1	Name of Course	**Certificate Course in Safety in Handling Industrial Hazards Chemical & Gases (307101)**
2	Max. Nos. of Student	25 Students
3	Duration	6 Months
4	Type	Part Time
5	Nos. of Days / Week	6 Days
6	Nos. of Hours /Days	4 Hrs
7	Space Required	Theory Class Room – 200 sqft Practical – 100 + 5000 sqft open ground for drills
8	Entry Qualification	S.S.C.
9	Objective Of Syllabus/ introduction	**He can have his own venture of TRADING & TRAINING** **He can get Job in any Establishment.**
10	Employment Opportunity	Can get jobs in small industries
11	Teacher's Qualification	Diploma in Chemical.
12	Training System	**Training System Per Week**

Theory	Practical	Total
6 Hours	18 Hours	24 Hours

13 Exam. System

Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks
1	**30710111**	Security Functions	TH-I	3 Hrs	100	35
2	**30710112**	Fire Prevention	TH-II	3 Hrs	100	35
3	**30710121**	Security functions	PR-I	3 Hrs	100	50
4	**30710122**	Fire Prevention	PR-II	3 Hrs	100	50
		TOTAL			**400**	**170**

SYLLABUS

Theory & Practical

Security Function

Theory – I	Practical - I
Safety in chemical process – Chemical Process classification Safety Parameters.	Machine Guard
Chemistry of Combustion	Practical on How and why the explosion takes place.
Classification of Hazardous Goods, Chemicals/ Gases **1) Class –I - Explosives** 1.1- Mass Explosion Hazard 1.2- Projection Hazard 1.3- Fire Hazard 1.4 – Minor Explosion Hazard 1.5 – Materials considered insensitive 1.6 – Extremely insensitive	Explosion because of mix of to chemicals with each other.
Flammable Gas Detection **Non Flammable –** Ammonia, Carbon dioxide, Chlorine, Vikane Gas Fumigant	
Oxygen - **Poison Gas –** Arsine, Hydrochloric, Hydrofluoric Acid, Methyl Bromide, Phosgene	Practical on the chemicals creating combustion an after mixing with the water.
Inhalation Hazard - **2) Gases – Flammable Acetylene HC=CH**	Potassium and sodium in open air ixed with glycerin & air, create fire and smoke.
HC=CH **Flammable –** Acetylene, Butadiene, Carbon Monoxide, Ethylene Oxide, Hydrogen Sulfide, Liquefied Petroleum Gas (LPG), Vinyl Chloride	Method of Fire Extinguishing
3) Flammable Liquids - Flammable Gasoline Combustible Fuel Oil Flammable Solid Spontaneously Combustible Dangerous when Wet	Handling chlorine leakage.
Oxidizer Organic Peroxide	Handling LPG leakage.

Poison Toxic Harmful Stow away from Food Stuffs Infectious Substance- in case of damage or leakage immediately notified public health authority Inhalation Hazard This classification denotes hazards that do not fit into any of the above definitions but present a significant danger. These dangers include, however are not limited to, anesthetic or noxious properties that may cause public concern, annoyance or discomfort.	Fire Grading of Structure and Graded Under Fire Resistance
4) Flammable Solids	Effect of Ventilation on Fire
5) Oxidizers	
6) Poisonous and Infectious Substances	
7) Corrosives	
8) Miscellaneous	
9) Study of a IEW Gases From the point of Fire Hazard	**Practice Fire Fighting Of Gases**
Sign of different material adopted by NFPA Sign related to different Hazards	
Sign and Symptoms and Chemistry of all above mentioned 8th categories. Notifying Signs and Symptoms and their Safety treatment	
Treatment Modalities In case of all emergencies related to all categories of dangerous material and gases.	
Safety in Handling Gases, Liquids and Solids Gases – Flammability limits of certain gases in air (Table 4.1) Chlorine Hazard Chlorine Leakage Management Safety in Handling Fluorine Important Safety Considerations in Ammonia Storage Precautions and storage of Flammable Solids Precautions in storage of Flammable Liquids Safety in handling of Aluminum Alkyls Handling of Liquefied Natural Gas (LNG) Requirement to be fulfilled for storing hydrocarbons or chemicals Fail Safe Concept Case 1 Case 2	
Off Site Emergency Plan	To attend the emergency practically with full ability to prevent

