



ADIKAVI SRI MAHARSHI VALMIKI UNIVERSITY, RAICHUR

**Under Graduate Curriculum for Degree
of Bachelor of Science (B.Sc.) in
Botany**

(III & IV Semester)

**As per Revised NEP
With Effect from the Academic year from 2025-26 and
onwards**

B.Sc. Semester-IV
Discipline Specific Course (DSC)-
SEMESTER IV
CORE COURSE: BOTANY PAPER -
Course Title: - ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY
Course Code: C4BOT1T1
(Credits: Theory-4, Practicals-2)
THEORY

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
DSC-4	Theory	04	04	64hrs.	3hrs.	20	80	100

Course No	Title of the Course	No. Of Credit	Teaching Hours/Per Week	Formative Assessment	Summative Assessment	Total Marks
DSC-BOT-4.1 Th	ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY	04	04	20	80	100

Programme Name	B.Sc. in Botany	Semester	IV
Course Title	ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY		
Course Code	DSC-BOT-4.1	No. Of Credits	4
Contact Hours	4 hrs/Week	Duration of SEA/Exam	3 Hrs
Formative Assessment	20	Summative Assessment Marks	80

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B.Sc.: Semester – IV
Subject: Botany
Discipline Specific Core Course (DSCC)

Number of Theory Credits	Total Lecture Hours/Semester	Number of Practical Credits	Total Practical hours/Semester
04	64	02	64

Title of the course (theory):

ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY

Course outcome students will be able to

- To know the principles and concept of ecosystems- Components, productions, Energy and limiting factors.
- To know the concepts of productivity, measurements of productivity, food chain, food webs and trophic levels
- To understand the diversity and characters of major ecosystems – Aquatic (Marine and Freshwater), Terrestrial and Agricultural ecosystems
- To know the Concept of biotic community with their Size and structure of biotic community- Physiognomy, Life-forms, stratification, ecotones and concept of edge-effect.
- To understand the causes and patterns of ecological succession, concept of climax.
- To know the Concept of ecological niches, species coexistence, overlapping and niche segregation.
- To know the concept of Eutrophication, Heavy metal pollution, Ozone depletion, greenhouse effect, Global warming and its effect, Acid rains. Pesticide, particulate and nuclear radiation.
- To understand the Solid wastes. Noise Pollution. Pest population and its biological control, invasive species and their effects on native species in aquatic and terrestrial ecosystems.
- To know the Patterns of diversity in a community, Diversity measurement and indices.
- To understand the Global distribution of organisms, concept of islands, biodiversity hotspots. Methods of conservation of biodiversity. Centers for origin of cultivator plants.
- To know the population density, Natality and mortality. Life table, population growth curves, carrying capacity.
- To know the positive and negative interactions among the organisms.

Contents of Theory Course		
Unit	Topics	Teaching Hours
I	<p>Plant ecology, ecosystem and plant succession: Definitions, Principles of Ecology, Brief History, Major Indian Contributions, Scope and importance. Ecological levels of organisation.</p> <p>Ecological factors: Climatic factors: light, temperature, precipitation and humidity.</p> <p>Edaphic factors: Soil and its types, soil texture, soil profile, soil formation; physico-chemical properties of soil - mineral particle, soil pH, soil aeration, organic matter, soil humus and soil microorganisms. Topographic Factors: Altitude</p> <p>Ecological groups of plants and their adaptations: Morphological and anatomical adaptations of hydrophytes, xerophytes, epiphytes and halophytes.</p> <p>General stages of succession. Hydrosere and xerosere.</p>	16
II	<p>Ecosystem Ecology: Introduction, types of ecosystems with examples -terrestrial and aquatic, natural and artificial. Structure of ecosystem: Biotic and Abiotic components, detailed structure of a pond ecosystem. Ecosystem functions and processes: Food chain-grazing and detritus; Food web. Ecological pyramids - Pyramids of energy, biomass and number. Principles of Energy flow in ecosystem. Bio-geo chemical cycles: Gaseous cycles -carbon and nitrogen, Sedimentary cycle-Phosphorus. Ecological succession: Definition, types- primary and secondary.</p> <p>Community Ecology: Community and its characteristics – frequency, density, Abundance, cover and basal area, phenology, stratifications, life-forms. Concept of Ecotone and Ecotypes.</p> <p>Intra-specific and Inter-specific interactions with examples.</p> <p>Ecological methods and techniques: Methods of sampling plant communities – transects and quadrates. Remote sensing as a tool for vegetation analysis, land use – land cover mapping.</p> <p>Population Ecology: Population and its characteristics – Population density, natality, mortality, age distribution, population growth curves and dispersal.</p>	16
III	<p>Phytogeography and Environmental issues:</p> <p>Theory of land bridge, theory of continental drift, polar oscillations and glaciations. Centre of origin of plant – Vavilov's concept, types. Phytogeographical regions – concept, phytogeographical regions of India.</p> <p>Vegetation types of Karnataka – Composition and distribution of evergreen, semi-evergreen, deciduous, scrub, mangroves, shoal forests and grasslands. An account of the vegetation of the Western Ghats.</p> <p>Pollution: Water pollution: Causes, effect, types; water quality indicators, water quality standards in India, control of water pollution (Waste water treatment).</p> <p>Water pollution disasters – National mission on clean Ganga , Minimata, Pacific gyre garbage patch, Exxon valdez oil spill.</p>	

