

[MBTCR7152T/P]: Advanced Plant Biology and Plant Biology Practical

Theory: [CIA:10 Marks; End-Sem: 60 Marks], **Practical:** 30 Marks

No. of Credits	6
Theory/Composite	Composite
No.ofperiodsassigned	4Theory+2Practical

Coursedescription/objective:

The course is designed to

1. Impart a comprehensive overview of the basic principles of advanced plant biology focusing on biotic and abiotic stress responses and programmed cell death
2. Provide knowledge about the intricacies of traditional and advanced plant classification methods and developmental cascades.
3. Familiarize students with an advanced understanding of various ethnomedicinal practices, diversity of natural products and how natural products can be utilized for computer aided drug discovery and design of lead compounds.

Syllabus:

Advanced Plant Biology (Theory)

Module A: 30 Marks

(2 Classes/week)

UNIT I: Molecular mechanisms of senescence and programmed cell death in plants.

UNIT II: Plant Stress Response: Biotic and Abiotic – Adaptation and phenotypic plasticity, ABA signaling in stress responses, Plant Pathology: Disease and Disease cycle concept;Symptoms; Etiology and causal complex; Primary and secondary inocula; Infection, Pathogenicity and Pathogenesis; Endemic, Epidemic, Pandemic and Sporadic disease: concepts with examples. Plant virus interactions – Tobacco mosaic virus (positive-sense RNA virus), Tomato spotted wilt virus (negative-sense RNA virus), Tomato yellow leaf curl virus (DNA virus).

UNIT III: Host pathogen interaction: Pre-penetration, Penetration and Post Penetration; Plant Immunity: Concept of gene for gene concept and ZigZag model, Role of viral silencing suppressors in plant diseases. Defense mechanisms; Resistance -Systemic acquired resistance and Induced systemic resistance; Plant disease management -Quarantine, Chemical, Biological and Integrated

Module B: 30 Marks

(2 Classes/week)

UNIT IV: Plant Development Biology and Systematics: Floral organ identity genes and their role; ABCD and ABCDE models; Early Pattern Formation in plants,Fundamentals of plant systematics and classification systems, Numerical taxonomy, Molecular taxonomy, chemotaxonomy and serotaxonomy, Salient features of dicotyledons and monocotyledons (with examples). Use of image processing techniques for plant taxonomy.

UNIT V: Ethnomedicine; Primary and secondary data sources; Tribal medicine methods of disease diagnosis and treatment–Plants in folk religion;Detection of drug adulteration,Biological testing of herbal drug, Natural compound based drug discovery with insights from pharmacokinetics, pharmacodynamics and Computer Aided Drug discovery(CADD)

Plant Biology Practical (30 marks)**(2 classes / Week)**

1. Identification of vegetative and reproductive structures of algae, bryophytes and pteridophytes from permanent mounts.
2. Identification of representative families of angiosperms, based on diagnostic characters and/or morphological descriptions.
3. Organoleptic evaluation of plant-derived crude drugs.
4. Virtual Screening and studying the interactions of plant-based natural compounds with target proteins using CADD techniques (Computer Lab required).
5. Ecological Census techniques and survey of plant groups through field trip

Reading and Reference List:

Module A:

Unit I:

1. Plant Physiology – Taiz & Zeiger
2. Review papers

Unit II:

3. Plant Pathology - George N Agrios; Academic Press. 5th Edition
4. Introduction to Principles of Plant Pathology by R.S. Singh; 5th Edition (MedTech Publishers)
5. Review papers

Unit III:

1. Ecology – Verma and Agarwal
2. Review papers

Module B:

Unit IV:

1. Introduction to the Principles of Plant Taxonomy by V.V. Sivarajan and N.K.P. Robson; Cambridge University Press (2nd Edition)
2. Plant Systematics - An Integrated Approach - Gurcharan Singh; CRC Press (4th Edition)
3. Plant Systematics - Michael G Simpson - Academic Press; (2nd Edition)
4. Taxonomy – O.P. Sharma
5. Research and Review Articles

Unit V:

1. Indian Medicinal Plants - An Illustrated Dictionary by C.P. Khare; Springer; 1st Edition
2. Nature's Pharmacopeia: A World of Medicinal Plants by Dan Choffnes; Columbia University Press (1st Edition)
3. Trease and Evans' Pharmacognosy by William Evans; 16th Edition.
4. Fundamentals of Pharmacognosy and Phytotherapy by Michael Heinrich, Joanne Barnes, Simon Gibbons, Elizabeth M. Williamson; Elsevier Press; 2nd Edition
5. In silico drug discovery and design : theory, methods, challenges, and applications; Claudio N Cavasotto; CRC Press; 1st Edition.
6. Research and Review Articles

Unit VI:

6. Plant Pathology - George N Agrios; Academic Press. 5th Edition
7. Introduction to Principles of Plant Pathology by R.S.Singh; 5th Edition (MedTech Publishers)
8. Plant Pathology by R.S. Mehrotra and A. Agarwal 2nd Edition; Tata McGraw Hill Publishers.
9. Research and Review Articles

Q.PaperStructureforEndSemTheory

Module A (30)

[1 question of 15 marks (Any 1 from 2);
3 questions of 5 marks (Any 3 from 5)]

Module B (30):

[1 question of 15 marks (Any 1 from 2);
3 questions of 5 marks (Any 3 from 5)]

Plant Biology Practical (30 marks)(2 classes / Week)

1. Identification of vegetative and reproductive structures of algae, bryophytes and pteridophytes from temporary or permanent mounts.
 2. Identification of representative families of angiosperms, based on diagnostic characters and/or morphological descriptions.
 3. Organoleptic evaluation of plant-derived crude drugs.
 4. Virtual Screening and studying the interactions of plant-based natural compounds with target proteins using CADD techniques (Computer Lab required).
 5. Survey of plant groups through field trip.
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