

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Chemical Engineering

Semester: 4

Subject Name: SAFTY AND HAZARDS MANAGEMENT IN CHEMICAL INDUSTRY

Sr No.	Course Content
1	Introduction to Safety 1.1.Definition of Safety 1.2.Importance of Safety in Chemical Industries 1.3.Development of safety organization
2	Safety codes and standards 2.1.Indian standards (IS) and codes 2.3.International Standards like ISO 9001, ISO 14001, OHSAS 18001,18002
3	Hazard Identification and Control Techniques 3.1.Hazard identification like..Fire Hazard, Explosion Hazard, Toxic Hazard, Corrosion Hazard 3.2.Failure mode and effect analysis (FMEA) 3.3.Hazard and Operatability study (HAZOP), HAZAN and HAZOP 3.4.Fault Tree analysis (FTA) 3.5.Even Tree analysis (ETA)
4	Chemical Hazards 4.1.Classification of Chemical Hazards and control. 4.2.Notified dangerous occupational health hazards 4.3.Chemical as a cause of occupational diseases and poisoning 4.4.Prevention of diseases due to chemical effect
5	Control of Chemical Plant Hazards 5.1.Industrial plant layout and factors effecting it 5.2.Ventilation and lighting 5.3.Safety factors: Heat and Temperature hazards (a) Thermal Hazards (b) Burns and their effect (c) Chemical burns 5.4.Colour codes and symbols for safety (a) Classification of colours and symbols for safety (b) Identification of colours for gas cylinders (c) Colour codes for pipelines (d) Different types of symbols in chemical industries
6	Other Types of Hazards 6.1.Mechanical Hazards: (a) Common mechanical injuries

	(b) Requirements for all safeguards (c) General precautions 6.2. Electrical Hazards: (a) Sources of electrical hazards (b) Reducing electrical hazards 6.3. Radiation Hazards (a) Terms and concepts (b) Precautions and personal monitoring (c) Instructing and informing personal 6.4. Noise and vibration Hazards (a) Hazard levels and risks (b) Noise control strategies (c) Vibration hazards
7	Fire Hazards and its prevention 7.1. Definition of fire hazards 7.2. Sources of fire hazards 7.3. Fire Triangle 7.4. Classification of different types of fire 7.5. Fire extinguishing agents and methods of applications 7.6. Fire extinguishers in detail along with their working mechanism
8	Personal Protective Devices 8.1. Protection for head, ears, eyes, face, respiratory organs, hands, feet etc.
9	Safe Handling of Hazardous chemicals 9.1. Important characteristics and chemical reaction of hazardous chemicals like (a) Chlorine (b) Nitric acid (c) Ammonia (d) Carbon Monoxide (e) Caustic Soda (f) Phosgene (g) Sulfuric acid (h) HCl 9.2. Transportation of hazardous chemicals 9.3. Storage of hazardous chemicals 9.4. Disposal of hazardous materials

Laboratory Experiences:

1. Demonstration of different types of fire extinguishers
2. Practical application of fire extinguisher for various fires.
3. Demonstration of various personal protective devices.
4. Identification colour & colour codes for pipe & gas cylinder for various chemicals
5. Identification of first aid for different hazard or accidents.
6. Identification of health hazard & remedies for it.
7. To maintain good house keeping
8. Case study
9. Safety regulation.
10. Industrial visit.

Reference Books:

	Name of Books	Author
1.	Chemtech-I	D. Venkateshwarlu K.R. Upendrashta K.D. Charudarshan
2.	Safe handling of hazardous chemicals	A.K. Rohatgi
3.	Industrial safety health	David L. Goetsch
4.	Fire Hazards in industry	Norman Thomson
5.	Industrial Accident Prevention	Charles A. Gaulin, Jr.
6.	Safety in Chemical Industry	O.P. kharbanda E.A. Stallworthy
7.	Hazardous and Toxic Materials	Howard H. Fawcett
8.	Fire Prevention	Lawrence E. Whitman
9.	Industrial Accident Prevention	H.W. Heinrich
10.	Hazards in the Chemical Laboratory	L.Bretherick
11.	Fundamentals of Industrial Safety & Health	K.U.Mistry