

MBTDS0052T/P:

Plant Genetic Engineering and Intellectual Property Rights & Grand Viva

Total Marks: 60marks: [CIA:10 Marks; End-Sem: 50 Marks]

No. of Credits	6
Theory/Composite	Composite
No. of periods assigned	4 Theory + Grand Viva

Course description/objective:

1. The design of this module empowers the students with the most advanced and applied aspects of plant biotechnology, which are ubiquitously used in academia as well as in industry and large corporate organizations involved in production of plant based products, engineering the metabolic pathways in plants for biofortification and generating industrial products, enhancing plant productivity as well as the biosafety and regulatory issues of genetically engineered plants.
2. The module also empowers the student with firsthand knowledge about how to deal with high throughput data in plant sciences and make informed decisions using standard methods. The module also provides a comprehensive overview of the process of Patents and patenting, as well as Intellectual property.
3. It also provides the students with the idea on patent landscaping and analysis. As an outcome of this theoretical module, the student is able to capture the theoretical fundamentals of the various transgenic technologies and patenting processes.

Syllabus:

Module A: (25 Marks)

(2 classes/week)

UNIT I: Application of plant transformation for productivity and performance: Herbicide resistance-glyphosate, glufosinate, atrazine; Insect resistance -Bt genes, protease inhibitors, Disease resistance-bacterial viral and fungal resistance; Marker elimination from transgenic plants; Genetic Use Restriction Technology(GURT); Phytoremediation.

UNIT II: Biofortification and Metabolic engineering: Advantages and disadvantages of transgenic plants as bioreactors; Engineering for improved nutrition; Metabolic engineering of carbohydrates and lipids; Production of plantibodies, edible vaccines and other therapeutic proteins; Oleosin technology.

Module B: (25 Marks)

(2 classes/week)

UNIT III: Computational Plant Biology: Comparing Plant Genomes, Pathway databases and analysis of Gene Enrichment. Basics of plant systems biology - identifying gene networks; basics of circuits and logic gates for synthetic biology of plants.

Unit IV: Intellectual Property Rights (IPR): General idea about intellectual property (IP) and IPR. Different forms of IPR. Patents –basic concepts, important features, protection and use. Criteria of

patentability. Legal, technical, scientific and commercial aspects. Concepts of Patent Landscaping and Analysis; protection of plant varieties and Farmers' Rights (PPVFR) Act, 2001. Case Studies.

UNIT V: Regulatory and Biosafety Aspects of Transgenic Plants: Status of Biotech crops in India and their present status, Socio-economic and ethical considerations for transgenic crops, National Biosafety Regulatory Framework in India, CBD and its provisions; contribution of CGIAR, IBPGR and NBPGR; movement of transgenic germplasm, ethical issues with antibiotic resistance, promoter use, gene flow associated with GM crops; Cartagena Protocol and applications; Bioprospecting, Biopiracy, Environmental Impact Assessment: food safety assessment, substantial equivalence, toxicological assessment, allergenic potential assessment

Q.Paper Structure for End Sem Theory

Module A (25)

1 question of 10 marks (Any 1 from 2);

3 questions of 5 marks (Any 3 from 5)

With suitable subparts

Module B (25):

1 question of 10 marks (Any 1 from 2);

3 questions of 5 marks (Any 3 from 5)

With suitable subparts.

Texts & Reading/Reference Lists:

Module A:

1. Plant Biotechnology: Adrian Slater
2. Plant Biotechnology: H.S. Chawla
3. Molecular Biotechnology: Principles and Applications of recombinant DNA; Bernard R. Glick and Jack J. Pasternak, Cheryl L. Patten
4. Transgenic Crop Plants: Utilization and Biosafety Editors: Kole, C., Michler, C., Abbott, A.G., Hall, T.C. (Eds.)
5. Plant Biotechnology, Transgenics, Stress Management, and Biosafety Issues; Edited By Sangita Sahni, Bishun Deo Prasad, Prasant Kumar (Eds).
6. Relevant Research and Review Papers.

Module B:

1. Plant Tissue Culture: Theory and Practice; Bhojwani and Razdan
2. Molecular Biotechnology: Principles and Applications of recombinant DNA; Bernard R. Glick and Jack J. Pasternak, Cheryl L. Patten
3. Transgenic Crop Plants: Utilization and Biosafety Editors: Kole, C., Michler, C., Abbott, A.G., Hall, T.C. (Eds.)
4. Plant Biotechnology, Transgenics, Stress Management, and Biosafety Issues; Edited By Sangita Sahni, Bishun Deo Prasad, Prasant Kumar (Eds).
5. Relevant Research and Review Papers.

GRAND VIVA: 40 Marks