

BOARD OF STUDIES IN B.Sc BOTANY

2023-2024

DEPARTMENT OF BOTANY

SYLLABUS FOR B.Sc BOTANY Honours

&

B.Sc BOTANY



PITHAPUR RAJAH'S GOVERNMENT COLLEGE

**Autonomous and Accredited with 'A' Grade by NAAC (3.17 CGPA)
KAKINADA – 533 001, E G Dist., ANDHRA PRADESH**

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II B.Sc., -Botany-III / III Semester End (W.E.F. 2023-24)

Anatomy, Embryology of Angiosperms, Plant Ecology and Biodiversity

Total hours of Teaching 60hrs @ 4 hrs/week

Total Credits:02

Learning outcomes:

- On successful completion of this course, the students will be able to;
- Understand on the organization of tissues and tissue systems in plants.
- Illustrate and interpret various aspects of embryology.
- Discuss the basic concepts of plant ecology, and evaluate the effects of environmental and biotic factors on plant communities.
- Appraise various qualitative and quantitative parameters to study the population and community ecology.
- Correlate the importance of biodiversity and consequences due to its loss.
- Enlist the endemic/endangered flora and fauna from two biodiversity hot spots in India and assess strategies for their conservation.

Unit – 1: Anatomy of Angiosperms **12 Hrs.**

1. Organization of apical meristems: Tunica-carpus theory and Histogen theory.
2. Tissue systems–Epidermal, ground and vascular, Special tissue.
3. Anomalous secondary growth in *Boerhaavia*, *Dracaena*
4. Study of timbers of economic importance - Teak, Red sanders and Rosewood.

Unit – 2: Embryology of Angiosperms **12 Hrs.**

1. Structure of anther, anther wall, types of tapetum. Microsporogenesis and development of male gametophyte.
2. Structure of ovule, Megasporogenesis; types of embryo sacs- monosporic, bisporic and tetrasporic .
3. Outlines of pollination, polyembryony and fertilization.
4. Endosperm - Types and biological importance - Free nuclear, cellular, helobial and ruminate.
5. Development of Dicot (*Capsella bursa-pastoris*) Embryo, development of monocot embryo

Unit – 3: Basics of Ecology **12 Hrs.**

1. Ecology: definition, branches and significance of ecology.
2. Ecosystem: Concept and components, energy flow, food chain, food web, ecological pyramids.
3. Ecotypes, Ecotone and Ecads.
4. Plants and environment: Climatic (light and temperature), edaphic and biotic factors.
5. Ecological succession: Hydro sere and Xerosere.

Unit – 4: Population, Community and Production Ecology **12 Hrs.**

1. Population ecology: Natalty, Mortality, growth curves, ecotypes, ecads
2. Community ecology: Frequency, density, cover, life forms, biological spectrum
3. Concepts of productivity: GPP, NPP and Community Respiration
4. Secondary production, P/R ratio and Ecosystems.

Unit – 5: Basics of Biodiversity **12 Hrs.**

1. Biodiversity: Basic concepts, Convention on Biodiversity - Earth Summit.
2. Value of Biodiversity; types and levels of biodiversity and Threats to biodiversity

3. Biodiversity Hot spots in India. Biodiversity in North Eastern Himalayas and Western Ghats.
4. Principles of conservation: IUCN threat-categories, RED data book, WWF, UNEP, UNESCO.
5. Role of NBPGR and NBA in the conservation of Biodiversity.
6. Role of Biodiversity board to protect Biodiversity of A.P

Text books :

- Botany – III (Vrukshasastram-I): Telugu Academy, Hyderabad Botany – IV (Vrukshasastram-II): Telugu Academy, Hyderabad
- Pandey, B.P. (2013) *College Botany, Volume-II*, S. Chand Publishing, New Delhi Pandey, B.P. (2013) *College Botany, Volume-III*, S. Chand Publishing, New Delhi
- 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
- Bhojwani, S. S. and S. P. Bhatnagar (2000) *The Embryology of Angiosperms (4th Ed.)*, Vikas Publishing House, Delhi.
- Pandey, A. K. (2000) *Introduction to Embryology of Angiosperms*. CBS Publishers & Distributors Pvt. Ltd., New Delhi
- Maheswari, P. (1971) *An Introduction to Embryology of Angiosperms*. McGraw Hill Book Co., London.
- Johri, B.M. (2011) *Embryology of Angiosperms*. Springer-Verlag, Berlin
- Pandey, B.P. (2013) *College Botany, Volume-III*, S. Chand Publishing, New Delhi
- Bhattacharya, K., A. K. Ghosh, & G. Hait (2011) *A Text Book of Botany, Volume- IV*, New Central Book Agency Pvt. Ltd., Kolkata
- Kormondy, Edward J. (1996) *Concepts of Ecology*, Prentice-Hall of India Private Limited, New Delhi
- Begon, M., J.L. Harper & C.R. Townsend (2003) *Ecology*, Blackwell Science Ltd., U.S.A.
- Eugene P. Odum (1996) *Fundamentals of Ecology*, Natraj Publishers, Dehradun
- Sharma, P.D. (2012) *Ecology and Environment*. Rastogi Publications, Meerut, India.
- N.S. Subrahmanyam & A.V.S.S. Sambamurty (2008) *Ecology Narosa Publishing House*, New Delhi
- K. Agrawal & P.P. Deo (2010) *Plant Ecology*, Agrobios (India), Jodhpur
- Kumar, H.D. (1992) *Modern Concepts of Ecology (7th Edn.)*, Vikas Publishing Co., New Delhi.
- Newman, E.I. (2000): *Applied Ecology* Blackwell Scientific Publisher, U.K.
- Chapman, J.L. & M.J. Reiss (1992): *Ecology - Principles & Applications*. Cambridge University Press, U.K.
- Kumar H.D. (2000) *Biodiversity & Sustainable Conservation* Oxford & IBH Publishing Co Ltd. New Delhi.
- U. Kumar (2007) *Biodiversity: Principles & Conservation*, Agrobios (India), Jodhpur

