

# GUJARAT TECHNOLOGICAL UNIVERSITY

## ENVIRONMENTAL ENGINEERING (13) OCCUPATIONAL HEALTH AND SAFETY SUBJECT CODE: 2161305 B.E. 6<sup>th</sup> SEMESTER

**Type of course:** Applied Science

**Prerequisite:** --

**Rationale:** To learn about the health problems associated with occupations and safety aspects of workers

**Teaching and Examination Scheme:**

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M)		ESE (V)		PA (I)		
			PA	ALA	ESE	OEP				
3	2	0	5	70	20	10	30	0	20	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
	(A)Occupational Health		
1	Occupational Health: Classification of occupational health hazards, dangerous properties of chemical and their health effects, routes of entry of toxic material into human body, permissible exposure limits, Threshold limit value, lethal dose and lethal concentration, Ergonomics, constituents of ergonomics, application of ergonomics for safety & health, occupational diseases due to metals & dusts, fumes & chemical compounds	08	20
	(B) Safety		
1	Concept, Philosophy & Psychology of safety: Concept of safety, Nature of concept of safety, Philosophy of safety, safety terminology, philosophy of total safety concept, safety psychology, accident causative factors, general psychological factors.	2	5
2	Accident Causes and prevention: Causation, Accident problem, Reasons for prevention, factors impending safety, Accident prevention	2	5
3	Safety Management: Concept of management, element of management, functions,	4	9

	management principles, safety management & its responsibilities, safety organization		
4	Electrical Safety: Electricity and Hazardous, Indian standards, effects of electrical parameters on human body, safety measures for electric works	4	9
5	Fire and Explosion: Fire phenomena, classification of fire and extinguishers, statutory and other standards, fire prevention & protection system, explosion phenomena, explosion control devices, fire awareness signs	4	9
6	Hazards & Risk identification, Assessment and control techniques: Hazards, Risks & detection techniques, Preliminary hazard analysis(PHA) & hazard analysis(HAZAN), failure mode effect analysis(FMEA), Hazard and operability(HAZOP) study, Hazard ranking (DOW & MOND index), Fault tree analysis, Event tree analysis(ETA), major accident hazard control, on-site and off-site emergency plans.	8	20
7	Personal Protective Equipment: Need of PPE, Indian standards, factors of selection of PPE, non respiratory equipments, respiratory equipments.	4	9
8	Safety in different industries as case study	6	14

#### Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	15	15	15	10	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. Fundamentals of Industrial safety & health by Dr. K. U. Mistry.
2. Social & Preventive Medicines by Yashpal Bedi.
3. Industrial & occupational Safety, Health & Hygein - by AHommadi.
4. Occupational Health, a Practical Guide for Managers -by Ann Fingret & Akin Smith.
5. Environmental Health & Technology - by Y P Kudesia & Ritu Kudesia.
6. Environment & Health by Norman M Triff

#### Course Outcome:

After learning the course the students should be able to:

1. Identify the diseases associated with occupation .

2. Identify the hazards in industrial operation and propose prevention measures.
3. Carry out Hazan and Hazop analysis.
4. Manage safety in industries by suggesting safety measures and PPE.
5. Identify toxic materials and quantify its toxicity.

**List of Tutorials:**

1. Occupational Hazards
2. Occupational diseases
3. Concept, Philosophy & psychology of safety
4. Accident : Causes & prevention
5. Safety management
6. Electrical safety
7. Fire and explosion
8. Hazard and Risk identification, assessment & control techniques.
9. Personal Protective Equipments
10. Safety in Chemical Industry: Case study

**Major Equipment:**

1. COD digestion apparatus.
2. BOD incubator
3. Monopan balance

**ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.