CHAITANYA SCIENCE AND ARTS COLLEGE

(AUTONOMOUS)

PAMGARH, JANJGIR-CHAMPA (C.G.)

ACCREDITED "A" GRADE BY NAAC

DEPARTMENT OF BOTANY

COURSE CURRICULUM & MARKING SCHEME

POSTGRADUATE PROGRAMME: M.SC BOTANY

PROGRAM CODE: CCMS04

FIRST & SECOND SEMESTER

Approved By	Board of Studies	Academic Council
Date	30/08/2025	04 SEP 2025

ACADEMIC YEAR 2025-26

SYLLABUS FRAMED ACCORDING TO THE NEP-2020 UNDER THE SCHEME OF CBCS (CHOICE BASED CREDIT SYSTEM)

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Department: Botany
Program Code: CCMS04
Program: M.Sc. (Botany)

Semester I

Course Code	Course Name	Paper No.	Course Type	L	T	P	Total Credit	CIA Marks	ESE Marks	MAX Marks	MIN Marks
MBOT101	I	1	Theory	3	1	-	4	30	70	100	40
MBOT102	II	2	Theory	3	1	-	4	30	70	100	40
MBOT103	III	3	Theory	3	1	-	4	30	70	100	40
MBOT104	IV	4	Theory	3	1	-	4	30	70	100	40
MBOP101	I	-	Practical	-	-	2	2			100	
MBOP102	II	-	Practical	-	-	2	2			100	

Semester II

Course Code	Course Name	Paper No.	Course Type	L	T	P	Total Credit	CIA	ESE	MAX Marks	MIN Marks
MBOT201	I	1	Theory	3	1	-	4	30	70	100	40
MBOT202	II	2	Theory	3	1	-	4	30	70	100	40
MBOT203	III	3	Theory	3	1	-	4	30	70	100	40
MBOT204	IV	4	Theory	3	1	-	4	30	70	100	40
MBOP201	I	-	Practical	-	-	2	2			100	
MBOP202	II	-	Practical	-	-	2	2			100	

Chaitanya Science and Art College, Pmagarh
SEMESTER SYLLABUS
M.Sc. BOTANY – SCHEME OF EXAMINATION & DISTRIBUTION OF MARKS

SEMESTER – I

Paper No.	Code	Title of the Paper(s)	Nature	CIA (Internal Test/ Assignment/Project/Seminar)	Term End Exam	Total Marks
1	MBOT101	Microbiology And Mycology	Theory	30(20+10)	70	100
2	MBOT102	Biology & Diversity of Algae, Bryophytes and Pteridophytes	Theory	30(20+10)	70	100
3	MBOT103	Biology & Diversity Of Gymnosperms	Theory	30(20+10)	70	100
4	MBOT104	Taxonomy Of Angiosperms	Theory	30(20+10)	70	100
Lab-1	MBOP101	Based On Paper I & II	Practical	100	-	100
Lab-2	MBOP102	Based On Paper III & IV	Practical	100	-	100
Total						**600**

SEMESTER – II

Paper No.	CODE	Title of the Paper(s)	Nature	CIA (Internal Test/ Assignment/Project/Seminar)	Term End Exam	Total Marks
1	MBOT201	Cytology, Genetics and Cytogenetics	Theory	30(20+10)	70	100
2	MBOT202	Cell And Molecular Biology of Plants	Theory	30(20+10)	70	100
3	MBOT203	Plant Physiology	Theory	30(20+10)	70	100
4	MBOT204	Plant Biochemistry and Bioenergetics	Theory	30(20+10)	70	100
Lab-1	MBOP201	Based On Paper I & II	Practical	100	-	100
Lab-2	MBOP202	Based On Paper III & IV	Practical	100	-	100
Total						**600**

SEMESTER SYLLABUS
M.Sc. BOTANY
SEMESTER–I
PAPER–I
MICROBIOLOGY AND MYCOLOGY

UNIT–1

Archaebacteria and Eubacteria: General account, ultrastructure, nutrition and reproduction, biology and economic importance,

Cyanobacteria: Salient features and biological importance.

UNIT–2

Viruses: Characteristics and ultra structure of virions, chemical nature, replication, transmission of viruses, economic importance. Nomenclature of Viruses.

Mycoplasma: General Account and plant diseases caused by Mycoplasma.

UNIT–3

Mycology:

General characters of fungi; Ultra structure; unicellular and multicellular organization;
Cell wall component and nutrition. Classification of Fungi.
Reproduction: vegetative, asexual, sexual.
Heterothallism and parasexuality. Phylogeny of Fungi.

