

Course Title: DSE: Industrial Chemicals And Environment <i>w.e.f. the session 2024-25 and onwards</i>	
Class: B.Sc. Pt.-III / Semester-V	Course code: BCH-E501
Lectures 60	Credits: 04
MM: 70	Exam Hrs.:03

NOTE: The question paper shall consist of Two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer (about 150 words) type questions of SIX marks each and student shall be required to attempt any five questions. Sec.-B shall contain 08 descriptive type questions of TEN marks each and student shall be required to attempt any four questions. Both sections shall have questions from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Contents:

Industrial Gases and Inorganic Chemicals

Industrial Gases: Hazards and safety measures in Large scale production (excluding manufacturing process), uses, storage of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, fluorine, sulphur dioxide and phosgene.

Inorganic Chemicals: Hazards and safety measures(excluding manufacturing process.) in the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, borax, bleaching powder, sodium thio-sulphate, hydrogen peroxide, potash alum, potassium dichromate and potassium permanganate.

(15 Lectures)

Environment and its segments

Ecosystems. Biogeochemical cycles of carbon, nitrogen and sulfur.

Air Pollution: Chemical and photochemical reactions in the atmosphere.

Air pollutants: types, sources, particle size and chemical nature; Dust, Smoke and particulates, smog and its constituents. Environmental effects of ozone.

Pollution by SO₂, CO₂, CO, NO_x, H₂S and other foul smelling gases. Effects of air pollution on living organisms and vegetation. Greenhouse effect and Global warming, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and Halogens. (20 Lectures)

Water Pollution: Sources and nature of water pollutants, Techniques for measuring water pollution, Impacts of water pollution on hydrological and ecosystems.

Water purification methods. Effluent treatment plants (primary and secondary treatment).

Industrial waste management, Water quality parameters for waste water, industrial water and domestic water. (15 Lectures)

Energy & Environment

Sources of Energy: Coal, petrol and natural gas. Nuclear Fusion/Fission, Solar energy, Hydrogen, etc.

Nuclear Pollution: Disposal of nuclear waste, nuclear disaster and its management.

(10 Lectures)

Recommended Books/References (Depends on paper)

1. E. Stocchi: *Industrial Chemistry*, Vol-I, Ellis Horwood Ltd. UK.
2. R.M. Felder, R.W. Rousseau: *Elementary Principles of Chemical Processes*, Wiley Publishers, New Delhi
3. J. A. Kent: *Riegel's Handbook of Industrial Chemistry*, CBS Publishers, New Delhi.
4. S. S. Dara: *A Textbook of Engineering Chemistry*, S. Chand & Company Ltd. New Delhi.
5. K. De, *Environmental Chemistry*: New Age International Pvt., Ltd, New Delhi.
6. S. M. Khopkar, *Environmental Pollution Analysis*: Wiley Eastern Ltd, New Delhi
7. S.E. Manahan, *Environmental Chemistry*, CRC Press (2005).
8. G.T. Miller, *Environmental Science* 11th edition. Brooks/ Cole (2006).
9. A. Mishra, *Environmental Studies*. Selective and Scientific Books, New Delhi (2005).

Course Objectives

In this course, students should be able to:

1. To understand the hazards and safety measures in large-scale production, uses and storage of industrial gases and inorganic chemicals.
2. To studies in detail about the various techniques for measuring water pollution and water purification methods.
3. To understand the aspects of the ecosystem, effects of air pollution on biodiversity and the instrumental techniques used for estimation of CO_x, SO_x and NO_x.
4. To studies on nuclear fusion and fission, solar energy and the disposal and management of nuclear waste.

Course Outcomes (COs)

On successful completion of the course with industrial chemicals and environment, the student will be able to:

CO:1 Helped students in attaining basic concepts with a balanced knowledge of fission and fusion.

CO:2 Created awareness about hazards and safety measures in the production and handling of industrial gases and inorganic chemicals for better industrial employment.

CO:3 Developed interest among students for chemistry and its application in various measurements and monitoring techniques of air pollution.

CO:4 Upgrade students' knowledge about basic concepts of water pollution and various methods of water purifications. Educated in various measurements and monitoring techniques of industrial waste management for better industrial employment.

CO:5 Developed and enhanced knowledge about the nuclear disaster and skills for its management.

CO:6 Created awareness about the effects of air pollution on biodiversity.

CO:7 Created the skill in students for better employment in environment monitoring laboratories.

CO:8 Created chemical knowledge in Vedic chemistry with hazardous chemicals and air pollution

Mapping of course Outcomes (COs) with program outcomes (POs)

Course Outcomes/Program outcomes	1	2	3	4	5	6	7	8
CO:1		X						X
CO:2				X				X
CO:3	X		X					
CO:4				X				X
CO:5				X			X	
CO:6			X	X	X			
CO:7			X				X	
CO:8						X		

Note: put 'X' in relevant column of mapping