



# **TRIPURA UNIVERSITY**

**(A Central University)  
Suryamaninagar-799022**

**Syllabus**

**OF**

**Botany  
(General & Major)**

**Semester – IV**

**2014**

**Semester-IV**  
**Syllabus for B.Sc. Botany (Major)**  
**(Theoretical)**

Paper-BT401H,

Full marks-60  
(IA-12, E.S.F.-48)  
Total Lectures - 28  
(Each Lecture-I hr)

**Unit I: Morphology and Embryology, Taxonomy**

**14 Periods**

Morphology- Inflorescence- types with examples, flower types, floral parts- calyx, corolla (Forms and aestivation), stamens (cohesion and adhesion), carpel (Apocarpous and Syncarpous), Placentation types, fertilization process; Fruits- types; Taxonomy- Nomenclature and rules of ICBN, Magnoliaceae, Poaceae, Orchidaceae, Mimosaceae, Caesalpiniaceae, Fabaceae, Malvaceae, Brassicaceae, Solanaceae, Apocynaceae, Lamiaceae, Rubiaceae and Asteraceae; Embryology- Micro and mega sporogenesis (Monosporic, bisporic and tetrasporic) Development of embryo, development of endosperm.

**Unit II: Anatomy, Ecology and Phytogeography**

**14 Periods**

Anatomy-Cell wall (Gross structure and chemical composition), Meristematic and Permanent tissue (structure, distribution and function); Vascular bundles- types, stele- types and evolution, Normal secondary growth ; Anomalous secondary growth (Stems of *Boerhaavia*, *Chenopodium*, *Mirabilis*, *Bignonia*, *Nyctanthes*, Root of *Tinospora*); Ecology- Habitat and Niche (preliminary idea), Ecological succession- Hydrosere and Xerosere, Endemism, Ecological adaptation - Hydrophytes and xerophytes, Red Data Book; Ecological adaptation of Halophytes; Phytogeography- Phytogeographical regions of India (D. Chatterjee-1960); Vegetation of Western and Eastern Himalaya, Sundarban and Tripura.

**Semester-IV**  
**Syllabus for B.Sc. Botany (General)**  
**(Theoretical)**

**Paper-BT401P**

**Full marks-50**  
**(IA-10, E.S.E.-40)**  
**Total Lectures -24**  
**(Each Lecture-I hr)**

**Unit I: Morphology and Taxonomy**

**12 Periods**

Morphology- Inflorescence- types with examples, flower types, floral parts- calyx, corolla (Forms and aestivation), stamens (cohesion and adhesion), carpel (Apocarpous and Syncarpous), Placentation types, fertilization process; Fruits-types; Taxonomy- Magnoliaceae, Poaceae, Orchidaceae, Mimosaceae, Caesalpiniaceae, Fabaceae, Malvaceae, Brassicaceae, Solanaceae, Apocynaceae, Lamiaceae, Rubiaceae and Asteraceae.

**Unit II: Anatomy, Ecology and Phytogeography**

**12 Periods**

Anatomy-Cell wall (Gross structure and chemical composition), Meristematic and Permanent tissue (structure, distribution and function); Vascular bundles- types, stele- types and evolution, Normal secondary growth; Ecology- Habitat and Niche (preliminary idea), Ecological succession- Hydrosere and Xerosere, Endemism, Red Data Book; Phytogeography-Phytogeographical regions of India (D. Chatterjee-1960); Vegetation of Western and Eastern Himalaya and Tripura.

**Semester-IV**  
**Syllabus for B.Sc. Botany (Major)**  
**2014**  
**(Practical)**

Time: 3 hrs

Full marks-40  
(IA-08, E.S.E.-32)

1. Work out on Angiosperm.....	08
2. Work out on Anatomy.....	06
3. Spotting (2no.).....	03
4. Identification with reasons .....(1x4)=04 (Morphology- 1, Ecology- 2, Embryology/Anatomy-1)	
5. Labnotebook and herbarium.....(2+2)=04	
6. Field record.....	03
7. Viva voce.....	04

**Practical - BT402H**

1. Work out on angiospermic plants- specimens to be selected from the families included in the BT 401 Theory paper.
2. Study of anomalous secondary structures with double staining- *Boerhaavia*, *Bignonia*, *Chenopodium*, *Nyctanthes*, Root of *Tinospora*,
3. Identification  
Microscopic study of anatomy: types of stomata, schlerides, types of Raphides, Cystolith, laticiferous duct, Aleurone grain.
4. Identification with reasons:
  - a) Morphology
    - i) Special types of inflorescence
    - ii) Types of stamens
    - iii) Types of Placentation
    - iv) Fruits- types
  - b) Study of adaptive anatomical features- *Nymphaea* petiole, *Nerium* leaf.
  - c) Embryology - Stages of Embryo
5. At least 25 herbarium sheets must be submitted.
6. Students are required to go for at least 2 field study tours.

