

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Environmental Science (CC)

Name of the Course: B.Sc. I Sem. I & II (Liberal Science)

(Syllabus to be implemented from June 2022)



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B. Sc. First Year (Liberal Science) Sem.-I

Core Course: ENVIRONMENTAL SCIENCE (Paper-I)

Teaching Scheme:

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

Examination Scheme:

UA – 40 Marks

CIE – 10 Marks

About Course:

The objective of any programme at Higher Education Institute is to prepare their students for the society at large. The PAH Solapur University envisions all its programs in the best interest of their students and in this endeavor it offers a new vision to all its Under-Graduate courses. It imbibes a Learning Outcome-based Curriculum Framework (LOCF) for all its Under Graduate programs.

The LOCF approach is envisioned to provide a focused, outcome-based syllabus at the undergraduate level with an agenda to structure the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen students' experiences as they engage themselves in the programme of their choice. The Under-Graduate Programme will prepare the students for both, academia and employability.

Each programme vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programs also state the attributes that it offers to inculcate at the graduation level. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for employability. In short, each programme prepares students for sustainability and life-long learning.

Environmental Science with its multidisciplinary nature and holistic approach mostly focuses on conservation and management aspects which help for survival of life on earth

by understanding and tackling various problems that deteriorate the quality of the environment. Understanding about Environmental Science is becoming ever more necessary for every person and it is responsibility of all to protect, conserve and restore the quality of our environment by using scientific knowledge.

The new curriculum of B.Sc. (Hons) ENVIRONMENTAL SCIENCE offer essential knowledge and technical skills to study Our Environment in a holistic manner. Students would be trained in all specialized areas of Environmental Science using a unique combination of core and elective papers with significant inter-disciplinary components. Students would be exposed to cutting-edge technologies that are currently used in the study of Earth and Environment, Biotic and Abiotic factors, evolution of flora and fauna and interactions with each other within the ecosystem, needs of biodiversity conservation and advanced technics used in the field of environment. Students would also become aware of the social and environmental significance of wildlife, plants, and their relevance to the national economy.

Scope and Importance:

Environmental Science is broad based and it encompasses a large number of area and major aspects such as Natural Recourses, Ecology and Biodiversity, Environmental pollution and control and Global environmental problems like pollution, climate change, health issues etc. Environmental awareness and education, Environmental legislation and Energy crises.

Applicants wishing to continue their environmental studies might study M.Sc.in Environmental Science further. During this course, candidates acquire environmental science knowledge and abilities. After the training, graduates may have further chances with large income packages from the private, public and government sectors.

B.Sc. (Hons.) Professional environmentalists can work in specific positions offered by top organizations such as environmental consultant, recycling officer, waste management officer, environmental education officer, marine biologist, sustainability consultant, nature conservation agents, transport planner, wildlife cinematographers, etc. Environmental

Science professionals can take-up specific roles in same field. Fresher's can earn on average INR 20K - 2 Lakhs per month, and up to INR 2, - 20LPA can be obtained with expertise.

- 1) **Introduction:** This course includes four papers Paper I: Fundamentals of Earth and Environment Paper II: Elements of Ecology and Environmental Biology Paper III: Physical and Chemical of Environment & Paper IV: Biodiversity Conservation and wild life management. Each paper consists of two units. All these papers help students to improve their basic knowledge about Earth, Earth Processes, Environment, Biodiversity, Ecosystems, Climate, Environmental issues, Physical and Chemical aspects in Environment, wildlife management, Human –wildlife conflicts, biogeochemical cycles etc.
- 2) **Advantages of Course:** All these papers will be helpful to improve their skills in environment field. Practical based papers will be helpful to develop their research and innovative skills & understanding of all the basic loopholes. These papers act as baseline to their next year studies.

Course Prerequisite:

Student shall have knowledge of Environmental Science

Preamble**Course Objectives:**

3) Objectives of the Course: To get the knowledge about surrounding environment includes life on various spheres, studies of environmental segments i.e. Lithosphere, Hydrosphere, Atmosphere and Biosphere characters, structure, and environmental importance. Knowledge about biodiversity includes the forms, size, types, and diversity of bacteria, fungi, parasites, viruses, pathogens, classification, and importance. To get the knowledge about introduction, components of ecosystem, ecological pyramids with food chain and food webs, about the ecological succession, To get knowledge about different concepts in taxonomy understand different classification systems and its merit & demerits, understand identification methods To get the detailed knowledge about characters, environmental pollution, pollutants, sources, causes, effects, control measures with case studies. To get the knowledge about structure, composition, and importance of lithosphere, hydrosphere, atmosphere. To get the knowledge about industrial pollution, municipal solid

waste management and urban and rural environmental issues. To get the knowledge concept, types, examples, case studies of accidents, hazards and disasters.