UNIT–4

General account of Following classes of Fungi

Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina.
Economic importance of Fungi with special reference to industries, medicine and food.
Fungal diseases in plants; fungi as biocontrol agents and Mycorrhiza.

Suggested Readings

1. Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. (2005). *Microbiology*. Tata McGraw Hill, New Delhi.
2. Dubey, R.C. and Maheshswari, D.K. (2000). *Microbiology*. Chand and Company Ltd., New Delhi.
3. Schlegel, H.G. (1995). *General Microbiology*. Cambridge University Press, U.K.
4. O.P. Sharma, A text of Fungi. Tata McGraw-Hill Publishing Company.
5. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (1990). *Introductory Mycology*. John Wiley & Sons, New York.
6. Mehrotra, R.S. and Aneja, K.R. (1996). *An Introduction to Mycology*. New Age International Publishers, New Delhi.
7. Webster, J. (1985). *Introduction to Fungi*. Cambridge University Press, U.K.
8. Vashisht,B.R., Sinha and Singh a Textbook Fungi. S.Chand & Co.
9. Ganguli, Das and Dutta, College Botany Vol II, New Central Book Agency PVT ITD Kolkata.

Suggested Laboratory Exercises

- Study of different forms of bacteria; Gram staining of bacteria.
- Morphological studies of representatives of fungi: *Albugo, Mucor, Pilobolus, Yeast, Chaetomium, Morchella, Melampsora, Polyporus, Helminthosporium, Penicillium, Aspergillus, Colletotrichum.*
- Identification of fungal cultures:
  Fusarium, Curvularia, Rhizopus, Mucor, Aspergillus, Penicillium.
- Symptomatology of some diseased specimens:
  White rust, downy mildew, powdery mildew, smuts, ergot, groundnut leaf spot (tikka disease), red rot of sugarcane, wilt, paddy blast, citrus canker, bacterial blight of paddy, Leaf curl of Papaya, Mango malformation.

SEMESTER SYLLABUS
M.Sc. BOTANY
SEMESTER–I
PAPER–II
Biology and Diversity of Algae, Bryophytes and Pteridophytes

UNIT–1 (Phycology)

Habit and Habitat of Algae (terrestrial, fresh water, marine), Cell structure;
Thallus organization & Reproduction (vegetative, asexual, sexual) in Algae,
Broad classification of algae (Basis: Pigments, reserve food, flagella),

UNIT–2

Salient features of following divisions:
Chlorophyta, Xanthophyta, Bacillariophyta, Phaeophyta, Rhodophyta.
Economic importance of Algae with special reference to food industries and biofertilizers

UNIT–3 (Bryophytes)

General Characters and Classification of Bryophyta: , Sterilization of sporogenous tissue in Bryophytes
Distribution Morphology, structure, reproduction and life history of following orders.
Marchantiales, Jungermanniales, Anthocerotales, Sphagnales, Funariales, Polytrichales.
Economical and ecological importance of bryophytes.

UNIT–4 (Pteridophytes)

General Charcters (characters) and Classification of Pteridophytes:
Heterospory and origin of seed habit: evolution of stele.
General account of fossil pteridophytes.
Morphology, structure, anatomy and reproduction & Classification of (Psilopsida) *Psilopsida, Lycopsida, Sphenopsida and Pteropsida.*

Suggested Readings

1. Kumar, H.D. (1988). *Introductory Phycology*. Affiliated East–West Press Ltd., New Delhi.
2. Morris, S. (1986). *An Introduction to Algae*. Cambridge Univ. Press, U.K.
3. Puri, P. (1980). *Bryophytes*. Atma Ram and Sons, Delhi.
4. Sporne, K.K. (1991). *The Morphology of Pteridophytes*. B.I. Publishing Pvt. Ltd., Bombay.
5. Stewart, W.N. and Rothwell, G.W. (1993). *Paleobotany and the Evolution of Plants*. Cambridge Univ. Press, U.K.
6. Vashishta, B.R. (2005). *Pteridophytes*. S. Chand and Co., Delhi.
7. Vashishta, B.R. (2005). *Bryophytes*. S. Chand and Co., Delhi.
8. Ganguli, Das and Dutta, College Botany Vol II, New Central Book Agency PVT lTD Kolkata.
9. Rashid, A. An Introduction to *Pteridophytes*. Vikas Publishing House, Delhi.
10. A textbook of Botany by Singh, Pandey and Jain. Vth edition, Rastogi Publications Meeruth.

