Department of Biotechnology

Revised Syllabus of Diploma Programme (UG)

Preamble:

To educate the students about basics ant various techniques in plant tissue culture and development of job oriented skill of student to work in commercial plant tissue culture laboratories

Program Objectives of the Course:

1. Know basics of Plant tissue culture.
2. Study of various culture techniques used in plant tissue culture.
3. Learn applications of plant tissue culture techniques.
4. Job oriented skill developments of students to start or work in commercial plant tissue culture laboratory.

Program Outcomes:

1. Introduction to plant tissue culture.
2. Study of laboratory organization for plant tissue culture.
3. Preparation of plant tissue culture media.
4. Study of Aseptic techniques for plant tissue culture.

I Year Diploma Programme /Advanced Diploma Programme

(Keep one of above as per year)

1. Title: Plant tissue Culture I
2. Year of Implementation: 2020-2021
3. Duration: One Year
4. Pattern: Semester
5. Medium of Instruction: English
6. Contact hours: 7 hours/week
8. Structure of Course:

Paper No	Name
C BiT101	Theory
CBiL102	Practical
CBiP103	Project

A) LIBRARY: Reference and Textbooks, Journals and Periodicals, Reference Books for Advanced Books for Advanced studies. –List Attached

B) SPECIFIC EQUIPMENTS: Computer, LCD, Projector, Visualizer, Smart board

C) Laboratory Equipments: 1. PCR 2. Flame Photometer 3. Gel -Dock 4. Spectrophotometer 5. Laminar air flow, 6. Plant tissue culture room 7. Autoclave 8. Incubator, etc.

Syllabus Structure (UG)

Year	Semester	Course No.	Course Code	Contact Hours	Credits (1Credit=15 H)	Total Marks
1	I	CT I	BiT 101	30	2	75
		CL I	BiL101	60	2	75
	II	CT II	BiT202	30	2	75
		CL II	BiL202	60	2	75
	Annual	CP I	BiP101	30	1	50
			Total	**210**	**9**	**350**
2	III	CT III	BiT303	30	2	75
		CL III	BiL303	60	2	75
	IV	CT IV	BiT404	30	2	75
		CL IV	BiL404	60	2	75
	Annual	CP II	BiP202	30	1	50
	Industrial and or Incubation and or Research and or Field Training			30	1	-
			Total	**240**	**10**	**350**
	V	CT V	BiT505	30	2	75
		CLV	BiL505	60	2	75
	VI	CT VI	BiT606	30	2	75
		CL VI	BiL606	60	2	75
	Annual	CP III	BiP303	60	2	100
	Industrial and or Incubation and or Research and or Field Training			30	1	-
			Total	**270**	**11**	**400**
			Total	**720**	**30**	**1100**

D: Diploma, *: Departmental Code (C: Chemistry, MI: Microbiology, CSE: Computer Science (Entire), etc)
C: Course, T: Theory, L: Lab (Practical), P: Project
Total No. of Courses: 10 (Theory: 06, Practical: 06, Project: 03) Theory and Practical: Semester, Project: Annual

Semester I

Bi*T 101**:**

(Contact Hrs: 30 Credits: 2)

Learning Objectives:

1. Students will be able to understand Introduction to plant tissue culture.
2. Students will be able to understand Study of laboratory organization for plant tissue culture.
3. Students will be able to understand Preparation of plant tissue culture media.
4. Students will be able to understand Study of Aseptic techniques for plant tissue culture.

Unit I: (15)

INTRODUCTION TO PLANT TISSUE CULTURE: Definition, brief history, principle and significance of tissue culture; Cellular totipotency – Cytodifferentation: factors affecting vascular tissue differentiation, cell cycle and TE differentiation; Organogenic Differentation: induction, factors affecting shoot bud differentiation

Unit II: (15)

LABORATORY ORGANIZATION: Design and layout for wash area, media preparation, sterilization and storage room, transfer area for aseptic manipulations, Culture rooms, and observation/data collection areas. Lab wares, Good laboratory practices, Good safety practices

INSTRUMENTATION: Working principle, maintenance and management of following instruments: Laminar air flow, autoclave, distillation unit, pH meter, orbital shaker, microscope, deep freezer, growth chamber Sterilization: Importance,

Learning Outcomes:

After completion of the unit, Student is able to understand

1. Introduction to plant tissue culture.
2. Knowledge about laboratory organization for plant tissue culture

Reference Books:

1. Plant Biotechnology: The genetic manipulation of plants. 1st edition. Slater A and others, Oxford University Press, New York, 2004

3. Plant propagation by tissue culture: vol 1. The background. George E.F. Springer, 2007

4. Cell Culture and Somatic Cell Genetics of Plants .Indra K. Vasil. 1980. Academic Press inc., New York.

5. In vitro culture in higher plants R.L.M. Pierik, 1987..Martinus Nijhoff Publishers, Boston

BiL101: **(Practical):**

(Contact Hrs: 60 Credits: 02)

