

Unit III: Recombinant DNA Technology

15

Vectors in gene cloning:

pUC19, phage, cosmid, BAC and YAC vectors. High and low copy number plasmids and its regulation.

Application of recombinant DNA technology for production of herbicide resistant plants, insect resistant plants, improving seed storage proteins and Golden rice.

Unit IV: Plant Breeding

15

Genetic systems and breeding methods - Selection and breeding strategies for self-pollinated, cross-pollinated and clonally propagated plants. Self-incompatibility, male sterility, apomixis.

Genetics and molecular basis of heterosis - Types of heterosis, genetic and molecular basis of inbreeding and heterosis, utilization in crop improvement.

Suggested readings

- Molecular Genetics of Plant Development, Howell SP (1998) Cambridge University Press
- The physical and chemical basis of molecular biology-Creighton
- Principles of Biochemistry-Nelson et al
- Lewin's Cell- Plopper, George (edtd)
- Principles of Mol. Biology-Tropp, Burton
- Cell Biology-Pollard
- The Cell: a molecular approach-Cooper
- Molecular Biology-Clarke, David
- Molecular Biology-Weaver

Course Type: Interdisciplinary Elective Course

Course Code: MSBOIE101P

Course Title: Genetics, Cell Biology & Plant Breeding

Credits-2

**Course Code:
MSBOIE101P**

**Course Title:
Genetics, Cell Biology & Plant Breeding.**

Course Credit: 2

Total contact hours: 60 Hrs

1. Preparation of cytological stains, fixatives and pretreatment agents.
2. Squash preparation from pre-treated root tips (colchicines/ Paradichlorobenzene/ Aesculin.
3. Squash preparation from mutagen treated root tips for study of aberrations.
4. Smear preparation from any suitable plant material.
5. Problems based on:
Restriction map analysis and construction of restriction maps,
Tetrad analysis in *Neurospora* – two genes and centromere.
Deletion mapping in Bacteriophage.

Course Type: Generic Elective Course

Course Code: MSBOGE101T

Course Title: Pharmacognosy

Credits-2

Course Code: MSBOGE101T	Course Title: Pharmacognosy	Allotted hours
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Course Credit: 2

Total contact hours: 30 Hrs

Unit I : Introduction to Pharmacognosy	15
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History, Definition and Scope of Pharmacognosy

Alternative systems of medicines

Classification of drugs of natural origin

Evaluation of crude drugs

Unit II : Cultivation, collection, production and utilization of herbal drugs	15
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Cultivation, Collection and Processing of Herbal Drugs

Indian Trade in Medicinal and Aromatic Plants

Utilization of aromatic plants

Pharmacognostical studies of crude drugs containing Alkaloids and Volatile Oils

Suggested readings

- Pharmacognosy Phytochemistry – Medicinal Plants – Jean Brunetton,
- Medicinal Plant – Their Bioactivity, Screening and Evaluation – Published by CSIR
- Textbook of Pharmacognosy – Trease and Evans – 14th edition
- Pharmacognosy and Phytochemistry - Biren Shah & A.K. Seth
- Principles of Ayurvedic Therapeutics – Kumar A. V. – Sri Satguru Publications
- MateriaMedica of Homeopathic Medicines – Phatak S. R.
- Homeopathic Pharmacopoeia of India of India – Published Ministry of Health
- The Ayurvedic formulary of India. Part I & II- Published by Ministry of Health
- Chinese Materia Medica- You- PinZhu- Harwood Academic Publishers
- India Materia Meidca – Nadkarni A. K. – Bombay Popular Prakashan

Course Type: Generic Elective Course

Course Code: MSBOGE102T

Course Title: Biodiversity and Conservation

Credits-2

Course Code: MSBOGE102T	Course Title: Biodiversity and Conservation	Allotted Hrs.
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Course Credit: 2

Total contact hours: 30 Hrs

UNIT: 1 BIODIVERSITY

15

Basic concepts of biodiversity, Biodiversity- definition, levels and types (genetic, species, ecosystem diversity), global biodiversity, biodiversity Indices.

Phytogeography regions of India, India as a mega diversity nation,

Hot-spots of biodiversity.

Floristic diversity of India and adjacent region, value of biodiversity: consumptive, productive use, social, ethical, aesthetic and option values.

