



VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

JNANASAGARA CAMPUS, BALLARI-583105

Department of Studies in Botany

II Semester Syllabus

Bachelor of Science

Effective from Academic Year 2021-22

(Revised as per NEP-2020)

DSC2 : DIVERSITY OF NON-FLOWERING PLANTS

Course Title: Diversity of non-flowering plants	Course code: 21BSC2C2DPL
Total contact hours: 56	Course credits –04
Internal Assessment: 40 marks	Duration of SEE: 03 hours
Semester end Examination Marks: 60 marks	

Course Outcome (COs)

At the end of the course, students will be able to understand:

1. The diversity and distinguishing characteristics of nonflowering plants.
2. The morphology, anatomy, reproduction and life cycle of Algae, Bryophytes,
3. Pteridophytes, Gymnosperms and their ecological and evolutionary significance.
4. Paleobotanical evidences supporting origin of non vascular plants.

Unit	Course content	Hours
1	<p>Chapter No. 1. Algae - Introduction and historical development in Biology. General characteristics and classification of algae, Diversity- habitat, thallus organization, pigments, reserve food, flagella types, life-cycle and alteration of generation in Algae. Distribution of Algae.</p> <p>Chapter No. 2. Morphology and reproduction and life-cycles of <i>Nostoc</i>, <i>Oedogonium</i>, <i>Chara</i>, <i>Sargassum</i> and <i>Polysiphonia</i>. Diatoms and their importance. Blue-green algae – A general account. Algal blooms and toxins.</p> <p>Chapter No. 3. Algal cultivation – Cultivation of microalgae – <i>Spirulina</i> and <i>Dunaliella</i>; Algal cultivation methods in India. Algal products – Food and Nutraceuticals, Feed Stocks, food colorants, Fertilizers, aquaculture feed, cosmetics, medicines, dietary fibers from algae and uses.</p>	12

2	<p>Chapter No. 4. Bryophytes – General characteristics and classification of Bryophytes, Diversity-habitat, thallus structure, Gametophytes and sporophytes</p> <p>Chapter No. 5. Distribution, morphology, anatomy, reproduction and life cycles of <i>Riccia</i>, <i>Anthoceros</i> and <i>Funaria</i>. Ecological and economic importance of Bryophytes. Fossil Bryophytes</p>	11
3	<p>Chapter No. 6. General characteristics and classification; structure of sporophytes and life-cycles. Distribution, morphology, anatomy, reproduction and life-cycles in <i>Selaginella</i>, <i>Equisetum</i>, <i>Pteris</i> and <i>Azolla</i></p> <p>Chapter No- 7. A brief account of heterospory and seed habit. Stellar evolution in Pteridophytes. Affinities and evolutionary significance of Pteridophytes. Ecological and economic importance.</p>	11
4	<p>Chapter No. 8. Gymnosperms: General characteristics. Distribution and classification of Gymnosperms. Study of the habitat, distribution, habit, anatomy, reproduction and life-cycles in <i>Cycas</i>, <i>Pinus</i> and <i>Gnetum</i>.</p> <p>Chapter No. 9 Affinities and evolutionary significance of Gymnosperms. Economic importance of Gymnosperms – food, timber, industrial uses and medicines</p>	11
5	<p>Chapter No. 10. Origin and evolution of plants: Origin and evolution of plants through Geological time scale.</p> <p>Chapter No. 11. Paleobotany – Paleobotanical records, plant fossils, preservation of plant fossils – impressions, compressions, petrification's, moulds and casts, pith casts, radiocarbon dating.</p> <p>Chapter No. 12. Fossil taxa – <i>Rhynia</i>, <i>Lepidodendron</i>, <i>Lepidocarpon</i>, <i>Lyginopteris</i> and <i>Cycadeoidea</i>. Exploration of fossil fuels. Birbal Sahni Institute of Paleosciences</p>	11