Suggested Laboratory Exercises

- Morphological and anatomical study of representative members of the Algae, Bryophytes and Pteridophytes.
- **Algae**: Volvox, Hydrodictyon, Oedogonium, Ulva, Pithophora, Stigeoclonium, Draparnaldiopsis, Polysiphonia, Sargassum, Chara.
- **Bryophyta**: Marchantia, Pellia, Anthoceros, Funaria, Polytrichum.
- **Pteridophyta**: Lycopodium, Selaginella, Equisetum, Gleichenia, Pteris, Ophioglossum, Isoetes, Marsilea.

SEMESTER SYLLABUS
M.Sc. BOTANY
SEMESTER – I
PAPER – III
BIOLOGY AND DIVERSITY OF GYMNOSPERMS

UNIT – I

Introduction

Gymnosperms: the vessel-less and fruitless seed plants.
Evolution of Gymnosperms
Classification of Gymnosperms and their Distribution in India.

UNIT – II

Fossil Gymnosperms: Brief account of the families of Pteridospermales:
Lyginopteridaceae, Medullosaceae, Caytoniaceae, Glossopteridaceae,
General Account of Cycadopsida and Cordaitales

UNIT – III

General Account

Genreral Account of, Cycadales and Ginkgoales Coniferales.

UNIT – IV

Comparative structure and reproduction in, Ephedrales, Welwitschiales and Gnetales.

Suggested Readings

1. Bhattacharjee S.P. & Moitra A. (1996). *Gymnosperms*. New Age International Pvt. Ltd., New Delhi.
2. Sporne K.K. (1991). *The Morphology of Gymnosperms*. B.I. Publishing Pvt. Ltd., Bombay.
3. Steward W.N. & Rothwell G.W. (1993). *Paleobotany and Evolution of Plants*. Cambridge University Press, U.K.
4. Vasishta P.C. & Sinha A.K. (2005). *Gymnosperms*. S. Chand Publishing Company, Delhi.
5. Singh H. (1978). *Embryology of Gymnosperms*. Encyclopaedia of Plant Anatomy, X. GebruderBorntraeger, Berlin.
6. A textbook of Botany by Singh, Pandey and Jain. Vth edition, Rastogi Publications Meeruth.
7. Ganguli, Das and Dutta, College Botany Vol II, New Central Book Agency PVT lTD Kolkata.

Suggested Laboratory Exercises

1. Comparative study of the anatomy of vegetative and reproductive parts of **Cycas, Ginkgo, Cedrus, Abies, Picea, Cupressus, Araucaria, Cryptomeria.**
2. **Agathis, Taxus, Ephedra and Gnetum**.
3. Study of important fossil gymnosperms through prepared slides and specimens.
4. Collection of various Gymnosperm plant materials.

SEMESTER SYLLABUS
M.Sc. BOTANY
SEMESTER – I
PAPER – IV
TAXONOMY OF ANGIOSPERMS

UNIT – 1

Population & the environment: ecads & ecotypes, evolution
Various models of differentiation of species.
The Species Concept
Taxonomic hierarchy,
Salient features of Melbourne Code

UNIT – 2

Taxonomic Evidence: Morphology, anatomy, embryology, cytology, phytochemistry, genome analysis & molecular biology.
Taxonomy tools: Herbarium, floras histological, biochemical, cytological, serological approaches; molecular techniques; computers & GIS, Chemotaxonomy: Role of secondary metabolites in taxonomy & their economic importance.

UNIT – 3

System of Angiosperm Classification:
Phenetic vs. Phylogenetic systems, Relative merits & demerits of major systems of classification, Recent advances in Angiosperm classification. Cladistics in taxonomy.

UNIT – 4

Concept of Phytogeography:
Endemism, hotspots, plant exploration, invasion & introduction.
Local Plants Diversity as represented by following Locally available Plants families and their socio-economic importance.
Ranunculaceae, Magnoliaceae, Nympheaceae, Rutaceae, Asteraceae, Asclepiadaceae, Bignoniaceae, Anacardiceae, Fabaceae,Acanthaceae, Apiaceae, Lamiaceae, Euphorbiaceae, Poaceae and Liliaceae.