UNIT II: MONITORING AND CONSERVATION

15

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Effects of human activities on environment. Endangered and endemic species of India.

Conservation: Definition, Methods of conservation of living resources; red and green data books, world conservation strategy.

Conservation of biodiversity : In-situ and Ex-situ conservation of Biodiversity, Constitutional Framework for Biodiversity, International Conventions and initiatives, Environmental Education

Suggested readings:

- Atkinson, P.M. and Tate, N.J. (Eds.) 1999 Advances in remote sensing and GIS analysis. Wiley, New York.
- Environmental Science and Engineering - Meenakshi, Prentice Hall India.
- Environmental Studies - Benny Joseph - Tata McgrawHill-2005
- Environmental Studies - Dr. D.L. Manjunath, Pearson Education-2006.
- Environmental studies – R. Rajagopalan – Oxford Publication – 2005.

Unit II: Fungal Taxonomy **15**

General account of recent trends in classification of fungi

Classification of fungi: An outline of latest classification up to orders, according to the system proposed by C J. Alexopoulos and Mimes or Ainsworth

General account of spore bearing organs and their arrangements in various groups of fungi; spore release and dispersal.

Unit III: Applied Mycology Mycorrhiza: types, distribution and significance with reference to agriculture and forestry. **15**

Application of fungi in food and beverages industry, Yeast fermentation, biocontrol and medicines

Industrial and non-industrial Fungal Metabolites (Antibiotics, Enzymes, Organic acids, Phytoalexins and Mycotoxins)

Aeromycological analysis of allergenic airborne fungi

Medical Mycology: Dermatophytic fungi - Knowledge of common dermatophytes and human diseases caused by them; Aspergillosis

Unit IV: Plant Pathology **15**

Plant-pathogen interactions, Factors influencing infection, Integrated Pest Management (IPM)

Biotic agents of infections and diseases: bacteria, viruses, fungi, phytocoplasma: Study of diseases with reference to symptoms, causal organism and disease cycle and Management of diseases with reference to following diseases :

- Angular leaf spot of Cotton
- Yellow vein mosaic of Bhindi
- Grassy shoot of sugarcane
- Downy mildew of grapes
- Leaf blotch of turmeric
- Rust of Wheat
- Tikka disease of groundnut

Suggested readings:

- Agrios, G. N. (1969) Plant Pathology, Academic Press, New York.
- Alexopolus, C. J., Minms, C. W. and Blackwell, M. (1999). (4th edn) Introductory Mycology. Wiley, New york.
- Bos, L. (1999) Plant viruses, unique and intriguing pathogens. Backhugs Publ. Leiden
- Casida, L. E. (1997). Industrial microbiology. New Age Publishers, New Delhi.
- Deacon, J. W. (2006). Fungal biology. (4th Ed.) Blackwell publishing, ISBN. 1405130660.

- Eggins, H.O.W. and Allsop (1975) The Filamentous Fungi Vol. I Industrial Mycology (Biodeterioration and Biodegradation by Fungi) Eds. J.E. Smith and D.R. Berry Edward Arnold, London.
- Emmons, C. W., C. H. Binford, J.P. Utz and Know Chung (1977) Medical Mycology, Lea and Febigo, Philadelphia
- Gupta, V. K. and V. S. Paul (2001) Disease of vegetable crops. Kalyani Publ. Ludhiana,
- Mehrotra, R. S. and Aneja, K.R. (1990). An introduction to mycology. New age publishers, ISBN 8122400892
- Rangaswaini G. & A. Mahadevan (2001) - Diseases of Crop Plants in India, Prentice Hall of India, New Delhi.
- Rangaswami, G. and S. Rajagopalan (1973) Bacterial Plant Pathology, T. N. Agri. Uni., Coimbatore
- Rangaswami, G. and A. Mahadevan (2001) Disease of crop plants in India, Prentice Hall of India, Pvt. Ltd., New Delhi.
- Raychaudhari, S. P. and T. K. Nariani (1977) Virus and Mycoplasma disease of Plants in India. Oxford and IBK Publ. Corp., New Delhi
- Sharma PD (2017) Mycology and Phytopathology. Rastogi Publishers, Meerut, India
- Sharma, O. P. (2007). Text book of Fungi. Tata McGraw Hill, Publishing Co. Ltd. New Delhi.
- Strange RN, (2003) Introduction to Plant Pathology, John Wiley & Sons, USA.
- V.K. Gupta & M.K. Behl (1994) Indian Plant Viruses & Mycoplasma, Kalyani Publishers, Ludhiana.
- Webster J and Weber R (2007). Introduction to Fungi. Third Edition. Cambridge University Press. Cambridge and New York

