

M.Sc – Botany (Two Years & Five Years – Integrated)  
Electives Offered to Other Departments

S. No.	Course Code	Course Title	Hours/week			Marks		
			L	P	C	CIA	ESE	Total
1.	19 BOTE 215.1	Plant Tissue Culture	3	-	3	25	75	100
2.	19 BOTE 215.2	Plant Science – I	3	-	3	25	75	100
3.	19 BOTE 315.1	Gardening and Horticulture	3	-	3	25	75	100
4.	19 BOTE 315.2	Plant Science – II	3	-	3	25	75	100

**19BOTE215.1: Plant Tissue Culture**

**Credits:3**  
**Hours:3**

**Learning Objectives(LOs):**

- To acquire knowledge on recent developments in Plant Tissue Culture and their uses

Unit – 1

Tissue Culture: Historical Background – Concept of totipotency, Organization of Plant tissue culture laboratory – Aseptic techniques- Culture media – Nutritional components.

Unit – 2

Steps of tissue culture - types of cultures- leaf culture- Ovule culture- Meristem culture- Virus free plants- Endosperm culture

Unit – 3

Micro-propagation– Isolation, purification and culture of protoplasts - Protoplast fusion and somatic hybridization- Artificial seed.

Unit – 4

Anther and pollen culture – Haploids and its significance- Embryo culture - Somaclonal variation – application- Screening and Production of tolerant plants for various stresses.

Unit – 5

Production of secondary metabolites by cell culture – Cryopreservation - Application of Tissue Culture.

**Text Books:**

1. Bhojwani,S.S. and M.K.. Razdan.2013. Plant Tissue Culture , theory and Practices. Panima book Distributors.
2. Narayanaswamy.S.2005. Plant Cell and Tissue Culture. Tata Mc.Graw Hill, New Delhi
3. Mishra, S.P. 2016. Plant Tissue culture. Ane Books pvt Ltd, New Delhi.

**Supplementary Reading:**

1. Baker. F.N.G.1992. Rapid propagation of fast growing woody species CAB International. London.
2. Dodds. J.H and L.N. Roberrtis.1985. Experiments in Plant tissue culture, Cambridge University Press – New York.
3. Reinert.J and M.M .Yeoman.1983. Plant Cell and Tissue Culture – Laboratory manual. Narosa Publishing House. New Delhi

## 19BOTE215.2: Plant Science – I

Credits:3

Hours:3

### Learning Objectives(LOs):

- To acquire basic knowledge in Plant Science

#### Unit – 1 Systematic Botany

Natural system of classification – Detailed study of the following families and their economic importance: Annonaceae, Cucurbitaceae, Rubiaceae, Lamiaceae and Poaceae.

#### Unit – 2 Plant Diversity

Patterns of variation in morphology and Life History in plants. Broad outlines of classification and evolutionary trends among Algae, Fungi, Bryophytes and Pteridophytes – Principles of Palaeobotany – Economic importance of Algae, Fungi and Lichens.

#### Unit – 3 Anatomy

Simple and Complex tissues, internal structure of dicot and monocot root, stem and leaf

#### Unit – 4 Embryology

Structural and Functional aspects of pollen and pistil – Microsporogenesis and male gametophytes – Megasporogenesis and female gametophytes - Pollination Biology – Fertilization – Embryo and Seed development.

#### Unit – 5 Plant Breeding

Objectives of Plant breeding and Breeding Methods: Methods of breeding in self and cross pollinated crops – Hybridization techniques, pure line selection, mass selection, intervarietal. Interspecific and intergeneric hybridization. Hybrid vigour

### Text Books:

1. Sharma O.P. 2007. A Textbook of Algae. Tata Mc Graw Hill Publishing Co.Ltd. New Delhi.
2. Singh,V., Pande, P.C. and D.K. Jain. 2005. Embryology of Angiosperms. Rastogi Publications, Meerut.
3. Pandey,B.P. 2015. College Botany- Volume I & II. S.Chand & company Ltd, New Delhi.

