



Department of Chemical Engineering	LP: CH18703 Rev. No: 00
B.E/B.Tech/M.E/M.Tech : Chemical Engineering Regulation: 2018A	Date: 04.07.2024
PG Specialisation :	
Sub. Code / Sub. Name : CH18703 / Proces Safety and Professional Ethics	
Unit : I	

**Unit Syllabus: Introduction to Safety Programmes**

Safety in industries; Need for Development; Importance of Safety Consciousness in Indian Chemical Industry; Social Environmental Setup; Tolerance Limit of the Society; psychological Attitude Towards Safety Programmes. Elements of Safety Program; Effective Realization; Economic and Social Benefits; Effective Communication, Training at Various Levels of Production and Operation.

**Objective:** To understand the importance of safety consciousness in Indian chemical industries, psychological attitudes, and the safety procedures to be followed in chemical process industries.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction to Safety in Industries	T2-Ch1; Pg. 1-4	PPT
2	Safety Consciousness in Indian Chemical Industry	T2-Ch1; Pg. 12-19	PPT
3	Social Environmental Setup	T1-Ch5.1; Pg. 861-875	PPT
4	Tolerance Limit of the Society (TLV, PEL)	T2-Ch2; Pg. 35-58	PPT
5	Tolerance Limit of the Society (Gastrointestinal tract)	T2-Ch2; Pg. 35-58	PPT
6	Psychological Attitude towards safety programmes (Ergonomics, Engineering approach, behavior approach)	T1-Ch3.8; Pg. 594-616	PPT
7	Elements of Safety program	T1-Ch2.3; Pg.209-229	PPT
8	Effective Realization	T1-Ch2.3; Pg.209-229	PPT
9	Economic and Social Benefits from Safety Program	T1-Ch1.3; Pg. 64-81	PPT
10	Effective Communication Training at various levels of Production and Operation	T1-Ch1.3; Pg. 64-81	PPT
11	Case Studies	CSB Reports	PPT
12	Case Study: Bhopal Disaster	-	PPT

**Content beyond syllabus covered (if any):**



Sub. Code / Sub. Name: **CH18703 / Proces Safety and Professional Ethics**

Unit: II

### Unit Syllabus: Industrial Safety

Chemical Process Industries; Potential Hazards; Chemical and Physical Job Safety Analysis; High Pressure; High Temperature Operation; Dangerous and Toxic Chemicals; Toxic Substances Definition, Classes of Toxicity, Entry Points for Toxic Agents, Effects of Toxic Substance, Relationship of Doses and Responses, Threshold Limiting Values, Exposure Thresholds, Airborne Contaminants, Confined Spaces Hazards, Respiratory Protection, Prevention and Control, Highly Radioactive Materials; Safe Handling and Operation of Materials and Machineries.

**Objective:** To impart knowledge on potential hazards, job safety analysis, operation involving high pressure, high temperature, toxic chemicals and radioactive materials and handling of machinery

Session No *	Topics to be covered	Ref	Teaching Aids
13	Potential Hazards in Chemical Process Industries	T1-Ch2.5; Pg. 267-296	PPT
14	Chemical and Physical Job Safety Analysis	T2-Ch11; Pg. 471-504	PPT
15	High pressure and High temperature operations	T2-Ch8; Pg. 353-359	PPT
16	Dangerous and toxic substances (Definition and classes)	T2-Ch2; Pg. 42-58	PPT
17	Entry points and effects of toxic substances	T2-Ch2; Pg.36-38	PPT
18	Effect of Toxic Substances	T1-Ch3.2; Pg. 451-490	PPT
19	Relationship of doses and responses	T2-Ch2; Pg. 42-47	PPT
20	Threshold limiting values, exposure thresholds	T2-Ch2; Pg. 54-58	PPT
21	Highly Radioactive Materials and its prevention and control	T1-Ch3.4; Pg. 525-541	PPT
22	Safe Handling and Operation of Materials and Machineries	R2-Ch14; Pg. 151-160	PPT
23	Case Studies of radioactive and toxic compound releases	CSB Reports	PPT
24	Case Study: Flix borough disaster	-	PPT

