

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

M. Sc. BOTANY SEMESTER –III

M3BOT01-CT09	PLANT BIOCHEMISTRY AND PHYSIOLOGY
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Unit-I Credit hours: 12

Bioenergetics: Principles of the thermodynamics, Gibb's free energy and chemical potential, redox potential. Types of Phosphorylations.

Carbohydrates: Classification, structure, properties.

Fats and Lipids: Fatty acids and fatty oils, Structure and function of lipids, classification of lipids.

Amino acids: Structure, Types, Properties, Functions.

Secondary metabolites: A brief account.

Unit-II Credit hours: 12

Enzymes: General characters, nomenclature and classification, Mode of enzyme action, Michaelis – Menton equation and its significance. Regulation of enzymes, allosteric modulation, enzyme inhibition, coenzymes, isoenzymes, abzymes. Factors effecting enzyme activity.

Biological nitrogen fixation: Non symbiotic and Symbiotic, nitrification and denitrification. Role and structure of Nitrogenase, Leghemoglobin, Genetics of Nitrogen fixation. Mechanism of nitrogen fixation.

Unit-III Credit hours: 12

Photosynthesis: Historical account, Evolution of photosynthetic apparatus, Photo pigments; types, structure, Photosystems; types, structure and function. Photophosphorylation. Photo-protective mechanisms. Carbon assimilation; C₃, C₄ and CAM pathways, Photorespiration and its significance.

Unit-IV Credit hours: 12

Respiration: Over view, Historical account, Evolution of anaerobic and aerobic metabolism, Aerobic respiration: glycolysis and its regulation, TCA cycle and its regulation, Pentose phosphate pathway, Oxidative electron transport and chemiosmotic hypothesis of ATP synthesis, alternative oxidase system, Anaerobic respiration. Gluconeogenesis

Unit-V Credit hours: 12

Stress physiology: Types of stress and physiological consequences, Response and resistance mechanisms, Molecular mechanism of tolerance, Stress tolerant Transgenics. Heat stress and heat shock proteins, Osmotic adjustments, Reactive oxygen species and oxidative stress, Metal toxicity. Biotic stress and response, HR and SAR mechanisms.

Practicals

1. Estimation of total fats in fatty seeds.
2. Preparation of standard curve of proteins (BSA)
3. Estimation of protein content in extracts of plant material by Bradford's method
4. Determination of saponification value of fats and oils
5. Determination of water potential of plant tissue by falling drop method.
6. Determination of osmotic potential of cell sap.
7. Determination of osmotic potential of cell sap by plasmolytic method.
8. Demonstration of mechanism of opening and closing of stomata.
9. Determination of the rate of transpiration.
10. Study of effect of plant hormone on rate of transpiration.
11. Demonstration of osmosis by using egg membrane.
12. Effect of osmotic potential of external solution on the rate of imbibition.
13. Determination of stomatal index, frequency and pore area.
14. Effects of chemicals and temperature on the permeability of protoplasmic membrane.
15. Estimation of water content, dry matter and ash content of plant.

Reference Books

1. Plant Physiology; Lincoln Taiz and Eduardo Zeiger, Sinauer Associates; 3rd ed. 2002.
2. Introduction to Plant Physiology; William G. Hopkins and Norman P. A. Huner. Wiley; 3 Ed., 2003.
3. Plant Physiology; Frank B. Salisbury and Cleon Ross. Brooks Cole; 4th edition 1992.
4. Water Relations of Plants, Paul Jackson Kramer. Academic Press. May 1983.
5. Plant Stress Biology: From Genomics to Systems Biology. Wiley-VCH, 2009.
6. Plant Abiotic Stress (Biological Sciences Series); Eds: Matthew A. Jenks and Paul M. Hasegawa. Wiley-Blackwell, 2005.
7. Plant Physiology; Eds; Meirion Thomas. Prentice Hall Press; 5th edition. 1973.