Course Outcomes:

1. Fascinating world of Environment and Environmental issues.
2. Hands on Training will help students learn use of environmental equipment's, and instruments, laboratory analysis for the study and solve the environmental problem.
3. Making environment friendly designs, flow diagrams in Practical Records will enhance understanding about environmental issues / problem.
4. Use of Illustrations, Photographs, Charts, Permanent Slides, Museum and Herbarium Specimens along with ICT Methods will provide an interesting insight into the beautiful world of flora and fauna.
5. Ecology and Biodiversity conservation includes Medicinal field, Industry, Agriculture, Research and Study, Job Opportunities and Environmental Conservation. This paper is both informative and interesting and will enable students to learn about Biodiversity not only as a plant or nature lover, but also for higher academic pursuits, particularly in the field of Biological Sciences, Environment and Biodiversity Conservation.
6. Understanding of evolution earth and environment, composition, properties and important species in the each sphere.
7. Contemporary approaches in wastewater treatment and environmental biotechnology.
8. Understand about need of EIA and Environmental Audit in environmental management.
9. Know about environmental laws, acts, policies, rules and important circular's or notices.
10. Know about design of bioreactors, factors affecting growth and production
11. Comprehend the techniques and the underlying principles in upstream and downstream processing
12. Learn the occurrence, abundance and distribution of microorganism in the environment and their role in the environment and also learn different methods for

their detection

13. Understand various biogeochemical cycles – Carbon and Nitrogen, and microbes involved.
 14. Understand the basic principles of organism and environment interaction and application of the same in solving environmental problems – waste water treatment and bioremediation
 15. Learn the basic concepts, principles and processes in Environmental Geo-Sciences.
 16. Have the ability of explanation of concepts, principles and usage of the acquired knowledge in environmental chemistry, energy and environment, aquatic biology, computer applications, environmental biotechnology, microbiology, ecological and agricultural applications.
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Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B. Sc. First Year (Liberal Science) Sem.-I

Core Course: ENVIRONMENTAL SCIENCE (Paper-I)

Paper No-I: Fundamentals of Earth and Environment

Teaching Scheme:

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

Examination Scheme:

UA – 40 Marks

CIE – 10 Marks

Unit 1: Fundamentals of Environment

Objective: To get the knowledge about the basics of Environment and various concepts in environmental sciences

Outcome: The student can understand the basic concept of Environmental science

Man, Environment and Evolution:

Objective: To get the knowledge about the evolution, impact on living and non-living things.

Outcome: The student can understand in detail about the concept of evolution, role of man in environmental conservation and how pollutants are affected on man and environment.

Unit 2: Introduction to Earth Systems

Objective: To get the knowledge about the basics of earth and earth processes evolution of earth and major studies of earth and Earth Processes.

Outcome: The student can understand in detail about Earth and Earth Processes.

Fundamentals of Climate Science

Objective: To get the knowledge about the climate condition, classification, important theories and global climatic issues

Outcome: The student can understand importance of climate change and global issues



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B. Sc. First Year (Liberal Science) Sem.-I

Core Course: ENVIRONMENTAL SCIENCE (Paper-II)

Paper –II : Elements of Ecology and Environmental Biology

Teaching Scheme:

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

Examination Scheme:

UA – 40 Marks

CIE – 10 Marks

Paper -II

Elements of Ecology and Environmental Biology

Unit 1: Introduction to Ecology

Objective: To get the knowledge about elements of ecology concept, types of ecosystems with examples.

Outcome: The student can understand about the concept and applications of ecological studies.

Ecosystems

Objective: To get the knowledge about concept of ecosystems, types and examples of ecosystems.

Outcome: The student can understand about uses and losses of ecosystems.

Unit 2: Environmental Biology

Objective: To get knowledge about environmental biology includes terrestrial and aquatic living things

Outcome: The student gets a detailed idea about environmental biology for research and environmental conservation under national and international regulations.

Biogeochemical Cycles

Objective: To get the knowledge about the Bryophytes with suitable example

Outcome: The student can understand and learnt about the various biogeo-chemical cycles.