**Content beyond syllabus covered (if any):**



Sub. Code / Sub. Name: **CH18703 / Proces Safety and Professional Ethics**

Unit: III

### Unit Syllabus: Safety Performance

Appraisal; Effective Steps to Implement Safety Procedures; Periodic Inspection , Study of Plant Layout ; Passive Protection, Active Protection, Emergency Shutdown System, Safety Integrity Level, Inherent Safety Techniques, Constant Maintenance; Periodic Advice and Checking to Follow Safety Procedures; Proper Selection and Replacement of Handling Equipments; Chemical Hazard Symbols ,Personal Protective Equipments .Role of Government, safety organizations, Management and Trade Unions in Promoting Industrial Safety.

**Objective:** To impart knowledge on implementation of safety procedures, selection and replacement of handling equipment; selection and usage of personal protective equipment

Session No *	Topics to be covered	Ref	Teaching Aids
25	Safety Appraisal	T1-Ch2.4; Pg. 260-263	PPT
26	Effective Steps to Implement Safety Procedures	T1-Ch2.3; Pg. 209-229	PPT
27	Study of Plant Layout (Passive and Active Protection Emergency Shutdown systems, Safety Integrity Level, Inherent Safety Techniques)	T1-Ch2.3; Pg. 218-224	PPT
28	Periodic Advice and Checking to follow safety procedures, Importance of Constant Maintenance of plant	T1-Ch4.3; Pg. 704-742	PPT
29	Proper Selection and Replacement of Handling Equipments	T1-Ch4.3; Pg. 704-742	PPT
30	Chemical Hazard Symbols	United Nations GHS	PPT
31	Personal Protective Equipments (Head, face & eye)	R2-Ch29; Pg. 320-328	PPT
32	Personal Protective Equipments (Respiratory, Hand, leg and clothing)	R2-Ch29; Pg. 328-348	PPT
33	Role of Government in Promoting Industrial Safety	T1-Ch1.2; Pg. 48-63	PPT
34	Role of safety organizations in Promoting Industrial Safety	T1-Ch1.2; Pg. 48-63	PPT
35	Role of Management and Trade Unions in Promoting Industrial Safety	T1-Ch1.2; Pg. 48-63	PPT
36	Case Study: Chernobyl Disaster	-	PPT

**Content beyond syllabus covered (if any):**



Sub. Code / Sub. Name: **CH18703 / Proces Safety and Professional Ethics**

Unit: IV

**Unit Syllabus: Accidents**

Industrial accidents, accident costs, identification of accident spots; Remedial measures; Identification and Analysis of Causes of Injury to men and machines, Accident Prevention – Accident Proneness, Vocational Guidance, Fault Tree Analysis, HAZOP, Fire Prevention and Fire Protection. Review of Industry Accidents.

**Objective:** To impart knowledge on industrial accidents, accident cost, accident investigation, preventive measures, fault tree analysis and fire prevention and protection.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Industrial accidents	T1-Ch2.2; Pg. 191-207	PPT
38	Accident Costs	T1-Ch2.2; Pg. 191-207	PPT
39	Identification of accident spots	T1-Ch2.2; Pg. 191-207	PPT
40	Remedial measures for avoiding accident spots	T1-Ch2.2; Pg. 191-207	PPT
41	Identification and analysis of causes of injury to men and machines	T1-Ch4.3; Pg. 711-742	PPT
42	Accident prevention (accident proneness, domino theory of accidents)	T1-Ch2.2; Pg. 202-204	PPT
43	Vocational Guidance, Fault tree analysis	T2-Ch11; Pg. 491-498	PPT
44	Hazard and Operability Analysis (HAZOP)	T2-Ch10; Pg. 448-453	PPT
45	Fire Prevention	T2-Ch7; Pg. 291-343	PPT
46	Fire Protection	T1-Ch4.2; Pg. 685-689	PPT
47	Review of Industry accidents	T2-Ch1; Pg. 23-29	PPT
48	Case Study: Confined space, H <sub>2</sub> S accident	-	PPT

