

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Remediation and site restoration services Programme: B.Tech (FSE) Course Code: FSEG 443 Time: 03 hrs. Instructions: Please read all the questions	Semester: VII Max. Marks: 100
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SECTION A

S. No.	Question	Marks	CO
Q 1	What do you mean by Major Accident Hazard Unit as per Indian Legislations?	4	CO1,C O3
Q 2	Explain the term major Accident? What is the criterion for selection of a Major accident hazard installation?	4	CO1,C O3
Q 3	What is the criterion for Hazardous chemicals in Indian Legislation and what do you mean by LD50 and LC 50? Which rule states about disclosure of information?	4	CO4
Q 4	What information has to be furnished to the concerned authority at the time of a Major Accident?	4	CO3
Q 5	Discuss salient features of major hazard installation. Discuss On site emergency plan? Who should make the Onsite emergency plan and by which rule?	4	CO1

SECTION B

Q 6	Illustrate the purpose and procedure for safe operation in major hazard Installation ? <p style="text-align: center;">OR</p> Explain the following HAZCHEM codes: i). 3YE iii)2PE ii)3YE iv)3Y	10	CO4
Q 7	Explain the requirements of Emergency Plan as per Indian Factory Act, MSIHC Rules & Chemical Accidents (Emergency planning Preparedness and response) Rules?	10	CO1,C O3
Q 8	Explain with suitable example the potentially hazardous natural phenomena with suitable example for following : a) Earthquake b) Landslides c) Cyclone	10	CO5
Q 9	Describe and explain the elements & objectives of Offsite and ON site Emergency Plan?	10	CO3,C O4

SECTION-C

Q 10	What do you understand by APELL. Describe the salient features of ISO 14001 and OHSAS 18001. Develop the EIP of a chemical having MSDS as stated below	20	CO2
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MSDS of ETHYL ALCOHOL

MATERIAL SAFETY DATA SHEET PRODUCT NAME: ETHYL ALCOHOL (96,1-96,5% VOL, 192 PROOF, FOOD GRADE) MSDS NO: 01 EFFECTIVE DATE: March 3, 2011 EXPORTED BY: XYZ Company
PRIMARY CLASS: 3 CLASS NAME: FLAMMABLE LIQUID EC: 200-578-6 CAS: 64-17-5 UN: 1170 No need any emergency document by air transport if ethanol is sample and total is volume under 100ml

EMERGENCY AND FIRST AID PROCEDURE

INGESTION

- Never give anything by mouth if victim is rapidly losing consciousness or is unconscious or convulsing.
- DO NOT INDUCE VOMITING.
- Have victim drink about 250ml (8fl. oz.) of water to dilute material in stomach.
- If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration.
- Seek medical assistance.

SKIN

- Flush contaminated area with water for at least 20 minutes.
 - Remove contaminated clothing under running water.
 - Completely decontaminate clothing before re-use, or discard.
 - If irritation occurs seek medical attention.
- INHALATION**
- Remove victim to fresh air.
 - Artificial respiration should be given if breathing has stopped and cardiopulmonary resuscitation if heart has stopped.
 - Oxygen may be given if necessary.
 - Seek medical attention immediately.

EYES

- Immediately flush eyes with water for at least 20 minutes, holding the eyelids open. • Seek medical attention immediately

Q 11

CASE STUDY

A massive explosion in Pasadena, Texas, on October 23, 1989, resulted in 23 fatalities, 314 injuries, and capital losses of over \$715 million. This explosion occurred in a high-density polyethylene plant after the accidental release of 85,000 pounds of a flammable mixture containing ethylene, isobutane, hexane, and hydrogen. The release formed a large gas cloud instantaneously because the system was under high pressure and temperature. The cloud was ignited about 2 minutes after the release by an unidentified ignition source. The damage resulting from the explosion made it impossible to reconstruct the actual accident scenario. However, evidence showed that the standard operating procedures were not appropriately followed.

The release occurred in the polyethylene product takeoff system, as illustrated in Figure 1-12. Usually the polyethylene particles (product) settle in the settling leg and are removed through the product takeoff valve. Occasionally, the product plugs the settling leg, and the plug is removed by maintenance personnel. The normal - and safe - procedure includes closing the DEMCO valve, removing the air lines, and locking the valve in the closed position. Then the product takeoff valve is removed to give access to the plugged leg. The accident investigation evidence showed that this safe procedure was not followed; specifically, the product takeoff valve was removed, the DEMCO valve was in the open position, and the lockout device was removed. This scenario was a serious violation of well-established and well-understood procedures and created the conditions that permitted the release and subsequent explosion.

