Syllabus Prescribed for Three Year UG Programme

Programme: B.Sc. Semester III

Code of the Course/Subject Title of the Course/Subject Number of Periods per week

BOT (3S)/Botany ANGIOSPERM SYSTEMATICS, ANATOMY, EMBRYOLOGY 06

Cos

After completion of this course successfully, the students would be able to

1. **Understand** the basic principles involved in identification, naming and classification of flowering plants.
2. **Know** the systematic study and economic importance of plants belonging to the various families.
3. **Differentiate** various tissue systems.
4. **Understand** the normal and anomalous secondary growth in plants and their causes.
5. **Understand** developmental stages in plant embryo and seed formation.
6. **Apply** understanding this knowledge to explain the taxonomic diversity of plants and Imply the embryological and anatomical knowledge to differentiate the plant taxa.

Unit	Content	Peroids
Unit- I	**Angiosperms Systematics and Biodiversity** **1.1** Phylogeny – Origin and Evolution of angiosperms. (Pteridospermean and Bennititalean theory). **1.2** Taxonomic Hierarchy –Concept of taxa (family, genus, species); Categories and taxonomic hierarchy; Species concept (taxonomic, biological, evolutionary). **1.3**. Botanical Nomenclature- Principles and rules of ICBN (ranks and names; principle of priority, binomial system; type method, author citation, valid-publication). **1.4** Biodiversity – Definition and types, concept, significance and conservation.	**12**
Unit- II	**Classification and Angiosperm Systematics** 2.1. Types of classification- Artificial, Natural and Phylogenetic. 2.2. Bentham & Hooker's system of classification with Merits and demerits. 2.3 Systematic study and economic importance of the following families: Dicotyledons –(Polypetalae) Malvaceae, Brassicaceae, Leguminosae and Apiaceae.	**12**
Unit- III	**Angiosperm Systematics** 3.1 Systematic studies & economic importance of following Families dicotyledons (Gamopetalae): Asteraceae, Asclepiadaceae, Apocynaceae, Solanaceae, Verbenaceae, Lamiaceae. 3.2 Dicotyledons (Monoclamydeae): Euphorbiaceae. 3.3 Monocotyledons: Liliaceae, Poaceae	**12**

Unit-IV	**Anatomy** 4.1 Types of Tissues: Meristematic – Types of meristems Permanent – Simple and complex. 4.2 Anatomy of Root: Primary structure in Dicot and Monocot root 4.3 Secondary growth in Dicot root. 4.4 Characteristics of growth rings, Sapwood and heartwood.	**12**
Unit-V	**Anatomy** 5.1 Anatomy of stem: Primary structure in monocot and dicot stem, normal secondary growth in dicot stem. 5.2 Anatomy and Anomalies in structure in *Boerhhavia* stem, *Bignonia* and *Dracaena* stem. 5.3 Leaf Anatomy: Internal structure in Nerium and Maize leaf.	**12**
Unit-VI	**Embryology** 6.1 Microsporangium, microsporogenesis, development of male gametophyte. 6.2 Megasporangium,types of ovules, megasporogenesis, development of female gametophyte (monosporic)- Detail structure of Polygonum type of embryo sac. 6.3 Double fertilization and triple fusion. 6.4 Development of Dicot Embryo. 6.5 Endosperm types & significance.	**12**
	Skill Enhance Module (SEM) **Plant Identification and Preparation of Herbarium Sheet** **Cos**- After completion of skill enhancement module, learner will be able to: 1. Gain Practical skills in plant identification. 2. Learn how to assemble and properly documentation of collected Plants. 3. Identify the taxonomic diversity of useful plants. 4. Provide scientific information to the public regarding the plants.	
	SEM – Plant Identification and Preparation of Herbarium Sheet **1.1** Introduction of plant identification **1.2** Morphological characters used for identification **1.3** Definition and Importance of Herbarium **1.4** Techniques of Herbarium preparation – collection, instruments, pressing, Drying, labelling, storage and maintains.	
	ACTIVITIES (Any Two Activities) 1. Workshop or Hands on Training for Herbarium technique. 2. Visit to any biodiversity rich area to study the plant diversity in natural habitat. 3. Key Preparation 4. Identify and classify the plants. 5. Submission of photographic (Geotagged) herbarium of plants. **6.** Submission of report including photographs at end of the session.	

