ICS 404: ENVIRONMENT, HEALTH AND SAFETY MEASURES

Course objectives:

- To understand the environmental segments
- To study the various sources of pollutants, their adverse effect on living organisms and control.
- To study the various available water bodies and hydrologic cycle
- Understanding the maximum contamination level of pollutants in water bodies and their estimation techniques
- To learn the various aspects of quality of products
- To understand the safety and chemical and waste management

UNIT I: **10 hr**

Air Pollution, Analysis & Control Methods: Qualitative study of **e**nvironmental segments, air pollutants, prevention & control, Green house gases & acid rain. Carbon monoxide, sources and control techniques. SO_x-sources, control techniques-scrubbing, limestone injection process. Ozone hole & CFC's.Photochemical smog & PAN. NO_x - Sources, NO_x,control techniques. Particulates: Size distribution, particulate collection-settling chambers, centrifugal separators, wet scrubbers, electrostatic precipitators & fabric filters. Analysis of air pollutants, Dispersion of air pollutants-weather, wind speed and acidity.

UNIT II: **10 hr**

Water, Waste Water Treatment and Analysis: Hydrologic cycle, sources, criteria & standards of water quality- safe drinking water, maximum contamination levels of inorganic & organic chemicals, radiological contaminants, and microbial contaminants. Public health significance & measurement of colour, turbidity, total solids, acidity, fluoride, alkalinity, hardness, chloride, residual chlorine, sulphate, fluoride, phosphate & different forms of nitrogen in natural & polluted water.

UNIT III: **12hr**

Quality Control and Quality Assurance: Role, Government standards like ISI, MINAS, Agmark, I.P., ASTM. Concepts of quality and quality control, the nature of variabilities. Specification and tolerances, sampling inspection, cost reduction and quality improvement experiments. Optimization.

Basic concepts of quality assurance, quality acceptance, sampling, reliability, cost aspects of quality decisions. Quality control in raw materials, production (in process) and finished product. Current trends in quality control, ISO 9000 and ISO 14000 series. Laws related to quality control. ISO 17025.

Chemical Warfare Convention: Definitions and schedules. Toxic chemicals, tear gas, chemical weapons, ocean dumping of chemical weapons.

UNIT-IV: **10 hr**

Good Laboratory Practices: Safety equipments, personal protective equipments, compressed gas safety, procedure for laboratory disposal of explosives, identification, verification and segregation of laboratory waste, disposal of chemicals in the sanitary sewer system, incineration and transportation of hazardous chemicals.

Emergency response-Chemical spills, radiation spills, biohazard spills, fires, medical emergency accident reporting, Safety rules of laboratory acquaintance of experimental set up and instruments,

Intellectual property and intellectual property rights. Data management, importance of safety and security of data. Experimental process and risk assessment

Course Outcome

The student will be able to understand and apply

- Fundamentals, analysis and control methods of air and water pollution
- Quality control and quality assurance aspects used in industry and the laws regarding QA and QC along with chemical warfare convention.
- Thorough knowledge on good lab practices.

References

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5. Environmental chemistry, Ahluwalia V. K., Anne Books India, 2008.
6. Chemistry for Environmental Engineering, Sawyer and McCarty, McGraw Hill, 1978.
7. Environmental Chemistry, I. Williams, John Wiley, 2001
8. Statistical Quality Control, 2nd Edn., Manohar Mahajan Dampat Rai and Sons, 1995.
9. Quality management: a process improvement approach, Fryman Mark A, Cengage learning, 2002.
10. Quality Control, Paranthaman D, Tata, McGraw Hill, 1987.
11. Gupta R. N. Chemical warfare and casualty management 2011
12. Vyas M. N. Safety and hazards management in chemical industries 2013.Atlantic publication.
13. Dikshith T. S. S Safety evaluation of environmental chemicals. New Age International, 1996.

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