20

CO1,C
O3

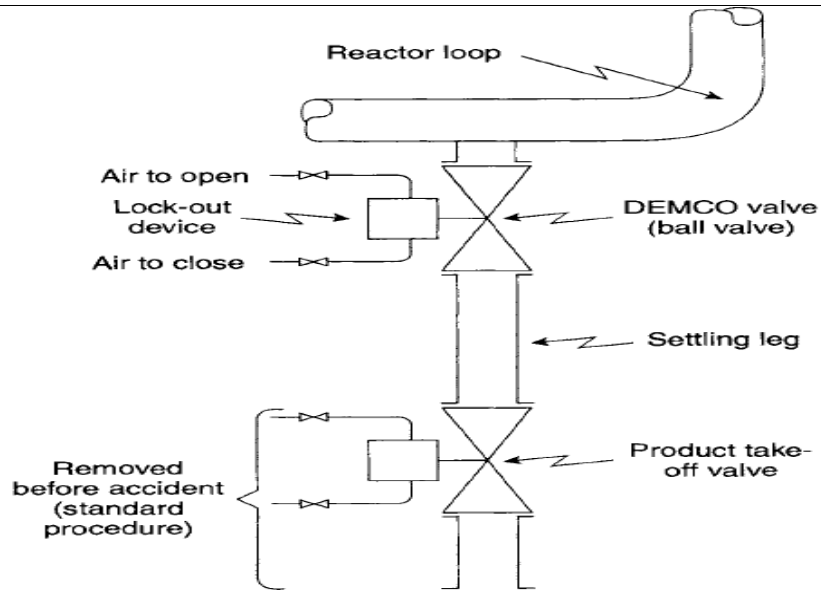


Figure 1-12 Polyethylene plant settling leg and product takeoff system.

- i. Analyze the root cause and give recommendations for the above given case study?

OR

Explain the causes and consequences of Major Industrial Disasters with suitable recommendations

a) Fukushima

b) Texas refinery

c) Tianjin Disaster

Name of Examination (Please tick, symbol is given)	:	MID		END	<input checked="" type="checkbox"/>	SUPPLE	
Name of the School (Please tick, symbol is given)	:	SOE	<input checked="" type="checkbox"/>	SOCS		SOP	
Programme	:	B.Tech FSE					
Semester	:	VII					
Name of the Course	:	Remediation and Site Restoration services					
Course Code	:	FSEG 443					
Name of Question Paper Setter	:	Akshi Kunwar Singh					
Employee Code	:	40001589					
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Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE":							
FOR SRE DEPARTMENT							
Date of Examination	:						
Time of Examination	:						
No. of Copies (for Print)	:						

Note: - Pl. start your question paper from next page

Model Question Paper (Blank) is on next page

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Max. Marks: 100

Instructions: Please read all the questions

SECTION A

S. No.		Marks	CO
Q 1	What are the components of major hazard control system? Which rule states about Safety data sheet?	4	CO1,C O3
Q 2	Give some highlights about Seveso III directives. What are the Do's and Don'ts while transporting hazardous chemical through road?	4	CO1,C O3
Q 3	Discuss salient features of major hazard installation? What do you mean by On site emergency plan? Who should make the Onsite emergency plan and by which rule?	4	CO4
Q 4	Extend your views on major Accident hazard unit as per Indian Legislations?	4	CO3
Q 5	Explain the term major Accident. What is the criterion for selection of a Major accident hazard installation?	4	CO1

SECTION B

Q 6	<p>As per EIP given below discuss the following HAZCHEM codes.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>CHLORINE</p> <p>UN No. 1017</p> <p>HAZCHEM 2XE</p> <p>IN EMERGENCY DIAL 000, POLICE OR FIRE BRIGADE</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>TOXIC GAS</p> <p>2</p> <p>CORROSIVE</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Kerosene</p> <p>UN No. 1223</p> <p>HAZCHEM 3Y</p> <p>IN EMERGENCY DIAL 000, POLICE OR FIRE BRIGADE</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>FLAMMABLE LIQUID</p> <p>3</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>HYDROCHLORIC ACID</p> <p>UN No. 1789</p> <p>HAZCHEM 2R</p> <p>IN EMERGENCY DIAL 000, POLICE OR FIRE BRIGADE</p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>CORROSIVE</p> <p>8</p> </div> </div> <p align="center">OR</p> <p>Explain the following HAZCHEM codes:</p> <p>i). 2YE iii)2PE</p> <p>ii)3YE iv)2Z</p>	10	CO4
Q 7	Explain the DMP cycle. What role does remote sensing plays in disaster management and how?	10	CO1,C O3
Q 8	Explain with suitable example the potentially hazardous natural phenomena as : b) Tsunami b) Cyclones c) Typhoon	10	CO5
Q 9	Enumerate the hazards in Arid and semi-Arid areas .What measures to be taken for rehabilitation and recovery from the effect of the disaster?	10	CO3,C O4

