SELF STUDY PAPER (OPTIONAL)

ENVIRONMENTAL CHEMISTRY FOR SUSTAINABLE WORLD

Semester	Subject Code	Category	Instruction Hours						Credits
			Lecture		Theory		Practical		
			Per Week	Per Semester	Per Week	Per Semester	Per Week	Per Semester	
I	POCCH1SS	Self study Paper (Optional)	-	-	-	-	-	-	2*

COURSE OBJECTIVES

- To provide an insight into the chemical reactions and to apply the principles in analysing pollution in water, air and soil environment.
- To provide an understanding on the fate of chemicals on the environment and suggest relevant interventions.

COURSE OUTCOMES

- On the successful completion of course, students will be able to

CO Number	CO statement	Knowledge level
CO1	Gain the knowledge on atmosphere of earth, global warming and greenhouse gases	**K1 & K2**
CO2	Gain the knowledge on contaminants, their natural pathways of degradation and their abatement	**K2 & K3**
CO3	Acquire knowledge about the various physicochemical parameters which affect the environment	**K3**
CO4	Have a better understanding of soil and water quality parameters by analysing the contaminated samples	**K2 & K4**
CO5	Gain knowledge on the various industrial wastewater treatment methods	**K3 & K4**

*CO-Course Outcomes

Knowledge level K1-Remember; K2-Understand; K3-Apply; K4-Analyze

MAPPING WITH PROGRAM OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	S	M	M	M	M
CO2	M	S	M	M	M	M
CO3	M	S	M	M	M	S
CO4	M	S	M	M	M	S
CO5	M	S	M	M	M	S

UNIT – I : ATMOSPHERIC CHEMISTRY

The atmosphere of Earth-Contaminant behavior in the environment-Greenhouse effect - Global Warming -Acid rain and - Ozone layer depletion.

Fundamental concepts in chemistry – Elements and compounds – Atomic structure – Formation of molecules – Solutions: normality, molality and molarity – Ionization – radicals – Expressing concentrations.

UNIT II: CONTAMINANTS AND THEIR NATURAL PATHWAYS OF DEGRADATION AND THEIR ABATEMENT

Carbon Cycle, Nitrogen Cycle, Sulphur Cycle, CO formation in atmosphere, Organic Pollutants, Pollution from Combustion Systems, Coal, Combustion, Photochemical Smog and Indoor Air Pollution

UNIT- III: PHYSICOCHEMICAL PARAMETERS

pH – Electrical conductivity – Total solids – Total suspended solids – Dissolved oxygen – Carbonates – bicarbonates – Hardness – Calcium – Magnesium – Total alkalinity – Fluoride – Iron – Nitrate – Nitrite –Phosphate Biochemical Oxygen Demand (BOD) – Chemical Oxygen Demand (COD). Biological Parameters: Macrophytes – Phytoplankton – Zooplankton – Primary Productivity. Bacteriological measurements-Standard Plate count method – MPN (Most Probable number)

UNIT-IV: SOIL AND WATER ANALYSIS

Nature of soil – Soil macro and micronutrients – Soil structure and texture – Soil water – Soil air – Soil Temperature – Soil organic matter. Water - Characteristics of bodies of water-Properties of water – Hydrogen Bonding – covalent bonding – ionic bonding –Water sampling: Sampling stations-Collection of water samples – Handling and Preservation. Water analysis: Physical parameters: Colour – Temperature – Transparency – Turbidity.

UNIT - V: INDUSTRIAL CHEMISTRY

Classification of Industries Based on Environmental Impacts, Criteria for Selection of Site for Establishment of Industry, Socio-economic and Environmental Impacts of Industries, Legal and Statutory Requirements, Manufacturing Process and the Sources of Wastes, Characterization & Treatment of Industrial Waste with respect to Paper and Pulp, Tannery, Textile, Dairy, Sugar, Petrochemical, Pharmaceutical, Oil Refinery and Power Plants-Thermal, Gas Based and Hydroelectric.

Distribution of Marks: Theory-90% and Problems-10%

TEXT BOOKS

S.No	Authors	Title	Publishers	Year of publication
1.	Manahan,Stanley E.	Fundamentals of Environmental Chemistry	Boca Raton, CRC Press, LLC	2001
2.	Sonja Krause, Herbert M. Clark, James P. Ferris, Robert L	Strong Chemistry of the Environment	Elsevier Science & Technology	2002
3.	Eugene R. Weiner 2000 CRC Press, LLC	Applications of Environmental Chemistry	CRC Press, LLC	2000
4.	Clair N.Sawyer, Perry L. McCarty, Gene F.Parkin,	Chemistry for environmental engineering and science	McGraw Hill, 5th Edition	2002

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