Course Type: Core Compulsory

Course Code: MSBOCC201P

Course Title: Plant Diversity III: Fungal Biology and Plant Pathology

Credits-2

Course Code:	Course Title:
MSBOCC201P	Plant Diversity III: Fungal Biology and Plant Pathology
Course Credit:	Total contact hours: 60 Hrs

1. Introduction to basic Mycological Techniques and culturing
2. Isolation and identification of fungi from infected plant tissues or rhizosphere using serial dilution technique
3. Study of representative genera belonging to following subdivisions of fungi with respect to vegetative, reproductive structures and classification with reasons: Myxomycotina, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina (At least one example from each class)
4. Monitoring and analysis of Aeromycoflora (using Anderson sampler/settle plate method)
5. Preparation of fungal spore atlas isolated from the air environment
6. Symptomology and histopathology of some common diseases with diagnostic characteristics of the followings:
 - a) Study of bacterial plant diseases
 - b) Study of Phytoplasma diseases
 - c) Study of viral plant diseases
 - d) Study of fungal plant diseases
7. A mini field project to study crop diseases from field and market specimens (only Identification). Identification of specimens from field trip or Visit to Agriculture University, Plant Pathological Research Centers

Course Type: Core Compulsory

Course Code: MSBOCC202T

Course Title: Plant Diversity: Angiosperms (Taxonomy, Anatomy and Developmental Botany)

Credits-4

Objectives:

To enable the students:

- To understand the various aspects of plant nomenclature and classification
- To understand the classical and modern trends of Angiosperm taxonomy
- To understand the salient features of angiosperm families with special reference to sexual characters To enable the students:
- To develop the skill on the identification of plants with their salient features
- To develop the skills on preparation of herbarium and microslides for identification
- To create an overall knowledge on the identification of all group of plants including fossil

Course outcomes (Students will be able to.....)

- Evaluate and discuss groups of plants in terms of their diversity and describe their evolution, phylogeny
- Apply the taxonomic principles in preparing keys and herbaria
- Analyse the anatomical and embryological stages of plants and their development
- Provides skill in structural and functional characteristics of various plant parts
- Acquire practical knowledge on identification of various groups of plants

**Course Code:
MSBOCC202T**

**Course Title:
Plant Diversity: Angiosperms (Taxonomy,
and Developmental Botany**

**Allotted
hours**

Course Credit: 4

Total contact hours: 60 Hrs

Unit I: Angiosperms

15

Systematics: Outline of classification of Angiosperms; Hutchinson, APG, merits and demerits.

Botanical nomenclature: International code of Botanic Nomenclature; principles: Rules and recommendations; priority; typification; Rules of effective and valid publications; retention and choice of names.

Unit II: Taxonomy of Angiosperms

15

Diagnostic characteristics, systematic phylogeny and economic importance of families: Magnoliaceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Acanthaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, Cyperaceae and Poaceae.

Unit III: Anatomy

15

Vascular plants: Meristems; secondary growth; wood development and its diversity; cambial variants; ultrastructure and control of xylem and phloem differentiation; secretory ducts and laticifers; anatomical adaptations for special Habitats-biotic and abiotic stresses. Applications (in brief) of anatomical studies in systematics, archaeology, Climate studies, pharmacology, forensic sciences and biomedical research.

Unit IV: Developmental Botany

15

Development of flower: Transition to flowering - vegetative to reproductive evocation, floral homeotic mutations (MAD box genes) in Arabidopsis, ABC model of flower development, gender expression in monoecious and dioecious plants.

Developmental biology of male and female gametophytes: microsporogenesis and microgametogenesis, megasporogenesis and megagametogenesis, pollen embryogenesis.

Pollen-pistil interaction: In vivo and in vitro pollen germination, pollen tube growth and guidance, double fertilization, self-compatibility mechanisms, incongruity.

