Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam
Department of Botany
IIISemester /Botany Course -3
Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

(Total hours of teaching – 60 @ 04 Hrs./Week)

arning outcomes:

On successful completion of this course, thestudents will be able to;

- Understand on the organization of tissuesand tissue systems inplants.
- Illustrate and interpret various aspects ofembryology.
- Discuss the basic concepts of plant ecology, andevaluate the effects of environmental and biotic factors on plantcommunities.
- Appraise various qualitative and quantitative parameters to study the population and communityecology.
- Correlate theimportance of biodiversity and consequences due to itsloss.
- Enlistthe endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for theirconservation.

Unit – 1: Anatomyof Angiosperms **12 Hrs.**

Types of Meristeme

1. Organization of apical meristems: Tunica-carpus theory and Histogentheory. Root apex and shoot apex theries
2. Tissue systems–Epidermal, ground andvascular.
3. Anomalous secondary growth in *Boerhaavia*and*Dracaena.*
4. Study of timbers of economic importance - Teak, Red sanders andRosewood.
5. Anatomy of Dicot & Monocot stem. Normal secondary growth in dicot stem

Unit – 2: Embryologyof Angiosperms **12 Hrs.**

1. Structure of anther, anther wall, types of tapetum. Microsporogenesisand development of malegametophyte.
2. Structure of ovule, megasporogenesis; monosporic (*Polygonum*), bisporic (*Allium*), Endymion and tetrasporic (*Peperomia*) types of embryo sacs. Structure of mature embryosac
3. Outlines of pollination, pollen – pistil interaction and fertilization. Oenothera
4. Endosperm - Types and biological importance - Free nuclear, cellular,helobialand ruminate. endosperm haustoria Penaea, Plumbago, Peperomia
5. Development of Dicot (*Capsella bursa-pastoris*)embryo.

Unit – 3: BasicsofEcology **12 Hrs.**

1. Ecology: definition, branches and significance ofecology.
2. Ecosystem: Concept and components, energy flow, food chain, food web, ecologicalpyramids.
4. Plants and environment: Climatic (light and temperature), edaphic and biotic factors.
5. Ecological succession:Hydrosere andXerosere.

Unit – 4:Population, Community andProductionEcology **12 Hrs.**

1. Population ecology: Natality, mortality, growth curves, ecotypes,ecads
2. Community ecology: Frequency, density, cover, life forms, biologicalspectrum
3. Concepts of productivity: GPP, NPP and CommunityRespiration
4. Secondary production, P/R ratio andEcosystems.

Unit – 5:Basicsof Biodiversity **12 Hrs.**

1. Biodiversity: Basic concepts, Convention on Biodiversity - EarthSummit.
2. Value of Biodiversity; types and levels of biodiversity and Threats tobiodiversity
3. Biodiversity Hot spots in India.Biodiversity in North Eastern Himalayas and WesternGhats.
4. Principles of conservation: IUCN threat-categories, RED databook
5. Role of NBPGR and NBA in the conservation ofBiodiversity.

Text books:

- Botany – III (Vrukshasastram-I) : Telugu Akademi,Hyderabad
- Botany – IV (Vrukshasastram-II) : Telugu Akademi,Hyderabad
- Pandey, B.P. (2013) *College Botany, Volume-II,* S. Chand Publishing, NewDelhi
- Pandey, B.P. (2013) *College Botany, Volume-III,* S. Chand Publishing, NewDelhi
- Bhattacharya, K., G. Hait&Ghosh, A. K., (2011) *A Text Book of Botany, Volume-II,* New Central Book Agency Pvt. Ltd.,Kolkata

Books for Reference:

- Esau, K. (1971)*Anatomy of Seed Plants.* John Wiley and Son,USA.
- Fahn, A. (1990)*Plant Anatomy*, Pergamon Press,Oxford.
- Cutler, D.F., T. Botha & D. Wm. Stevenson (2008)*Plant Anatomy: An Applied Approach,* Wiley,USA.
- Paula Rudall (1987)*Anatomy of Flowering Plants: An Introduction to Structure and Development.* Cambridge University Press,London

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(Re-Accredited by NAAC with A)
II B.Sc -Botany III Semester /Botany Core Course – 3
Model Paper
Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

SECTION-A

Answer all the following 5x2=10

1. Phloem tissue
2. Tapetum
3. Food chain
4. Ecotype
5. Species diversity

SECTION-B3x5=15

Answer any THREE of the following

6. Histogen theory
7. Bisporic Embryosac
8. Food web
9. Population growth curves
10. RED DATA BOOK

SECTION-C

Answer all thefollowing 5x10=50

11.a) Explain the Anamolous secondary growth in Boerhavia

(or)

b) Describe the wood structure of Teak, Rose wood and Red sander.