Theory & Practical – II

Fire Prevention

Theory -II	PRACTICAL - II
Chemistry of combustion, Fires – Classification of Fires, Control of Heavy Vapour Pressure Fire, Fire Fighting Foams, Foam for Fire Protection, Aqueous Film Forming Foam, Automatic Sprinkler System, Water Spray System, Dry Chemical Powder Extinguisher, CO2 Fire Extinguisher, General Safety Precautions for Fire Maintenance of Fire Extinguisher.	Hands on Lock-out & Tag-out Techniques • Safety chemist disonal safety, case studies, relief sys and detectors,, risk management personal safety. • Use of Different Branches and their application • Special use of Mayura Water Spray Screen • Use of all Portable Fire Extinguishers.
Portable Fire Extinguisher – Types, Operation Maintenance and Film on use of Different Fire Extinguisher	Maintenance of Refilling
Risk Management – Managing Risks and Hazards Risk Risk Management Objective of Risk Management Risk in case of Chlorine Accident Frequency Rate	Practically Studding the Leakage with the Help of Dep.
Safety Check List – General Safety Rules n Plants Operation, Common Terms related to Safety, Safety Check List, Safety Check List for Hazardous Gases	**Case Studies –** i) Benzene Leakage from ii) Toluene Leakage iii) Chlorine Leakage iv) Safety and Precautions v) Bhopal Gas Disaster vi) Accidents related to Ammonia
Factory Act 1948 Workmen Compensation Act, 1923 The Employees State Insurance Act, 1948	Serious Fire in petroleum products (Jaipur) hotels-New York, multi-story building- Thana / Calcutta, Gas leakage- (Bhopal).
Personal Safety - Introduction of Personal Safety, Role of Training, Fatigue and Boredom, Role of Human Error in Losses, Protective Devices for Operations, Safety Management.	Use of PPE and cloth Use of Aluminum Suit
Relief System and Detectors - Introduction of Relief System, Sizing vents for gas explosion, Weight Covers, Drains and Vents, Fire Detectors, Smoke Detectors, Heat Detectors, IR Detectors, Fire Allowance System.	Demonstration on First Aid for injury, fracture, burns, drowning in water, CPR(Cardio Pulmonary resuscitation)
Risk Assessment – Managing Risk & Hazards, Risk Management, Risk in Case of Chlorine, Hazard control in Chemical	Video Films on Several Safety, Fire Prevention, Rescue & First Aid.
Safety Tips for Factory Employees	Film on LPG Safety and stopped the leakage practically by demonstration and practical.
Using LPG Safety	

List of Tools & Equipments Required for Training

- Safety Gear – Hearing /Head/Foot/Hand and Arm/ Eyes and Face Protection 2 Sets of each
- Safety Signs (Different Charts)
- Fire Fighting Equipment (Delivery Hose with Couplings - 3(15 meters of length)
- Short Branch - 1
- Deffuger Branch - 1
- Landon Pattern Hand Control Branch - 1
- First Aid Equipments -1 box
- Fire Extinguisher of Water/ CO2/ DCP/Foam/ AFFF - One each
- Safety Helmet - 6
- Safety shoes - 6 Pairs
- Safety Gloves - 6 Pairs
- Safety Goggles - 6
- Ear Plugs - 6 Sets
- Safety Belts - 6
- Detector – Fire , Smoke, Heat - 1 each
- 20 Minutes Fire Proof Fire Fighting Jackets - 1
- Fire Alarm (Manual & Automatic) 1 + 1
- Aluminum Fire Suit - 1
- Fire Resistant Material – 1 Set
- Flammable with Flame Proof, spark Proof equipment and tools – 1 Set
- Breathing Apparatus –1
- Structure – 2
- Housekeeping Equipment – 1 Set

LIST OF REFERENCE BOOKS

- Industrial Safety Management written by L.D. Deshmukh
- Books Published by National Safety Council on Health and Safety Vol- I & Vol-II
- Safety Book Prepared by the Institute of Security & Fire Technology
- Books and Notes prepared by Institute and Fire Technology.
- Chemical Hazards and Safety by Dr. Shrikant D. Dawande.
- Hazardous Material Filed Guide by Armando Bevelacqua Richard Stilp
- Safety and Fire Protection Handbook by R. Veeraraghavan.