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UNIVERSITY OF DELHI



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**SCHEME OF EXAMINATION
AND
COURSES OF READING
FOR**

B.Sc. (Hons.) EXAMINATION IN BOTANY

Part I Examination 2002

Part II Examination 2003

Part III Examination 2004



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**Officer-in-Charge, Special Duty,
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University of Delhi.**

*Syllabi applicable for students seeking admission to the
B.Sc. (Hons) Botany Course in the academic year 2001-2002*

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B.Sc. (Hons.) BOTANY
SCHEME OF EXAMINATION

Part I Examination :

		<i>Duration</i> <i>Hours</i>	<i>Marks</i>
Paper I-	Cell Biology and Elementary Biochemistry	3	75
Paper II-	Thallophysics (Algae, Fungi, Pathology, Lichens)	3	75
	Practicals on Paper 1 and 2	4	75

Part II Examination :

Paper III-	Bryophytes, Preridophytes, Gymnosperms	3	75
Paper IV-	Genetics	3	75
	Practicals on Paper 3 and 4	4	<u>75</u>

Part III Examination :

Paper V-	Angiosperm Anatomy, Embryology	3	75
Paper VI-	Angiosperm Taxonomy, Economic Botany	3	75
Paper VII-	Plant Physiology	3	75
Paper VIII-	Ecology	3	75
	Practicals on Paper 5-8	8	<u>150</u>
	Theory Papers 1-8	...	600
	Practicals on above	...	300
	Total	...	<u>900</u>

DETAILED COURSES OF READING

Part I—Examination :

Paper I—Cell Biology and Elementary Biochemistry.

(1) The Cell - A Brief Introduction

Historical background; microscopy and cell theory; newer techniques of study - cell fractionation and electron microscopy; cell size and structures: structure of prokaryotic and eukaryotic cells; cell division - mitosis and meiosis.

(2) Cellular Chemistry

(i) Covalent bonds; non-covalent bonds and their importance in biology; ionic bonds vander Waals forces and hydrophobic interactions; properties of water; (ii) the pH scale; buffers; (iii) the small molecules of life - sugars, amino acids, organic acids, and alcohols; (iv) macromolecules - polysaccharides; fats; proteins; and nucleic acids, general idea of the primary, secondary and tertiary structure; importance of conformational changes; (v) the making and breaking of chemical bonds - concept of free energy; ATP; coupled reactions and group transfers.

(3) Mitochondria

Structure, organization and function (elementary account of glycolysis and Krebs cycle and role of mitochondria in latter process)

(4) Chloroplasts

Structure, organization and function (basic information light and dark reactions).

(5) Nucleus, Ribosomes and Protein Synthesis

Chromosomes, nucleolus, nuclear membrane and their significance
Role of ribosomes in protein synthesis.

(6) Cell Wall, Cell Membrane, and other Cell Constituents

Cell membrane-organization; movement of substances, across the membranes; cell wall; endoplasmic reticulum; elementary idea of the constituents like Golgi bodies; lysosomes, and microbules.

(7) Viruses

Discovery, structure, types and multiplication.

(8) Bacteria

Discovery, structure, types, mode of reproduction and genetic recombination, economic importance

(9) Origin of Life**PRACTICALS**

Practicals based on the topics mentioned above.

Paper II-Thallophytes (Algae, Fungi, Pathology, Lichens)**Algae****1. Cyanophyceae - general account.**

Morphology and life history of the following with special reference to alternation of generations, sex, nature of sexuality and ecology.

Chlamydomonas, Volvox, Ulothrix, Colechaete, Oedogonium, Spirogyra, Chara, Vaucheria, Ectocarpus, Fucus and Polysiphonia

Economic importance of algae - general account.

Fungi**2. Morphology and life history of the following with a general account of genetics, physiology, ecology, spore dormancy and germination, economic importance and classification.**

Myxomycetes, Phytophthora, Albugo, Pteridospores, Rhizopus, Saccharomyces, Erysiphe, Neurospora, Claviceps, Ascobolus, Ustilago, Puccinia, Agaricus, Alternaria, Penicillium, Colletotrichum and fusarium.