Embryogenesis and seed development: Polarity during embryogenesis, pattern mutants, in vitro fertilization, endosperm development, apomixis, polyembryony, somatic embryogenesis.

Suggested readings

- Lawrence George H M (1951). Taxonomy of vascular plants. Oxford and IBH Publ. Co. Pvt. Ltd.
- Jeffrey C (1968). An Introduction to principles of Plant Taxonomy.
- Cole A J (1969). Numerical Taxonomy. Academic Press.
- Davis P H, Heywood V M (1973). Principles of Angiosperm Taxonomy. Robert E Kereiger Publ.
- Harrison H J (1971). New Concepts in Flowering Plant Taxonomy. Heiman Educational Books Ltd.
- Cronquist A (1981). An Integrated system of classifications of flowering plants. Columbia University Press.
- Heywood V H, D M Moore (Eds) (1984). Current concept in Plant Taxonomy.
- Naik V V (1984). Taxonomy of Angiosperms. Tata McGraw Hill Publ. Co. Ltd.
- Radford A E (1986). Fundamentals of Plant Systematics. Harper & Row Publ.
- Davis P H, V H Heywood (1991). Principles of Angiosperm Taxonomy. Today and

Tomorrow Publications.

- Stace C A (1989). Plant Taxonomy and Biosystematics. Etwaed Arnold.
- Woodland D W (1991). Contemporary Plant Systematics. Prentice Hall.
- Sivarajan V V (1991). Introduction to Principles of Plant Taxonomy. Oxford IBH
- Takhtajan A L (1997). Diversity and Classification of Flowering Plants. Columbia Univ. Press.
- Taylor D V, L J Hickey (1997). Flowering plants: Origin, evolution and phylogeny. CBS Publishers & Distributors.
- Stuessy T F (2002). Plant taxonomy: The systematic Evaluation of comparative data. Bishen Singh, Mahendra Pal Singh. Dehradun.
- Gurcharan Singh (2004). Plant Systematics: Theory and practice. Oxford and IBH Publishing.
- Wendy B Zomlefer (2006). Guide to Flowering Plant Families. Overseas Press India Private Ltd.
- International Code of Botanical Nomenclature (latest)
- Henry A N, Chandrabose M (1980). An aid to the International Code of Botanical Nomenclature.
- Cutter EG (1978) Plant Anatomy, Part I & II, Edward Arnold, United Kingdom
- Dickinson WC (2000). Integrative Plant Anatomy, Harcourt Academic Press, USA. 8.
- Fahn A (1974) Plant Anatomy, Pergmon Press, USA & UK.
- Fosket DE. (1994) Plant, Growth and Development: A Molecular Approach, Academic Press.
- Hopkins WG. (2006). The Green World: Plant Development, Chelsea House Publication
- Howell SH. (1998) Molecular Genetics of Plant Development, Cambridge University Press.
- Leyser O and Day S (2003) Mechanism of Plant Development, Blackwell Press
- Mauseth JD (1988). Plant Anatomy, The Benjamin/ Cummings Publisher, USA 15.
- Nair MNB (1998). Wood Anatomy and Major Uses of Wood, Faculty of Forestry, University of Putra Malaysia, Malaysia.
- Raghavan V (2000) Developmental Biology of Flowering Plants, Springer, Netherlands
- Raghavan V (1997). Molecular Embryology of Flowering Plants. Cambridge. University Press.
- Richards AJ (1986) Plant Breeding System, George Allen and Unwin.
- Shivanna KR (2003) Pollen Biology and Biotechnology, Science Publishers.

Course Type: Core Compulsory

Course Code: MSBOCC202P

Course Title: Plant Diversity: Angiosperms (Taxonomy, Anatomy and Developmental Botany)

Credits-2

**Course Code:
MSBOCC202P**

**Course Title:
Plant Diversity: Angiosperms (Taxonomy,
Anatomy and Developmental Botany**

Course Credit: 2

Total contact hours: 60 Hrs

1. Study of at least 10 locally available families of flowering plants
2. Identification of genus and species of locally available wild plants; location of key characters and preparation of key
3. Study of xylem and phloem elements using maceration, staining, light and electron micrographs (xerophytes, hydrophytes and halophytes)
4. Pollen in vitro germination methods: Sitting drop culture, suspension culture, surface culture.
5. Correlation between fertility (stainability), viability (TTC and FDA staining) and germinability (in vitro) of pollen grains.
6. Study of post-fertilization stage with the help of permanent slides and electron micrographs.
7. Role of transcription and translation inhibitors on pollen germination and pollen tube growth
8. Field excursion for familiarization with and study of vegetation type(s) and flora(s) of areas of different bioclimatic zones of India, and in the local areas, and training in collection and preservation methodologies. Submission of at least 05 herbarium specimens of common cultivated plants.