Semester-IV  
Syllabus for B.Sc. Botany (General)  
2014  
(Practical)

Time: 3 hrs

Total marks-50  
(IA-10, E.S.E.-40)

1. Work out on Angiosperm.....10
2. Work out on Anatomy.....06
3. Spotting identification.....03
4. Identification with reasons .....(4x2)=08  
(Morphology/Embryology/Anatomy-3 Ecology-2)
5. Lab note book and herbarium.....(3+3)=06
6. Field record .....03
7. Viva voce.....04

**Practical - BT 402 P**

1. Work out on angiospermic plants- specimens to be selected from the families included in the theory paper.
2. Study of primary structures- Monocot stem, Dicot stem, Dorsiventral leaf, Isobilateral leaf, Monocot root, Dicot root.
3. Identification
  - a) Morphology
    - i) Types of Placentation
    - ii) Types of fruits
  - b) Types of stomata, Raphides, Cystolithn and Starch grain.
  - c) Aadaptive anatomical features of *Nymphaea* petiole and *Nerium* leaf
4. At least 15 herbarium sheets must be submitted.
5. Students are required to go for at least 1 field study tours.

## SUGGESTED READINGS

1. Angiosperm Phylogeny Group 2003. An update of the Angiosperm Phylogeny Group classification for the orders and families of the flowering plants: APG II. *Botanical Journal of the Linnaean Society* 141: 399-436.
2. Crawford, D.J. 2003. *Plant Molecular Systematics*. Cambridge University Press, Cambridge, UK.
3. Cronquist, A. (1981). *An Integrated System of Classification of Flowering Plants*. Columbia University Press, New York.
4. Hollingsworth, P.M., Bateman, R.M. and Gornall, R.J. 1999. *Molecular Systematics of Plant Evolution* Taylor and Francis, London.
5. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. and Donoghue, M.J. 2008. *Plant Systematics- A Phylogenetic Approach*. Sinauer Associates Inc, Massachusetts, USA.
6. Simpson, M.C. 2006. *Plant Systematics*. Elsevier, Amsterdam.
7. Stussy, T.F. 1990. *Plant Taxonomy*, Columbia University Press, USA.
8. Singh, V. and Jain, D.K., *Taxonomy of angiosperms*. Rastogi Publication, Meerut2.
9. Pandey, B.P., *Angiosperms-Taxonomy, Emrbyology and Anatomy*, S. Chand and Co., New Delhi
10. Raghavan, V. 2000. *Developmental Biology of Flowering plants*, Springer, Netherlands.
11. Raghavan, V. 1997. *Molecular embryology of flowering plants*. Cambridge, University Press.
12. Shivanna, K.R. 2003. *Pollen Biology and Biotechnology*, Science Publishers.
13. Bhojwani, S.S. and Bhatnagar, S.P. 2004. *The Embryology of Angiosperms*, Vikas Publishing House
14. Johri, B.M. 1984. *Embryology of Angiosperms*, Springer-Verlag, Netherlands.
15. Dickinson, W.C. 2000. *Integrative Plant Anatomy*. Harcourt Academic Press, USA.
16. Fahn, A. 1974 *Plant Anatomy*. Pergmon Press, USA and UK.
17. Mauseth, J.D. 1988. *Plant Anatomy*. The Benjamin/Cummings Publisher, USA.
18. Esau, K. 1977. *Anatomy of Seed Plants*. Wiley Publishers.
19. Sharma, P.D. 2009. *Ecology and Environment*, (10th Revised Ed.), Rastogi Pub. FIP, Patparaganj, New Delhi-92
20. Edward, J. Kormondy, 2008. *Concepts of Ecology* (4th Ed, 2008) Pearson Education Inc. & Dorling Kindersley Pub, Inc. Capital offset Press, New Delhi
21. Smith, T.M. and Smith, R.L. 2008. *Elements of Ecology*, Benjamin-Cummings, N.Y. (7th Edn.)
22. Miller, G.T., 2004. *Essentials of Ecology*, Brooks, Cole, N.Y. (3rd Edn.)
23. Odum and Barrett, Thomson, Ed. Brooks/Cole, *Fundamentals of Ecology*, Cengage Learning
24. Singh, Singh and Gupta Ed., *Ecology, Environment and Resources Conservation*, , Anamaya Pub., New Delhi
25. Odum, E.P., *Basic Ecology*, Ed. Saunders College Pub.