### Supplementary Reading:

1. Tayal,M.S. 2001. Plant Anatomy. Rastogi Publications, Meerut.

## 19BOTE 315.1: Gardening and Horticulture

Credits:3

Hours:3

### Learning Objectives(LOs):

- To acquire knowledge on structure and construction of garden
- To gain knowledge on cultivation of fruit and flowering crops

#### Unit – 1

Garden and Garden design. Knowledge of plants – Soil Types – Transplanting- Potting- Soil less culture. Lawn – Rock garden – Rosary – water garden – terrace garden – Kitchen garden –Landscaping- Fences for utility and beauty – Archers and pergolas – Green house and glasshouse – summer house.

#### Unit- 2

Propagation techniques – Sexual propagation – Seed – Seed dormancy – Seed germination – Vegetative cuttings – Layering – Grafting – Budding – Stock – Scion relationships – Micro Propagation.

#### Unit – 3

Manures and Manuring – Training and Pruning – Irrigation techniques. Uses of plant growth regulators in horticulture – Some important diseases of Horticultural Plants and plant protection. Weed management strategy.

#### Unit – 4

Pomology and Floriculture -Fruit culture : Mango – Guava – Banana - Papaya. Culture of Economically important flowers : Jasmine – Rose – Cut flowers.

#### Unit – 5

Post Harvest Technology – Storage and Transport- Flower arrangements and decorations- Harvesting – Marketing – Scientific Post harvest Storage of fruits and vegetables – Preservation and transport of fruits and vegetables – their economic impacts.

**Text Books:**

1. Hartman. H.T. and Kester D.E . 1986. Plant propagation principles and practices. Prentice Hall of India Ltd., New Delhi.
2. Shanmugavelu K.G. 1989. Production Technology of vegetable Crops. Oxford India. Publication, New Delhi.

**Supplementary Reading:**

1. Bhattacharjee,S.K. 2010. Advanced commercial Floriculture. Aavishkar publishers, Jaipur.
2. Bose .T.K. Som. M.G. and Katrir. J. 1993. Vegetable Crops, Naya Prakash, Calcutta.
3. Abhishek Guneta, 2014. Scientific Horticulture. Random publications, New Delhi.
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**19 BOTE315.2: Plant Science – II**

**Credits:3**

**Hours:3**

**Learning Objectives(LOs):**

- To acquire knowledge on recent developments in plant science

Unit – 1 Plants and Human Welfare

Plants and civilization, center of origin– utilization, cultivation of plants for food, drug, fibre and industrial Values – plants as a source of renewable energy.

Unit – 2 Plant Physiology

Water relations – Photosynthesis – C<sub>3</sub>, C<sub>4</sub> and CAM Photosynthetic pathways - Photorespiration – Stomatal Physiology – source and sink relationship - Mineral nutrition – Nitrogen, Phosphorus and Sulphur metabolism.

Unit – 3 Plant Growth and Development

Dormancy, Physiology and Biochemistry of seed dormancy and seed germination – Plant Hormones - Hormonal regulation of growth and development - growth responses, physiology of flowering – senescence.

Unit – 4 Plant Tissue Culture

Sterilisation techniques – media preparations – plant cell, Totipotency- Cell and tissue culture in plants –cell line – cell clones. Callus cultures – soma clonal variations – clonal propagation.

Unit – 5 Micropropagation

Micropropagation – somatic embryogenesis – Haploid. Protoplast isolation, fusion and somatic hybridization – Cybrids– Artificial seeds– Gene transfer methods in plants.

**Text Books:**

1. Jain, V.K. 2017. Fundamentals of Plant Physiology, S.Chand & Company Ltd., New Delhi
2. Narayanaswamy. S. 1994. Plant cell and tissue culture. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
3. Wickens. 2013. Economic Botany- principles and Practices. Panima book Distributors, Meerut.

**Supplementary Reading:**

1. Debergn,P.C and R.Zimmerman.2013. Micropropagation, Technology and Application. Panima Book distributors, Meerut.
2. Dodds J.H and L.W. Roberts. 1995. Experiments in Plant tissue culture. (2nd Ed) Cambridge Uni. Press. London.
3. William G. Hopkins, 1999. Introduction to Plant Physiology. John Wiley and Sons. INC, New York