Course Type: Core Compulsory

Course Code: MSBOCC203T

Course Title: Ecosystem & Environmental Botany

Credits-4

Objectives: To enable the students:

The concepts and principles of ecology, biological diversity, conservation, Sustainable development, population, community and ecosystem structure and function, Application of these concepts to solve environmental problems.

Course outcomes (Students will be able to.....)

Students will learn about ecology and environment,
Characteristics of organisms as population, community and ecosystems
Functions of the ecosystem, importance of food chain and food web
Phytogeography, biodiversity and hotspots
Applications of ecological **knowledge for the benefit of anthropogenic society**

Course Code: MSBOCC203T	Course Title: Ecosystem & Environmental Botany	Allotted hours
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Course Credit: 4

Total contact hours: 60 Hrs

Unit I: Structure and Functions of Ecosystem **15**

An introduction to plant ecology and its scope.

Structure of ecosystem: Abiotic components, Biotic components, Ecological Pyramids (Pyramid of numbers, Biomass and energy)

Functions of ecosystem: Productivity (Primary and secondary productivity), food chains, Grazing and detritus food chains and food webs.

Ecosystem stability : concepts, natural and anthropogenic disturbances

Unit II: Habitat Ecology **15**

Habitat and Niche: concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.

Population Ecology: Characteristics of a population; population growth curves; life history strategies (r and K selection);

Concept of metapopulation – demes and dispersal, interdemic extinctions, age structured population

Unit III: Phytogeography and Biodiversity **15**

Biomes: Classification and components, Major biomes of the World -Terrestrial, Tundra, arboreal coniferous forests, temperate and tropical grasslands and deciduous forests, Mediterranean and Desert vegetation, Tropical rain forests; Aquatic Types of Indian Forest. Diversity types and levels (alpha, beta and gamma)

Unit IV: Environmental Pollution **15**

Environmental pollution in relation to air, water and soil. Use of fertilizer, pesticides and other chemicals in agriculture

Effect of solid waste disposal on soil. Bioindicator and biomarkers of environmental health.

Concepts of ecological management and sustainable development

Climate change: Greenhouse gases, their sources, trends and role, Ozone layer and its depletion (Global warming, Sea level rise, UV radiation) acid rain

Course Type: Core Compulsory

Course Code: MSBOCC203P

Course Title: Ecosystem & Environmental Botany

Credits-2

Course Code:

MSBOCC203P

Course Title:

Ecosystem & Environmental Botany

Course Credit: 2

Total contact hours: 60 Hrs

1. To Study the Quantitative Characters of Plant Community by Quadrat Method (Frequency, Density, Abundance)
2. To calculate mean, mode median, variance, standard deviation, standard error related to ecological data
3. To calculate coefficient of variation and use t-test for comparing two means related to ecological data
4. To determine the turbidity of different water bodies using turbidity meter or Secchi disc method.
5. To estimate chlorophyll content in plants growing in polluted and non-polluted areas / SO₂ fumigated and non-fumigated plant leaves

6. Interpretation of satellite images and aerial photographs with respect to major vegetation/ landforms/ land use patterns.
7. Field visit: students should be taken for field visits to places of ecological/environmental interest or Research Institutes working in conservation of plants. They should submit detailed report of the visit in the form of project report in the final practical examination for evaluation. The report shall carry marks.

Course Type: Interdisciplinary Elective Course

Course Code: MSBOIE201T

Course Title: Bioactive Molecules in Plants

Credits-4

Objectives:

- To impart knowledge on the status and export potential of medicinal and aromatic plants.
- To inculcate the importance of conserving rare medicinal species
- To discuss the problems in production and marketing of medicinal and aromatic crops.
- To describe the importance of medicinal and aromatic plants in medicine, nutraceuticals, cosmetics, perfumery industry and Indian system of medicine.