References

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3. Bhatnagar, S. P. and Alok, M. (1996): Gymnosperms, New Age, Delhi.
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13. Frans Verdoorn (1932): Manual of bryology.
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15. Parihar, N. S. (1965): An Introduction to Embryophyta. Vol. I. Bryophyta.
16. Parihar, N. S. (1977): The Biology and Morphology of Pteridophytes, CBD, Allahabad.
17. Rashid, A. (1986): An introduction to Pteridophytes, Vikas, New Delhi.
18. Russel T. H. (1990): Moss and Liverworts.
19. Smith G. M. (19380): Cryptogamic Botany Vol-II & Bryophytes and Pteridophytes.
20. Sporne, K. R. (1969): Morphology of Gymnosperms, Hutchinson Univ, London.
21. Sporne, K. R. (1970): Morphology of Pteridophytes, Hutchinson Univ, London.
22. Vasishtha B.R and others. Bryophytes S. Chand and Co New Delhi
23. Walton, J. (1953): An introduction to the study of fossil plants.
24. Watson V. (1971): Structure and life of Bryophytes.

DSC2: 21BSC2C2BOT2P: DIVERSITY OF NON-FLOWERING PLANTS

Course Title: Diversity of non-flowering plants	Course code: 21BSC2C2DPP
Total contact hours: 56	Course credits –02
Internal Assessment: 25 marks	Duration of SEE: 03 hours
Semester end Examination Marks: 25 marks	

Course Outcome (COs)

CO I: Obtain laboratory skills/explore non-flowering plants for their commercial applications.

List of experiments

1. Study of morphology, classification, reproduction and life-cycle of *Nostoc / Oscillatoria*
2. Study of morphology, classification, reproduction and life-cycle of *Oedogonium and Chara, Sargassum, Polysiphonia*
3. Preparation of natural media and cultivation of soil algae
4. Study of morphology, classification, reproduction and life-cycle of *Riccia* and *Anthoceros*
5. Study of morphology, classification, anatomy, reproduction and life-cycle of *Selaginella* and *Equisetum*
6. Study of morphology, classification, anatomy, reproduction and life-cycle of *Pteris* and *Azolla*
7. Preparation of natural media and cultivation of *Azolla* in artificial ponds
8. Media preparation and cultivation of *Spirulina*
9. Study different algal products and fossils impressions and slides
10. Study of morphology, classification, anatomy and reproduction in *Cycas*
11. Study of morphology, classification and anatomy, reproduction in *Pinus*
12. Study of morphology, classification and anatomy, reproduction in *Gnetum*
13. Study of important blue green algae causing water blooms in the lakes
14. Visit to algal cultivation units / lakes with algal blooms / Fern house / Nurseries / Geology museum / lab to study plant fossils.

(Note: Botanical study tour to a floristic rich area for 1-2 days and submission of study report is compulsory)

OEC2: Biofertilizers and Biopesticides

Course Title: Biofertilizers and Biopesticides	Course code: 21BSC2O2BO2
Total contact hours: 56	Course credits –04
Internal Assessment: 40 marks	Duration of SEE: 03 hours
Semester end Examination Marks: 60 marks	

Course Outcome (COs)

At the end of the course, student will be able to understand

1. The roles of Bio-pesticides and Bio-fertilizers are used widely by the agricultural society
Biofertilizers supplement the requirements of fertilizers. Ability to distinguish the types of biofertilizers
2. Biological Pesticides are natural pest control agents that are obtained from natural substances
3. Biofertilizers are live products (or latent cells of microbes) and require care in storage, transport, application and maintaining field conditions.
4. Ability to distinguish the types of biofertilizers. These are eco-friendly and renewable resources.
5. Accelerate some biochemical processes and make more nutrients available to the crops. This will improve seed germination and produce thicker roots.
6. In the economy, bio-fertilizers are cost-effective and they also have low manufacturing costs, especially when it comes to nitrogen and phosphorus use
7. To create self-employment opportunities

Unit	Course content	hours
1	Biofertilizers: A general account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers – Azospirillum, Azatobacter, Frankia, Phosphobacteria and Rhizobium.	11 hrs
2	Mass production of microbes: Isolation, characterization, mass inoculum production, field	11 hrs

	applications of Phosphobacteria, Rhizobium, Azospirillum, and Azatobacter.	
3	Cyanobacteria as biofertilizers: A general account of Anabaena, Cyndrospermum, Gleocapsa, Lyngbya, Nostoc, Plectonema, and Tolypothrix. Symbiotic association of cyanobacteria with crop plants. Field application of cyanobacterial inoculants.	11 hrs
4	Mycorrhizal Biofertilizers: Importance of mycorrhizal inoculum, types of mycorrhizae and associated plants. Mass inoculum production of AM Fungi, field applications of Ectomycorrhizae, and AM Fungi. Applications of Mycorrhizae.	11 hrs
5	Biopesticides and Bioinsecticides: Definition, introduction, importance, and limitations of biopesticides and their advantages over synthetic pesticides. Biocontrol of plant diseases, Fungal and bacterial biopesticides- Trichoderma, <i>Bacillus thuringiensis</i> . Viruses, Bacteria and Fungi, Neem plant as insecticides.	11 hrs

