



# GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Chemical Engineering (semester 6)

Minor Degree : Industrial Process Safety

Subject Code : 116AA01

Subject Name : Industrial safety Practices-I

**Type of course :** Compulsory.

**Prerequisite :** A good understanding regarding basics of safety system, active and passive fire fighting system.

## Rationale :

The main objective of this subject is to study safety aspects in different sector like Metallurgical and Textile industry, Construction industry, information technology industry, chemical industry. The subject also focuses on plant inspection and inspection of various equipment using Non destructive test.

## Teaching and Examination Scheme :

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
3	0	2	4	70	0	30	0	100

## Content :

Sr. No.	Content	Total Hrs.
1	Introduction to safety practices in industry: Classification of industry, different process safety aspects in industry, Challenges in rescue and firefighting operation in High-rise buildings.	3
2	Metallurgical and Textile Industry: Introduction to Metallurgical Industry. Hazards and safety measures of heat treatment operations, Hazards and safety measures of other operations like blasting, welding and cutting, brazing, soldering, polishing, buffing, cleaning etc. Introduction to Textile Industry. Flow chart of textile processes including synthetic textile industry, Machine guarding for Spinning, Weaving and Processing machinery for cotton and synthetic fibre industry, Fire, explosion and health hazards and their control measures. Potential fire risk in textile industries, fire prevention and mitigation planning.	10
3	Construction Industry: Basic parameters governing the safety in construction such as site planning and layout, safe access, safety work permit and checklist, good housekeeping, Safety in the use of construction machinery and equipment, Underground and above ground works. Hazards and Controls Statutory safety requirements, Health and Welfare of construction workers – Dust, noise, vibration, heat, humidity and other hazards. First aid, medical examinations and health records.	8



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4	Information Technology: Safety features of manufacture of electronic valves, tubes, other electromagnetic devices, semiconductors and superconductors, Safety features of Manufacture of Computers, Radio, Television and Communication equipment and apparatus, Hazards involved in testing of IT equipments and their safety measures, Electrical fire safety and installation of electrical equipment in hazardous zones.	5
5	Fertilizer Industry and Pesticide Industry: Types of Fertilizer and manufacturing processes, Flow chart and safety aspects of machinery in use, Hazards due to bulk storages, processes, transfer and transportation of chemicals, dust, noise etc. and their control measures. Types of pesticides and their lethal dosages, Marking, labelling and safe disposal of containers, Manipulation processes, their hazards and controls, Medical treatment in case of exposure. Antidotes.	7
6	Petroleum Refinery and Petrochemical Industry: Petroleum classification and hazards due to petroleum products, Hazards of bulk storages, Storage of Naphtha, propylene, ethylene, xylene, benzene, LPG, petrol, diesel, kerosene etc. and their control measures, Testing of storage vessels and their safety fittings, Safety in Pipeline transport, Stages of manufacturing processes. Hazards and controls during manufacturing process. Testing of pressure vessels, DCS control rooms and instrumentation for safety, Fire and gas detectors and firefighting system.	7
7	Plant Inspection: Non Destructive Tests: Its significance and limitations, Radiography, Ultrasonic, Magnetic Particle Methods, Eddy-Current Method, Dye Penetration test, Strain measurement.	5

### Suggested Specification table with Marks (Theory) : (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	20	10	15	0

**Legends : R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

Note : This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Reference Books :

1. Safety and Health for Engineers by Roger L. Brauer John Wiley & Sons, Inc.
2. Ronald P. Blake, Industrial Safety: Prentice Hall, New Delhi.
3. Accident Prevention Manual for Industrial Operations: National Safety Council, Chicago.
4. Willie Hammer, Occupational Safety Management and Engineering, Prentice Hall.



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## Course Outcomes :

Sr. No.	CO statement	Marks % weightage
CO-1	To understand the safety aspects of metallurgical and textile Industry.	15%
CO-2	To understand the safety aspects of construction industry.	15%
CO-3	To understand the safety aspects of information technology.	15%
CO-4	To Know about the safety aspects of fertilizer industry and pesticide industry.	20%
CO-5	To Know about the safety aspects of petroleum refinery and petrochemical industry.	20%
CO-6	To assess the methods for Non Destructive Tests of material.	15%

## List of Practical/Tutorials :

1. To study dispersion model analysis technique.
2. To perform Dye/Liquid Penetration Test for given sample with visible and fluorescent dye.
3. To study and perform Magnetic Particle test using different methods of magnetization.
4. To study and perform Ultrasonic Test for weld sample.
5. To measure thickness using UT machine for given sample.
6. To study and perform Radiographic Testing.

## Major Equipment :

Non – destructive test assembly (ultrasonic test, magnetic particle test, radiographic test, dye penetration test).

## List of Open Source Software/learning website :

Reference to NPTEL can be made for a better understanding.

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