

**SARDAR PATEL UNIVERSITY**  
**SECOND YEAR B. Sc. (THIRD SEMESTER )**  
**ENVIRONMENTAL SCIENCE**  
**US03CENV21 (T): FUNDAMENTALS OF ENVIRONMENTAL SCIENCE**  
**(Four Credit Course, Four hours per week)**  
**(Effective from June – 2019)**  
**(Total Marks-100, Internal-30 marks, External -70 marks)**

**UNIT 1: ENVIRONMENTAL PHYSICS:**

Definition, Principles and scope of Environmental Science, Basic concepts of light and matter, Laws of thermodynamics and the human body, Energy transfers (conduction, convection), Spectroscopic concepts (concept of absorption and transmission of light, Beer–Lambert law), Basic concepts of force, Types of forces and their relation (pressure gradient, viscous, coriolis, gravitational, centripetal, and centrifugal force), Concept of temperature (lapse rate, dry and moist adiabatic)

**UNIT 2: ENVIRONMENTAL CHEMISTRY:**

Atomic structure, Mole concept (molarity and normality), Quantitative volumetric analysis, Types of chemical reactions (acids, bases and salts, solubility products, solutes and solvents), Concepts of pH and electrochemistry, Dissolution and precipitation reactions, Basic concepts of biomolecules (carbohydrates, proteins, lipids and vitamins)

**UNIT 3: ETHICS AND POPULATION ISSUES:**

Introduction and scope of environmental management, Need of environmental ethics, Guiding principles of environmental ethics, Basic directives of environmental ethics, Individual's obligations to community, Rights of nature, Our obligations to future generation, Human population as a global environmental problem, Three phases of population growth (lag phase, rapid growth phase, stabilization phase), Biotic potential, Analysing the pattern of population growth.

**UNIT 4: SUSTAINABLE DEVELOPMENT AND SOCIETY:**

Social and cultural construction of 'environment', Developmental issues and related impacts (ecological degradation, environmental pollution), Development-induced displacement, Resettlement and rehabilitation (problems, concerns, and compensative mechanisms), Evaluation of sustainable development, Participation of Community in Sustainable development, Project Affected People (PAPs), Imperatives for sustainable development, Slacking pace of climate change, Green Technologies for sustainable development, Major conservation efforts for society – WWF, IUCN, UNEP, CPCB, MOEF, GCPC, CITES, ENVIS, Role of NGO's in Environment protection.

(\* Designed following UGC Curriculum)

**SUGGESTED READINGS:**

- Environmental Chemistry by A. K. De
- Environmental Science - Arms Karen
- Destruction of hazardous chemicals- G.Lunn, E.B.Sandome
- Essentials of Nuclear Chemistry, H. J Arnika, Wiley Eastern Limited, 4<sup>th</sup>Edition.(1995)
- Principles of Environmental Science-Watt, K. E. F. (1973) McGraw-Hill Book Company.
- Environmental Science –Noble, B .J. Kormandy, E.J. (1981). The way worldworks, Prentice-Hall Inc., N .J.
- Environmental Issues: Measuring, Analyzing, Evaluating, Abel, Daniel C. McConnell, Robert L. Abel, Daniel C. Edi. 2 Prentice Hall Publication
- Beard, J.M. 2013. Environmental Chemistry in Society (2nd edition). CRC Press.
- Connell, D.W. 2005. Basic Concepts of Environmental Chemistry (2nd edition). CRC Press.
- Forinash, K. 2010. Foundation of Environmental Physics. Island Press.
- Girard, J. 2013. Principles of Environmental Chemistry (3rd edition). Jones & Bartlett.
- Manhan, S. E. 2000. Fundamentals of Environmental Chemistry. CRC Press.
- Pani, B. 2007. Textbook of Environmental Chemistry. IK international Publishing

**SARDAR PATEL UNIVERSITY**  
**SECOND YEAR B. Sc. (THIRD SEMESTER )**  
**ENVIRONMENTAL SCIENCE**  
**US03CENV22 (T): ECOLOGY & WATER RESOURCES**  
**(Four Credit Course, Four hours per week)**  
**(Effective from June – 2019)**  
**(Total Marks-100, Internal-30 marks, External -70 marks)**

**UNIT 1: POPULATION ECOLOGY:**

Introduction, Population characteristics (spacing, size and density, dispersion, growth forms, age structure, natality, mortality), Concepts of growth rate, Survivorship curve, Biotic potential, Population dynamics, Theory of population growth, Population regulation, Species survivability, 'r' and 'k' selected species.

