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| **Module Code:** | Bot - 103 |
| **Module title:** | Botany – II (**Plant Taxonomy, Anatomy And Development**) |
| **Name of Scheme:** | BS Chemistry (4 Years) |
| **Semester :** | 2nd |

**Module Type:** General
**Module Rating:** 2 Credits

**1. Introduction of the Course:**

The course is organized to provide an introduction to plant taxonomy, history of classification, introduction to nomenclature and International Code. It also includes morphological Study of plant families, anatomical study of cell wall and the Internal Structure (Tissues) of the Plant Body

**2. Course Objectives:**

The course is designed:

1. To provide an adequate knowledge about basic concepts of different plant groups and their morphological/anatomical characteristics.
2. To give an insight to the basic concepts of Plant taxonomy and its role in classification.

**3. Course Contents**

**1. Taxonomy**:

1.1. Introduction to Plant Taxonomy: Aims, Objectives and Importance.

1.2. Classification: Brief History of Various Systems of Classification (Artificial, Natural and Phylogenetic) withemphasis on Takhtajan's system of Classification.

1.3. Nomenclature: Introduction: Importance of Latin Names and Binomial Nomenclature with an Introduction to International Code of Botanical Nomenclature (ICBN), St. Louis Code.

1.4. Morphology: Brief Account of various morphological characters of root, stem, leaf, Inflorescence, Flower, Placentation and Fruit Types.

1.5. Diagnostic Characters: Economic Importance and Distribution Patterns of the following Families: Ranunculaceae, Brassicaceae, Fabaceae, Rosaceae, Euphorbiaceae, Cucurbitaceae, Solanaceae, Lamiaceae, Apiaceae, Asteraceae, Liliaceae, Poaceae.

**2. Anatomy:**

2.1. Cell Wall: Cell Wall Structure and Chemical Composition.

2.2. Simple Tissues: Parenchyma, Collenchyma, Sclerenchyma.

2.3. Epidermis: Epidermis and Epidermal Appendages including Stomata.

2.4. Complex Tissues: Xylem, Phloem.

2.5. Meristem: Types of Meristems, Stem and Root Apices, Secondary Meristem, Vascular Cambium and Periderm.

2.6. Structure and Development of Primary Root and Stem, Structure of Leaf.

**3. Developmental Embryology:**

*Capsella bursa-pastoris*: Structure of Anther, Microsporogenesis, Microgametophyte, Structure of Ovule, Megasporogenesis, Megagametophyte, Endosperm Formation.

**4. Teaching-learning Strategies**

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

**5. Learning Outcome:**

1. Students are expected to get familiarized with the morphological and systematic knowledge about different plant groups.
2. They will be able to learn about the history of Plant Systematics and its role in classification.
1. The obtained knowledge shall also enable the students to make use of this knowledge for the identification and grouping of different plants based on the anatomy.

6. **Assessment Strategies**:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

**7. <u>Recommended Readings</u>:**

1. Esau, K. (1960). Anatomy of Seed Plants. John Wiley and Sons, New York.

2. Fahn, A. (1990). Plant Anatomy. Pergamum Press Oxford.
3. Foster, F. (2002). Practical Plant Anatomy. John Wiley and Sons, New York.
4. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens P.F. and Donoghue, M.J. (2015). Plant Systematics; A phylogenetic Approach, Sinauer, US.
5. Lawrence, G.H.M. (2007). *Taxonomy of Vascular Plants.* (2nd Ed.). MacMillan and Co. New York.
6. Maheshawari, P. (1971). Embryology of Angiosperms. McGraw Hill. New York.
7. Mauseth, J.D. (1998). An Introduction to Plant Biology: Multimedia Enhanced. Jones and Bartlett Publisher. UK.
8. Moore, R.C., Clark, W.D. and Vodopich, D.S. (2003). *Botany.* McGraw Hill Company, U.S.A.
9. Panday, B.P. (2004). A Text Book of Botany (Angiosperms). S. Chand and Co. New Delhi.
10. Raven, P.H., Even, R.E. & Eichhom, S.E. (2010). *Biology of Plants.* W.H. Freeman and Company worth Publisher.
11. Raymond, F. and Eicbhorn, S.E. (2005). *Esau's Plant Anatomy. Meristematic cells and tissue of the plant body*, (3rd Ed.) John Wiley and Sons Inc. New York.
12. Simpson, M. G. (2018). Plant Systematics (3rd edition). Elsevier Academic Press, UK.
13. Singh, G. (2016). Plant Systematics; An Integrated Approach (3rd edition), University of Dehli, India.
14. Zahur, M.S. (1992). *The Taxonomy of Angiosperms.* Al-Hejaz Printers. Lahore.

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| **Module Code:** | Bot - 104 |
| **Module title:** | Botany – II (Botany Lab) |
| **Name of Scheme:** | BS Chemistry (4 Years) |
| **Semester :** | 2nd |
| **Module Type:** | General |
| **Module Rating:** | 1 Credits |

**1. Introduction of the Course:**

The course is organized to provide an introduction to plant taxonomy, history of classification, introduction to nomenclature and International Code. It also includes morphological Study of plant families, anatomical study of cell wall and the Internal Structure (Tissues) of the Plant Body.

**2. Course Objectives**

The course is designed:

1. To provide an adequate knowledge about basic concepts of different plant groups and their morphological/anatomical characteristics.
2. To give an insight to the basic concepts of Plant taxonomy and its role in classification.

**3. Course Contents**

**Practicals:**

1. Identification of Families with the help of keys
2. Description of Flowers (in technical terms) of following Families: Ranunculaceae, Brassicaceae, Fabaceae, Rosaceae, Euphorbiaceae, Cucurbitaceae, Solanaceae, Lamiaceae, Apiaceae, Asteraceae, Liliaceae and Poaceae.
3. Field tours shall be undertaken to study and collect local plants. Students are required to submit Forty (40) fully identified herbarium specimens.
4. Study of Epidermis, Stomata and Trichomes.
5. Study of Simple Tissues from fresh material and prepared slides as well.
6. Study of Complex Tissues (Xylem), Maceration and Study of Xylem from Macerated Material.
7. Study of a Transverse Section of Stem and Leaf of Angiosperm

**4. Teaching-learning Strategies**

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

**5. Learning Outcome:**

1. Students are expected to get familiarized with the morphological and systematic knowledge about different plant groups.
2. They will be able to learn about the history of Plant Systematics and its role in classification.
3. The obtained knowledge shall also enable the students to make use of this knowledge for the identification and grouping

of different plants based on the anatomy.

6. **Assessment Strategies**:
   1. Lecture Based Examination (Objective and Subjective)
   2. Assignments
   3. Class discussion
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   5. Tests

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1. Recommended Readings:
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