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II Year B.Sc., Degree Examinations at III Semester End
Botany Paper III: ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS, PLANT
ECOLOGY AND BIODIVERSITY
(Course: BO4207 Model Paper w.e.f. 2023-24)

Time: 2 Hrs.

Max. Marks: 50

SECTION – A

3 × 10 = 30 M

Answer any **THREE** of the following by choosing atleast one question from each Part., draw neat and labeled diagrams wherever necessary

PART – I

1. Give an essay on shoot Meristems?
2. Describe the tetrasporic Embryosac and their development.
3. Give a note on Ecosystem? Describe the different components of an Ecosystem?

PART – II

4. General account on Community Ecology?
5. Give a detailed note on Biodiversity Hotspots in India
6. Write an essay on Xylem tissue

SECTION – B

4 × 5 = 20 M

Answer Any **FOUR** Of The Following Questions, Draw Neat And Labeled Diagrams Wherever Necessary

7. Histogen theory
8. Latisiferous tissue
9. Polyembryony
10. Types of tapetum
11. Food chain
12. Life forms
13. Red Data Book

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II B.Sc., Practical syllabus of Botany Core Course – 3 /Semester – III
Anatomy and Embryology of Angiosperms, Plant Ecology and
Biodiversity

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

Practical Syllabus

1. Tissue organization in root and shoot apices using permanent slides.
2. Anomalous secondary growth in stems of *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*..
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 gauge, 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 for frequency, density and abundance.
12. Identification of vegetation/various plants in college campus and comparison with Raunkiaer's frequency distribution law.
13. Mapping of biodiversity hotspots of the world and India.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II B.Sc., Botany Practical Examinations at the End of Semester-III
Anatomy and Embryology of Angiosperms, Plant Ecology and Biodiversity
Botany Practical Model Paper-III (w.e.f 2023-24)

Time: 2 hours

Max. Marks: 50

1. Analyze the T.S. of the material 'A' (Anatomy),
prepare a temporary slide and justify the identification with specific comments. 1 X 10 = 10 M
2. Illustrate the procedure for the experiment 'B' (Embryology) and demonstrate the same
1 X 10 = 10 M
3. Analyze the T.S. of the material 'C',
prepare a temporary slide and justify the identification with specific comments. 1 X 10 = 10 M
4. Identify the following with specific comments. 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

50 M

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II B.Sc., -Botany/ III Semester End (W.E.F. 2023-24)
Anatomy, Embryology of Angiosperms, Plant Ecology and Biodiversity
Mapping as per Blooms Taxonomy

S. N O	Subject	Sem ester	Title of the course (Paper)	Topic	Parameters as per Blooms Taxonomy (knowledge/ Application / Creativity/ Innovation)	Experiential learning component	Scope (skill/ employability/entrepreneurship)
1	Botany	III	Anatomy, Embryology of Angiosperms, Plant Ecology & Biodiversity	Anatomy of Angiosperms	Knowledge	Shall be shown by microscope & Photographs	Skill
2	Botany	III	Anatomy, Embryology of Angiosperms, Plant Ecology & Biodiversity	Embryology of Angiosperms	Knowledge	Shall be shown by microscope & Photographs	Skill
3	Botany	III	Anatomy, Embryology of Angiosperms, Plant Ecology & Biodiversity	Basics of Ecology	Knowledge	Lecture	Skill
4	Botany	III	Anatomy, Embryology of Angiosperms, Plant Ecology & Biodiversity	Population, Community and production Ecology	Knowledge	Lecture	Skill
5	Botany	III	Anatomy, Embryology of Angiosperms, Plant Ecology & Biodiversity	Basics of Biodiversity	Knowledge	Lecture	Skill

CO-PO Mapping

	Pithapur Rajah's Government College (Autonomous) Kakinada	Program & Semester II B.Sc. (III Semester)			
Course3	TITLE OF THE COURSE Anatomy, Embryology of Angiosperms, Plant Ecology & Biodiversity				
Teaching	Hours Allocated: 60 (Theory)				
Pre-requisites:		3	1	-	3

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand on the organization of tissues and tissue systems in plants.
CO2	Illustrate and interpret various aspects of embryology.
CO3	Discuss the basic concepts of plant ecology, and evaluate the effects of environmental and biotic factors on plant communities.
CO4	Appraise various qualitative and quantitative parameters to study the population and community ecology.
CO5	Correlate the importance of biodiversity and consequences due to its loss.

CO-PO Mapping:

(1:Slight[Low]; 2:Moderate[Medium]; 3:Substantial[High], -:No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	3	3	3	3
CO2	1	2	2	2	3	3	2	3	3	3
CO3	1	2	3	3	3	3	2	3	3	3
CO4	1	2	3	3	1	2	2	3	3	3
CO5	2	2	3	2	2	3	3	3	3	3