(or)

12. a) Write about different types of endosperms in Angiosperms.

(or)

b) Explain the development of Dicot embryo

13. a) Define Ecology. Explain the structural components of ecosystem.

(or)

b) Define plant succession and describe the xerosere

14. a) Define Productivity ecology and explain about Productivity types.

(or)

b) Define community ecology and explain Raunkiaer's classification.

15. a) Write an essay on Biodiversity Hotspots in INDIA

(o r)

b) Define the biodiversity? Write an essay on levels of biodiversity.

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Unit – 1: Anatomy of Angiosperms

Essays 10 marks questions

1.Anamolous secondary growth in Boerhavia

2.Anamolous secondary growth in Dracaena

Short answers 5 marks questions

3.Tunica corpus theory

4.Histogen theory

5.Economic importance of teak

6.Economic importance of red sanders

7.Economic importance of rose wood

Very short answers 2 marks questions

8.Dermatogen

9.periblem

10. Plerome

11.Phillogen

Unit – 2: Embryology of Angiosperms

Essays 10 Marks

1.Write about mon, bi and tetrasporic type of embryosac development in Angiospetms with diagrams.

2.Write about different types of endosperms in Angiosperms.

3. Write about the Development of Dicot (*Capsella bursa-pastoris*) embryo.

Short answers 5 marks

1.Structure of ovule 2. Pollen-pistil interaction 3. Monosporic (Polygonum) type of embryo sac 4. Bisporic (Allium) type of embryo sac 5.Tetrasporic (Peperomia) type of embryo sac.

Very shorts 2 marks

1.Aril2.Micropyle 3. Caruncle 4.Endothelium 5.Obturator 6.Micropyle7.Epistase, hypostase 8.Crassinucellate ovule.9.Tenuicellate ovule.10.Synergids.

Unit – 3: Basics of Ecology

Unit – 4: Population, Community and Production Ecology

Essays 10 Marks questions

1, Define Productivity ecology and explain about Productivity types.
2, Explain secondary productivity

Short answers 5 Marks questions

1, Primary Productivity

2. Secondary productivity

3. P/R Ratio

Very short answer 2 marks questions

1.Gpp

2.NPP

4 Secondary productivity

Unit5 Basics of Biodiversity

Essays 10 Marks questions

1.Write an essay on Value of Biodiversity and Threats to biodiversity

2.Write an essay on levels of biodiversity?

3. Write an essay on Biodiversity Hot spots in India. (Biodiversity in North Eastern Himalayas and Western Ghats.)

4.Write an essay on role of NBPGR and NBA in the Conservation of Biodiversity

Short answers 5 Marks questions

1.Earth summit

2.IUCN threat-categories,

3.Values of Biodiversity

4.NBPGR

4.NBA

Very short answers 2marks Questions

1. RED data book 2. Biodiversity 3.Genetic diversity4.Species diversity 5.Ecosystem diversity 6.Biodiversity hot spot 7.IUCN 8.Red data book 9.NBPGR 10NBA

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II B.Sc - Botany
III Semester /Botany Core Course - 3
Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Blue Print for Question paper

S. No.	Question type	Section	Unit I	Unit II	Unit III	Unit IV	Unit V	Max.Marks 75
1	Very Short Answer Questions	A	1	1	1	1	1	5x2=10
2	Short Answer Questions	B	1	1	1	1	1	3x5=15
3	Essay questions(Internal choice)	C	2	2	2	2	2	5x10=50

Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam
Department of Botany
Practical syllabus of Botany Course – 3 /Semester – III Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

(Total hours of laboratory exercises 30 Hrs. @ 02 Hrs./Week)

Course Outcomes:

On successful completion ofthispractical course students shall be able to:

1. Get familiarized with techniques of section making, staining and microscopic study of vegetative, anatomical and reproductive structure of plants.
2. Observe externally and under microscope, identify and draw exact diagrams of the material in the lab.
3. Demonstrate application of methods in plant ecology and conservation of biodiversityand qualitative and quantitative aspects related to populations and communities of plants.