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B. Sc. First Year (Liberal Science) Semester-II

Core Course: ENVIRONMENTAL SCIENCE (Paper-III)

Paper No. III : Physics & Chemistry of Environment

Teaching Scheme:	Examination Scheme:
Lectures – 3 Hours/week, 2 Credits	UA – 40 Marks
Practical – 4 Hours/week, 4 Credits	CIE – 10 Marks

Paper No. III Physics & Chemistry of Environment

Unit 1: Fundamentals of Environmental Physics

***Objective:** To get the knowledge about the fundamentals of physical and use of various physical methods for environmental conservation.*

***Outcome:** The student can understand about the physical concepts in environmental monitoring and environmental conservation.*

Fundamentals of Energy and Environment

***Objective:** To get the knowledge about the energy and environment with suitable examples.*

***Outcome:** The student can understand and learnt about the various energy resources and energy generation technologies.*

Unit 2: Fundamentals of environmental chemistry

***Objective:** To get the knowledge about the fundamentals of environmental chemistry and its applications.*

***Outcome:** The student can understand and learnt about the various parameters of environmental chemistry for nature conservation*

Fundamental Chemistry of Environmental Segments

***Objective:** To get the knowledge about the Atmosphere, Lithosphere, Hydrosphere and Biosphere chemistry with its structure and composition.*

***Outcome:** The student can understand and learnt about the environmental segments.*



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B. Sc. First Year (Liberal Science) Semester-II

Core Course: ENVIRONMENTAL SCIENCE (Paper-IV)

PAPER IV: Biodiversity Conservation and Wild Life Management

Teaching Scheme:

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

Examination Scheme:

UA – 40 Marks

CIE – 10 Marks

PAPER IV: Biodiversity Conservation and Wild Life Management

Unit 1: Introduction of Biodiversity

Objective: To get knowledge about basics of biodiversity, need and types of biodiversity *using various research and field studies.*

Outcome: *The student can understand about importance of biodiversity and this will help in their further higher studies. They will get employment opportunities in the forest and environment departments, research organization, NGO etc.*

Biodiversity Conservation Conventions and treaties

Objective: *To understand different biodiversity conservation methods and various laws, conventions, and treaties in the biodiversity conservation.*

Outcome: *The student can understand about use of various conventions and treaties for conservation of biodiversity.*

Unit 2: Wild Life Management

Objective: *To understand fundamentals of wildlife management, methods, Nomenclature, Principles and Rules of managements.*

Outcome: *The student can understand different methods of classification and rules of wildlife management where they can get employability.*

Wild Life Conservation

Objective: *To understand fundamentals of wildlife conservation, methods, principles and rules of managements.*

Outcome: *The student can understand different methods of classification and rules of wildlife conservation where they can get employability.*



Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B. Sc. First Year (Liberal Science) Semester-I

Paper No-I: Fundamentals of Earth and Environment

(Lecture 30)

Unit- 1: Fundamentals of Environment

(7 L)

Definition, Principles and Scope of Environmental Science; Moral and Aesthetic Nature of Environmental Science; Objectives and Historic roots of the subject; Need for Public Awareness. Goals of environmental education; Environmental Literacy, Environmental Careers, Environmental Justice, Individual Organisms, Environmentalism, Environmental Education.

Man, Environment and Evolution

(8 L)

Origin of life and speciation, Darwinism and modern synthetic theory of evolution, Natural Selection; Biochemical basis of origin of life; genetic drift. Man-Environment relationships; Impacts of human activity on environment (Agriculture, transportation, mining, urbanization, industrialization); Environmental Degradation and Conservation Issues, Modern concept of environmental conservation, Sustainability and Carrying Capacity.

Unit- 2: Introduction to Earth Systems

(7 L)

Formation of the Earth: formation and composition of core, mantle, crust, atmosphere and hydrosphere; chemical composition of Earth; geological time scale and major changes on the Earth's surface.

Fundamentals of Climate Science

(8 L)

Evolution of earth's atmosphere, composition of atmosphere, Observations and theory of the general circulation of the atmosphere, physical and optical Properties, circulation; interfaces: atmosphere-ocean interface, atmosphere-land interface, ocean-land interface. Global energy balance, the greenhouse effect, natural and anthropogenic climate change, waves in the atmosphere, clouds, weather systems, tropical dynamics and monsoons, ocean circulation

References Book

1. Environmental Science by William P. Cunningham and Mary Ann Cunningham; McGraw-Hill Publications.

2. Environmental Science: Earth as a Living Planet by Botkin and Keller; JOHN WILEY & SONS, INC.
3. A text Book of Environment Studies, Asthana, D. K. and Asthana, M. 2006, S. Chand & Co.
4. Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
5. Atmosphere, Weather and Climate, Barry, R. G. 2003, Routledge Press, UK.
6. Environmental Science: S. C. Santra, New Central Book Agency.
7. Dennis L. Hartmann, Global Physical Climatology, Academic Press, 1994.
8. Wallace J.M. and Hobbs, P.V., Aytmospheric Sciences: An Introductory survey, Academic Press
9. Peixoto J.P and Oort, A.H., Physcs of Climate. American Institute of Physics, New York.

