

241/BOT/MD401

BOTANY: SEMESTER-IV								
Course Code	Course ID	Course Title	Credit	Contact Hours/Week	Internal Assessment marks	End Term Marks	Max. Marks	Exam Duration
MDC-04	241/BOT/MD404	Plant Tissue Culture	2	2	15	35	50	2 hrs
			1	1	5	20	25	
Course Learning Outcomes (CLO) Students will be able to: <ol style="list-style-type: none"> 1. Acquire knowledge about the non - conventional methods of plant propagation. 2. Learn about regeneration of complete plants from plant organs/cell other than seeds 3. Apply knowledge regarding in vitro techniques in Agriculture and forestry. 4. Attain practical knowledge of preparing artificial seeds. Develop curiosity about use of non - conventional methods in storage and conservation of germplasm. 								
Instructions for Paper-Setter <ol style="list-style-type: none"> 1. Nine questions will be set in all. All questions will carry equal marks. 2. Question No. 1, which will be short answer type covering the entire syllabus, will be compulsory. The remaining eight questions will be set unit wise selecting two questions from each Unit I to IV. The candidate will be required to attempt question No. 1 and four more questions selecting one question from each unit. 								
UNIT	TOPICS							CONTACT HOURS
I	Plant Tissue Culture: History of Plant Tissue Culture, Basic concept, principles and scope of plant cell and tissue culture, concepts of cellular differentiation; Totipotency; basic techniques of plant tissue culture; callus formation, organogenesis and embryogenesis. Protoplast isolation, fusion and culture, somatic hybridization, hybrid selection and regeneration. Cybrids and their application.							12
II	<i>In vitro</i> haploid production and its significance, Anther/Pollen culture and ovary culture; Embryo and ovule culture Production of triploids through endosperm culture. Micropropagation: meristem culture and virus-free plants; Cryopreservation of plant cell and tissue cultures and establishment of gene banks Somaclonal variations and isolation of useful mutants; mechanisms and applications in genotype improvement.							11
III	Plant Secondary Metabolites: Sources and production of secondary metabolites; criteria for cell selection, factors affecting the culture of cells; different bioreactors and their use in secondary metabolite production; biochemical pathways for the production of different secondary metabolites; biotransformation.							11
IV	Somatic embryogenesis, production of synthetic seeds, importance, limitation and their utilization. Application of tissue culture in forestry and agriculture; status of tissue and cell culture technology in India edible vaccines, and their prospects.							11
	List of Practical: <ol style="list-style-type: none"> 1. Preparation of different types of standard tissue culture media. 2. Establishment of aseptic cultures following appropriate sterilization procedures using seeds. 3. Preparation of competent cells and Agrobacterium transformation by electroporation. 4. Agrobacterium tumefaciens-mediated transformation of tobacco. 5. Visualization of GFP or YFP in transgenic Arabidopsis. 6. Morphological and histochemical features of major cereals, oilseeds, legumes, forest trees, non-alcoholic beverages and medicinal plants. 7. Analysis of crude extracts from medicinal plants using HPLC. 8. Evaluation of a transgenic phenotype (viz., Herbicide resistance) under containment conditions in 							
Learning Resources								
Bhojwani, S.S. and Razdan, M.K., 1996, Plant Tissue Culture: Theory and Practice (Arevised Edition), Elsevier Science Pub., New York, USA. Chawla, H.S., 2020, Introduction to Plant Biotechnology (3rdEdition), Oxford and IBHPub. Co., New Delhi. Collins, H.A. and Edwards, S. 1998, Plant Cell Culture, Bios Scientific Pub., Oxford,U.K. Glick, B.R., and Pasternak, J.J., 1998, Molecular Biotechnology: Principles andApplications, ASM Press, Washington, DC. Razadan, M.K., 1993, An introduction to Plant Culture, Oxford & IBH Pub., Co., NewDelhi, India.								

S. Bhojwani