AOCH501: ENVIRONMENTAL SCIENCE

Credits: 3 **Contact Lecture Hours: 72**

Aim

To study he chemical aspects of environmental issues.

Objectives

To study:

- environmental management and impact assessment
- toxic effects of pollutants
- air, water, and soil pollution

Unit I: Environmental management and impact assessment (10 hours)

Basic principles, concepts and scope of environmental planning Conservation of energy: renewable and non-renewable energy sources - nuclear energy, solar energy, non-conventional energy sources. Environmental pollution: concepts and definition. Impact assessment: aim, concepts and methods, environmental management system: ISO-14001.

Unit II: Chemical toxicology (12 hours)

Toxicity effects, toxic chemicals in the environment, impact of toxic chemicals on enzymes, biochemical effects of As, Cd, Pb, Hg, Co, NO_x, SO_2 , O_3, PAN, CN, pesticides, carcinogenic substances.

Unit III: Air pollution (18 hours)

Primary pollutants: hydrocarbons – photochemical, smog, particulates, radioactivity. Effects of atmospheric pollution: acid rain, ozone layer depletion. Indoor air pollution. Effect of electric and magnetic fields in the environment. Air pollution accidents: Bhopal and Chernobyl. Air quality standards. Sampling and analysis of pollutants – CO, SO_2, H_2S, hydrocarbons, SPM. Noise pollution: measurement, classification, hazards.

Unit IV: Water pollution (20 hours)

Types, effects and sources of water pollution. Pollution of fresh water, ground water and ocean. Thermal pollution. Sampling and measurement of water quality- odour, colour, EC, turbidity, TDS, salinity, COD, BOD, DO, coliform, pH, acidity, CO_2, alkalinity, hardness, NO^{3-}, NO^{2-}, NH3, phosphate, fluoride, chloride, cyanide, sulphide, sulphate and

metals - As, Cd, Fe, Pb, Hg, SAR, WQI. Water quality parameters and standard. Case study: Kuttanadu wetland. Waste water treatment techniques.

Unit V: Lithosphere **(12 hours)**

Composition of soil - reactions in soil. Wastes and pollutants in soil. Sampling procedures and analysis of soil. Cation exchange capacity, lime status, lime requirement, gypsum requirement, pH, N, P, K, S, Ca, Mg. Management of solid waste.

Reference

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2. G. M. Tyler, Living in the Environment: Principles, Connections, and Solutions, Thomson Brooks/Cole, 2005
3. N. Manivasakam, Physico-chemical Examination of Water, Sewage and Industrial Effluents, Pragathi Prakashan, 1984
4. R. K. Khitoliya, Environmental Pollution – Management and Control for Sustainable Development, S. Chand Publishing, 2012
5. B. B. Kebbekus, S. Mitra, Environmental Chemical Analysis, Chapman and Hall, 1998
6. D. D. Mishra, S. S. Dara, A Textbook of Environmental Chemistry and Pollution Control, S. Chand Publishing, 1993
7. R. A. Malviya, Environmental Pollution and its Control Under International Law, Chugh Publications, 1987
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9. G. K. Ghosh, Environmental Pollution – A Scientific Dimension, A. P. H. Publishing Corporation, New Delhi, 2008
10. Nelson L. Nemerow, Industrial Water Pollution: Origins, Characteristics and Treatment, Addison - Wesley Pub. Co., 1971
11. James W. Moore, S. Ramamoorthy, Organic Chemicals in Natural Waters: Applied Monitoring and Impact Assessment, Springer-Verlag, 1984
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