SECTION-C

<p>Q 10</p>	<p style="text-align: center;">CASE STUDY 1 Ethylene Explosion</p> <p>Ethylene was accidentally released from a 118-in stainless steel instrument tubing line leading to a gauge from a main line on a compressor system. The tubing failed as a result of transverse fatigue caused by vibration from the reciprocating compressor. Ignition may have been by static electricity. This accident caused \$21.8 million in damage. The unmanned compressor building was equipped with a combustible gas detection system. However, it failed to sound an alarm because of a faulty relay in the control room. Automatic fail-safe valves functioned properly, blocking-in the flow of ethylene, but not before 450-11,000 lb of gas had already escaped.</p> <p style="text-align: center;">CASE STUDY 2 Organic Oxidation</p> <p>Chemical operators were preparing for an organic oxidation. Steam was applied to the reactor jacket to heat the sulfuric acid and an organic material to a temperature of 70°C. The rate of heating was slower than normal. The two operators turned the agitator off and also shut off the steam. One operator went to find a thermometer. Approximately 1 hour later, the operator was ready to take a temperature reading through the manhole. He turned on the agitator. At this point the material in the kettle erupted through the manhole. The two operators were drenched and both died from these injuries. The accident investigation stated that the agitator should never be turned off for this type of reaction. Without agitation, cooling is no longer efficient; so heat-up occurs. Without agitation, segregation of chemicals also occurs. When the agitator is subsequently activated, the hotter chemicals mix and react violently.</p> <p>i. Analyze the root cause and give recommendations for the above given case studies?</p> <p style="text-align: center;">OR</p> <p>Explain the causes and consequences of Major Industrial Disasters with suitable recommendations Fukushima b) Texas refinery c) Tianjin Disaster</p>	<p style="text-align: center;">20</p>	<p style="text-align: center;">CO1,C O3</p>
<p>Q 11</p>	<p>What do you understand by APELL. Describe and Illustrate the salient features of ISO 14001 and OHSAS 18001. Develop the EIP of a chemical having MSDS as stated below</p> <p style="text-align: center;">MSDS of SULPHURIC ACID</p> <p>Potential Acute Health Effects: Very hazardous in case of skin contact (corrosive, irritant,</p>	<p style="text-align: center;">20</p>	<p style="text-align: center;">CO1,C O2</p>

permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects: CARCINOGENIC EFFECTS: Classified 1 (Proven for human.) by IARC, + (Proven.) by OSHA. Classified A2 (Suspected for human.) by ACGIH.

. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, lungs, heart, cardiovascular system, upper respiratory tract, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged p. 2 contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

EMERGENCY AND FIRST AID PROCEDURE

Eye Contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact: Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation: Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation.

WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention. **Ingestion:** Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear. **Serious Ingestion:** Not available

FIRE AND EXPLOSION DATA

Flammability of the Product: Non-flammable. **Auto-Ignition Temperature:** Not applicable. **Flash Points:** Not applicable. **Flammable Limits:** Not applicable. **Products of Combustion:** Products of combustion are not available since material is non-flammable. However, products of decomposition include fumes of oxides of sulfur. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas. Reacts with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively. **Fire Hazards in Presence of Various Substances:** Combustible materials

	<p>Explosion Hazards in Presence of Various Substances: Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of oxidizing materials. Fire Fighting Media and Instructions: Not applicable. Special Remarks on Fire Hazards: Metal acetylides (Monocesium and Monorubidium), and carbides ignite with concentrated sulfuric acid. White Phosphorous + boiling Sulfuric acid or its vapor ignites on contact. May ignite other combustible materials. May cause fire when sulfuric acid is mixed with Cyclopentadiene, cyclopentanone oxime, nitroaryl amines, hexalithium disilicide, phosphorous (III) oxide, and oxidizing agents such as chlorates, halogens, permanganates</p> <p style="text-align: center;">ACCIDENTAL RELEASE MEASURES</p> <p>Small Spill: Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate. Large Spill: Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.</p>		