Programme: B.Sc. II

Semester III

Code of the Course/Subject	Title of the Course/Subject	(No.of Periods/week)
BOT (3S)/BOTANY	**Practical**	**2 Practicals per week**

*** List of Practical/Laboratory Experiments/Activities etc**

1.	Taxonomy: Description of ten plants belonging to different families in technical language and identification up to family level. Brassiacaceae- *Brassica,* Malvaceae- *Hibiscus*, *Sida*, *Malvastrum*, Fabaceae- *Crotalaria*, *Indigofera*, *Tephrosia*, Caesalpinoidae - *Caesalpinea*, *Cassia*, Mimosoidae- *Prosopis*, *Acasia*, Apiaceae- *Corindrum*, Apocynaceae- *Vinca*, *Thevetia*, Asclepiadaceae-*Cryptostegia*, *Calatropis*, Solanaceae- *Datura*, *Solanum*, *Withania*, Euphorbiacea-*Jatropha*, *Euphorbia*, *Croton* Lamiaceae- *Oscimum*, *Hyptis*, Asterceae- *Tridax*, *Lagasca*, Verbenaceae-*Lantana*, *Clerodendron*
2.	Anatomy of angiosperms: Preparation of double stained permanent slides of stem (*Boerhhavia*, *Bignonia* and *Dracaena*) and leaves (*Nerium*, Maize) of angiospermic plants.
3.	1) Embryology of Angiosperms: i) Observation of wide range of flowers available in the locality and methods of their pollination. ii) Study through permanent slides of T.S. of anther, microsporogenesis, L.S. of ovule, types of endosperms and embryo of *Capsella*. iii) Mounting of T.S. of anther, Pollen grains and pollinia.
4.	Long and short excursion is essential. Note : Field tour reports should be supported by exhaustive field notes and photographic representation of plant species studied

Books Recommended:

1) A.C.Dutta: Text Book of Botany.

2) Andrews A.N.: Studies in Paleobotany.

3) Arnold C.A.: Introduction of Paleobotany.

4) Bhojwani & Bhatnagar: Embryology of Angiosperms.

5) Chandurkar: Plant Anatomy

6) Cutter E.G., 1971: Plant Anatomy Experiment and Interpretation Part-II, Organs, Edward Arnold, London.

7) Davis P.H., and Heywood V.H., 1993: Principles of Angiosperm Taxonomy: Oliver and Boyd, London.

8) Eames E.J.: Morphology of Vascular Plants. Edition, Prentice Hall of India Pvt. Ltd. New Delhi.

9) Esau K.: 1977, Anatomy of seed plant, 2nd Edition, John Wiley and Sons, New York.

10) Gangulee and Kar: College Botany Vol.II

11) Gangulee Das and Dutta: College Botany, Vol.I

12) Gifford E.M. and Foster A.S., 1988: Morphology and Evolution of Vascular Plants, W.H. Freeman & Company, New York.

13) Hartmann H.T. and Kestler D.E., 1976: Plant Propagation Principles and practices, 3rd

14) Heywood V.H. and Moore D.M. (Eds) 1984: Current concepts in plant Taxonomy. Academic Press, London.

15) Jeffrey C., 1982: An introduction to Plant Taxonomy, Cambridge University Press, Cambridge, London.

16) Maheshwari P.: Introduction of Embryology of Angiosperms.

17) Pande B.P.: A Text Book of Angiosperms.

18) Radford A.E., 1986 : Fundamentals of Plant Systematics, Harper and Row, New York.

19) Rendle A.B.: Classification of flowering plants, Vol.I & Vol.II.

20) S. Sundar Rajan: College Botany, Vol. II & Vol. III.

21) Shukla and Mishra: Paleobotany.

22) Singh and Jain: Plant Anatomy.

23) Singh and Jain: Taxonomy of Angiosperms. 2

24) Singh, F. 1999, Plant Systematics - Theory and Practices, Oxford and IBH Pvt. Ltd., New Delhi.

25) Stace C.A., 1989. : Plant Taxonomy and Biosystematics (2nd Edition) Edward Arnold, London.

26) Stewart W.N., 1983: Paleobotany and Evolution of Plants, Cambridge University Press, Cambridge. Cutter, E.G. 1969: PartI, Cells and tissues, Edward, Arnold, London.

27) Trivedi B.S. & Sharma B.B.: Introductory Taxonomy.

28) Tyagi and Kshetrapal: Taxonomy of Angiosperms.