Pathology**3. Late blight of potato, white rust of the crucifers and other plants; powdery mildew of pea; smut of wheat, oat, and sugarcane, rusts of wheat, red rot of sugarcane; early blight of potato, wilt of arhar.****4. Transmission and control of diseases caused by bacteria, viruses and fungi.****Lichens****5. General account**

PRACTICALS

Practicals based on the types mentioned above, and phytoplankton estimation.

Part II-Examination*Paper III-Bryophytes, Pteridophytes, Gymnosperms***1. Bryophytes**

Morphology, anatomy, life history, classification, phylogeny, and experimental studies with special reference to the following :

Riccia, Marchantia, Pellia, Porella, Anthoceros, Sphagnum, Funaria Pogonatum.

2. Pteridophytes

Structure and evolutionary significance of Rhynia and Psilotum. Morphology, anatomy, life - history, classification, phylogeny, stelar evolution, apogamy, apospory seed habit, and experimental studies with special reference to the following :

Lycopodium, Selazinella, Equisetum, Pteris, Marsilea

3. Gymnosperms

Distribution, morphology, anatomy, life-history of the following :
Cycas, Pinus, Ephedra, Gnetum.

Classification, and Phylogeny, Economic importance and experimental studies on gymnosperms.

PRACTICALS

Practicals based on the topics mentioned above.

*Paper IV-Genetics***1. Mendelian Principles**

Mendel's experiments and the laws of inheritance

2. Deviations from Mendelian Laws

Incomplete dominance; gene interactions (opisthosis, duplicate, complementary and supplementary factors)

3. The Chromosome Theory of Inheritance

Linkage and crossing over, gene mapping; genetic recombination in prokaryotes and eukaryotes

4. Chemical Basis of Heredity

Transformation in bacteria; evidence for DNA (and RNA) as genetic material; Miescher's discovery; base equivalence in DNA; the Watson and Crick model of DNA structure

5. Replication and Transcription of DNA

Semi-conservative replication-experimental findings of Meiselson-Stahl. Taylor; and Cairns replication at the molecular level

6. Translation

Gene-protein relationship (Beadle and Tatum's experiments); colinearity of genes and proteins; deciphering the genetic code

7. Structural Organization of the Genetic Material

Genome organization in viruses, bacteria, and the organelles of eukaryotes chromosome of eukaryotes; cell cycle

8. Sex Determination

Chromosomal and genic basis

9. Variations in the Number and Structure of Chromosomes

Haploids, euploids, aneuploids; deletion, duplication, inversion, translocation; chromosomal abnormalities in man.

10. Mutation and Repair of DNA

Type of mutations; spontaneous or induced mutations; physical and chemical mutagens; molecular basis of mutation; damage and repair of DNA

11. Quantitative Inheritance and Hybrid Vigour

Polygenic inheritance in plants and animals; mechanism of quantitative inheritance, mechanism of hybrid vigour; hybrid vigour and crop improvement.

12. Cytoplasmic Inheritance and Maternal Influence

Organic inheritance; plasmids and episomes; maternal influence

13. Gene Regulation

The operon concept-inducible and repressible systems

14. Evolution

The genetic mechanisms, elementary idea of population genetics

15. Applied Aspects of Genetics

Genetics counselling; genetics and cancer, artificial synthesis of genes and genetic engineering; general principles and techniques of plant breeding; uses of mutations; genetics in the improvement of wheat, sugarcane, and cotton.

PRACTICALS

Practicals based on the topics mentioned above.

Part III-Examination :***Paper V - Angiosperm Embryology and Anatomy*****Embryology****1. *Brief History and Scope*****2. *Anther and Pollen***

Development of anther and pollen; role of anther tapetum; pollen viability, storage and germination; haploids from pollen grains

3. *Ovule and Embryo sac*

Development of ovule; brief outline of megasporogenesis and megagametogenesis; organization and ultrastructure of embryo sac; ovule culture.

4. *Pollen-Stigma Interaction and Fertilization*

Role of pollen-wall proteins and stigma-surface proteins; pollen tube growth in pistil; basic concepts of incompatibility and methods of overcoming incompatibility.

5. *Embryo and Endosperm*

Development, organization and differentiation, role of suspensor, embryo-endosperm relation; polyembryony; culture of embryo and endosperm