V- **SEMESTER**

Course 12 B : Environmental Chemistry

Credits: 03

Learning Outcomes:

Students after successful completion of the course will be able to:

1) Understand the environment functions and how it is affected by human activities.
2) Acquire chemical knowledge to ensure sustainable use of the world's resources and
3) ecosystems services.
4) Engage in simple and advanced analytical tools used to measure the different types of pollution.
5) Explain the energy crisis and different aspects of sustainability.
6) Analyze key ethical challenges concerning biodiversity and understand the moral principles, goals
7) and virtues important for guiding decisions that affect Earth's plant and animal life.

II Syllabus

UNIT-I Environmental chemistry 9h

Definition – Concept of Environmental chemistry-Scope and importance of environment in now a days – Nomenclature of environmental chemistry – Segments of environment–Effects of human activities on environment – Natural resources–Renewable Resources–Solar and Biomass Energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydrological cycle.

UNIT-II Air Pollution 9h

Definition – Sources of air pollution – Classification of air pollution – Ambient air quality standards- Climate change – Global warming – Pollution from combustion systems- Acid rain –Photochemical smog – Green house effect – Formation and depletion of ozone –

Bhopal gas disaster–Instrumental techniques to monitor pollution – Controlling methods of air pollution.

UNIT-III

Water pollution 9h

Unique physical and chemical properties of water – Water quality standards and parameters – Turbidity- pH Dissolved oxygen – BOD, COD, Suspended solids, total dissolvedsolids,alkalinity–Hardnessofwater–Methodstoconverttemporaryhardwaterintosoft water – Methods to convert permanent hard water into soft water – eutrophication and its effects –Industrial waste water treatment.

UNIT-IV

Chemical Toxicology 9h

Toxic chemicals in the environment – effects of toxic chemicals – cyanide and its toxic effects – pesticides and its biochemical effects – toxicity of lead, mercury, arsenic and cadmium- Solid waste management.

UNIT-V

Ecosystem and biodiversity 9h

Ecosystem : Concepts–structure–Functionsandtypesofecosystem– Abioticandbioticcomponents – Energy flow and Energy dynamics of ecosystem– Food chains – Food web– Tropic levels– Biogeochemical cycles (carbon, nitrogen and phosphorus)

Bio diversity:

Definition – level and types of biodiversity – concept- significance – magnitude and distribution of biodiversity–trends-biogeographical classification of india – biodiversity at national, global and regional level.

Suggested Co-Curricular Activities:

1) Training of students by related industrial experts.
2) Assignments, Seminars, Group discussions, Debates and Quiz(on related topics).
3) Visits to laboratories, firms, research organizations etc.

4) Invited lectures and presentations on related topics by field/industrial experts.

5) Preparation of videos on tools, techniques on selected topics.

I. List of Reference books:

1. Fundamentals of ecology by M.C.Dash
2. A Text book of Environmental chemistry byW. Moore and F.A. Moore
3. Environmental Chemistry by Samir k.Banerji
4. Water pollution, Lalude, MC Graw Hill
5. Environmental Chemistry, Anil Kumar De, Wiley Eastern ltd.
6. Environmental analysis, SM Khopkar (IIT Bombay)
7. Environmental Chemistry by BK Sharma & H Kaur, Goel publishing house.
8. Fundamentals of Environmental Chemistry, Manahan, Stanley. E
9. Applications of Environmental Chemistry, Eugene R. Wiener
10. Web related references suggested by teacher.

V - SEMESTER

Course 12 B Environmental Chemistry

Credits: 01

Environmental Chemistry

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. List out, Identify and handle various equipment in Chemistry lab.
2. Learn the procedures of preparation of standard solutions.
3. Demonstrate skills in operating instruments.
4. Acquire skills in handling spectrophotometer.
5. Analyze water and soil samples.

Laboratory course Syllabus:

1. Identification of various equipment in the laboratory.

2. Determination of carbonate and bicarbonate in water samples by double titration method.
3. Determination of hardness of water using EDTA

   a) Permanent hardness b) Temporary hardness
4. Determination of Chlorides in water samples by Mohr's method.
5. Determination of pH, turbidity and total solids in water sample.
6. Determination of Ca^{+2} and Mg^{+2} in soil sample by flame photometry.
7. Determination of pH in soil samples using pHmetry.

Suggested Co-Curricular Activities:

Mandatory:*(Lab /field training of students by teacher:(lab:10+field:05):*

1) For Teacher: Skills training of students by the teacher in classroom, lab and field for not less than15 hours on field related quantitative techniques for the water quality parameters, soil pollution and air pollution.

2) For Student: Individual visit to any one of the local field agencies/research laboratories in universities/research organizations/private sector culminating writing and submission of a handwritten fieldwork/project work Report not exceeding 10 pages in the given format.

3) Max marks for Field work / project work Report:05.

4) Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations, findings and acknowledgements.*

5) Unit tests (IE).

II. List of Reference books:

1. A Text Book of Quantitative Inorganic Analysis(3^{rd}Edition) –A.I.Vogel
2. Water pollution, Lalude, MC Graw Hill
3. Environmental analysis, SM Khopkar (IIT Bombay)
4. Web related references suggested by teacher.