29) Vashistha P.C.: Plant Anatomy.

30) Vashistha P.C.: Taxonomy of Angiosperms.

31) Walton: An Introduction & Study of fossil.

32) Modern Practical Botany, Volume-I, Dr. B. P. Pande, S. Chand Publication, New Delhi.

33) Modern Practical Botany, Volume-II, Dr. Dr. B. P. Pande, S. Chand Publication, New Delhi.

34) Modern Practical Botany, Volume-III, Dr. Dr. B. P. Pande, S. Chand Publication, New Delhi.

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

PRACTICAL EXAMINATION (Botany)

SEMESTER III (CBCS New)

Angiosperm Systematics, Anatomy and Embryology

External Practical Examination

Time - 4 Hours **25 Marks**

Q. 1 Description of given angiospermic plant in technical language, identification up to family, floral formula, floral diagram. (Any one plant) 10 Marks

Q. 2 Preparation of double stained permanent slide of given angiospermic material identification with description - 8 Marks

Q. 3 Spotting (Anatomy-2, Embryology -2) 4 Marks

Q. 4 Viva voce 3 Marks

Internal Practical Examination **25 Marks**

Q.1 Attendance 5 Marks

Q.2 Student Performance – Submission of double stained permanent slides of stem and leaves of angiospermic plants mentioned in the syllabus. OR Any other activity performed by students related to the syllabus. 5 Marks

Q.3 Activity report – Botanical Excursion / Tour reports or field visit report/ Any Activity report related the syllabus. 5 Marks

Q.4 Practical Record 5 Marks

Q.5 Viva-voce (Internal Examiner) 5 Marks

GENERAL INTEREST COURSE - III

Programme: B.Sc. Semester III

Code of the Course/Subject	**Title of the Course/Subject**	**Total Number of Periods**
BOT (3S) / Botany	**GIC-3 NURSERY TECHNIQUES AND MANGEMENT**	**30**

Cos

After completing this course, the students will be able to

- Understand the importance of a plant nursery and basic infrastructure to required.
- Explain the preliminary materials, tools and techniques required for nursery.
- Demonstrate expertise related to various practices in a nursery.
- Apply comprehend skills and knowledge to become Nursery entrepreneur or worked as nursery supervisor, assistants.

Unit	Content
Unit-I : Nursery Management 1.1 Introduction, Importance and Types of Nurseries. 1.2 Establishment of a Nursery – Selection of the nursery site, Layout of a Nursery, **Preliminary operation for Raising Nursery.** 1.3 Media for Propagation. 1.4 Tools and Accessories for Nursery. 1.5 Plant Propagation Structures in Plant Nursery- Green house, shade net house 1.6 Regular Nursery Operations – soil sterilization, seed sowing, planting, transplanting of seedlings, transplanting of potted plants, mulching, staking, shading, pricking, defoliation, disbudding, de-shooting, Pruning, watering. Seed Propagation – By seed bed, in seed pan, in polythene bag, In situ, in poly house	**(15 L)**
Unit-II: Management and Marketing Strategy	**(15 L)**

1.1 Nursery Disease and their Management 1.2 Plant Nutrients and their Requirement 1.3 Water Management in Nursery 1.4 Lifting, Packing, storage and sale of Nursery plants. 1.5 Branding of Nursery 1.6 Marketing and Export of Nursery plants.	

Reference Books:

1. Nursery Raising : S.N. Das
2. Objective Floriculture and Landscaping : Desh Raj
3. Physical and economic requirements for pot-in-pot nursery production. 2002. Robert McNiel, Department of Horticulture and Landscape Architecture, University of Kentucky.
4. Plant Nursery Management : P.K.Ray
5. Plant Nursery Development & Management - An Innovative Way of Self Employment Priya Lokare & Dr Keshamma Ee.
6. Plant Propagation and Nursery Management Dr.Arun Kumar Singh & Abhinav Kumar
7. https://hindi.icfre.gov.in/UserFiles/File/Books/Nursery%20Technology.pdf
8. Indian Council of Forestry Research & Education New Forest, Dehradun - 248 006 (Uttarakhand) (An autonomous body of Ministry of Environment, Forest & Climate Change, Government of India) www.icfre.gov.in
9. Textbook of plant propagation and Nursery Management – Sharma R.R. & Hare Krishna
10. http://cazri.res.in/publications/PRathaKrishnan.pdf