Outcomes:

Gain knowledge on the Indian herbal industry

- Develop an understanding on constraints and problems in production of medicinal and aromatic plants.
- Develop expertise among the students for medicinal and aromatic plants.
- Create niche market covering phytochemicals, value addition and market enhancement.
- Develop entrepreneurship activities to establish value addition ventures, botanical extracts, isolation of bioactive compounds, aroma chemicals.
- Transform the knowledge into skills for promotion of herbal industry.

Course Code: MSBOIE201T	Course Title: Bioactive Molecules in Plants	Allotted hours
Course Credit: 4	Total contact hours: 60 Hrs	
Unit I: Bioactive Compounds in Plants		15
Importance of active principles and uses of medicinal plants in different traditional systems of medicine. Major groups of Phytochemicals sources, Pharmaceutical and medicinal importance a) Alkaloids b) Terpenoids c) Flavonoids		
Unit II: Cultivation and Collection of Herbal Drugs		15
Soils, Seeds and Propagation Material, Factors Affecting Cultivation. Origin, Historical background. Active principles uses and cultivation practices of the following medicinal plants <i>Coleus forskohlii</i> , <i>Rauwolfia serpentina</i> , <i>Dioscoria sps</i> and <i>Plantago ovata</i>		

Unit III: Extraction, Isolation and Identification of Herbal Drugs	15
Extraction Methods:- Maceration, Percolation, Continuous Extraction- Soxhlet, Supercritical Fluid Extraction, Types of Extracts:- Decoction, Infusion, Digestion, Tinctures, Liquid Extracts, Soft Extracts, Dry Extracts Isolation and Identification of Natural Products: Chromatography:- Paper, TLC, HPTLC, Column, Flash Chromatography, HPLC and GC	
Unit IV: Secondary Metabolites Production Using Plant Cell Cultures	15
Plant Cell Culture Technique: Cell cultures, applications, advantages and disadvantages Strategies to Increase Secondary Metabolites Production: Selection according to Molecular & Biochemical characteristics, Targeting Metabolism:, Immobilization and Biotransformation. Industrial Production of useful Biochemicals	

Course Type: Interdisciplinary Elective Course

Course Code: MSBOIE201P

Course Title: Bioactive Molecules in Plants

Credits-2

**Course Code:
MSBOIE201P**

**Course Title:
Bioactive Molecules in Plants**

Course Credit: 2

Total contact hours: 60 Hrs

1. Phytochemical Screening of Secondary Metabolites
2. Organoleptic and Microscopic analysis and identification of the following crude drugs.
 - a) Leaf drugs Mentha and Thyme
 - b) Root drugs Ginger and Licorice
 - c) Bark drugs Cinnamon
 - d) Flower drugs Chamomile
 - e) Seeds drugs Fenugreek and Mustard
3. Histochemical identification of the following chemical substances:
 - a) Carbohydrates b) Proteins c) Amino acids d) Starch e) Tannins
4. Extraction of volatile oil (Clove Oil and Hisperidin)

Suggested readings

- Pharmacognosy- Kokate et al

- Pharmacognosy- Trease & Evans-1996
- Pharmacognosy- Shaw and Quadri
- Pharmacognosy Laboratory Manual- Nidal Jaradat & Samah Al-Jabi

Course Type: Skill Enhancement Compulsory Course

Course Code: MSBOSC201T

Course Title: Plant Tissue Culture-I

Credits-4

Objectives:

The students will be technically and critically trained with good practical exposure to perform the plant, which is the most required in this field of science; This area can be taken up as micropropagation business with smaller investment by entrepreneurs. Many Central and State Government departments to name a few: The Department of Agriculture and Cooperation, National Horticulture Board (NHB) under the Ministry of Agriculture, Agricultural and Processed food products Export Development Authority (APEDA) under the Ministry of Commerce and Industry etc., are promoting by providing various schemes and subsidies along with incentives to strengthen this stupendous discipline.

Course outcomes (Students will be able to.....)

