

GUJARAT TECHNOLOGICAL UNIVERSITY

BRANCH NAME: Environmental Management (18)
SUBJECT NAME: INDUSTRIAL HYGINE & SAFETY
SUBJECT CODE: 3711810
M.E. 1st SEMESTER

Type of course: Engineering and Technology

Prerequisite: Health Hazards
 Safety instruments
 Personal Protective Devices

Rationale: To develop basic understanding of Industrial Health & Safety Measures for environmental engineering point of view

Teaching and Examination Scheme :

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction Industrial Hygiene: Historical Aspects, Concept, Definition, Scope, Benefits of Industrial Hygiene With Reference to Environmental Management; Industrial safety: Safety and its significance, safety management, various terms related to safety, safety organization , safety audit; Environment, Health & Safety (EHS) : Purpose, Basic Concept , Role of Industrial Hygienist, Safety Officer, Environmental Engineer/ Officer, Factory Medical Officer and Work Coordination Between them; Introduction of ACGIH ,OSHA, NIOSH, ILO, EPA Etc, Industrial Hygiene Survey Work, Monitoring & Preparation of Database	6	14
2	Work Environment Monitoring Type of Monitoring, Types of air samplings, sampling instruments, Sampling Analysis Methods, Exposure Assessment Monitoring, Personal Exposure Monitoring, Biological Monitoring, Knowledge of Monitoring and Analytical Instrumentation, Significance of Threshold Limit Value, TLV, STEL, Ceiling Limit , BELs	4	10
3	Control of Health Hazards Classification of Health Hazards, Hierarchy of Control, Substitutions, Engineering Control, Administrative Control, Personal Protective Equipments (PPE)	5	12
4	Industrial Ventilation Introduction to Ventilation & General Principal of Ventilation, General Industrial Ventilation, Local Exhaust Ventilation (LEV) Systems, Heat ,Ventilation & Air Conditioning (HVAC), Testing of Ventilation System	4	10
5	Ergonomics	4	10

Sr. No.	Content	Total Hrs	% Weightage
	Introduction of Ergonomics and Its Constituents, OSHA'S ergonomics guideline, Worksite analysis program for ergonomics, hazard prevention and control: Hand Tool and Their Use, Work Station Design, Machine Controls and Display; Medical management program; ergonomics problem solving strategies.		
6	Hazards Identification, Assessment And Control Techniques Hazard Identification and Risk Assessment Techniques, Major Accident Hazard (MAH) Controls, Preliminary hazard analysis, Failure mode effect analysis, Fault tree analysis, Even tree analysis.	5	14
7	Physical Aspect of Work Environment Exposure, Assessment/Effects & Control of Noise, Vibration, Heat Stress, Poor Illumination, Radiation, Non-Ionization and Ionization	4	10
8	Occupational Health And Diseases Route Of Entry Of Toxic Substance Into Human Body, Occupational diseases, ways to reduce risk of occupational diseases, measures for occupational health and safety, Occupational diseases due to Chemical Agents, Physical Agents, Biological Agent, Psychological Agents, Physiological Agents. Ergonomical Agents Etc., Occupational Health and Hygiene Services At Work Place: Occupational Health and Hygiene Centre at Workplace, Ambulance Van and First Aid, Factory Medical Officer, Introduction to Epidemiology and Biostatistics.	6	10
9	Legislation On Industrial Safety And Occupational Health ISO 45001:2018, Factory's Act, Miner's Act, Workmen Compensation Act, Other Acts Related to Safety And Occupational Health and Its Integration With Environment Act	4	10

Reference Books:

1. Fundamentals of Industrial Safety and Health By K U Mistry(2008), Publisher Siddharth Prakashan, Janaki Society, Ahmedabad-380014
2. Industrial safety and environment by Anupama Prashar and Pratibha Bansal, Publisher: S. K. Kataria and Sons
3. Industrial Safety & Environmental Management System R. K. Jain & Prof. Sunil S. Rao, Publisher: Khanna Publishers
4. HAZOP & HAZEN by Trevor Kletz, Publisher: Institutions of Chemical Engineers
5. Health & Safety Handbook by Jeremy Strainks Publisher: Kogan Page
6. Industrial Safety & Health by David L. Goetsch Publisher:Macmillan Publishing Company
7. Industrial Hygiene and Toxicology by Frank A Patty (Revised Edition, Vol-1, 2, 3).
8. Industrial Hygiene by Robert W Allen, Michael D Ellis and Andrew W Hart
9. Industrial Ventilation, A Manual of Recommended Practice, Edition 23, By American Conference of Government Industrial Hygienist(ACGIH)
10. Air Sampling instruments for Evaluation of Atmospheric Contaminants Edition By ACGIH
11. Occupational Lung Diseases by Hans Weill and Turner
12. Occupational Health and Hygiene: Guide Book for the WHSO by David Grantham
13. ILO Encyclopedia on Occupational Health and Safety, Vol-1 and Vol-2
14. Ergonomics at work by David J Osborne, John Wiley and Sons

Course Outcome: At the end of this course, students will be able to solve the industrial & occupational health problems from safety and environmental engineering point of view

List of Exercises:

1. Familiarization with Work Environment Monitoring Instruments and Safety instruments.
2. Case studies: Industrial visits to study and understand the EHS department role and management at various types of industries
3. Engineering Control in Industries like Cement, Textile, Fertilizers, Battery, Chemical, Glass as Case Study
4. Identification of Toxic Effects of Heavy Metals Like Pb, Cd, Mn, As, Hg, Cr, Ni, Etc, Solvents & Gases Like Chlorine, Ammonia, Carbon Monoxide, SO₂, NO_x etc. due to continuous exposure.
5. Cause, symptoms, effects, diagnosis and control of various occupational diseases.

Major Equipments:

- Ion Analyzer
- Sound Level Meter
- Lux meters for simple light meters measuring