

PRACTICAL
BOTANY -Discipline specific core course- (BOTDSC04P)
Title of the course: Ecology and Conservation Biology

Course No	Type of course	Theory/practical	Credits	Instruction hours per week	Total number of hours / sem.	Duration of Exam	Formative assessment marks	Summative assessment marks	Total marks
4.2	BOTDSC04P	Practical	02	04hrs	52hrs	3hrs	25	25	50

LIST OF PRACTICAL IN ECOLOGY AND CONSERVATION BIOLOGY

1. Determination of pH of different types of Soils, Determination of soil texture of different soil samples
2. **Study of Ecological instruments** – Wet and Dry thermometer, Altimeter, Hygrometer, Soil, thermometer, Rain Gauge, Barometer, etc
3. **Hydrophytes:** Morphological adaptations in *Pistia*, *Eichhornia*, *Hydrilla*, *Nymphaea*
Anatomical adaptations in *Hydrilla*(stem) and *Nymphaea* (petiole).
5. **Xerophytes:** Morphological adaptations in *Asparagus*, *Casuarina*, *Acacia*, *Aloe vera*
Euphorbia tirucalli. Anatomical adaptations in phylloclade of *Casuarina*
6. **Epiphytes:** Morphological adaptations in *Acampe*, *Bulbophyllum*, *Drynaria*.
Anatomical adaptations in epiphytic root of *Acampe/ Vanda*
4. **Halophytes:** study of Vivipary, Pneumatophores in mangroves,
7. Study of a pond/forest ecosystem and recording the different biotic and abiotic components
8. Demonstration of different types of vegetation sampling methods – transects and quadrats Determination of Density and frequency.
9. Application of remote sensing to vegetation analysis using satellite imageries
10. Field visits to study different types of local vegetations/ecosystems and the report to be submitted.
11. Determination of water holding capacity of soil samples
12. Determination of Dissolve oxygen in water sample.
13. Determination of Chemical oxygen demand (COD)
14. Estimation of salinity of soil/water samples.



	density, natality, mortality, age distribution, population growth curves and dispersal.	
III	<p>Phytogeography and Environmental issues: Theory of land bridge, theory of continental drift, polar oscillations and glaciations. Centre of origin of plant – Vavilov’s concept, types. Phytogeographical regions of India.</p> <p>Vegetation types of Karnataka – Composition and distribution of evergreen, semi- evergreen, deciduous, scrub, mangroves, shoal forests and grasslands.</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.</p>	14Hrs
IV	<p>Biodiversity and its conservation</p> <p>Biodiversity: Definition, types of biodiversity - habitat diversity, species diversity and Genetic diversity. SDG’s (Sustainable Development Goals)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. ICUN plant categories with special reference to Karnataka/ Western Ghats.</p> <p>Biodiversity Conservation- Indian forest conservation act, Biodiversity bill (2002).</p> <p>Conservation methods – <i>In-situ</i> and <i>ex-situ</i> methods</p> <p><i>In-situ</i> methods –Biosphere reserves, National parks, Sanctuaries, Sacred grooves.</p> <p><i>Ex-situ</i> methods-Botanical gardens, seedbank, gene bank, pollen bank. cryopreservation.</p>	14Hrs

SUGGESTED REFERENCE BOOKS:

1. Sharma, P.D. 2018. Fundamentals of Ecology. Rastogi Publications.
2. Odum E.P. (1975): Ecology By Holt, Rinert& Winston.
3. Kochhar, P.L. (1975): Plant Ecology. (9th Edn..) New Delhi, Bombay, Calcutta-226pp.,
4. Kumar, H.D. (1992): Modern Concepts of Ecology ,Vikas Publishing Co., New Delhi
5. Kumar H.D. (2000): Biodiversity & Sustainable Conservation. Oxford & IBH New Delhi.
6. Newman, E.I. (2000): Applied Ecology, Blackwell Scientific Publisher, U.K.
7. Saha T. K., 2017. Ecology and Environmental Biology. Books and Allied Publishers



II B Sc- SEMESTER- IV

BOTANY- Discipline specific core course -(BOTDSC04)

Title of The Course: ECOLOGY AND CONSERVATION BIOLOGY

Course No.	Type of course	Theory/ practical	Credits	Instruction hours per week	Total number of hours / sem.	Duration of Exam	Formative assessment marks	Summative assessment marks	Total marks
4.1	BOTDSC04	Theory	04	04hrs	56hrs	2hrs	40	60	100

Course Outcomes: On completion of this course, the students will be able to:

1. Understand core concepts of biotic and abiotic
2. classify the soils on the basis of physical, chemical and biological components
3. Analysis the phytogeography or phytogeographical division of India
4. Evaluate energy sources of ecological system
5. Assess the adaptation of plants in relation to light, temperature, water, wind and fire.
6. Conduct experiments using skills appropriate to subdivisions