	<p>Air pollution: Causes, effect, air quality standards, acid rain, control.</p> <p>Soil pollution: Causes, effect, solid waste management, control measures of soil pollution. Noise Pollution</p>	
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IV	<p>Biodiversity and its conservation: Biodiversity: Definition, types of biodiversity - habitat diversity, species diversity and genetic diversity, Global and Indian species diversity. SDG's in biodiversity conservation.</p> <p>Values of Biodiversity – Economic and aesthetic value, Medicinal and timber yielding plants. NTFP. Threats to biodiversity.</p> <p>Concept of Biodiversity Hotspots, Biodiversity hot spots of India. Concept of endemism and endemic species.</p> <p>ICUN plant categories with special reference to Karnataka/ Western Ghats. Biodiversity Conservation- Indian forest conservation act, Biodiversity bill (2002). Conservation methods – <i>In-situ</i> and <i>ex-situ</i> methods. <i>In-situ</i> methods –Biosphere reserves, National parks, Sanctuaries, Sacred grooves. <i>Ex-situ</i> methods-Botanical gardens, Seed bank, Gene banks, Pollen banks, Culture collections, Cryopreservation.</p>	16
Total		64 Hours

Formative Assessment for Theory	
Assessment Occasion/Type	Marks
Session Test	10
Seminar/Group Discussion	5
Assignment/Field work/Minor project	5
Total	20

Formative Assessment for Practical	
Assessment Occasion/Type	Marks
Session Test	6
Practical Record	2
Assignment/Tour Report/Field Studies	2
Total	10

SUGGESTED REFERENCE BOOKS:

1. Sharma, P.D. 2018. Fundamentals of Ecology. Rastogi Publications.
2. Odum E.P. (1975): Ecology By Holt, Rinert& Winston.
3. Oosting, H.G. (1978): Plants and Ecosystem Wadworth Belmont.
4. Kochhar, P.L. (1975): Plant Ecology. (9th Edn.,) New Delhi, Bombay, Calcutta-226pp.,
5. Kumar, H.D. (1992): Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
6. Kumar H.D. (2000): Biodiversity & Sustainable Conservation. Oxford & IBH Publishing Co Ltd. New Delhi.
7. Newman, E.I. (2000): Applied Ecology, Blackwell Scientific Publisher, U.K.
8. Chapman, J.L&M.J. Reiss (1992): Ecology (Principles & Applications). Cambridge University Press, U.K.
9. Malcolm L. Hunter Jr., James P. Gibbs, Viorel D. Popescu, 2020. Fundamentals of Conservation Biology, 4th Edition. Wiley-Blackwel.
10. Saha T. K., 2017. Ecology and Environmental Biology. Books and Allied Publishers.

B.Sc. BOTANY: Semester - 4
Theory: Discipline Specific Core Course
(DSCC)

ECOLOGY, ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY

LIST OF PRACTICALS TO BE CONDUCTED

Practical No.	Experiments
1	Determination of pH of different types of Soils, Estimation of salinity of soil/water samples.
2	Study of Ecological instruments – Wet and Dry thermometer, Hygrometer, Soil thermometer, Rain Gauge, Barometer, etc
3	Hydrophytes: Morphological adaptations in <i>Pistia</i> , <i>Eichhornia</i> , <i>Hydrilla</i> , <i>Nymphaea</i> . Anatomical adaptations in <i>Hydrilla</i> (stem) and <i>Nymphaea</i> (petiole).
4	Xerophytes: Morphological adaptations in <i>Casuarina</i> , <i>Aloe vera</i> , <i>Optunia</i> <i>Euphorbia tirucalli</i> . Anatomical adaptations in phylloclade of <i>Casuarina</i> .
5	Epiphytes: Morphological adaptations and Anatomical adaptations in epiphytic root of <i>Vanda</i> . Halophytes: study of Viviparyin mangroves, Morphology and anatomy of Pneumatophores.
6	Study of a pond/forest ecosystem and recording the different biotic and abiotic components
7	Demonstration of different types of vegetation sampling methods – transects and quadrats. Determination of Density and frequency.
8	Field visits to study different types of local vegetations /ecosystems and submit the report
9	Determination of water holding capacity of soil samples
10	Determination of Biological oxygen demand (BOD)
11	Determination of Chemical oxygen demand (COD)
12	Determination of soil texture of different soil samples.

SEMESTER IV

CORE COURSE: BOTANY PRACTICAL-

DSC-BOT-4.2 Pr: ECOLOGY AND CONSERVATION BIOLOGY

Time: 03Hours

Max. Marks: 40

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| 1. | Identify & assign the plant 'A' to its respective ecological group. Explain morphological adaptations with labelled diagrams | 8 |
| 2. | Identify & assign the plant 'B' to its respective ecological group. Explain anatomical adaptations with labelled diagrams | 8 |
| 3. | Determination of BOD / COD by given 'C' water samples | 5 |
| 4. | Determination of pH by given 'D' soil / water samples | 3 |
| 5. | Identify and comments on the given slides/ Ecological instruments E, F and G | 6 |
| 6. | Viva voce | 5 |
| 7. | Practical Record | 5 |

Scheme for practical examination

- A. Any plant material
- B. Any plant material
- C. Pond or Tap water
- D. Any type of soil and water sample
- E. and F- Ecological permanent slides
- G. any ecological instruments

SEMESTER SCHEME OF EVALUATION

1 A- Identification	4Marks
Preparation of the slide	2marks
Sketch and label the parts with reasons	2marks
2 B- Requirements	2 Marks
Principle	2 Marks
Procedure	2Marks
Observation and Results	2Marks
Experiment conducts	3Marks
3C- Requirements	1Marks
Procedure	1Marks
Conclusion	1Marks
4. D- Principal	1 Marks
Reading	2 Marks
5. E,F & G–Identification for Each	
Identification	1Marks
Comment and Diagram	2 Marks

