Course No : **BT-124** Course Title : **Plant Tissue Culture**

Credits : **3(2+1)** Semester : **II**

Theory

UNIT I

History of plant tissue culture; concept of totipotency; Concept of aseptic culture practices; Components of *in vitro* culture media and role of different macro and micro nutrients, vitamins, plant growth regulators and growth supplements; Sterilization techniques.

UNIT II

Various plant cell, tissue and organ culture techniques and uses; Somatic cell cultures; morphogenesis: organogenesis and somatic embryogenesis; Micropropagation: *In vitro* grafting, meristem culture; Anther, pollen, embryo, ovule, ovary culture; Protoplast culture and somatic hybridization; Somaclonal variation.

Practical

Good laboratory practices;Media preparation and sterilization; Surface sterilization of explants; Establishment of callus/cell suspension cultures; Micropropagation; Embryo culture; Anther and pollen culture; Induction of plant regeneration; Hardening and transfer to soil.

Text Books:

1. Bhojwani SS & Razdan MK. 1996. *Plant Tissue Culture: Theory and Practice.*Elsevier.
2. Bhojwani SS & Dantu PK. 2013. *Plant Tissue Culture: An Introductory Text.* Springer.
3. K.K. Dey. Plant Tissue Culture
4. H.S. Chawla. Introduction to Plant Biotechnology.

Reference Books:

1. Dixon RA & Gonzales RA. 2003. *Plant Cell Culture: A Practical Approach.* Oxford University press.
2. Helgason CD & Miller CL. 2005. *Basic Cell Culture Protocols.*3rd Ed. Humana Press.

Course No: PB-246 Credits: 3 (2+1) Course Title: -Plant cell and Tissue Culture

Sr. No.	THEORY:- Name of the topic	Lectures Required (No.)
1	**Historical perspective of Plant cell/tissue culture** Contributions of all scientists in the field of Plant Tissue Culture	01
2	**Scope and importance of Plant cell and tissue culture in crop improvement** Plant tissue culture present status, Future prospects and applications for crop improvement	02
3	**Totipotency and morphogeneis** Totipotency explanation ,Expression of Totipotency– dedifferentiation, re-differentiation ,regeneration ,Morphogenesis – definition , events ,contents	02
4	**Nutritional requirement of in vitro cultures** Explaination about Macronutrients ,micronutrients ,iron ,vitamins, sugars ,gelling agent, organic supplements ,role in culturing of cells	02
5	**Different techniques of in-vitro culture- Micro-prpoagation** Microprapogation – definition ,discovery ,stages , types, advantages and disadvantages	02
6	**Anther culture, Pollen culture** Definition , Procedure ,factors affecting , applications	02
7	**ovule culture, Embryo culture** Definition , Procedure ,factors affecting , applications	02
8	**In-vitro pollination, in-vitro fertilization** Defination ,Types –Stigma fertilization ,Placental fertilization	02
9	**Endosperm culture** Definition ,method , Applications	01
10	**Factors affecting in vitro culture.** Factors affecting Microprapogation , anther culture ,pollen culture , ovary culture , somaclonal variation , somatic embyogenesis etc.	02
11	**Somaclonal variation, types, causes,** Definition ,causes ,schemes , applications	02
12	**Somatic embryogenesis** Defination, stages , applications	02
14.	**Synthetic seed production** Definition ,advantages ,disadvantages ,procedure for production ,applications	02
13	**Protoplast isolation , culture Manipulation and fusion** Protoplast definition , Isolation methods ,culture methods, fusogens, fusion methos ,checking of viability of protoplast	02
14	**Cybrids Products of somatic hybridization.** Cybrid definition , Cybridization	02
15	**Secondary metabolites production, extraction of secondary metabolites** Cell suspension culture ,types , measures, techniques , Secondary metabolites definition , examples ,extraction and production methods	02
16	**Hardening techniques of micro-propagated seedlings**	02
Total practical's required (No.)		32

Course No: PB-246 Credits: 3 (2+1) Course Title: -Plant cell and Tissue Culture

Sr. No.	**THEORY:-** Name of the topic	Lectures Required (No.)
1	Historical perspective of Plant cell/tissue culture	**01**
2	Scope and importance of Plant cell and tissue culture in crop improvement	**02**
3	Totipotency and morphogeneis	**02**
4	Nutritional requirement of in vitro cultures	**02**
5	Different techniques of in-vitro culture- Micro-propagation	**02**
6	Anther culture, Pollen culture	**02**
7	ovule culture, Embryo culture	**02**
8	In-vitro pollination, in-vitro fertilization	**02**
9	Endosperm culture	**01**
10	Factors affecting in vitro culture.	**02**
11	Somaclonal variation, types, causes,	**02**
12	Somatic embryogenesis	**02**
14.	Synthetic seed production	**02**
13	Protoplast isolation , culture Manipulation and fusion	**02**
14	Cybrids Products of somatic hybridization.	**02**
15	Secondary metabolites production, extraction of secondary metabolites	**02**
16	Hardening techniques of micro-propagated seedlings	**02**
Total practical's required (No.)		**32**

Course No: - PB-4711 Credits: 4 (0+4) Course Title: Advances in Plant Tissue Culture

Sr. No.	**PRACTICALS:-** **Name of the topic**
1	Sterilization and culturing of seeds, bulbs, leafs, stems, roots, suckers, and flower buds etc.
2	Seed germination, Embryo culture and embryo rescue after wide hybridization.
3	Meristem tip culture for virus elimination.
4	*In-vitro* pollination and Fertilization.
5	Cell suspension culture
6	Organogenesis and embryogenesis.
7	Protoplast isolation and fusion (Somatic hybrid production).
8	Secondary metabolite production.
9	Somaclonal Variations,
10	Agrobacterium mediated gene transfer,
11.	Gene transfer by biolistic method.