Suggested Readings

1. Davis, P.H. & Heywood, V.H. (1973) – *Principle of Angiosperm Taxonomy*. Robert E. Krieger Publ. Co., New York.
2. Grant, V. (1971) – *Plant Speciation*. Columbia Univ. Press, New York.
3. Heywood, V.H. (1967) – *Plant Taxonomy*. Academic Press, London.
4. Stace, C.A. (1989) – *Plant Taxonomy & Biosystematics*. Edward Arnold Ltd., London.
5. Takhtajan, A.L. (1997) – *Diversity and Classification of Flowering Plants*. Columbia Univ. Press, New York.
6. Woodland, D.W. (1991) – *Contemporary Plant Systematics*. Prentice Hall, New Jersey.
7. Sharma, A.K. & Sharma, A. (2000) – *Taxonomy*. Pragati Prakashan, Meerut.

Suggested Laboratory Exercises

1. Description of specimen from representative locally available families.
2. Description of species based on various specimen sets to study intraspecific variation.
3. Floral & Pollen calendar.
4. Construction of keys (Brackets & Indented).
5. Training in the use of floras and manuals.
6. Mounting of properly identified plant specimens.
7. Determination of similarity coefficient and preparation of dendrograms.
8. Demonstration of the utility of secondary metabolites in taxonomy.
9. Description of species of a genus, study of key characters & preparation of keys at family level.
10. Field Trip/ Visit.

SEMESTER SYLLABUS
M.Sc. BOTANY
SEMESTER – II
PAPER – I
CYTOLOGY AND GENETICS

UNIT – I

Chromatin Organization

Chromosome structure and packing of DNA.
Molecular organization of centromere and telomere, nucleolus and ribosomal RNA gene, euchromatin, heterochromatin, satellites and karyotype evolution.
Specialized types of chromosomes – polytene, lampbrush, B-chromosomes and sex chromosomes.

Structural and Numerical Alterations in Chromosomes

Deletion, duplication, translocation and inversion – their origin, occurrence and breeding behaviour. Aneuploidy and euploidy – origin and production of aneuploids and allopolyploids. Types genome Constituton and analysis, evolution of major crop plants.

UNIT – II

Genetics of Prokaryotes & Eukaryotic Organelles

Mapping the bacteriophage genome.

Genetic recombination in bacteria, genetic transformation, conjugation, transduction in bacteria.

Gene Structure & Expression

Genetic fine structure, cistrons, introns and their significance.

RNA splicing, genetic code, gene Expression in prokaryotes & eukaryotes.

UNIT – III

Genetic Recombination & Genetic Mapping

Recombination, independent assortment & crossing over.
Chromosome mapping, linkage groups, genetic markers, corelation of genetic and physical maps, Extranuclear inheritance – cytoplasmic inheritance, maternal effects and shell coiling in Limnaea, plastid inheritance in *Mirabilis jalapa*.

UNIT – IV

Mutation and Molecular Cytogenetics

Spontaneous and induced mutation, molecular basis of gene mutation, transposable elements in Prokaryotes, DNA damage and repair mechanism, inherited human disease and defects in DNA repair, initiation of cancer at cellular level, proto oncogene and oncogenes.

Molecular Cytogenetics: Nuclear DNA content, C-value paradox, Cot curve and its signification, restriction mapping in situ hybridization, physical mapping of genes on Chromosomes, micro cloning.

Overview of Alien Gene Transfer through Chromosome Manipulation

Transfer of whole genomes, taking examples from wheat, Triticale, Brassica, Hybrid vigour.

Suggested Readings

1. Alberts B., Bray D., Lewis J., Raff M., Robert K. and Watson J.D. (1981) *Molecular Biology of Cell*, Garland Publishing Inc., New York, USA.

2. Kapoor J.N. (1988) *Molecular Biology – Concepts & Experiments*, John Wiley and Sons, USA.

3. Khush G.S. (1973) *Cytogenetics of Aneuploidy*, Academic Press, New York/London.

4. Lewin B. (1995) *Genes VII*, Oxford University Press, New York, USA.

5. Malacinski G.M. (1987) *Essentials of Molecular Biology*, Springer Verlag, New York, USA.

6. Russel P.J. and Sinnott J.A. (2000) *Principles of Genetics*, John Wiley and Sons, Inc.

Suggested Laboratory Exercises

1. Study of mitotic and salivary chromosomes of *Drosophila*.
2. Study of polytene chromosomes of *Drosophila* in relation to puffs.
3. Study of lampbrush chromosomes of *Triturus*.
4. Study of aneuploidy in *Allium cepa* root tip.
5. Study of meiosis in crop plants.
6. Isolation and estimation of DNA by colorimetric and chemical methods.
7. Estimation of DNA using DNA diphenylamine method.

