BOARD OF STUDIES
IN
B.Sc BOTANY

2022-2023

DEPARTMENT OF BOTANY

SYLLABUS FOR 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. 2022-23)

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, Megaspoorogenesis; types of embryo sacs- monosporic, bisporic and tetrasporic .
3. Outlines of pollination, polyembryony and fertilization.
4. Endosperm - Types and biological importance - Free nuclear, cellular,helobialand ruminate.
5. Development of Dicot (*Capsella bursa-pastoris*) 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. Eotypes, 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: Natality, 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.
5. Carbon foot printing

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
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 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*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 for frequency, 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.

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 2022-23)

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/ III Semester End (W.E.F. 2022-23)
ANATOMY AND EMBRYOLOGY OF ANGIOSPERMS, PLANT ECOLOGY AND BIODIVERSITY

II B.Sc-Botany-III Semester Question Bank

UNIT – I: PLANT ANATOMY

Essay Questions.

1 Essay on Shoot Apical Meristem?
2 Essay on Xylem
3 Explain the anomalous secondary growth in stem of Boerhaavia ?
4 Explain the anomalous secondary growth in stem of Dracaena ?

Short Answer Questions

1 Histogen Theory
2 Tunica Carpus Theory
3 Teak wood
4 Red Sanders
5 Rose Wood
6 Latisiferous Tissue

UNIT – II: EMBRYOLOGY OF ANGIOSPERMS

Essay Questions.

1. Tetrasporic embryosac and their development
2. Give an account of Development of male gametophyte in Angiosperms
3 Give an account of types of endosperm

Short Answer Questions

1. Polyembryony
2. Types of tapetum
3. Dicot Embryo development
4. Pnemec Phenomenon
5. Types of Ovules
6. Triple fusion and double fertilization

UNIT –III: Basics of Ecology

Essay Questions

1. Illustrate Ecosystem? Describe the different components of an Ecosystem.
2. Define Ecological succession.
3. Describe the role of Light as an ecological factors.

Short Answer Questions

1 Biotic factors
2 Food chain
3 Food web
4 Ecads and Ecotypes
5 Ecological pyramids

UNIT –IV: Population &Community Ecology

Essay Questions

1. Explain about Community Ecology?
2. Explain about Population Ecology ?
3. Explain Production Ecology?

Short Questions

1. Competition
2. Frequency
3. Growth curves
4. Natality and mortality
5. Life forms
6. Carbon footprinting

UNIT- V: Basics of Biodiversity

Essay Questions

1. Explain the levels of biodiversity
2. Explain the Biodiversity hotspots in India
3. Explain the conservation principles of biodiversity?

Short Questions

1. Earth summit
2. Threat to biodiversity
3. Endemic species of india
4. Role of IUCN in conservation of Biodiversity
5. Red data book

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II Year B.Sc., Degree Examinations at III Semester End
Botany Paper III: ANATOMY AND EMBYOLOGY OF ANGIOSPERMS, PLANT ECOLOGY AND BIODIVERSITY
(Course: BO4207 Model Paper w.e.f. 2022-23)

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. A) Give an essay on shoot Meristems?
   Or
   B) Illustrate anomalous secondary growth in stem Boerhaavia?

2. A) Describe the tetrasporic Embryosac and their development.
   Or
   B) Give an account of development of male gametophyte in Angiosperms?
3. A) Give a note on Ecosystem? Describe the different components of an Ecosystem?
   Or
   B) Describe the role of Light as an ecological Factor ?

PART – II

4 A) General account on Community Ecology?
OR
B) General account on Population Ecology

5 A) Illustrate the levels of Biodiversity
Or
B)Give a detailed note on Biodiversity Hotspots in India

6 A) write an essay on Xylem tissue
OR
B) Explain the types of endosperms.

SECTION – B

4 × 5=20 M

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

1. Histogen theory
2. Types of tapetum
3. Biotic factors
4. Growth curves
5. Threat to Biodiversity
6. Red Data Book

BLUE PRINT FOR QUESTION SETTER

UNIT NO/ TITLE	LAQ	SAQ	MARKS ALLOTED TO THE MODULE
UNIT-I: ANATOMY OF ANGIOSPERMS	**3**	**2**	**40**
UNIT-II :EMBRYOLOGY OF ANGIOSPERMS	**3**	**1**	**35**
UNIT-III: BASICS OF ECOLOGY	**2**	**1**	**25**
UNIT-IV : POPULATION, COMMUNITY, AND PRODUCTION	**2**	**1**	**25**
UNIT-V: BASICS OF BIODIVERSITY	**2**	**1**	**25**
Total marks alloted to all questions including choice			**150**

Note: Question paper setters are requested to adhere strictly to the above blue print while preparing the said paper