

Class : **S. Y. B. Sc. (Semester - IV)**
Course Code : **USBT 241**
Paper : **I** **Course Title** : **Plant Anatomy and Embryology**
Credit : **3** **No. of lectures** : **48**

A) Learning Objectives:

1. To introduce students with internal structure of plant and its organs.
2. To study developmental aspects of male gamete, female gamete, fertilization and embryodevelopment.
3. To study different tissues present in plant.

B) Learning Outcome:

By the end of the course, students will be able to:

1. Get knowledge of internal structure of tissue system in plant.
2. Aware about microsporogenesis, megasporogenesis and embryogenesis.
3. Get knowledge of tissue and tissue systems present in plant.

Credit – I **(14L)**

1. Plant anatomy introduction **(2L)**

Definition, scope of plant anatomy and types of tissues

2. Epidermal tissue system **(4L)**

Structure and function of epidermal tissue system, uniseriate and multiseriate epidermis, stomata: structure, types and functions, epidermal outgrowth: glandular and non-glandular trichomes.

3. Mechanical tissue system **(4L)**

Principles involved in distribution of mechanical tissues – inflexibility, incompressibility, inextensibility and shearing stress, tissues providing mechanical support, their distribution in leaf, stem and root of dicots and monocots.

4. Vascular tissue system **(4L)**

Structure and function of xylem, phloem and cambium

Credit - II **(16L)**

1. Normal secondary growth **(5L)**

Introduction, cambium and its role in secondary growth, process of secondary growth in stems of *Helianthus annuus*, extrastelar and intrastelar secondary growth, annual rings, periderm, bark, tylosis and lenticels.

2. Anomalous secondary growth **(5L)**

Introduction causes or reasons of anomalous secondary growth, anomalous secondary growth in dicot stem (*Bignonia*), dicot root (*Raphanus*) and monocot stem (*Dracaena*).

3. Plant embryology introduction **(1L)**

4. Definition and scope of plant embryology.

5. Microsporangium and male gametophyte **(5L)**

a. Microsporangium: structure of tetrasporangiate anther, types of tapetum, sporogenous tissue.

b. Microsporogenesis: process and its types, types of microspore tetrad.

c. Male gametophyte: structure and development of male gametophyte.

Credit – III **(18L)**

1 Megasporangium and female gametophyte: **(7L)**

a) Megasporangium: structure, types of ovules - anatropous, orthotropous, amphitropous, campylotropous, circinotropous.

b) Megasporogenesis: process and its types, types of megaspore tetrads.

c) Female gametophyte: structure of typical embryo sac, types of embryo sacs with examples - monosporic, bisporic and tetrasporic.

2. Fertilization: **(5L)**

Mechanism of pollination - entomophily, anemophily, hydrophily, zoophily, germination of pollen grain, double fertilization (syngamy and triple fusion) and its significance.

3. Endosperm and embryo

(6L)

- a) Endosperm: Types— nuclear, helobial and cellular.

- b) Embryogeny: structure of dicot and monocot embryo and seed formation

References

1. Plant Anatomy, Chandurkar P J, 1971, Oxford and IBH publication Co. New Delhi
2. B. P. Pandey, Plant Anatomy, 1987, S. Chand and Co. Ltd, New Delhi
3. Eams and Mc Daniel, An Introduction to Plant Anatomy, 1990, McGraw –Hill Book Co. Ltd andKogakusha Co, Tokyo, Japan
4. Adriance S Foster Practical Plant Anatomy, 2000, D Van Nostrand Co. INC, Newyork
5. Esau, Plant Anatomy, 2000, Wiley Toppan Co. California, USA
6. Pijush Roy, Plant Anatomy, 2004, New Central Book Agency Ltd, Kolkata
7. Pandey S N and Ajanta Chadha, Plant Anatomy and Embryology, 2005, Vikas Publishing House, Pvt, Ltd, New Delhi/
8. Bhojwani S S and Bhatnagar S P, An Embryology of Angiosperms.
9. Maheshwari P, An introduction to Embryology of Angiosperm.

Class	:	S. Y. B. Sc. (Semester - IV)			
Paper Code	:	USBT 242			
Paper	:	II	Title of Paper	:	Plant Ecology
Credit	:	3	No. of lectures	:	48

A) Learning Objectives:

1. To understand the concepts of plant ecology.
2. To impart ecosystem dynamics.
3. To knowledge about ecological adaptations and ecological successions.

B) Course Outcomes:

By the end of the course, students will be able to:

1. Know basics concepts of plant ecology.
2. Get knowledge of ecosystem dynamics.
3. Learn about ecological adaptations and ecological successions.

Credit - I **(16L)**

1. Introduction of plant ecology **(02L)**

Introduction, concept, definition, autecology and synecology, applications.

2. Ecosystem ecology **(08L)**

Introduction, ecological organization, concept of population, community, ecosystem and biosphere.

Kinds of ecosystem – natural and artificial, terrestrial and aquatic-fresh (lotic/lentic), marine and brackish.

Components of ecosystem – biotic and abiotic components.

Ecosystem dynamics – food chain, food web and ecological pyramids.

Biogeochemical cycles – carbon, nitrogen and phosphorous.

3. Population and community ecology **(04 L)**

Population – concept, definition, characteristics- size, density, distribution, age structure, reproductive base and ecotypes.

