

ICE 459: INDUSTRIAL SAFETY, ENVIRONMENTAL AND ELECTROCHEMICAL SCIENCES

Unit I: 10 hrs

Safety: Flammable material handling and fire fighting equipments, control measures for toxic chemicals, industrial hygiene, safety in laboratories & plant, safety in the transportation & storage of chemicals. OHSAS 18000.

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

Unit II: 12 hrs

Quality Control and 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.

Unit III: 10 hrs

Air Pollution: Qualitative study of environmental segments, air pollutants, prevention & control, Green house gases & acid rain. Ozone hole & CFC's. Photochemical smog, PAN and Bhopal Gas tragedy.

Water, Waste Water Treatment and Analysis: Hydrologic cycle, sources, criteria & standards of water quality- safe drinking water. Public health significance & measurement of colour, turbidity, total solids, acidity, fluoride, alkalinity, hardness, chloride, residual chlorine, sulphate, fluoride and phosphate in natural & polluted water. Significance of DO, BOD & COD. Water purification for drinking & industrial purposes, disinfection techniques, demineralization, desalination processes & reverse osmosis.

Energy systems: Chemical energy sources and limitations. Electrochemical energy sources. Principle and importance of primary(dry cell), secondary (Lead-acid battery) and fuel cells (H₂-O₂). Basics of solar energy system. Safety implications. Energy from wind, ocean, geothermal and biomass.

Unit IV: 10hrs

Corrosion: Fundamentals of corrosion. Corrosion related damage, Types of corrosion. Methods of prevention & control (organic & inorganic coating, inhibitors, cathodic & anodic protection, material selection & design improvement). Corrosion problems in practice, passivity.

Metal Finishing & Processing: Metal finishing & technological importance, fundamentals of electrodeposition, electroplating process (copper and Nickel). Principles & applications of electroless plating.

Paints: Classification of paints, types, Constituents of paints. Requirements of a good paint. Emulsion paints. Paint removers.

Electrochemistry of Environment: Global warming, role of electrochemistry in the transport system, fixing of CO₂, sewage disposal and treatment of waste

References

1. A Text Book of Fertilizers, Ranjan Kumar Basak.
2. Agronomy - Theory & Digest, Bidhan Chandra, Krishi Vishwavidyalaya, Mohanpur.
3. Fertilizers, Organic Manures & Biofertilizers—A Product Quality Guide for Major & Micronutrients, HLS Tandon, Fertilizer Development and Consultation Organisation, New Delhi.
4. Handbook on Fertilizer Technology, Bham Swaminathan & Manish Goswami, The Fertilizer, Association of India, New Delhi.
5. Perfumary Technology, B. Billot and F. V. Wells
6. Perfumes, Soaps, Detergents and Cosmetics, S.C. Bhatia, CBS publishers.
7. Introduction to Food chemistry, Suresh Gopalani, Cyber Tech publishers, 2012.
8. Food propagation, Origin propagation analysis, S.N. Mahindru, APH publishers, 2004.
9. Chemistry of Insecticides and fungicides, U S Ramulu
10. Pest management principles and practices, Rajesh ravi, 2007.
11. Biochemical toxicology of Insecticides, R.D. O. Brien, Izuru Yamamoto.

