BTY 5001	**PLANT TISSUE CULTURE TECHNIQUES** (Credit4;Theory 3hrs;Practical3 hrs)
AIM	Tofamiliarizewithplanttissueculturetechniques
Objectives	• To teach different components used in tissue culture media and their specific uses. • To teach different methods of micropropagation and their advantages • To teach different techniques used in in vitro conservation.
Learning outcome	After completion of the course, the students ➢ Are able to understand the principles of plant tissue culture and various *in vitro* techniques ➢ Proficient for developing haploid and triploid plants through tissue culture protocol. ➢ Understand the techniques of protoplast isolation, culture and fusion and their application in crop improvements.
Sl.No	**Theory**
1.	History of plant tissue culture, cellular totipotency:concepts and applications.
2.	Techniques of plant tissue culture, essential requirements of a plant tissue culture laboratory, Plant tissue culture media, General composition of the solid and liquid media, various gelling agents, media selection.
3.	Sterilization of medium, galsswares, instruments, plant material, transfer area,Preparation of explants, sterilization culture and incubation. Subculture andhardening.Micropropagation:various stagesof micropropagation, importance.
4.	Principles and protocol applications of culture of different explants, embryoculture,importanceof embryo culture
5.	Haploidplantproduction,Importanceofhaploidplants. Androgenesis: pre-treatment of anther/pollen grains, callus induction andshoot regeneration, androgenic embryos, their development. Merits anddemeritsof anther culture. Microspore culture, Protocol, Advantages of microspore culture over antherculture.
6.	*In vitro*gynogenesis, Ovary/ovule/flower bud culture, embryo induction fromculturedovary/ovule/flowerbud,Callusinductionfromembryosaccellsand theirorganogenesis,advantagesofgynogenenicplantsoverangrogenicplants
7.	Triploidplantproduction:Importanceoftriploidplants,endospermculture, stage of endosperm culture, role of embryo in endosperm culture, advantagesandlimitations of triploid plants.
8.	Suspensionculture,batchculture,continuousculture,singlecellculture.
9.	Somatic embryogenesis: Factors affecting somatic embryogenesis,differences between somatic and zygotic embryogenesis, synthetic seedproduction, desiccated and hydrated synthetic seeds, merits and demerits ofsyntheticseeds,somaclonalvariationandapplicationsofsomacloanl variationincropimprovement.
10.	Protoplastisolation,culture,plantregenerationfromprotoplast,protoplast fusionandsomatichybridization,cybrids.
11.	Invitrogermplasmstorage,in-situconservation,ex-situconservation, cryopreservation.
12.	Applicationoftissuecultureforcropimprovement,problems,limitationsand futureprospectus.
S. No.	**Practical**
1.	PreparationofthestocksolutionsofMSmedium,

2.	PreparationofMSmediumfromstocksolutions,
3.	Isolation, preparation, sterilization and inoculation of different explants likeshoottip, node, anther, embryo and cambium
4.	Isolationandfusionofplantprotoplasts,
5.	Preparationofsyntheticseeds,
6.	Preparationofselectivemediumfordroughtorsalinityresistance.Preparation of MS soild medium from stock solutions containing auxin and cytokinin,NaClor PEG, and inoculation,
7.	Findouttheuninucleatestageofantherandantherculture
8.	Dissect out an embryo from any seed and culture it on a suitable solidmedium.

TextBooks:

1. Barbara M. Reed (2008) Plant Cryopreservation: A Practical Guide. Springer,Heidelberg.
2. Bhojwani SS, Razdan MK (1996) Plant tissue culture: Theory and Practice. Elsevier,NorthHolland
3. Colin Ratledge, Bjorn Kristianson (2001) Basic biotechnology. Cambridge Universitypress.
4. Dixon RA, Gonzales RA. (2004) Plant cell culture, a practical approach (II Edn). OxfordUniversityPress.
5. EricaE.Benson(1999)PlantConservationBiotechnology.TaylorandFrancis,USA
6. Evans DE, Coleman JOD, Kearns A (2003) Plant Cell Culture. Taylor and Francis,USA.
7. Gamborg L, Philips GC (Eds.) (2005) Plant cell, tissue and organ culture: Fundamentalmethods.NarosaPublishing House, New Delhi.
8. Hamish A Collin, Sue Edwards (1998) Plant tissue culture. Bios scientific publishers,India
9. Michael R. Davey, Paul Anthony (2010) Plant Cell Culture: Essential Methods. Wiley-BlackwellPublishers, India
10. Susan R. Barnum (1998) Biotechnology an introduction. Wadsworth PublishingCompany,USA.
11. Wang TL, Cuming A. (1996) Embryogenesis the generation of a plant. Bios ScientificPublishersLimited, UK
12. William J Thieman, Michael A Palladino (2009) Introduction to biotechnology (II Edn).Pearson.