8. Physiology and Molecular Biology of Stress Tolerance in Plants; Eds; K.V. Madhava Rao, A.S. Raghavendra and K. Janardhan Reddy. Springer; 1st edition, 2006.
9. Oxidative Stress in Plants; Dirk Inze and Marc Van Montagu. CRC Press; 1st edition, 2001. Antioxidants and Reactive Oxygen Species in Plants (Biological Sciences Series). Ed; Nicholas Smirnoff. Wiley-Blackwell. 2005.
10. Plant Physiology; Hans Mohr, Dr Hans Mohr, Hans Mohr. Springer. 1995.

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M. Sc. BOTANY SEMESTER –III

M3BOT02-CT10	PLANT SYSTEMATICS
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Unit-I Credit hours: 12

Fundamentals of Systematics: Historical account of development of Taxonomy, Plant nomenclature, Type concept, Melbourne code 2012, Taxonomic hierarchy - concept of taxa, species, genus, family

Unit –II Credit hours: 12

Systems of angiosperm classification – broad outline and relative merits and demerits of major systems of classification - Bentham and Hooker; Engler and Prantl; Hutchinson; Takhtajan; Angiosperm Phylogeny Group (APG).

Unit –III Credit hours: 12

Taxonomic terminology; floral formula and floral diagram. Phylogeny; origin and evolution of angiosperms, numerical taxonomy, Botanical gardens, Herbarium,

Unit –IV Credit hours: 12

Angiosperm families: Diagnostic features of Ranunculaceae, Asteraceae, Lamiaceae, Euphorbiaceae, Orchidaceae, Liliaceae, Poaceae, Combretaceae, Loranthaceae, Lemnaceae, Cyperaceae, Araceae and Orobanchaceae.

Unit –V Credit hours: 12

Taxonomic evidence – Role of morphology, anatomy, embryology, palynology, phytochemistry and molecular systematics.

Practicals:

- (i) Study of at least 20 locally available families of flowering plants
- (ii) Identification of genus and species of locally available wild plants
- (iii) Preparation of botanical keys
- (iv) Training in using floras and herbarium for identification of specimens described in the class.

- (v) Field trips within and around the campus, compilation of field notes and preparation of herbarium sheets of such plants.

Reference books:

1. Cronquist, A. 1988. The Evolution and Classification of Flowering Plants (2nd ed.) Allen Press, U.S.A.
2. Davis, P. H. and V. H. Heywood 1991. Principles of Angiosperm Taxonomy. Today and Tomorrow Publications, New Delhi
3. Gurcharan Singh. 2004. Plant Systematics : Theory and Practice Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Heywood (ed.) Modern Methods in Plant Taxonomy.
5. Jones, S.B., Luchsinger, A.L. 1987. Plant Systematics.
6. Judd Walter S., Campbell C. S., Kollogg, E. A., Stevens P.F. and M. J. Donoghue 2008. Plant Systematics: A phylogenetic approach. Sinauer Associates, INC, Publishers. Sunderland, Massachusetts, USA.
7. Lawrence, George H. M. 1951. Taxonomy of Vascular Plants. Oxford and IBH Publ. Co. Pvt. Ltd., New Delhi
8. Nordenstam, B., El Gazaly, G. and Kassas, M. 2000. Plant Systematics for 21st century.
9. Quicke, Donald, L. J. 1993. Principles and Techniques of Commemorative Taxonomy. Blakie Academic and Professional, London
10. Radford, A.E. 1986. Fundamentals of Plant Systematics, Harper & Row Publ. USA.
11. Stace, C. A. 1980. Plant Taxonomy and Biosystematics Edward Arnold, London.
12. Takhtajan, A.L. 1997. Diversity and Classification of Flowering Plants. Columbia Univ. Press, New York.
13. Tiagi, Y.D. and Aery, N.C. Flora of Rajasthan (South and South -east Region). Himanshu Publications, New Delhi, Udaipur.
14. Woodland, D.W. 1991. Contemporary Plant Systematics. Prentice Hall, New Jersey.