**UNIT 2: COMMUNITY ECOLOGY:**

Definition, Characteristics, Composition, Structure, Origin and development, Analytical characters (quantitative and qualitative), Synthetic characters, Methods of study of communities (floristic methods, physiognomic methods and phytosociological methods), Ecological succession (causes, basic types, general process), Hydrosere, Lithosere.

**UNIT 3: WATER- PROPERTIES & CHEMISTRY:**

Sources and types of water, Hydrological cycle, Precipitation, Runoff, Infiltration, Evaporation, Evapotranspiration, Major inorganic and organic constituents of water, Physical, Chemical and Biological properties of water, water table, vertical distribution of water, Formation and properties of aquifers, Techniques for ground water recharge, River structure and patterns, Watershed and drainage basins

**UNIT 4: WATER RESOURCE AND MANAGEMENT:**

Demand for water (agriculture, industrial, domestic), Overuse and depletion of surface and ground water resources, Water quality standards in India, Hot Spots of surface water, Water Resources Planning and Management (Introduction, Needs, System Components, Planning and Management, Models, Adaptive Integrated Policies, Role of government)

(\* Designed following UGC Curriculum)

**SUGGESTED READINGS:**

- Fundamentals of Ecology – E.P.Odum (1997) Natraj Publishers, Dehradun
- Fundamentals of Ecology – M.C.Dash (1993) Tata Mc. Graw Hill Pub.
- Ecology and Environment – P.D.Sharma
- Bansil, P.C. 2004. Water Management in India. Concept Publishing Company, India.
- Brebbia, C.A. 2013. Water Resources Management VII. WIT Press.
- CEA. 2011. Water Resources and Power Maps of India. Central Board of Irrigation & Power.
- Mays, L.W. 2006. Water Resources Sustainability. The McGraw-Hill Publications.

**SARDAR PATEL UNIVERSITY**  
**SECOND YEAR B. Sc. (THIRD SEMESTER)**  
**ENVIRONMENTAL SCIENCE**  
**US03CENV23 (P): PRACTICAL BASED ON FUNDAMENTALS OF**  
**ENVIRONMENTAL SCIENCE**  
**(Two Credit Course, Four hours per week)**  
**(Effective from June – 2019)**  
**(Total Marks-50, External -50 marks)**

1. To determine pH, temperature, electrical conductivity and turbidity
2. To prepare solutions to understand molarity and normality
3. Verification of Beer's law
  - a)  $\text{KMnO}_4$
  - b) Methylene blue
4. To identify the given carbohydrates
  - a) Glucose
  - b) Fructose
  - c) Sucrose
  - d) Maltose
  - e) Lactose
5. Estimation of lipids
6. Estimation of vitamins
7. Estimation of proteins
8. To study Aldo Leopold's Land Ethic
9. Demonstrate the working of spectrophotometer
10. To estimate sulphate from given water sample
11. To estimate phosphate from given water sample
12. Report writing on Environmental Organization with chart preparation
13. Visit to NGO (environment concerned)

## **PRACTICAL BASED ON ECOLOGY & WATER RESOURCES**

**(Two Credit Course, Four hours per week)**

**(Effective from June – 2019)**

**(Total Marks-50, External -50 marks)**

1. To calculate natality and mortality of given population
2. Estimation of Total Solids, Total dissolved solids and Total Suspended Solids
3. To determine the minimum size of quadrat by species area-curve method
4. To study communities by quadrat method and to determine % frequency, density and abundance
5. To determine minimum number of quadrats required for estimate of biomass in grassland
6. To study frequency of herbaceous species in grassland and to compare the frequency distribution with Raunkiaer's standard frequency diagram
7. To estimate Importance Value Index for grassland species on basis of relative frequency, relative density and relative dominance
8. To determine basal cover or vegetational cover of one herbaceous community by quadrat
9. To measure vegetation cover through point frame method
10. To prepare list of plant occurring in grassland using line transect
11. To determine diversity indices ( richness, Simpson, Shannon-Wiener) in grassland
12. Estimation of Alkalinity and Acidity
13. Estimation of Dissolved Oxygen
14. To estimate Nitrate from given water sample
15. To estimate Boron from given water sample
16. Preparation of water management model