Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Plant Tissue Culture ALS-DSC 7	**4**	**2**	**0**	**2**	**VI Sem**	**Nil**

Course Learning Objectives

To give students knowledge of techniques used in plant tissue culture and its applications.

Learning Outcomes

The successful students will be able to:

- learn the basic concepts, principles and processes in plant cell and tissue culture.
- understand the use of tissue culture techniques in plant improvement.
- apply the concepts and principles of plant cell and tissue culture in biotechnological and agricultural fields.
- become an entrepreneur by establishing their own plant tissue culture lab.

Theory; 30 Hours

Unit 1 Introduction **08 Hours**

Historical perspective, Important contributions of Haberlandt, White, Reinert & Steward, Murashige, Skoog, Cocking, Guha & Maheshwari, Morrel & Martin. Terminologies: Cell culture,organ culture, explant, callus, totipotency, plasticity, regeneration, somaclonal variants. Role of nutrients, vitamins, hormones and supplements in nutrient medium. Composition of MS and White medium.

Unit 2 Techniques of Plant Tissue Culture **08 Hours**

Collection of plant material, sterilization of tissue (maintenance of aseptic conditions by use of autoclave and laminar flow chamber), filter sterilization, inoculation. Protoplast isolation (mechanical and enzymatic), culture, purification (viability test) and fusion (spontaneous, induced), selection of fused protoplasts, applications

Unit 3 Micropropagation **05 Hours**

Selection of plant material and suitable explant, methodology, plant regeneration pathways-somatic embryogenesis, organogenesis, difference between somatic and zygotic embryos.

Unit 4 Tissue culture applications **09 Hours**

Anther culture, Production of haploids, triploids and cybrids, artificial seeds (production & advantages), embryo rescue, virus elimination, secondary metabolite production; Cryopreservation; Germplasm conservation. Novel sources of variation.

Practicals **60 Hours**

- To study the equipment used in tissue culture: autoclave and laminar air flow chamber.
- Preparation of Murashige & Skoog's (MS) medium.

- Demonstration of sterilization and inoculation methods using leaf

and nodal explants of tobacco, carrot, *Datura*, *Brassica* etc. (any two).
- Study of anther, embryo and endosperm culture.
- Study of micropropagation, somatic embryogenesis & artificial seeds.
- Isolation of protoplasts.
- Visit to a plant tissue culture laboratory and submission of field report.

Suggested Readings:

- Bhojwani, S.S. (1990). Plant Tissue Culture: Applications and Limitations {Elsevier}
- Bhojwani, S.S, Bhatnagar, S.P. (2015). The Embryology of Angiosperms, 6th edition. New Delhi, Delhi: Vikas Publication House Pvt. Ltd.
- Bhojwani, S. S. and Dantu, P. K. (2013). Plant Tissue Culture: An Introductory Text Springer
- Bhojwani, S. S. and Razdan, M. K. (1996). Plant Tissue Culture: Theory and Practice, Revised Edition, Elsevier
- Newmann, Karl-Hermann (2020). Plant Cell and Tissue Culture: A Tool in Biotechnology, 2nd Edition Springer **Additional Resources:**

- Park, Sunghun (2021). Plant Tissue Culture: Techniques and Experiments, 4th Edition Elsevier
- Razdan, M. K. (2019). Introduction to Plant Tissue Culture, 3rd Edition CBS / Oxford & IBH
- Smith, R. H. (2013). Plant Tissue Culture: Techniques and Experiments, 3rd Edition
- {Elsevier}
- Stewart, C. Neal (2016). Plant Biotechnology and Genetics, 2nd Edition Wiley-Blackwell
- Trigiano, R. N. (2011). Plant Tissue Culture, Development, and Biotechnology CRC Press

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.