Community – concept, definition, characteristics-structure, dominance, diversity, periodicity, stratification, ecotone and edge structure

Credit - II	(16L)
1. Ecological adaptations	(04 L)
Adaptive features of plants - external and internal features.	
Classification of plants and characteristics – hydrophytes, mesophytes, xerophytes.	
2. Ecological succession	(06 L)
Introduction, concept, definition, Principles and types – primary and secondary.	
Hydrosere, xerosere and climax community.	
3. Man and Environment	(06L)
Introduction, Interrelationship between the living world and the environment, components and dynamism of Ecosystem, homeostasis.	
Impact of human activities on environment – Causes, Prevention and control of –	
Air, water and Soil Pollution	
Environmental toxicology – Eutrophication, bioaccumulation and biomagnifications	
Environmental Crisis-Desertification, Ozone depletion and Global warming	

Credit - III	(16 L)
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1. Environmental Impact Assessment and Environmental audit	(06L)
EIA- concept, definition, objectives, methodology, EIS, applications	
Environmental Audit- concept, definition, need, methodology, certification	
difference between EIA and Environmental audit	
2. Remote Sensing	(4L)
Definition, basic principles, Process of data acquisition and interpretation,	
Global positioning System	
Application of Remote Sensing in ecology.	
3. Biodiversity and conservation	(06 L)
Concept, definition and types of biodiversity. Methods of biodiversity conservation <i>Ex-situ and In-situ</i> social approaches in biodiversity conservation-sacred groves, Chipko movement	

References:

1. **M. Anji Reddy** Textbook of Remote sensing and GIS (Third edition, 2006) by BS Publication, Hyderabad.
2. **George Joseph** Fundamentals of remote sensing (Second edition, 2005) by Universities

- press (India) Private Ltd., Hyderabad.
3. **John R. Jensen** Remote sensing of the environment (2000), Dorling Kindersley India Pvt.Ltd,
 4. Current sciences special issue remote sensing for national development Volume 61 numbers 3 and 4 August 1991
 5. **Larry W. Canter**," Environment Impact Assessment", McGraw-Hill Book Company,New York
 6. **G.J. Rau and C.D. Weeten**, "Environmental Impact Analysis Hand book, McGraw Hill,1980.
 7. **E.P. Odum. 1996.** Fundamentals of Ecology. Natraj Publishing, Dehradun.
 8. **Daubenmire.R.F. 1974.** Plants and Environment- A Text Book of Plant Ecology (3rd edition). John Wiley & Sons. New York.
 9. **Kendeigh.S.C. 1980.** Ecology with Special Reference to Animals and Man. Prentice Hall of India Pvt. Ltd., New Delhi.
 10. **Kumar.H.D. 1996.** Modern Concepts of Ecology (3rd edition). Vikas Publishing House Pvt., Ltd. Delhi.
 11. **Kumar.H.D. 1997.** General Ecology. Vikas Publishing Pvt. Ltd., Delhi.
 12. **KermondyF.J. 1996.** Concepts of Ecology.Prentice Hall of India Pvt. Ltd.,New Delhi.
 13. **Smith.L.R. 1996.** Ecology and Field Biology (5th edition). Harper Collns College Publishers, USA.
 14. **Weaver. J.E. and Clements. S.E. 1966.** Plant Ecology. Tata McGraw Publishing Co. Ltd. Bombay.
 15. **Smith L.R. and Mith T.M. 1998.** Elements of Ecology. (4th edition). An Imprint of Addison Wesley, Longman ink., California.

Class	:	S. Y. B. Sc. (Semester - IV)
Course Code	:	USBOT 243
Paper	:	III
Course Title	:	Practical based on USBT 241 and USBT 242
Credit	:	2
		No. of Practicals : 12

A) Learning Objectives:

1. To study internal morphology of plant.
2. To study in detail developmental changes during microsporogenesis, megasporogenesis and embryogenesis.
3. To study ecological adaptations in plants.
4. To make students expertise in sectioning and staining technique.

B) Learning Outcome:

By the end of the course, students will be able to:

1. Learn internal morphology of plant.
2. Get knowledge of developmental changes during microsporogenesis, megasporogenesis and embryogenesis.
3. Learn ecological adaptations in plant
4. Make expertise in sectioning and staining technique.

Practicals:

- 1) Study of epidermal tissue system – non-glandular and glandular trichomes, multilayeredepidermis, typical stomata (dicot and monocot). (01 P)
- 2) Study of mechanical tissues and their distribution in root, stem and leaves. (01 P)
- 3) Study of normal secondary growth in dicot stem – *Annona /Moringa*. (Double stainedtemporary preparation). (01 P)
- 4) Study of anomalous secondary growth in *Bignonia* and *Dracaena* stem. (Double stained temporary preparation). (01 P)
- 5) Study of tetrasporangiate anther and types of ovules. (01 P)
- 6) Study of dicot and monocot embryo. (01 P)
- 7) Vegetation study by list count quadrat method. (01 P)
- 8) Study of Hydrophytes. (01 P)
- 9) Study of Xerophytes. (01 P)
- 10) Study of Ecological instruments. (01 P)
- 11) Determination of organic carbon in soil by titration method. (01 P)
- 12) Interpretation of data using satellite imageries. (01 P)

N.B. Visit to any aquatic / terrestrials ecosystem and submission of visit report is compulsory.