

B.Sc. BOTANY: Semester - 3

Theory: Discipline Specific Core Course (DSCC)

Title of the Course and Code:

BOT-A-3.1:PLANT ANATOMY AND DEVELOPMENT BIOLOGY

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/ Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOT A-3.1	DSCC	Theory	04	04	52 hrs	4hrs	40	60	100

Course Outcomes:

On completion of this course, the students will be able to:

- 1.Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept.
2. Skill development for the proper description of internal structure using botanical terms, their identification and further classification.
3. Induction of the enthusiasm on internal structure of locally available plants.
4. Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.
5. Observation and classification of the floral variations from the premises of college and house.
6. Understanding the various reproductive methods sub-stages in the life cycle of plants
7. Observation and classification of the embryological variations in angiosperms.
8. Enthusiasm to understand evolution based on the variations in reproduction among plants.

PLANT ANATOMY

Unit 1: ANGIOSPERM ANATOMY, PLANT CELL STRUCTURE

AND TISSUES

14 Hrs

Introduction, objective and scope of Plant Anatomy, Plant cell structure – nature of plant cell wall. Tissue and tissue systems - meristematic tissue, permanent tissue and secretory cells. Classification of meristem: (apical, intercalary and lateral), primary and secondary meristem. Apical meristem: Theories, **concept and Evolution** on organization of meristem (apical cell theory, Tunica-Corpus theory, histogen theory and Korper-Kappe theory), quiescent centre, Root cap.

Unit II: MORPHOGENESIS AND DIFFERENTIATION

14 Hrs.

Morphogenesis in plants - Differentiation of root, stems and leaf. Types of vascular bundles and Vascular cambium, Origin, development, arrangement and diversity in size and shape of leaves. Structure of Dicot root: primary and secondary structures (Tridax/Sunflower), Structure of monocot root (Maize). Structure of Dicot stem: Primary and secondary structures (Tridax/Sunflower), Structure of Monocot stem (Maize), Nodal anatomy. Structure of Dicot leaf: primary structure (Tridax/Sunflower), primary structure of Monocot leaf (Maize), Stomatal types. Anomalous secondary growth: Bignonia, Boerhaavia (dicot stem) Dracaena (monocot stem)

DEVELOPMENT BIOLOGY

Unit III: Morphogenesis and Differentiation

14 Hrs.

Differentiation and cell polarity in acellular (Dictyostelium), Unicellular (Acetabularia) and multicellular system (root hair and stomata formation) Shoot Apical meristem (SAM): Origin, structure and function,; Differentiation of root, stem, leaf Transition from vegetative apex into reproductive apex

Developmental patterns at flowering apex: ABC model specification of floral organs. Modification of gene action by growth hormones and cellular differences between floral organs. Senescence – a general account.

Unit IV: Reproductive Biology

14 Hrs.

Introduction, Scope and contributions of Indian embryologists:

P. Maheswari, B G L Swamy, M.S. Swaminathan and K.C. Mehta.

Microsporangium: Development and structure of mature anther, Anther wall layers, Tapetum - types, structure and functions and sporogenous tissue.

Microsporogenesis - Microspore mother cells, microspore tetrads, Pollinia.

Microgametogenesis – Formation of vegetative and generative cells, structure of male gametophyte. Pollen embryosac (Nemec phenomenon). **Megasporangium** – Structure of typical Angiosperm ovule. Types of ovule- Anatropous, Orthotropous, Amphitropous, Circinotropous.

Megagametogenesis – Types of development of Female gametophyte/embryosac- monosporic- Polygonum type, bisporic – Allium type, tetrasporic - Fritillaria type. Structure of mature embryosac.

Pollination and fertilization: Structural and functional aspects of pollen, stigma and style. Post pollination events; Current aspects of fertilization and Significance of double fertilization, Post fertilization changes.

Endosperm – Types and its biological importance. Free nuclear (Cocos nucifera) cellular (Cucumis), helobial types. Ruminant endosperm.

Embryogenesis – Structure and composition of zygote, Dicot (Capsella bursa-pastoris) and Monocot (Najas) embryo development. A general account of seed development.

B.Sc. BOTANY: Semester - 3

Theory: Discipline Specific Core Course (DSCC)

Title of the Course and Code:

BOT-A-3.2: PLANT ANATOMY AND DEVELOPMENT BIOLOGY

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/ Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
BOT A-3.2	DSCC	Practical	02	04	52 hrs	4hrs	25	25	50

Practical No.1

- i)** Study of meristem (Permanent slides/ Photographs).
- ii)** Study of Simple Tissues (Parenchyma, Collenchyma and Sclerenchyma) and Complex Tissues (xylem and phloem).