**Content beyond syllabus covered (if any):**

\* Session duration: 50 mins



Sub. Code / Sub. Name: **CH18703 / Proces Safety and Professional Ethics**

Unit: V

### Unit Syllabus: Professional Ethics

Introduction to Ethical Reasoning and Engineer Ethics, Professional Practice in Engineering, Commitment to Safety, Central Professional Responsibilities of Engineers, Rights and Responsibilities Regarding Intellectual Property, Workplace Rights and Responsibilities, Responsibility for the Environment, Bioethics.

**Objective:** To understand the personal and corporate standards of behavior expected of engineering professionals towards safety, intellectual property rights, workplace rights and their responsibility to the environment.

Session No *	Topics to be covered	Ref	Teaching Aids
49	Introduction to Ethical Reasoning and Engineer Ethics	T3-Ch1; Pg. 2-18	PPT
50	Professional Practice in Engineering	T3-Ch1; Pg. 24-33	PPT
51	Commitment to Safety (Concept of safety, risks, acceptability of risk)	T3-Ch4; Pg. 129-137	PPT
52	Central Professional Responsibilities of Engineering	T3-Ch3; Pg. 80-94	PPT
53	Rights and Responsibilities regarding Intellectual Property	T3-Ch6; Pg. 237-239	PPT
54	Workplace Rights (Basic right of professional conscience)	T3-Ch6; Pg. 237-255	PPT
55	Workplace Rights (Institutional recognition of rights, whistle-blower protection)	T3-Ch6; Pg. 237-255	PPT
56	Workplace Responsibilities	T3-Ch5; Pg. 188-229	PPT
57	Responsibility for the Environment: Case Studies (acid rain, asbestos in air & water)	T3-Ch7; Pg. 304-310	PPT
58	Responsibility for the Environment: True costs, Technology Assessment, Philosophical views.	T3-Ch7; Pg. 310-318	PPT
59	Bioethics, Engineer's involvement in weapons development	T3-Ch7; Pg. 332-341	PPT
60	Engineers as managers, expert witnesses and advisors	T3-Ch8; Pg. 350-372	PPT

**Content beyond syllabus covered (if any):**

\* Session duration: 50 mins



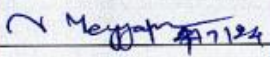
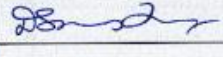
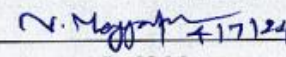
Sub Code / Sub Name: **CH18703 / Process Safety and Professional Ethics**

**TEXTBOOKS:**

1. Ridley Safety at Work, Seventh Edition, Butterworth Heinman 2007.
2. Daniel A. Crowl, Joseph F. Louvar, Chemical Process Safety: Fundamentals with Applications - Prentice Hall, 2002.
3. Mike W. martin, Roland Schinzinger, Ethics in Engineering, Fourth Edition Tata McGraw Hill, 2005.

**REFERENCES:**

1. Heinrich, H.W. Dan Peterson, P.E. and Nester Rood. Industrial Accident Prevention, McGraw Book Cos., 1980
2. Blake, R.P., Industrial Safety, Prentice Hall Inc., New Jersey – Third Edition., 1963
3. S Banerjee, Industrial Hazard and Plant Safety, Taylor & Francis, 2003.
4. F P Lees, Loss Prevention in the Process Industries: Hazard Identification, Assessment and Control, Butterworth-Heinemann, 1996.
5. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

	Prepared by		Approved by
Signature			
Name	Dr. N. Meyyappan	Dr.D.Sivakumar	Dr. N. Meyyappan
Designation	Professor & Head	Assistant Professor	Professor & Head
Date	04.07.2024		04.07.2024
Remarks *:			
Remarks *:			

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD