

SRM UNIVERSITY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CHEMICAL ENGG

COURSE PLAN

Course Code : CH2105
Semester : II

Course Title: INDUSTRIAL SAFETY AND HAZARD ANALYSIS
Course Time : January –June

Required Text Books:

1. Fawcett & Wood W.S., "Safety and Accident Prevention in Chemical Operation", 2nd Edn. Wiley Interscience, 1982.
2. "Loss Prevention and Safety Promotion in Chemical Process Industries", Vol. III, Published by Institution of Chemical Engineers, U.K., 1983.
3. M.H. Fulekar Industrial Hygiene and Chemical Safety, I.K International Publishing house Pvt. Ltd., 2006.
4. Yoshida T., "Safety of Reactive Chemicals", Vol. I, Elsevier, U.K., 1987. 22
5. Quantitative Risk Assessment in Chemical Process Industries" American Institute of Chemical, Centre for Chemical Process safety William Handley, "Industrial Safety Handbook" 2nd Edn. McGraw Hill, New York, 1968.
6. Daniel A. Crowl & Joseph F. Louvar Chemical Process safety: fundamentals with applications, Prentice Hall International Series.

Objectives

To provide an introduction to Industrial Safety and Hazard Analysis
 To familiarize:

- **concepts and techniques**
- **Chemical hazards and industrial safety**
- **Safety in chemical process and plant design**
- **Industrial accidents and fire safety**
- **Hazard identification technique**

Assessment Details:

Cycle test I : 20marks
 Surprise Test / Quiz : 5marks
 Assignment : 5marks
 Model Exam : 20 Marks

Test Schedule:

S.No	Date	Test	Topics	Duration
1	-	Cycle test-I	30%	100 min
2	-	Quiz/Surprise Test	20%	20 min
3	-	Assignment	30%	-
4	-	Model exam	100%	3 h

Outcomes

Students who have successfully completed this course will have full understanding of the following concepts

Course outcome	Program outcome
This course makes the students knowledgeable in various Chemical hazards and safety aspects, Fire hazards and prevention, Safety aspects in chemical industries, Hazard identification technique	To provide students with a high quality education at both the undergraduate and graduate levels which enables them to adapt to a rapidly changing technical environment.

Detailed Session Plan

CONCEPTS AND TECHNIQUES					
Evolution of modern Work place safety concept – Fundamentals of safe working - Safety Management functions - Safety Organization – Committee – Budgeting- Industrial recall technique (IRT) – disaster control – safety survey - Fundamentals of safe working. Safety Communication – education and training.					
Session No.	Topics to be covered	Time (min)	Ref	Teaching Method	Testing Method
1	Evolution of modern Work place safety concept	50	1,2,5	BB	Discussion

2	Fundamentals of safe working	50	1,2,5	BB	Discussion
3	Safety Management functions		1,2,5	BB	Discussion
4	Safety Organization – Committee – Budgeting-	50	1,2,5	BB	Discussion
5	Industrial recall technique (IRT) – disaster control	50	1,2,5	BB	Discussion
6	safety survey		1,2,5	BB	Discussion
7	Fundamentals of safe working.	50	1,2,5	BB	Discussion
8	Safety Communication –	50	1,2,5	BB	Discussion
9	education and training	50	1,2,5	BB	Discussion
CHEMICAL HAZARDS AND INDUSTRIAL SAFETY Chemical hazards and safety of workers – Recognition – Evaluation and Control methods of Chemical hazards, Hazards of commercial chemical reactions and operations of chemical plants – Case studies. Storage and Transportation of hazardous chemicals, Effect of toxic agents. Flammable materials.					
10	Chemical hazards and safety of workers	50	1,2,5	BB	Discussion
11	Recognition Evaluation and Control methods of Chemical hazard	50	1,2,5	BB	Discussion
12	Recognition Evaluation and Control methods of Chemical hazard	50	1,2,5	BB	Discussion
13	Evaluation and Control methods of Chemical hazards	50	1,2,5	BB	Discussion
14	Evaluation and Control methods of Chemical hazards	50	1,2,5	BB	Discussion
15	Hazards of commercial chemical reactions and operations of chemical plants	50	1,2,5	BB	Discussion
16	Case studies	50	1,2,5	BB	Case study
17	Storage and Transportation of hazardous chemicals	50	1,2,5	BB	Discussion
18	Effect of toxic agents. Flammable materials.	50	1,2,5	BB	Discussion
SAFETY IN CHEMICAL PROCESS AND PLANT DESIGN Safety measures to be incorporated during process design, Safety in pressure system. Instrumentation for safe operations, Safety considerations during site selection- Plant layout and development – Plant operations – Inspection - Plant Maintenance, Modification and Emergency preparedness – Onsite and Offsite plan – APELL.					
19	Safety measures to be incorporated during process design	50	1,2,5	BB	Discussion
20	Safety in pressure system	50	1,2,5	BB	Discussion
21	Instrumentation for safe operations	50	1,2,5	BB	Discussion
22	Safety considerations during site selection	50	1,2,5	BB	Discussion
23	Plant layout and development	50	1,2,5	BB	Case study
24	Plant operations	50	1,2,5	BB	Discussion
25	Inspection	50	1,2,5	BB	Discussion
26	Plant Maintenance	50	1,2,5	BB	Discussion
27	Modification and Emergency preparedness – Onsite and Offsite plan – APELL.	50	1,2,5	BB	Discussion
INDUSTRIAL ACCIDENTS AND FIRE SAFETY Industrial Accidents – Principle – prevention - Theories – Costs - Root cause - investigation analysis and reporting – Case studies – Safety performance monitoring - Protective equipment for personnel – Respiratory, skin, eyes hazards and protection, Fire fighting system and prevention – Explosion protection system.					
28	Industrial Accidents – Principle – prevention - Theories – Costs - Root cause - investigation analysis and reporting Industrial Accidents	50	1,2,5	BB	Discussion
29	Industrial Accidents – Principle – prevention - Theories – Costs - Root cause - investigation analysis and reporting	50	1,2,5	BB	Discussion
30	Case studies – Safety performance monitoring - Protective equipment for personnel – Respiratory, skin, eyes hazards and protection,	50	1,2,5	BB	Discussion
31	Case studies	50	1,2,5	BB	Discussion
32	Case studies	50	1,2,5	BB	Discussion
33	Safety performance monitoring - Protective		1,2,5	BB	Discussion

	equipment for personnel – Respiratory, skin, eyes hazards and protection,	50			
34	Safety performance monitoring - Protective equipment for personnel – Respiratory, skin, eyes hazards and protection,		1,2,5	BB	Discussion
35	Fire fighting system and prevention – Explosion protection system.	50	1,2,5	BB	Discussion
36	Fire fighting system and prevention – Explosion protection system	50	1,2,5	BB	Discussion
HAZARD IDENTIFICATION TECHNIQUE Risk Assessment – Job Safety Analysis - FMEA- Hazard and Operability study - Event tree and fault tree analysis, Frequency analysis- Accident Consequence analysis – Human error analysis- Computer aided instruments - Safety Audit - Case studies.					
37	Risk Assessment – Job Safety Analysis -	50	1,2,5	BB	Discussion
38	FMEA- Hazard and Operability study -	50	1,2,5	BB	Discussion
39	FMEA- Hazard and Operability study	50	1,2,5	BB	Discussion
40	Event tree and fault tree analysis, Frequency analysis- Accident Consequence analysis –	50	1,2,5	BB	Discussion
41	Event tree and fault tree analysis, Frequency analysis- Accident Consequence analysis –	50	1,2,5	BB	Discussion
42	Human error analysis- Computer aided instruments	50	1,2,5	BB	Discussion
43	Safety Audit - Case studies	50	1,2,5	BB	Discussion
44	Safety Audit - Case studies	50	1,2,5	BB	Discussion
45	Safety Audit - Case studies	50	1,2,5	BB	Discussion