Paper-II: Elements of Ecology and Environmental Biology (Lecture 30)

Unit 1: Introduction to Ecology

(7 L)

Introduction of Ecology (Definition, History, Branches and Scope). Basic principles of Environment and Ecology; Environmental factors (Abiotic and biotic) their importance and role. Concept of Keystone Species, Ecotone, Ecotypes, Ecophene, ecological indicators; Ecological Succession, Major biomes of the world.

Ecosystems

(8 L)

Concept and Types of ecosystem: forest, grassland, lentic, lotic, estuarine, marine, desert, wetlands; ecosystem structure and function; abiotic and biotic components of ecosystem; ecosystem boundary; ecosystem function; ecosystem metabolism; primary production and models of energy flow; secondary production and trophic efficiency; ecosystem connections: food chain, food web; detritus pathway of energy flow and decomposition processes; ecological efficiencies; ecological pyramids, ecosystem input of nutrients; biotic accumulation; ecosystem losses; nutrient supply and uptake.

Unit 2: Environmental Biology

(8 L)

Autecology: Population Characteristics- Dispersion, Density, Natality, Mortality, Age-Structure, Population Growth; Human population & growth; Positive and Negative Interactions of Populations. Synecology: Community Structure, Growth Forms; Methods of Plant Community Analysis;

Biogeochemical Cycles

(7 L)

Concept, types and need of biogeochemical Cycles: Hydrological, Gaseous and Sedimentary Cycle- Carbon, Oxygen, Nitrogen, Phosphorus and Sulphur Cycles. nutrient cycle models; ecosystem input of nutrients; biotic accumulation; ecosystem losses; nutrient supply and uptake; role of mycorrhizae; decomposition and nutrient release; nutrient use efficiency; nutrient budget; nutrient conservation strategies.

References Book

1. Ecology and Environment: P.D. Sharma., Rastogi Publication.
2. Fundamental of Ecology: E. P. Odum, W. B. Saunders Company, USA
3. Ecology, 2nd Edition by Paul Colinvaux, Wiley.
4. Ecology: From Individuals to Ecosystems by Michael Begon & Colin R. Townsend & John L. Harper; Blackwell publishing.
5. Ecology: Theories and Applications (4th Edition) by Peter Stiling; Prentice Hall.

6. Text Book of Environmental Studies, Erach Bharucha, Orient longman Pvt. Ltd., Ernakulam.
7. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders.
8. Groom. B. & Jenkins. M. 2000. Global Biodiversity: Earth's Living Resources in the 21st Century. World Conservation Press, Cambridge, UK.
9. Gurevitch, J., Scheiner, S. M., & Fox, G. A. 2002. The Ecology of Plants. Sinauer associates incorporated.
10. Loreau, M. & Inchausti, P. 2002. Biodiversity and Ecosystem functioning: Synthesis and Perspectives. Oxford University Press, Oxford, UK.
11. Pandit, M.K., White, S.M.& Pocock, M.J.O. 2014. The contrasting effects of genome size, chromosome number and ploidy level on plant invasiveness: a global analysis. *New Phytologist* 203: 697-703.

Semester- II

Paper No. III Physics & Chemistry of Environment (Lecture 30)

Unit 1: Fundamentals of Environmental Physics (7 L)

Basic concepts of light and matter; concept of EMR, spectroscopic concepts: Introduction to the concept of absorption and transmission of light, Beer-Lambert law; scattering of light, Rayleigh and Mie scattering.

Fundamentals of Energy and Environment (8 L)

Basic concepts of pressure, force, work and energy; types of forces and their relation (pressure gradient, viscous, Coriolis, gravitational, centripetal, and centrifugal force); concept of heat transfer, conduction, convection; concept of temperature, lapse rate (dry and moist adiabatic); laws of thermodynamics; concept of heat and work.

