GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering Syllabus

Subject Code : 3164404

Subject Name : Safety Engineering in Process Plants

WEF Academic Year :	2021 - 22
Semester :	VI
Category of the Course:	Professional Elective

Prerequisite :	NA
Rationale :	This subject places emphasis on various facets of safety engineering. These include gaining insights into hazard comprehension, quantifying risk, safety-centric design, examining accidents, and promoting safety through education and training.

Course Scheme :

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

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Introduction to safety: Concept and importance of industrial safety. Fundamental safety tenets. Safety in the site selection and lay out. Accidents- Classification Cost of accidents. Key safe practices in chemical industry for accident prevention programme. Material safety data sheet. Work permit system.	8	16
2	Chemical hazards classification. Consequence of chemical hazards. Physical hazards- Atmospheric contaminants, Sound, Light, Radiation, Pressure, Temperature. Electrical hazards- electric shock, flash over, lightning Strokes. Mechanical hazards. Environmental hazards.	8	16
3	Prevention techniques for hazards. Hazard area classification. Safety in transportation of hazardous chemicals by road-HAZCHEM CODE, TREM CARD Relief system and Detectors. T.L.V, STEL, TLV-C, IDLH, UFL, LFL. Hazard identification techniques- Dow index and Toxicity index.	10	20

4	Safety Inspections, safety Audits, Job- safety Analysis, Hazard Survey and analysis, HAZOP, Fault tree analysis, failure mode and effect analysis, Event tree analysis, examples. Consequence of chemical hazards. Probit equations, FN curves, Risk-individual risk, societal risk.	8	16
5	Hazards due to Fire-Pool fire, Jet fire, Flash fire, Explosion-UVCE, BLEVE, Toxic release, Runaway Reaction. Fire pyramid. Types of fire extinguishers and its handling. Types of built in extinguishing systems. Fixed fire protection systems. Firefighting techniques. Flame proof equipments.	8	18
6	Emergency planning-onsite and offsite emergency planning, Mock drill. Health hazards due to Chemical exposure. Safety provisions in the Factories Act, Salient features of Petroleum Act. The concept of inherent safety.	6	14
	Total	**48**	**100**

Reference Books :

1. Bhaskara Rao- "Safety in Process Plant Industries" Khanna Publications.
2. Daniel Crowl- " Chemical Process Safety" 3rd edition, Pearson Publications
3. R.K.Jain & Sunil S Rao, Industrial Safety, Health and Environment Management Systems, Khanna Publishers.

Course Outcome :

After Completion of the Course, Student will able to:

No.	Course Outcomes	RBT Level*
CO-1	Describe the theories of accident causation and preventive measures of industrial accidents.	15
CO-2	Describe various hazards associated with different machines and mechanical material handling.	25
CO-3	Utilize different hazard identification tools in different industries with the knowledge of different types of chemical hazards.	25
CO-4	To familiar with different types fire and explosion and their prevention techniques using different extinguishers	20
CO-5	Demonstrate safety practice aspects in industry.	15

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List :

1. Study about wear and service life of equipment.
2. Study about maintenance and repair of production equipment.
3. Study about restoring of the guide ways of machine tools.
4. To study maintenance planning and scheduling.
5. Study about preventive maintenance.
6. Study about industrial safety.
7. Study about accidents and industrial hazards.
8. Study about safety measurement.

List of Laboratory/Learning Resources Required :

Students can refer to video lectures available on the websites including NPTEL.

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