Polygonum type; T.S. of Ovary showing placentation, Embryos.

Paper III (Plant Physiology)

Unit I (General Principles and Mechanisms)

1. Diffusion, imbibition, osmosis, Plasmolysis; water relations of a plant cell with reference to diffusion pressure deficit (D.P.D.) and water potential.

2. Mechanism of active and passive water absorption.

3. Ascent of sap.

5. Mechanism of absorption of mineral salts.


7. Mechanism of Translocation of solutes.

Unit II (Growth and Nutrition)

1. Photosynthesis: Light and Dark reactions; Factors affecting photosynthesis; C3 and C4 plants; Photorespiration; autotrophic bacteria (Photosynthetic and chemosynthetic)

2. Nitrogen Metabolism: N2 fixation (Symbiotic and Asymbiotic); assimilation into Amino-acids.

3. Plant Growth Regulator: Auxins, Gibberellins, Cytokinins and abscissic acid (ABA).

4. Physiology of Flowering: Photoperiodism and vernalization.

5. Seed Domancy and Germination:

   Method of breaking dormancy such as scarification Impaction and stratification; Photoblasticity; Physiology of seed germination.
6. **Mineral nutrition:** Macro and microelements and their physiological role; symptoms of mineral deficiency; hydroponics and aeroponics.

**Practicals**

(i) Demonstration of **Endosmosis, Exosmosis, Plasmolysis** and **Imbibition**.

(ii) Demonstration of root pressure and guttation, temporary and permanent wilting.

(iii) Measurement of transpiration.

(iv) Evolution of O₂ during photosynthesis under different conditions; determination of starch.

(v) Measurement of R.Q. of different seeds.

(vi) Effect of hormones & light on the germination of seeds.

**B.Sc. II Botany**

**Practical Examination scheme based on paper I, II and III**

**Time:** 3.30  
**M.M.:** 50

Q. 1 **Description of one flowering plant in semi-botanical language.**  
Identification of families giving floral diagram and floral formula 8

Q. 2 **Temporary mounting of a double stained section of a material for anatomical study.** Identification of material with suitable comments
Q. 3 One Physiological experiment to be set up and to be described by students

Q. 4 Comment upon sport (1-5)
   (2 from Eco. Botany, 2 from Embryology, 1 from Taxonomy/Anatomy)

Q. 5 Viva-Voce

Q. 6 Record

Q. 7 Collection and Excursion Report

Total Marks

BOTANY

B.sc. Part III

Paper- I (Cytology, Genetics and Plant Breeding)

Unit - I (Cytology)

1. Ultrastructure of a typical plant cell and its organelles

2. Morphology and Chemistry of chromosome; special types of chromosomes.
3. Structural change in chromosomes.


Unit II (Genetics)

1. Mendel's laws of inheritance, interaction of genes.

2. Linkage and crossing over.

3. chromosome number (Polyploidy)

4. Mutations.

Unit - III (Plant Breeding)

1. Methods of plant breeding:
   (a) Selection
   (b) Hybridization
   (c) Plant introduction and acclimatization
   (d) Mutation breeding

2. Hybrid vigour (Heterosis) and its application.

3. Breeding for disease resistance

Practical

1. Identification of cell organelles, under microscope and through photographs.
2. Gene interaction and modified dihybrid ratios (Numericals).

3. Stage of mitosis and meiosis in plants by temporary and permanent slides.

4. Emasculation technique.

Paper II Biochemistry, Biotechnology and Molecular Biology

Unit I (Biochemistry)

1. Enzymes: Nomenclature and classification; structure and mechanism of enzyme action including Michaelis-Menten constant; factors affecting enzyme activity.

   1. Classification, properties and biological roles of carbohydrates and lipids.

   2. Classification and structure of proteins; biological significance of proteins; Denaturation and renaturation of proteins.

   3. ATP, its synthesis and biological role.

Unit - II (Biotechnology)

1. Tissue culture and micropropagation with reference to artificial seed and virus free plants; protoplast fusion and somatic hybridization.

2. Production and uses of haploids such as Androgenic and gynogenic; Uses of haploids in plant breeding.
3. Recombinant DNA and Gene cloning; cloning vectors for recombinant DNA; Restriction enzymes for cloning; Southern, Northern and western blotting techniques.

4. Use of Microbes in Industry and Agriculture; production of organic chemicals by microbial fermentation (ethanol); production of antibiotics by micro-organisms; single cell proteins (SCP) from microorganisms; Biofertilizers and bioinsecticides.

Unit - III (Molecular Biology)

1. Recent Concept of Gene: Cistron, Recon, Muton; split genes, overlapping genes

2. Structure of DNA and its replication; DNA as genetic material.

3. Types of RNA (r-RNA, m-RNA and t-RNA); RNA as genetic material.

4. Gene Function and protein synthesis:
   a. Central dogma
   b. Transcription
   c. Genetic code
   d. Translation
   e. Termination

5. Regulation of protein synthesis: The operon; types of control
Practicals

i. Colour tests, microtests for carbohydrates, proteins and lipids.

ii. Paper chromatography for amino-acids.

iii. Enzyme activity.

iv. To show Azolla and Rhizobium as biofertilizers.

Paper III (Plant Ecology)

Unit -I


2. Soil erosion and conservation; soil salinity and alkalinity with reference to unus soils and their reclamation.


4. Plant succession.

5. Ecological niche; gene ecology with reference to ecads and ecotypes

UNIT II

1. Autecology ans its significance
2. Ecosystem: Energy flow and biogeochemical cycles with reference to gaseous (Carbon and nitrogen) and sedimentary (Phosphorous) cycles; types of ecosystems


Unit - III (Molecular Biology)

1. Recent Concept of Gene: Cistron, Recon, Muton; split genes, overlapping genes

2. Structure of DNA and its replication; DNA as genetic material.

4. Phytogeography.

5. Various types of soils found in India

Practicals

1. Study of plant communities by Quadrat method to work out average density, abundance and % frequency.

2. Demonstration of soil texture, carbonate, nitrate, pH and base deficiency including spot test.

3. Estimation of soil moisture and water holding capacity.

4. Effect of polluted water and saline water on germination.

5. Hydrophyte and xerophyte as specimens.
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BOTANY

B.Sc. III

Practical Examination Scheme based on paper I, II and III

Time : 3.30

Max Marks : 50

Q.1 Acetocarmine smear preparation of onion root tip. 04

Q.2 Emasculation of given material with description of methods adopted/
Numerical based on Mendel’s Laws 04

Q.3 One experiment related with biochemistry as prescribed in course 06

Q.4 One experiment on ecology related with : soil moisture status or
rapid soil tests or seed germination 05

Q.5 Study of plant community by quadrat method to find out average
density, abundance and % Frequency 03

Q.6 Comment upon spots (1-5) including at least one from Biotechnology
and Molecular Biology each 10

Q.7 Viva - voce 05

Q.8 Record 05

Q.9 Collection and tour report 08

Total Marks 50