UNIT	COURSE CONTENT	HOURS
I	<p>Introduction to Ecology: Definitions, Principles of Ecology, Major Indian Contributions, Scope and importance. Ecological levels of organization.</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.</p> <p>Topographic Factors: Altitude</p> <p>Ecological groups of plants: Morphological and anatomical adaptations of hydrophytes, xerophytes, epiphytes and halophytes.</p>	14Hrs
II	<p>Ecosystem Ecology: Introduction, types of ecosystems with examples - terrestrial and aquatic, natural and artificial</p> <p>Structure of ecosystem: Biotic and Abiotic components, detailed structure of a pond ecosystem.</p> <p>Ecosystem functions and processes: Food chain(Grazing and detritus), Food web, Ecological pyramids: Pyramid of energy, biomass and number. Principles of energy flow in ecosystem.</p> <p>Bio-geo chemical cycles: Gaseous cycles -carbon and nitrogen, Sedimentary cycle-Phosphorus.</p> <p>Ecological succession: Definition, types- primary and secondary. General stages of succession. Hydrosere and xerosere.</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</p>	14Hrs



PRACTICAL SYLLABUS – PAPER-II

Credits-2

1. Study of morphological character of Hydrophytes (*Eichhornia, Elodea*).
Xerophytes (*Casuarina, Opuntia, Nerium*), Epiphyte (*Vanda*), Halophytes (*Rhizophora*), Parasites (*Cuscuta*).
2. Study of Anatomical Characters (Slides only)
Elodea, Nerium or *Casuarina, Rhizophora, Vanda* aerial root, *Cuscuta*.
3. Study of Ecological instruments – photographs of Hygrometer, Anemometer, Rain gauze, Lux meter.
4. Determination of PH of soil, soil porosity.
5. Water holding capacity of different soil samples.
6. Determination of Relative density of Plant species by Qudrat method (Demonstration only).
7. Determination of Total hardness of the given Water sample.
8. Study of plant diseases – Koleroga, Late blight of potato, Grain smut of Sorghum, Blast disease of Rice.
9. Study of plant diseases – Red rot of Sugar Cane, Citrus Canker, Coffee rust, Tikka disease.



Symptoms, causal organism and Management of

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| 1. Koleroga | 5. Red rot of Sugar Cane. |
| 2. Late blight of Potato. | 6. Citrus canker. |
| 3. Grain smut of Sorghum. | 7. Coffee rust. |
| 4. Blast disease of Rice | 8. Tikka disease. |

A brief account of bio-pesticides – Neem, Trichoderma

14 hrs.

References :

1. Odum E.P. (1971) Plant Ecology, W.B. Sanderson Co. Philadelphia.
2. Sharma P.D. (1993) Ecology and Environment, Rastogi publications, New Delhi.
3. Sundarrajan S. (1997), College Botany Vol II, Himalaya Publication.
4. Trivedi. A text book of Environmental Sciences. L.B. Publishers.
5. Ambasht – A text book of Plant Ecology. L.B. Publishers.
6. R.S. Shukla & P.S. Chandel – Test book of Plant Ecology.
7. Singh R.S. Plant diseases. Oxford and IBH, New Delhi.
8. Mehrothra. Plant Pathology.
9. Kochar. Ecology.



II-SEMESTER
PAPER-II PLANT ECOLOGY, PHYTOGEOGRAPHY AND PLANT PATHOLOGY

- Theory : 90 Marks. Credits-4
60Hrs
- 4 Hrs. per week.
- Unit-1: Introduction and scope of ecology. 2 hrs.
- Unit-2: Ecological factors – climatic factor – Light, Temperature Wind, precipitation and Atmospheric humidity. Edaphic factors – Soil Profile, Types of soil, soil Humus, Soil Water, Soil pH, Soil organisms and soil temp. Biotic factors – Positive and Negative interactions. 10 hrs.
- Unit-3 : Ecosystem – Concept, Components, Study of Marine, Grassland and Forest Ecosystems, Food Chain, Food Web, Ecological Pyramids, Production and Productivity (Primary and Secondary), Biogeochemical Cycles – Carbon, Nitrogen and Phosphorus. 10 Hrs.
- Unit-4: Ecological adaptations – Hydrophytes, xerophytes, Halophytes, Epiphytes and parasites.
- Ecological succession – Definition, Process of succession, Xerosere and Hydrosere.
- Pollution – A brief account on air, water and soil. Global issues – Green house effect, ozone depletion, Nuclear winter, Solid Waste management. 14 Hrs.
- Unit-5: Plant biodiversity – Definition, types, values of biodiversity Conservation – Soil Conservation, Social forestry, Hot spots, Endangered species, Red data book.
- Phytogeography - Phytogeographical regions of India, Vegetational types of Karnataka. 10 hrs.
- Unit-6 : Plant pathology – Introduction and classification of plant diseases based on pathogens.