References:

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9. Verma A (1999) Mycorrhiza. Springer Verlag, Berlin
10. Ilan chet (Ed.). Innovative approaches to plant disease control. Wiley Inter Science Publication, Ihon Wiley and Sons New York (1987)
11. Agrios GN. Plant Pathology, Fourth Edition 1997, Academic Press.

CBCS Question Paper Pattern for UG Semester End
Examination with effect from the AY 2021-22

Languages /Discipline Core Courses (DSC) & Open Elective Courses
(OEC)

Paper Code:

Paper Title:

Time: 3 Hours

Max. Marks: 60

Instruction: Answer all Sections

SECTION-A

1. Answer the following sub-questions, each sub-question carries **ONE** mark. (10X1=10)

a).

b).

c).

.

.

j).

Note for Section-A: Two sub-questions from each unit.

SECTION-B

Answer any **FOUR** of the following questions, each question carries **FIVE** marks. (4X5=20)

2.

3.

4.

5.

6.

7.

Note for Section-B: Minimum One question from each unit (Q No 2 to 6) and remaining one question from unit II to V (Q.No. 7)

SECTION-C

Answer any **THREE** of the following questions, each question carries **TEN** marks. (3X10=30)

8.

9.

10.

11.

12.

Note for Section- C: One question from each unit. Sub-questions such as 'a' and 'b' may be given for a question in section-C only.

SEC & AECC Subjects

Paper Code:

Paper Title:

Time: 1 Hours

Max. Marks: 30

There shall be Theory examinations of **Multiple Choice Based Questions [MCQs]with Question Paper of A, B, C and D Series** at the end of each semester for **AECCs (Environmental Studies and (ii) Constitution of India)** and **SECs (SEC-1: Digital Fluency, SEC-2: Artificial Intelligence, SEC-3: Cyber Security and SEC-4: Societal Communication)** for the duration of One hour (First Fifteen Minutes for the Readiness of OMR and remaining Forty-Five Minutes for Answering thirty Questions). The Answer Paper is of OMR (Optical Mark Reader) Sheet.

PRACTICAL EXAMINATION QUESTION PAPER AND SCHEME OF EVALUATION

DIVERSITY OF NON-FLOWERING PLANTS

Course: Diversity of non-flowering plants	Course code: 21BSC2C2DPP
Time: 3 hrs	Max Marks: 25

QUESTION PAPER

1. Identify and classify the specimens A, B and C 06
2. Conduct the experiment as per slip D. 06
3. Mounting/ Temporary slide preparation of given material E 02
4. Comment/Preparation of temporary slides F, G and H 06
5. Record and submission of Field Visit Report 05

Scheme of Evaluation

1. **A**-Bryophytes, **B**-Pteridophytes, **C**-Gymnosperms (3x2=6 marks)
Identification and classification-1 mark, Reasons-1 mark
2. **D**- Cultivation of soil algae/cultivation of *Azolla*/cultivation of *Spirulina*(06 marks)
Preparation of Media- 03 marks, Cultivation Procedure -03 marks
3. **E**- Mounting of given algal specimen (02 marks)
Mounting of the specimen-01 marks, Identification and Reasons-01 marks
4. **F**- Pollen grain of Pinus or Gnetum, Mounting-01 marks, Reasons-01 marks
G- Sporangia of Pteridophytes, Mounting-01 marks, Reasons-01 marks
H-Fossils photograph or Impressions of Pteridophytes or Gymnosperms
Identification-01 mark, Reasons- 01 mark
5. Record and submission of Field visit report (05 marks)
Practical Record- 03 marks, Field visit report -02 marks
