LESSON PLAN

Branch: B.Tech in Biotechnology
Semester: 6th
Subject: BTPE3005 – Plant Biotechnology
Name of the Teaching Faculty: Dr. Susmita Mahapatra

Week	Class Day	Theory Topics
1st	1st	Plant genome organization: structure of nuclear genome, gene families, repetitive DNA sequences
	2nd	Chloroplast genome: structure, gene organization, replication and expression
	3rd	Mitochondrial genome: structure, inheritance patterns and functional significance
2nd	1st	Gene expression in plant cells: transcription and translation in plant systems
	2nd	Cytoplasmic male sterility: genetic basis and applications in hybrid seed production
	3rd	Intergenomic interactions: nuclear-cytoplasmic interactions and their biological significance
3rd	1st	Biology of Agrobacterium tumefaciens and its role in plant transformation
	2nd	Ti plasmid and Ri plasmid: structure, components and functions
	3rd	Mechanism of T-DNA transfer from bacterium to plant genome
4th	1st	Agroinfection process: steps and molecular mechanisms
	2nd	Plant viral vectors: types, advantages and limitations
	3rd	Direct gene transfer methods: electroporation, microinjection and particle bombardment
5th	1st	Selectable markers: antibiotic and herbicide resistance genes
	2nd	Reporter genes: GUS, GFP and their applications
	3rd	Promoters used in plant vectors: constitutive and inducible promoters
6th	1st	Genetic engineering strategies in plants: introduction and workflow
	2nd	Engineering for disease resistance: bacterial and fungal resistance
	3rd	Engineering for pest and herbicide resistance in crops
7th	1st	Conventional plant breeding methods: selection, hybridization and limitations
	2nd	Introduction to plant tissue culture: principles and aseptic techniques
	3rd	Composition of tissue culture media: macro and micronutrients, hormones
8th	1st	Callus culture: induction, maintenance and applications
	2nd	Suspension culture: growth kinetics and scale-up
	3rd	Single cell culture and its applications
9th	1st	Micropropagation techniques: stages and commercial applications
	2nd	Initiation and maintenance of cultures under controlled conditions
	3rd	Production of hybrid plants using tissue culture techniques
10th	1st	Secondary metabolites in plants: classification and importance
	2nd	Extraction and isolation of plant secondary metabolites

	3rd	Characterization techniques for metabolites
11th	1st	Role of plant secondary metabolites in drug development
	2nd	Biopesticides: types, mechanisms and applications
	3rd	Biofertilizers and plant growth regulators
12th	1st	Biotransformation: concept and industrial applications
	2nd	Bioremediation using plants (phytoremediation)
	3rd	Biofuel production from plant biomass
13th	1st	Feedstock chemicals derived from plants
	2nd	Industrial applications of plant biotechnology products
	3rd	Case studies on genetically modified crops
14th	1st	Advanced topics in plant biotechnology
	2nd	Recent trends and innovations in plant genetic engineering
	3rd	Environmental and biosafety concerns
15th	1st	Revision of key concepts from all modules
	2nd	Discussion of important questions and applications
	3rd	Case study-based learning
16th	1st	Final revision and concept integration
	2nd	Viva preparation and discussion
	3rd	Doubt clearing session