SEMESTER SYLLABUS
M.Sc. BOTANY
SEMESTER – II
PAPER – II
CELL AND MOLECULAR BIOLOGY OF PLANTS

UNIT – I

The Dynamic Cell: Structural organization of plant cell: specialized plant cell types.

Cell Wall: Structure and function, biogenesis and growth.

Plasma Membrane & Structures: Models of plasma membranes, function: site of ATP, ion carriers, channels and pumps, receptors, plasmodesmata and their role in movement of molecules.

UNIT – II

Chloroplast: Structure, genome organization, gene expression, nucleo–chloroplastic interaction.

Mitochondria: Structure, genome organization, biogenesis & function.

Other Cell Organelles: Structure and function of micro bodies, Golgi apparatus, endoplasmic reticulum.

UNIT – III

Ribosomes: Structure, site of protein synthesis.
mechanism of translation – initiation, elongation and termination.
Plant Vacuoles: Tonoplast, membrane ATPase, transporter, function as storage organelle.

Nucleus: Structure, nuclear pore, nucleosome organization, DNA structure, A-B-Z forms of DNA.

DNA replication, transcription, splicing of mRNA, mRNA transport, nucleolus/rRNA biosynthesis & structure, role of tRNA.

UNIT – IV

Cell Shape and Motility

Cytoskeleton: Organization and role of microtubules and microfilament, ~~motomoterm;~~ motor implications of flagellar and other movements.

Cell Cycle and Apoptosis

Mitosis and meiosis, role of cyclins and cyclin dependent kinases, cytokinesis in cell and cell plate formation, mechanism of programmed cell death (PCD).

Suggested Readings

1. Lewis, B. (2005) *Gene VIII* Oxford University Press, New York, USA.
2. Roberts, D. and Roberts, D. *Cell Biology*.
3. Karp, G.L. (1993) *Molecular and Cellular Biology*, Wadsworth Publishing Co., California, USA.
4. Gupta, P.K. (2007) *Cell and Molecular Biology*, Rastogi Publication, Meerut, India.

5. Lodish H., Berk A., Zipsurski SL., Matsudaira P., Baltimore D., and Darnell J. (2000) *Molecular Cell Biology*, W.H. Freeman and Co., New York, USA.

Suggested Laboratory Exercises

1. Isolation of mitochondria from plant cells
2. Extraction and estimation of DNA content in plants.
3. Electrophoresis separation of nucleic acids.
4. Isolation and characterization of cell organelles.
5. Study of mitotic index from root tip cells.
6. Study of chiasmata frequency and terminalisation coefficient in *Allium cepa* and *Vicia Flox*.
7. Study of differentially stained plant cell.
8. Study of different stages of mitosis.
9. Study of different stages of mitosis meiosis.
10. Preparation of Karyotype of Alium Cepa

SEMESTER SYLLABUS
M.Sc. BOTANY
SEMESTER – II
PAPER – III
PLANT PHYSIOLOGY

UNIT – I

Membrane Transport and Translocation of Water and Solutes
Plant–water relations, mechanism of water transport through xylem, root–microbe interaction in facilitating nutrient uptake, comparison of xylem and phloem transport, phloem loading and unloading, active and passive solute transport, membrane transport proteins. Transpiration.

UNIT – II

Nitrogen Fixation, Nitrogen and Sulphur Metabolism
Overview of biological nitrogen fixation, root nodules formation and nod mechanism of nitrate uptake and reduction, ammonium assimilation, sulphate uptake transport and assimilation.

Signal Transduction
Overview of receptors and G-protein, phospholipids signalling, specific signalling mechanism, example of two-component sensor-regulator system in bacteria and plant, source sensing mechanism.

UNIT – III

Photochemistry and Photosynthesis
General concept and historical background, evolution of photosynthesis apparatus, photosynthetic pigment and light harvesting complexes, photo-oxidation of water, mechanism of electron and proton transport, carbon assimilation, the Calvin cycle, photorespiration and its significance, the C4 cycle, CAM pathway, biosynthesis of starch and sucrose, physiological and ecological consideration.

UNIT – IV

Stress Physiology
Plant response to biotic and abiotic stress, mechanism of biotic and abiotic stress tolerance, HR and SAR, water deficit and drought resistance, salinity stress, metal toxicity, freezing heat stress, oxidative stress.