Practical Syllabus

1. Tissue organization in root and shoot apices using permanent slides.
2. Anomalous secondary growth in stemsof *Boerhavia* and *Dracaena*.
3. Study of anther and ovule using permanent slides/photographs.
4. Study of pollen germination and pollen viability.
5. Dissection and observation of Embryo sac haustoria in *Santalum*or*Argemone*.
6. Structure of endosperm (nuclear and cellular) using permanent slides / Photographs.
7. Dissection and observation of Endosperm haustoria in *Crotalaria* or *Coccinia*.
8. Developmental stages of dicot and monocot embryos using permanent slides / photographs.
9. Study of instruments used to measure microclimatic variables; soil thermometer, maximum and minimum thermometer, anemometer, rain gauze, and lux meter. (visit to the nearest/local meteorology station where the data is being collected regularly and record the field visit summary for the submission in the practical).
10. Study of morphological and anatomical adaptations of hydrophytes and xerophytes (02 each).
11. Quantitative analysis of herbaceous vegetation in the college campus forfrequency, density and abundance.

12. Identification of vegetation/various plants in college campus and comparison with Raunkiaer's frequency distribution law.
13. Find out the alpha-diversity of plants in the area
14. Mapping of biodiversity hotspots of the world and India.

Dr.V.S.Krishna Govt. Degree College (Autonomous), Visakhapatnam

Department of Botany

Model paper for Practical Examination

Semester – III/ Botany Course – 3

Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity

Max. Time: 3 Hrs. Max. Marks: 50

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1. Take T.S. of the material 'A' (Anatomy), prepare a temporary slide and justify the identification with specific reasons. 10 M
2. Write the procedure for the experiment 'B' (Embryology) and demonstrate the same. 10 M
3. Take T.S. of the material 'C', prepare a temporary slide and justify the identification with specific reasons. 10 M
4. Identify the following with specific reasons. 4 x 3 = 12 M
   D. Anatomy/Embryology
   E. Ecology instrument
   F. Mapping of Biodiversity hot spot
   G. Endemic/endangered plant/animal
5. Record + Viva-voce 5 + 3 = 8 M

Suggested co-curricular activities for Botany CoreCourse-3 in Semester-III:

A. Measurable :

a. Student seminars :

1. Anatomy in relation to taxonomy of Angiosperms.
2. Nodal anatomy
3. Floral anatomy
4. Embryology in relation to taxonomy of Angiosperms.
5. Apomictics and polyembryony.
6. Biogeochemical cycles- Carbon, Nitrogen and Phosphorous.
7. Deforestation and Afforestation.
8. Green house effect and ocean acidification.

9. The Montreal protocol and the Kyoto protocol.
10. Productivity of aquatic ecosystems.
11. Mangrove ecosystems in India.
12. Kollerulake – Ramsar site.
13. Biodiversity hotspots of the world.
14. Origin of Crop plants - Vavilov centers
15. Agrobiodiversity
16. International organizations working on conservation of Biodiversity
17. Nagoya protocol – ABS system.
18. Endemic and endangered plants in Andhra Pradesh.

b. Student Study Projects :

1. Stomata structure in plants from college campus/ their native place.
2. Report on xylem elements in plants using maceration technique.
3. Collection of information on famous herbaria in the world and preparation of a report.
4. Microscopic observations on pollen morphology from plants in college Campus/ their native locality.
5. Study report on germination and viability of pollen in different plants.
6. Observation of anthesis time in different plants and their pollinators.
7. A report on autecology and synecology of some plants in college campus their native place.
8. Collection of photos of endemic/endangered plant and animal species Makean album.
9. Biodiversity of the college or their own residential/ native area.
10. Collection of seeds/vegetative organs of rare plant species from their localities and to raise/grow in college garden

c. Assignments: Written assignment at home / during '0' hour at college: preparation of charts with drawings, making models etc., on topics include syllabus.

B. General :

1. Visit to an arboretum/silviculture station/Forest research institute to see live timber yielding plants or to visit a local timber depot. to observe various woods.
2. Field visit to a nearby ecosystem to observe the abiotic-biotic relationships.