Practical No.2

Maceration technique to study elements of xylem and phloem, Study of primary structure of dicot root, stem and leaf (Sunflower) and monocot root, stem and leaf (Maize)

Practical No.3

Study of Normal secondary growth structure in dicot stem and root (Sunflower) and Anomalous secondary growth: Bignonia, Boerhaavia (dicot stem) Dracaena (monocot stem)

Practical No. 4

Study of trichomes (any three types) and stomata (any three types) with the help of locally available plant materials

Practical No. 5

Permanent slides of Microsporogenesis and male gametophyte Mounting of Pollen grains of Grass and Hibiscus and Pollinia of Calotropis

Practical No. 6

Pollen germination (hanging drop method) and Effect of Boron and Calcium on pollen germination

Practical No. 7

Permanent slides of types of ovules, Megasporogenesis &embryosac development and types of placentation: Axile, Marginal and Parietal types. Sectioning of ovary, for the studied types of placentation

Practical No. 8

Mounting of embryo: Tridax and Cyamopsis, Mounting of endosperm: Cucumis

Practical No. 9 and 10

Mini project work in groups of 3-5 students, from the following list

- a) Study of pollen morphology of different flowers with respect to shape, colour, aperture etc.
- b) Pollen germination of different pollen grains and calculates percentage of germination.
- c) Calculating percentage of germination of one particular type of pollen grain collected from different localities/ under different conditions.
- d) Study of placentation of different flowers.
- e) Any other relevant study related to Anatomy / Embryology.

Text Books for Reference:

1. Bhojwani and Bhatnagar, Introduction to Embryology of Angiosperms –Oxford & IBH, Delhi
2. Bhojwani Sant Saran, 2014.Current Trends in the Embryology of Angiosperms, Woong-Young Soh, Springer Netherlands,
3. Coutler E. G. , 1969. Plant Anatomy – Part I Cells and Tissues – Edward Arnold, London.
4. Dickison, W.C. (2000). Integrative Plant Anatomy, Harcourt Academic Press, USA
5. Eames A. J. - Morphology of Angiosperms - Mc Graw Hill, New York.
6. Esau, K. 1990. Plant Anatomy, Wiley Eastern Pvt Ltd New Delhi
7. Evert, R.F. (2006) Esau's Plant Anatomy: Meristem, Cells, and Tissues of the Plant Body: Their Structure, Function and Development. John Wiley and Sons, Inc
8. Fahn, A.1992. Plant Anatomy, Pergamon Press, USA
9. Johri, B.M. l., 1984.Embryology of Angiosperms, Springer-Verlag, Netherlands.
10. Karp G., 1985. Cell Biology; Mc.Graw Hill Company
11. Maheshwari,P 1950. An introduction to the embryology of angiosperms. New York: McGraw-Hill
12. Mauseth, J.D. (1988). Plant Anatomy, the Benjammin/Cummings Publisher, USA.
13. Nair P .K .K - Pollen Morphology of Angiosperms - Scholar Publishing House, Lucknow
14. Pandey S.N. 1997, Plant Anatomy and Embryology .A. Chadha, Vikas Publication House Pvt Ltd;
15. Pandey, B. P., 1997. Plant Anatomy, S.Chand and Co. New Delhi
16. Raghavan, V., 2000. Developmental Biology of Flowering plants, Springer, Netherlands.
17. Saxena M. R. – Palynology – A treatise - Oxford & I. B .H., New Delhi.
18. Shivanna, K.R., 2003. Pollen Biology and Biotechnology. Oxford and IBH Publishing Co. Pvt.Ltd. Delhi.
19. Vashishta .P.C .,1984. Plant Anatomy – Pradeep Publications – Jalandhar
20. Vashishta, P.C. 1997. Plant Anatomy, Pradeep Publication

RANI CHANNAMMA UNIVERSITY BELGAVI

B.Sc III SEMESTER

SUBJECT: BOTANY (OPEN ELECTIVE COURSE) OEC CODE:-003 BOT 051

Cou rse No.	Type of Cou rse	Theory / Practica l	Credit s	Instructi o n hour per week	Total No. of Lectures / Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
003 BOT 051	OE C	Theory	03	03	42 Hrs	2 Hrs	40	60	100

OEC-3 (OEC for other students): 003 BOT 051

Title of the Paper: BOTANICAL GARDEN AND LANDSCAPING

Learning outcomes:

After the completion of this course the learner will be able to: Apply the basic principles and components of gardening

- **Conceptualize flower arrangement and bio-aesthetic planning**
- **Design various types of gardens according to the culture and art of bonsai**
- **Distinguish between formal, informal and free style gardens**
- **Establish and maintain special types of gardens for outdoor and indoor landscaping**

Keywords:

Gardening, Landscaping, Flower arrangement, Vertical gardens, Roof gardens, Computer aided designing