The students will be technically and critically trained with practical exposure to perform both the plant and animal culture, which is the most required in this field of science, skilled candidates are absorbed in well-established and commercial tissue culture units. Agricultural literates of tissue culture have the ability to set up their own laboratories for the propagation of the plants which is the need in the society

Course Code: MSBOSC201T	Course Title: Plant Tissue Culture and Techniques	Reqd. hours
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Course Credit: 4

Total contact hours: 60 Hrs

Unit I: Plant Tissue Culture I **15**

Introduction. History. Scope. Advantages. Applications. Limitations. Guidelines for establishing academic and commercial laboratory. Steps involved in Plant Tissue Culture. Various nutrient medium compositions. Plant growth regulators and their role in nutrient media.

Unit II : Plant Tissue Culture II **15**

Types of organ cultures and their applications. Pathways of regeneration. Micro grafting of commercially important plants. In vitro approaches for crop improvement. Plant cell reactors. Microtechniques

Unit III: Micropropagation I **15**

Meristem culture for the production of virus free plants. Nucellus culture for clonal propagation and large-scale multiplication. Strategies of Micropropagation. Stages of micropropagation via axillary shoot proliferation in Monocots and Dicots.

Unit IV : Micropropagation II

15

Stages in micro propagation via direct and indirect organogenesis. Stages in micro propagation via direct and indirect somatic embryogenesis. Low cost methods for micro propagation.

Suggested readings

- Bhojwani, S.S. 1990. Plant Tissue Culture: Theory and Practical (a revised edition). Elsevier Science Publishers,
- Bhojwani, S.S. 1996. Plant Tissue Culture: Application and Limitations. Elsevier Science Publishers, New York, USA.
- Vasil, I.K. and Thorpe, T.A. 1994. Plant Cell and Tissue Culture. Kluwer
- Shantharam, S. and Montgomery, J.F. 1999. Biotechnology, Biosafety and
- Glick, B.R. and Thomson, J. E. 1993. Methods in Plant Molecular Biology and Biotechnology. CRC Press, Boca Raton,
- A Textbook of Biotechnology, R. C. Dubey, S. Chand Publication

Internal Assignments in Plant Tissue Culture:

**40
Marks**

1. Handling and Instrumentation of Plant Tissue Culture.
2. Glassware Washing & Sterilization Techniques.
3. Preparation of stock solutions and nutrient media.
4. Surface sterilization of Explants.
5. Monocot and Dicot Seed cultures for the establishment of organ
6. Establishment of organ cultures for the induction of callus
7. Establishment of organ cultures for the induction of multiple shoots
8. Cytological study of calli cells
9. Establishment of embryogenic/ non embryogenic cell suspension
10. Embryo / Endosperm/ Ovules and anther Cultures.

Department of Botany

Theory Examination Question Paper Pattern

Time: 2:30 Hrs

Total Marks: 60

Q.1- Two (2) Long Answer Questions on **Unit- I**. out of which One has to be solved. (12 Marks)

Q.2- Two (2) Long Answer Questions on **Unit- II**. Out of which one has to be solved. (12 Marks)

Q.3- Two (2) Long Answer Questions on **Unit- III**. Out of which one has to be solved. (12 Marks)

Q.4- Two (2) Long Answer Questions on **Unit -IV**. Out of which one has to be solved. (12 Marks)

Q.5- Four (4) Short Answer Questions on all four Units out of which three have to be solved. (12 Marks)

Internal Examination Question Paper Pattern

Seminars: 20 Marks

Multiple choice questions: 20 Marks (5 questions from each Unit)

Note:

Total Marks: 40

1. A candidate shall be eligible for appearing at the examination provided he/she maintains percentage of attendance as specified by the University.
2. Minimum Marks of 20 are required in Every Practical Paper Examination in each semester.
3. A minimum of two field excursions (One long & One short) for habitat studies are compulsory.
4. A candidate will be allowed to appear for the practical examinations only if he/she submits a certified journal and the Field Report or a certificate from the Head of the Department/Institute to the effect that the candidate has completed the practical course of M.Sc. Botany as per the minimum requirements. In case of loss of journal, a candidate must produce a certificate from the Head of the Department/ Institute that the student completed the practical for the academic year. However, such a candidate will be allowed to appear for the practical examination but the marks allotted for the journal will not be granted.