Unit 2: Fundamentals of environmental chemistry (7 L)

Concept and basics of Atomic structure, electronic configuration, periodic properties of elements (ionization potential, electron affinity and electronegativity), types of chemical bonds (ionic, covalent, coordinate and hydrogen bonds); mole concept, molarity and normality, quantitative volumetric analysis. Types of chemical reactions; acids, bases and salts, concept of chemical equilibrium, solubility products; solutes and solvents; redox reactions, concepts of pH and pE, electrochemistry. Hydrocarbons, aliphatic and aromatic compounds, organic functional groups, polarity of the functional groups, colloid chemistry. Xenobiotic compounds, chemistry of pesticides and dyes, synthetic polymers.

Fundamental Chemistry of Environmental Segments (8 L)

Concept, types, structure and composition of segments. A) Atmospheric chemistry: Photochemical reactions in atmosphere; smog formation and types of smog, aerosols; acid rain, reactions of NO_x and SO_x; free radicals and ozone layer depletion, role of CFCs in ozone depletion.

B) Water chemistry: Chemical and physical properties of water; Gases in water, alkalinity and acidity of water, hardness of water, calculation of total hardness; solubility of metals, complex formation and chelation; heavy metals in water.

C) Soil chemistry: Soil composition; relation between organic carbon and organic matter, inorganic and organic components in soil; soil humus; cation and anion exchange reactions in soil; nitrogen, phosphorus and potassium in soil.

References-

1. Forinash, K. 2010. Foundation of Environmental Physics. Island Press.
2. Pani, B. 2007. Textbook of Environmental Chemistry. IK international Publishing House.
3. Beard, J.M. 2013. Environmental Chemistry in Society (2nd edition). CRC Press.
4. Boeker, E. & Grondelle, R. 2011. Environmental Physics: Sustainable Energy and Climate Change. Wiley.
5. Connell, D.W. 2005. Basic Concepts of Environmental Chemistry (2nd edition). CRC Press.
6. Girard, J. 2013. Principles of Environmental Chemistry (3rd edition).
7. Jones & Bartlett, Harnung, S.E. & Johnson, M.S. 2012. Chemistry and the Environment. Cambridge University Press.
8. Hites, R.A. 2012. Elements of Environmental Chemistry (2nd edition). Wiley & Sons.
9. Manhan, S. E. 2000. Fundamentals of Environmental Chemistry. CRC Press.

Unit 1: Introduction of Biodiversity (7 L)

Basic concepts and importance; Types (Species diversity, Genetic diversity, Ecosystem diversity); Measurement of Biological Diversity; Biological and Phylogenetic Species Concept; Basic Concept of Species and Speciation. Concept and basis of identification of Biodiversity Hotspots; hotspots in India. Factors for Decline of Biological Diversity, Concept of Extinction, Threatened and Endangered Species; IUCN categorization.

Biodiversity Conservation Conventions and treaties (8 L)

Approaches for Conservation of Biological Diversity: *In-situ* conservation, *Ex-situ* conservation; Role of local communities and traditional knowledge in conservation; Biodiversity convention; International and national efforts to conserve biodiversity. India as a mega diversity nation; Biogeographic zones of country; Forest Types and Forest Cover in India; National parks, Sanctuaries, and Sacred groves in India; important conservation projects; Concepts of gene pool, Bio piracy and bio-prospecting, Biodiversity Rule & acts, Biodiversity Register.

Unit 2: Wild Life Management (8 L)

General introduction; Definition, Importance; Reason for wildlife Depletion; Journey of mankind from predator to conservator; prehistoric association between wildlife and humans: records from Bhimbetkawall paintings; conservation of wildlife in the reign of king Ashoka: excerpts from rock edicts; understanding wildlife management, conservation and policies regarding protected areas in 21st century; positive values provided by wildlife conservation (monetary, recreational, scientific and ecological benefits). Role of government, wildlife biologists and social scientists, concept of deep and shallow ecology. IUCN categories of protected areas, Natural World Heritage sites; concept of core and buffer area in a protected range, brief introduction to Wildlife Protection Act of 1972, Forest act 1927, Environmental Protection Act 1986, and Forest conservation Act 1920; introduction of Tiger task force, Status of current protected areas in India.

Wild Life Conservation (7 L)

Impact of conflict on humans and wildlife, impact of habitat fragmentation, social inequality in terms of forest conservation: forest produce as a need vs. forest exploitation, introduction to tribal rights in India, demographic profile of tribes in India, importance of forest produce to tribal populations, Forest dwellers (Recognition of forest right) Act, 2006. Human wildlife coexistence, Symbiotic relationship between tribals and forest, forest and development, focus on the inclusive growth of tribes: community participation in forest management, case study of Chipko movement, sacred groves forests, ecological economic welfare and development: conservation of

indigenous culture and traditions, role of international organizations, importance of wildlife corridors in minimizing the conflicts and conservation.

