
SEMESTER VIII

I. MAJOR COURSE- MJ 20:

ADVANCED BIOTECHNOLOGY

Marks: 25 (5 Attd. + 20 SIE: 1Hr) + 75 (ESE: 3Hrs) = 100	Pass Marks: Th (SIE + ESE) = 40
--	---------------------------------

(Credits: Theory-04) **60 Hours**

Course Objective

To familiarize the students with the fundamental principles of Biotechnology, various developments in Biotechnology and its potential applications.

Course Learning Outcomes

Ability to carry out research /investigation independently in specialized area of Biotechnology.

Course Content:

Unit 1: History of plant cell and tissue culture; Culture media; Various types of culture; callus, suspension, nurse, root, meristem, etc.; In vitro differentiation: organogenesis and somatic embryogenesis; Plant growth regulators: mode of action, effects on in vitro culture and regeneration; Molecular basis of plant organ differentiation. **(10 Lectures)**

Unit 2: Micropropagation; Anther and microspore culture; Somaclonal variation; In vitro mutagenesis; In vitro fertilization; In vitro germplasm conservation; Production of secondary metabolites; Synthetic seeds. **(10 Lectures)**

Lectures)

Unit 3: Embryo rescue and wide hybridization; Protoplast culture and regeneration; Somatic hybridization: protoplast fusion, cybrids, asymmetric hybrids, etc. **(8 Lectures)**

Unit 4: Methods of plant transformation; Vectors for plant transformation; Genetic and molecular analyses of transgenics; Target traits and transgenic crops; Biosafety issues, testing of transgenics, regulatory procedures for commercial approval. **(15 Lectures)**

Unit 5: Secondary Agriculture Biotechnology: Biotech feed, Silage, Biomanure, biogas, biofuels – advantages and processing parameters. **(5 Lectures)**

Unit 6: GM crops: Advantages, social and environmental aspects, Bt crops, golden rice, transgenic animals. **(5 Lectures)**

Unit 7: Bioethics and Biosafety **(3 Lectures)**

Unit 8: Intellectual Property Right in Biotechnology **(4 Lectures)**

Reference Books:

1. Bhojwani SS. 1983. Plant Tissue Culture: Theory and Practice. Elsevier.
 2. Christou P & Klee H. 2004. Handbook of Plant Biotechnology. John Wiley & Sons.
 3. Dixon RA. 2003. Plant Cell Culture. IRL Press.
 4. George E F, Hall MA & De Klerk GJ. 2008. Plant Propagation by Tissue Culture. Agritech Publ.
 5. Gupta PK. 2004. Biotechnology and Genomics. Rastogi Publ.
 6. Herman EB. 2005-08. Media and Techniques for Growth, Regeneration and Storage. Agritech Publ.
 7. Pena L. 2004. Transgenic Plants: Methods and Protocols. Humana Press.
 8. Pierik RLM. 1997. In vitro Culture of Higher Plants. Kluwer.
 9. Singh BD. 2007. Biotechnology: Expanding Horizon. Kalyani.
-