Learning Objectives:

1. Students will be able to understand laboratory safety and preparation of solutions.
2. Students will be able to understand Laboratory Organizations & general techniques.
3. Students will be able to understand Preparation of Laminar Air Flow unit.
4. Students will be able to understand study of methods of sterilization

List of Practical's

1. laboratory safety (01
2. Preparation of solutions (02)
3. Laboratory Organizations & general techniques (02)
4. Preparation of Laminar Air Flow unit (02)
5. Callibration of Ph Meter (01)
6. study of methods of sterilization (03)

A) Moist heat sterilization

B) Dry heat sterilization

C) Filter sterilization

Learning Outcomes:

After completion of the unit, Student is able to understand laboratory safety and preparation of solutions, Laboratory Organizations & general techniques, study of methods of sterilization

Reference Books:

1. Plant Biotechnology: The genetic manipulation of plants. 1st edition. Slater A and others, Oxford University Press, New York, 2004

3. Plant propagation by tissue culture: vol 1. The background.George E.F. Springer, 2007

4. Cell Culture and Somatic Cell Genetics of Plants .Indra K. Vasil. 1980. Academic Press inc., New York.

5. In vitro culture in higher plants R.L.M. Pierik, 1987..Martinus Nijhoff Publishers, Boston

Semester II

BiT 202:

(Contact Hrs: 30 Credits: 2)

Learning Objectives:

1.Students will be able to understand Preparation of plant tissue culture media.

2. Students will be able to understand Study of Aseptic techniques for plant tissue culture.

Unit I: (15)

TISSUE CULTURE MEDIA: Introduction, Types of Media and its importance; Preparation of stocks, pH and Buffers and their significance in media. Media Constituents (Vitamins, Unidentified supplements, carbohydrate for energy source, Nitrogen source and organic supplements, complex substances, hormones, Activate charcoal) PLANT HORMONES: Role of Plant hormones (auxins, cytokinins, abscissic acid, ethylene and Gibberellins) in plant development

Unit II: (15)

ASEPTIC TECHNIQUES: Methods of sterilization of equipments, culture media and explants:- Washing and preparation of glassware's, packing and sterilization, media sterilization, surface sterilization, aseptic workstation, precautions to maintain aseptic conditions

Learning Outcomes:

After completion of the unit, Student is able to understand Know technique of preparation of plant tissue culture media, Knowledge about various Aseptic techniques for plant tissue culture.

Reference Books:

1. An Introduction to Plant Tissue Culture. Kalyanakumar De. 1997., New Central Book Agency, Calcutta
2. Environmental and ecological impacts from transgenic plants .: Unintended effects. Wolfenbarger,
3. 2003. Information System for Biotechnology, Virginia Tech.USA.
4. Varshney RK and Tuberosa R. 2007. Genomics-Assisted Crop Improvement. Springer, Dordrecht, vol.

BiL202: **(Practical):**
(Contact Hrs: 60 Credits: 02)

Learning Objectives:

1. Students will be able to understand Study of lux meter.
2. Students will be able to understand Study of surface sterilization.
3. Students will be able to understand Preparation of M.S. stock solutions.
4. Students will be able to understand Students will be able to understand

List of Practical's

1. Study of lux meter (01)
2. Study of surface sterilization (02)
3. Preparation of M.S. stock solutions:

A) Macrosalt (02)
B) Microsalt (02)
C) Vitamin (02)

4. Students will be able to understand (02)
5. To study types of explant and its preparation (02)
6. Aseptic culture techniques for establishment and maintenance of cultures (02)

Learning Outcomes:

After completion of the unit, Student is able to understand:-

Study of lux meter, Study of surface sterilization, Preparation of M.S. stock solutions, Students will be able to understand, To study types of explant and its preparation.

Reference Books:

1. An Introduction to Plant Tissue Culture. Kalyanakumar De. 1997., New Central Book Agency, Calcutta
2. Environmental and ecological impacts from transgenic plants .: Unintended effects. Wolfenbarger,
3. 2003. Information System for Biotechnology, Virginia Tech.USA.
4. Varshney RK and Tuberosa R. 2007. Genomics-Assisted Crop Improvement. Springer, Dordrecht, vol.

BiP101 (Project):
(Contact Hrs. 30/60, Credits: 1/2)

Replace Certificate Course (I Year)/Diploma Course (II Year)/Advanced Diploma Course (III Year)
By I Year Diploma Course (UG) / I Year Advanced Diploma Course (PG)

BOS Sub-Committee		Expert Committee
1. Mr.P.S.Mundada	Chairman	1. Name of Academic Expert-Dr.Uday sidu pawar
2. Ms.D.D.Dhumal	Member	2. Name of Industrial Expert-Mr.Vishwas Chavan