Unit-I	Principles of gardening, garden components, adornments, lawn making, methods of designing rockery, water garden, etc. Special types of gardens, their walk-paths, bridges, constructed features. Green house, Special types of gardens, trees, their design, values in land scaping, propagation, planting shrubs and herbaceous perennials. Importance, design values, propagation, planting, climbers and creepers, palms, ferns, grasses and cacti succulents.	14 Hrs
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Unit II	Flower arrangement: importance, production details and cultural operations, constraints, post-harvest practices. Bio-aesthetic planning, definition, need, round country planning, urban planning and planting avenues, schools, villages, beautifying railway stations, dam sites, hydroelectric stations, colonies, river banks, planting material for play grounds.	14 Hrs
Unit III	Vertical gardens, roof gardens. Culture of bonsai, art of making bonsai. Parks and public gardens. Land scape designs, Styles of garden, formal, informal and freestyle gardens, types of gardens, Urban land scaping, Land scaping for specific situations, institutions, industries, residents, hospitals, road sides, traffic islands, dam sites, IT parks, corporate. Establishment and maintenance, special types of gardens, Bioaesthetic planning, eco- tourism, indoor gardening, therapeutic gardening, non-plant components, water-scaping, xeri-scaping, hardscaping; Computer Aided Designing (CAD) for outdoor and indoor scaping Exposure to CAD (Computer Aided Designing) components of a nursery, sowing, pricking, use of greenhouse for nursery production, propagation through cuttings, layering, grafting and budding. Ethnobotany and Folk medicines. Definition; Ethnobotany in India: Methods to study ethnobotany; Applications of Ethnobotany: National interacts, Palaeo-ethno-botany. Folk medicines of ethnobotany, ethnomedicine, ethnoecology, ethnic communities of India.	14 Hrs
	Suggested Readings: 1. Berry, F. and Kress, J. (1991). Heliconia: An Identification Guide. SmithsonianBooks 2. Butts, E. and Stensson, K. (2012). Sheridan Nurseries: One hundred years ofPeople, Plans, and Plants. Dundurn Group Ltd. 3. Russell, T.(2012). Nature Guide: Trees: The world in your hands (Nature Guides).	

**Details of Formative Assessment (IA) For DSCC theory/OEC: 40%
weightage for Total Marks**

Type of Asesment	Weightage	Duration	Comment
Written Test -1	10%	1 Hrs	8th Week
Written Test-2	10%	1 Hrs	12th Week
Seminar	10%	10 minutes	-----
Case Study/Assignment/Field Work/Project Work/Activity	10%	-----	-----
Total	40% of the Maximum Marks allotted for the paper.		

Faculty of Science

04- Year UG Honors Programme: 2022-23

General Pattern of Theory Question paper for OEC

(60 Marks for semester end Examination with 2 hrs duration)

1	Part-A	Question number 1-6 carries 2 marks each. Answer any 5 questions.	10 Marks
2	Part-B	Question number 7-11 carries 5 marks each. Answer any 4 questions.	20 Marks
3	Part-C	Question number 12- 15 carries 10 marks each. Answer any 3 question.	30 Marks
(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)			
Total -60 Marks			

Practical Question Paper Pattern

RANI CHANNAMMA UNIVERSITY ELGAVI

B.Sc Botany III Semester (NEP) Plant

Anatomy and Development Biology

Time: 04 Hrs

Max Marks: 25

Q No I	Make a double stained micro preparation of T.S of material 'A' Draw a labeled diagram (Show the preparation to the Examiners)	05 Marks
Q No II	Mount Endosperm/Embryo in specimen 'B' and draw the diagram (Show the preparation to the Examiners)	05 Marks
Q No III	Identify and mention the important features observed in the slides C,D,E,F and G.	10 Marks
Q No IV	Mini Project Submission	05 Marks
	Total	25

Instruction to Examiners

Q No I- For double staining preparation give the stem of Bignonia, Boerhaavia & Dracena stem any one.

Preparation -03 Diagram -02 (05)

Q No II-Mount Endosperm/ Embryo

Preparation -03 Diagram -02- (05)

Q No III- Two slides from Anatomy(C-Simple tissue & D-Complex tissue),

Two slides from Embryology (E & F) and 'G'- Trichome/ Stomata. (10)

Submission (05)

Question Paper Pattern

RANI CHANNAMMA UNIVERSITY BELGAVI

B.Sc Botany III Semester (NEP)

Subject:

Code:

Maximum Marks: 60

Answer any Six Questions from Question no I

Answer any Three each Questions from Question no II, III, IV and V

QNO I	Answer any Six Questions (At least Two questions from each unit) 1 2 3 4 5 6 7 8	2X6=12
QNO II	Should cover Entire unit I 1 2 3 4	4X3=12
QNO III	Should cover Entire unit II 1 2 3 4	4X3=12
QNO IV	Should cover Entire unit III 1 2 3 4	4X3=12
QNO V	Should cover Entire unit IV 1 2 3 4	4X3=12