Suggested Readings

1. Salisbury F.B. and Ross C.W. (1992) *Plant Physiology*. Wadsworth Publishing Co., California, USA.
2. Dennis D.T., Turpin D.H., Lefebvre D.D. and Layzell D.B. (1997) *Plant Metabolism*. Longman, Essex, England.
3. Taiz L. and Zeiger E. (1998) *Plant Physiology*. Sinauer Associates Inc. Publishers, Massachusetts, USA.
4. Moore T.C. (1989) *Biochemistry and Physiology of Plant Hormone*. Springer Verlag, New York.
5. Noble P.S. (1999) *Physiochemical and Environmental Plant Physiology*. Academic Press, San Diego, USA.
6. Thomas B. and Vince-Prue (1997) *Photoperiodism in Plants*. Academic Press, San Diego, USA.

Suggested Laboratory Exercise

1. Measurement of catalytic activity of catalyse and diastase in germinating seeds.
2. Effect of time in Enzyme concentration on the rate of reaction of Enzyme action.
3. Study of R.Q. value for different respiratory substrate carbohydrate, protein and fat through respirometer.
4. Study of cassulacean Acid Metabolism (CAM) in succulants.
5. Separation of protein by PAGE.
6. Separation of Iso-enzyme of esterases and peroxidases by PAGE.
7. Study of effect of auxins on apical dominance.
8. Study of seed dormancy in Lathyrus seed.
9. Effect of external factors on seed dormancy.
10. Effect of different measures for removal of seed dormancy.
11. Study of phototropic and geotropic movement in plant.

M.Sc. BOTANY
SEMESTER-II
PAPER-IV
PLANT BIOCHEMISTRY AND BIOENERGETICS

UNIT -1

Energy Flow: Principles of thermodynamics, redox reaction, structure and function of ATP.

Respiration and lipid Metabolism: Overview of plant respiration, glycolysis, the TCA cycle, electron transport and ATP synthesis, pentose Phosphate pathway, glyoxylate cycle, alternative oxidase system, structure and function of lipids, fatty acid biosynthesis, synthesis of membrane lipids,

UNIT -2

Fundamentals of Enzymology: General aspect, allosteric, mechanism, regulatory and active site isomerism, enzyme catalysis, Michaelis-Menton equation and its significance.

Sensory Photobiology: History and discovery of phytochromes and cryptochromes, photochemical and biological property, photophysiology of light induced responses cellular localization, molecular mechanism and role of photo-morphogenic receptors signalling and gene expression.

UNIT -3

Plant Growth Regulators and Elicitors: Physiological effects and mechanism of auxins, gibberellins, ethylene, abscissic acid, brassinosteroids, Jasmonic acid and Salicylic acid, hormone receptors, ~~signal transduction; and gene expression~~

UNIT 4

The Flowering Process: Photoperiodism and its significance, endogenous clock and its regulation, ~~phytochrome,~~ floral induction and development, genetic and molecular analysis,
~~Overview of~~ Vernalization, with spl. ref. to flowering.

Suggested Reading

1. Galston, A.W. (1989) Life Processes in Plants. Scientific American Library Springer Verlag, New York, USA.

2. Hopkins, W.G. (1995) Introduction to plant Physiology. John Wiley and Sons Inc., New York, USA.

3. Salisbury, F.B. and Ross, C.W. (1992) Plant Physiology. Wadsworth Publishing Co., California, USA.

4. Dennis, D.T., Turpin, D.H., Lefebvre, D.D. and Layzeel, D.B. (1997) Plant Metabolism. Longman, Essex, England.

5. Taiz, L. and Zeiger, E. (1998) Plant Physiology. Sinauer Association, Inc. Publishers, Massachusetts, USA.

Suggested Laboratory Exercise:

1. Demonstration of plasmolysis and deplasmolysis in plant cell.
2. Demonstration of transpiration.
3. Measurement of transpiration rate by Potometer. (Shift to Paper III of Pl. Physiology)
4. Study of interrelationship between transpiration and absorption and by T/A apparatus.
5. Extraction of chloroplast pigment from green leaves.
6. Separation of chloroplast pigment through paper chromatography.
7. Preparation of absorption spectrum of chlorophyll-a.
8. Separation of chloroplast pigment through solvent method.
9. Determination of chlorophyll a/chlorophyll/b ratio in C3 and C4 plants.
10. Extraction of seed proteins depending upon solubility.
11. Principal of colorimetry, spectrometry and fluorimetry.