



CSS Aspirants
Empowering Future Officers

CSS Syllabus

Subject: Botany

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Paper: Botany (100 Marks)

I. *Algae, Fungi and Bryophytes*

- Phycology: Distribution, Classification, Structure, Life History and Economic importance of the main groups of Algae.
- Mycology and Plant Pathology: Structure, Reproduction, Classification and Economic importance of the main groups of Fungi. Diseases of economically important crops and general principles of their control
- Bryology: Structure and reproduction of bryophytes, Evolution of Gametophyte and Sporophyte.

II. *Pteridophyta and Gymnosperms*

- General account with special reference to structure, life history and affinities of both Pteridophytes and Gymnosperms. Ontogeny and structure of seed, classification and economic importance of Gymnosperms.

III. *Anatomy and Embryology*

- Primary and secondary tissues. Meristems. Secondary growth in dicot stem. Anatomy of leaf, stem and root.
- Micro and megasporogenesis, pollination mechanism, fertilization, development of Embryo and Endosperm, Seed dispersal.

IV. *Taxonomy of Angiosperms*

- Systems of classification. Rules of botanical nomenclature. Concepts of speciation. Introduction to modern trends in plant taxonomy: bio-systematic, chemotaxonomy and numerical taxonomy. General characters and economic importance of common angiosperm families.

V. *Plant Physiology*

- Plant water relations, Osmotic Quantities, component potentials of water and their role in transport, water absorption by roots, transpiration. Role of essential mineral elements and their uptake. Plant hormones. Photoperiodism, Vernalization. Dormancy and Seed germination. Enzymes.
- Photosynthesis: Plant pigments, Light reaction, CO₂ fixation, Mechanism of photophosphorylation.
- Respiration: Glycolysis, Krebs cycle, Mechanism of oxidative phosphorylation.

VI. *Ecology*

- Influence of climatic, edaphic and biotic factors on plant growth. Vegetation sampling techniques. Concepts of ecosystems and their productivity, ecological energetics, Pyramids (of numbers, biomass and energy), trophic levels, food chains and food webs. Biogeochemical cycles (Hydrological and Nitrogen). Succession.
- Causes and reclamation of soil salinity and water logging in Pakistan. Soil erosion, its control and soil conservation methods. Deforestation. Biodiversity conservation. Pollution.

VII. Cytology

- Cell cycle, cellular morphology, chemistry of cell wall and cell membrane, cell to cell communication, plant tissue and cell culture, cell senescence and cell death.
- Ultra-structure of various cell organelles: Mitochondria, Golgi bodies, Endoplasmic reticulum, Plastids, Ribosomes, Glyoxysomes, Vacuoles, Nucleus.

VIII. Genetics

- Mendelian Genetics, Multiple Alleles, Polygenic inheritance, Gene interaction, Epistasis and pleiotropy, Sex-linked inheritance, Chromosomal aberrations, Mutations, DNA repair.

IX. Evolution

- Introduction of Evolution, Evolutionary history, Evolution of life, Convergent Evolution, Divergent Evolution, Parallel Evolution and Natural selection

X. Molecular Biology

- Nucleic acids, DNA as hereditary material, DNA replication, Transcription, Genetic code, Protein synthesis, Genetic engineering and its application, Genetically Modified Organisms (GMO).

SUGGESTED READING

S. No.	Title	Author
1.	Esau's Plant Anatomy: Meristems, Cells and Tissues of the Plant Body: Their Structure, Function and Development	Evert, F.F. and S. Hichhorn 2006
2.	Cryptogamic Botany-Algae and Fungi	Smith, G. M. 2001
3.	Cryptogamic Botany-Bryophyte and Pteridophyte	Smith, G. M. 2001
4.	Comparative Morphology of the Vascular Plants	Foster, A.S. and E.H. Gifford. 1989
5.	Plant and Environment	Daubermine, R, F, 1974
6.	Plant Taxonomy and Biosystematics	Stac, C. A. 1980
7.	Plant Physiology	Taiz, L. & E. Zeiger 2006
8.	Genetics: A Conceptual Approach. 4 th edition	Pierce, B. A. 2012
9.	Molecular Cell Biology	Lodish, H., A. Berk, S.L. Zipursky, P. Matsudaira, D. Baltimore and J. Darnell 2000
10.	Concepts of Genetics. 10 th edition	William S. Klug. 2012

11.	Ilmi Biomolecules, Cell Biology and Genetics.	Cheema, T.A. and Cheema Z.T. 2009
12.	Carvan Textbook of Botany Paper " A" (Morphology of Plants)	Malik, T. A. 2006
13.	Ecology (Principles and applications). 1st ed. Cambridge University Press UK.	Chapman, J.L. and Reiss, M.J. 1992.
14.	Fundamentals of Ecology	Odum, E.P. and Barrett, G.W. 2004
15.	Advanced Plant Taxonomy	Mondal, A. K., 2009
16.	Growth and Differentiation in Plants	Phillips and Wareings

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