

Subject Code: 1ET5010201	Subject Name: Hazard Identification, Assessment and Control
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Unit : 1 Safety Appraisal, Analysis and control Techniques

- Safety Appraisal System, Damage control, Total Loss Control (TLC), Job Safety Analysis (JSA)
- Product Safety, Standard (Safe) Operating Procedure (SOP)
- Incident Recall Techniques, Procedures Analysis, Methodical Analysis, Technique for Human Error rate Prediction (THERP)

Unit : 2 Hazard and Risk assessment Techniques

- Definition: Hazards and risk assessment, Hazards, Risk & detection techniques, Hazards and risk progression chart.
- Risk analysis assessment and management, Preliminary Hazard Analysis (PHA) and hazard analysis (HAZAN), Failure mode and effect analysis (FMEA), Hazards and operability (HAZOP) study, Fault tree analysis (FTA), Event tree analysis (ETA)
- Accident or cause consequence analysis, Maximum credible accident assessment.

Unit : 3 Accident and Incident Investigation, Reporting and Analysis

- Accident and Incident Investigation : Philosophy, Purpose, Process and types of investigation, identifying the key factors and the immediate and basic causes, corrective action, Agencies investigation accident, accident investigation form
- Accident and Incident Analysis: Standard classification of factors associated with accident, Methods of collecting and tabulating data, Record keeping.
- Accident Reporting: Reporting to authorities in statutory forms, writing reports, essential elements.

Unit : 4 Major Accident Hazard (MAH) Controls

- Concept of MAH, Definition of “Major Accident Hazard”, Identification and assessment of MAH units, criteria and classification of threshold quantities of Hazardous materials, Types and consequences of Major Accident Hazards : Fire, Explosion and Toxic Release.
- Types and Effects of Gas Dispersion, Types of Toxic Spills, Meaning of Dispersion and Effects.
- Probity analysis.
- Criteria (Identification) for the plant to be under MAH unit.
- Safety Report, Safety audit Report and Risk Assessment Report.

Subject Code: 1ET5010202

Subject Name: Safety Engineering

Unit : 1 Plant Design and Layout

- Citing criteria: General and Environmental guidelines, Meteorological aspect, Separation distances.
- Need for planning and Follow-up, Plant layout and Design, General principles for factory building, Plant and equipment layout and fire protection.
- Statutory provisions under the factories Act 1948 and rules, Indian Standard and national building code.

Unit : 2 Fire and Explosion.

- Fire phenomena: Chemistry of fire, Stage of fire, Factors contributing to fire, Classification of fire, Common cause of industrial fires, spread of fires, Determination of fire load. Fire prevention and protection system, Special safety precaution, Control of fire and explosion in handling / processing flammable liquids, gases, vapors, mists, dusts etc. Effects of combustion products.
- Explosion phenomena: Deflagration, Detonation, Confined and unconfined Vapor Cloud Explosion (VCE), Boiling Liquid Expanding Vapor Explosion (BLEVE).
- Fire emergency action plan and control room.
- NFPA code and standard, on-site emergency plan, off-site emergency plan.

Unit : 3 Electricity safety, lighting (illumination) and color

- Electricity, its usefulness and hazards, statutory provisions, Indian standard, Effect of Electrical parameters on human body, safety measures for electric work, over load and other protection, Electrical work in Hazardous atmosphere, earthing standards, Lockout and Tag-out.
- Lighting (illumination) and colour : Principles of illumination, Types of Light: Natural and artificial, direct and indirect, Light source, Lighting Design fitting and types of installation, Effects of colour on safety.

Unit : 4 Machine Guarding, Noise and Vibration.

- Requirement of machine guarding, Indian standard, Principles of machine Guarding, Types and selection of guard, Mechanical Tool, Inspection, testing & Maintenance.
- Noise and Vibration: Generation, Perception, Nature & Types of noise, Effect & Hazards of noise and vibration, statutory provisions, control Method.

Subject Code: 1ET5010203	Subject Name: Environmental Management System and ISO 14000
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Unit : 1 Environmental Management System in Industry

- Quality of environment.
- ISO 14000 Environment standards, EMS model.
- Policy planning process, implementation and operation in industry.

Unit : 2 Environmental Pollution & Control Techniques

- Definition of pollution, pollutant and significance of pollution of pollution control.
- Types of environment pollution: air, water and land pollution and control.
- Hazardous waste management system : landfill as incineration, environment problems and solution
- Concept of Restoration Ecology and Reclamation of degraded land.

Unit : 3 Environment Impact Assessment and Audits

- Basic concept of EIA, Needs for EIA and Methods.
- Introduction and Significance of Environment Audit.
- Audit regulations, standards and protocols.
- Setting up EIA and Audit Division in Industry.

Unit : 4 Disasters and their management

- Introduction of disasters, Classification and sub types of disasters.
- Industrial disasters and related case studies.
- Precautions of SHE in disaster management
- Relief operation and rehabilitation
- Role of SHE in disaster management

Subject Code: 1ET5010204	Subject Name: Natural Disaster and Industries
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Unit 1: Understanding Disasters

- Definition, Classification and types of Disasters
- Natural Disasters their probable cause and types
- Impacts of Natural Disasters on Man and Materials
- Natural disasters and their impacts on Industry

Unit 2: Disaster Management in Industries

- Terminology used in disaster management
- State Disaster management policies and rules
- Role of safety officer in disaster management in industry
- Economical impacts of natural disasters on industry and role of EHS officer

Subject Code: 1ET5010205	Subject Name: Seminar
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Candidates are required to work for the Project work or for an Industrial Training or Internship related to the subject at least for 15 days and submit the report to the Department. The report will be evaluated by the panel of examiners in the final examination where the candidate shall present their work by Power Point Presentation followed by Viva-voce.