

Industrial Safety

B.E. Sem. VIII [CHEM]

(Elective – III)

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral	–	–
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. Introduction

Concepts, Definitions. Safety Program, Types of accidents. Causes, direct and indirect effects of accidents. Types of damages. Role of safety consideration in Chemical plant Design and Operation. Protective and safety equipments. Measure of risk liabilities of accidents laws. Rules and regulation for prevention of accidents. Disaster control organization, OSHA, Process Safety Management.

2. Toxicology and industrial hygiene

Typical toxins and their biological effects. Outline of their ingestion to and elimination from biological system. Toxicological parameter – Their definitions and outline of the measurement methods. Evaluation exposure to toxicants and its impacts. Source models release and flow of toxic gases and liquids flashing liquids. Dispersion models- Factor affecting dispersion and their modeling. Design and equipments for protection of toxic release in Chemical plants. Management of toxic release scenario.

3. Fire and Explosion

The fire triangle and the factor contributing to fire and explosion. Definitions, Relevant materials, characteristics and properties. Concept of Ignition, Ignition energy. Phenomenon and source of ignition, auto ignition, auto oxidation, adiabatic compression, electrostatic ignition. Role of fuel spray, mists dusts on ignition process. Explosions: various types and conditions for their occurrences. Inerting and Purging of equipments, ventilation of rooms, control of static electricity process control system, Sprinkler system, Fire fighting system.

4. Relief and Relief system

Definitions. Relief requiring scenario. Relief's types and location. Relief's systems, various options and their sizing and application for single and multiple flows. Deflagrations venting for dusts and vapors explosions. The role of Mechanical integrity in Chemical Process Safety.

5. Hazards Identifications

HAZOP, HAZAN and such methods. Safety review and other methods, example. Safety audits. Process Hazards Checklist, Hazards Surveys.

Risks Assessment: Review of probability theory in respect of failures, coincidences etc. leading to unsafe situations. Concepts of event tree and fault tree. Analysis of trees of risk assessment, its advantages and disadvantages for simple examples of application of risk assessment technique.

6. Accidents Investigation

Learning from accidents. Methods of investigating and diagnosing aids for recommending. Root Cause and Root Cause Analysis, Case studies of well known accidents such as Flixborough, Bhopal, Seveso Italy, Pasadena Texas etc.

Safety Management

The essence of safety management, the challenge to safety management. Function of safety management.

Reference Books :

1. Chemical Process Safety Fundamentals with Applications (*Crowl D. Y, Louvar J.F.*) Prentice Hall, Englewood, 1990.
2. Hazards in Chemical Units (*Pandya C.L*) Oxford ISH 1991.
3. Safety Management (*Grimaldi J. H, Simonds, R.H*) 5th edition, AITBS, Delhi, 1990
4. Chemical Process Safety (*Roy E. Slanders*) Learning from Case Histories, Butterworth, 1999.
5. What went wrong? (*Kleitiz T.A*) 3rd edition, Gulf publishing 1995.
6. Loss Prevention in Process Industries, Vol 1-2 and 3, (*Lees F.P*) Butterworth 1995.
7. Safety Related Acts, Rules and Regulations.
8. Handbook of Fire Technology (*Gupta R. S.*) Orient Longman, 1993.
9. Major Industrial Hazards-Their Appraisal & Control (*Withers, J*) Wiley, New Delhi, 1988.
10. Hazard Assessment & Disaster Mitigation in Chemical Process Industries (*CLRI*) Oxford IBH, 1994.