References:

1. Woodroffe, R. 2005. *People and Wildlife: Conflict and Coexistence*. Cambridge.
2. Woodroffe, R., Thirgood, S., & Rabinowitz, A. 2005. *People and Wildlife, Conflict or Coexistence?* (No. 9). Cambridge University Press.
3. Conover, M. 2001. *Resolving Human Wildlife Conflicts*, CRC Press.
4. Dickman, A. J. 2010. Complexities of conflict: the importance of considering social factors for effectively resolving human–wildlife conflict. *Animal Conservation* 13: 458- 466.
5. Messmer, T. A. 2000. The emergence of human–wildlife conflict management: Turning challenges into opportunities. *International Biodeterioration & Biodegradation* 45: 97- 102.
6. Paty, C. 2007. *Forest Government and Tribe*. Concept Publishing Company.
7. Treves, A. & Karanth, K. U. 2003. Human--- carnivore conflict and perspectives on carnivore management worldwide. *Conservation Biology* 17: 1491-1499.
8. *The Biodiversity of India*, Bharucha Erach, Mapin Publishing Pvt. Ltd.
9. *Ecology and Environment*: P.D. Sharma., Rastogi Publication.
10. *Biodiversity: An Introduction*, Gaston, K. J. & Spicer, J. I., Blackwell Science, London, UK.
11. *Global Biodiversity: Status of the Earth's Living Resources*, World conservation Monitoring Centre, Groombridge, B., UNEP, Cambridge.
12. *Biodiversity: a beginner's guide*, John I. Spicer, Oneworld Publications.
13. *Environmental Science*: S. C. Santra, New Central Book Agency.

- **Continuous Internal Evaluation (CIE):**

CIE will consist of Home Assignment/Tutorials/Tests/Seminars/field visit/Industrial visit, etc.

PRACTICAL (CORE COURSE)
B. Sc. First Year (Liberal Science)
Semester-I & II

Practical – I: ENVIRONMENTAL SCIENCE

Teaching Scheme:

Practical – 4 Hours/week, 4 Credits

Examination Scheme:

UA – 80 Marks

CIE – 20 Marks

List of Practicals:

(Minimum 20 Maximum 25)

Students should perform minimum 20 practical during Semester I & II

• **List of Practical (based on paper no I to IV):**

1. Good Lab Practices (GLP).
 - i. Instructions
 - ii. DOs and DON'Ts in the Laboratory
 - iii. General Information
 - iv. Introduction
2. Laboratory Safety Rules and Methods
3. Study of effects of human interaction with natural environment.
4. Describe the environmental problem of your locality and suggest a remedy.
5. Choose five common species of Trees / plants from your NEIGHBORHOOD and list their common names. Describe each plant in terms of its height and leaves.
6. To record the following parameters of weather monitoring station:
 - a) Atmospheric Pressure
 - b) Rainfall
 - c) Outdoor, indoor temperature
 - d) Wind speed and Direction
 - e) Humidity & dew point.
7. Survey of vegetation, birds, insects and other animals in an area.
8. To study the quality of a sample of water collected or provided.
9. To determine Texture of various soil samples.
10. To set up an aquarium.
11. To determine the following parameters of grassland vegetation:
 - i. Minimum size and number of quadrat
 - ii. Density of plant species
12. Preparation of field report based on the survey of local flora (herbarium sheet).
13. To determine the primary productivity by light and dark bottle method.
14. To determine chlorophyll content of the given plant material.

15. To study pore space, water holding capacity and bulk density of soil.
16. Qualitative analysis of soil organic carbon, Soil pH.
17. Water and wastewater Acidity
18. Water and wastewater Alkalinity (PA & TA)
19. Total Hardness of water, Calcium Hardness of Water
20. Soil moisture
21. Soil pH
22. Soil electrical conductivity
23. Identification of rocks & minerals (Hand Specimen)
 - a) Rocks- Granite, Basalt, Dolerite, Shale, Sandstone, Limestone, Slate, Marble, Quartzite, Gneiss
 - b) Minerals- Talc, Bauxite, Mica, Quartz, Hematite, Galena
24. Topological sheet interpretation for geomorphology.
25. Field visit, industrial visit, excursion report.