Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2023

Program Name : B.Tech APE Gas **Semester :** VII
Course Name : HSE in Petroleum Industry **Time :** 3 hrs
Course Code : HSFS3034P **Max. Marks:** 100
Nos. of page(s): 04

Section A
(4x15=60 Marks)

S. No.		Marks	CO
Q 1	a) List the various Acts related to health, safety, and the environment in the oil and gas industry. b) Name any 7 OISD standards about Exploration and Production Operations and describe any one of them.	**(8+7) 15**	**CO1**
Q 2	a) Describe the air pollutants produced during drilling and production operations. Explain with details. b) Discuss different waste management methods utilized in the Oil and gas Upstream industry.	**(8+7) 15**	**CO2**
Q 3	a) Illustrate the impact of various hydrocarbons released in the oil and gas industry on human health and the factors that cause diseases. b) Explain the health hazards of hydrogen sulfide emissions in the oil and gas industry.	**(8+7) 15**	**CO3**
Q 4	a) Outline a work permit with a proper example. b) Analyze the environmental aspects of oil field operations with respect to offshore.	**(7+8) 15**	**CO4**
	Section B **(2x 20=40 Marks)**		
Q 5	a) Explain Toxicity, Dose, Concentration, LD_{50}, LC_{50} b) Illustrate different human health and safety guidelines developed for toxicity in the oil and gas industry. c) State the precautions to be taken as per regulations after blow out occurs. d) Write the safety procedure to carry out well completion by perforation.	**[5]** **[5]** **[5]** **[5]** **20**	**CO3**
Q 6	**Case study:** **Title:** Pipeline failure incident in River crossing. **Location**: River crossing. **Loss/ Outcome**: Inventory loss and shutdown. **BRIEF OF INCIDENT:** Pressure drop was observed in Natural Gas pipeline at various consumer ends and at intermediate Sectionalizing valve locations. The pressure drop was more significant between sectionalizing valves installed across the river crossing in the pipeline. There was gradual increase in flow in the pipeline at dispatch side and reduction of flow at receipt end. The Control room alerted the top management and mainline team was mobilized to field locations to verify the possibility of leak. Later, information regarding gas leakage in river crossing was received through villagers approximately 35-40 mins after the fluctuations in monitoring	**20**	**CO4**

	parameters. The sectionalizing valves were closed for isolation of leak section and monitoring of the mainline pressure. The maintenance team reached the location and observed leakage from mainline in river crossing. The information regarding the incident was shared with District Administration and Police Authorities and affected area was cordon off. The situation was brought under control. No fire incident/ casualties/ injuries were reported from the site. Gas leakage from the affected section was stopped after gas got released into atmosphere subsequent to isolation of the section from the supply side & downstream side. **OBSERVATIONS / SHORTCOMINGS :** 1. During construction, design of the (Horizontal Directional Drilling) HDD crossing was modified based on site conditions. Initial design was having single HDD section, which was modified to two HDD sections with tie-in at the midpoint. The pipeline tie-in section was constructed by excavating pit in the middle of the river during dry season. At tie-in portion, in-situ concreting was done on pipeline at 5-meter intervals for providing anti-buoyancy measure. 2. Design approval documents related to the initial HDD, final design of tie-in section and in-situ concreting design for support blocks was found not available. Any kind of Management of Change (MOC) document for the design change considering risk of washout of the tie in portion was not evidenced. 3. Though the tie-in section was identified for frequent check for erosion on account of heavy floods during monsoon in project closure, any additional monitoring plan & implementation was not observed. 4. There was decreasing trend of pressure at dispatch and receipt side along with increase of flow at dispatch side and decrease of flow at receipt side, suggesting loss of flow at intermediate point. Leak Detection Sensor alarm (LDS) alarm and Pipeline Intrusion Detection and Warning System (PIDWS) generated alert with signature (V shape) of burst observed in Control Room. 5. Inline inspection (ILI) of the pipeline could not be done since commissioning in 2010 due to unexpected quantity of dust and debris received during scrapper pigging operations causing tripping of customer plant. Later, additional Knock Out Drums (KODs) were installed to increase filtration capacity. Pigging exercise was again started in 2022, but ILI could not be done due to contractual issues. 6. The muck analysis report points out presence of iron & iron oxides indicative of internal corrosion effects, which need to be substantiated with integrity inspection data of ILI. 7. The river crossing inspection being followed was based on visual inspection of washout as per internal format and not covering the profile study of the river course. As per the profile data of the river, it was observed that river course had shifted towards downstream side by about 500 m laterally. The tie-in point, which was located at a dry zone within the Provided for information purpose only. This information should be evaluated to determine if it is applicable in your operations, to avoid recurrence of such incidents. river channel at the time of construction, was currently submerged in river. Learnings from OISD issued Safety alert OISD/SA/2022-23/PL/07 dated 6th September, 2022 was not considered in river inspection procedure.		

	8. Such scenario was covered in Emergency Response and Disaster Management Plan (ERDMP) document. Control measures by isolating the section by closing upstream and downstream valves. 9. Continuity of the pipeline was not observed across the river crossing through Cathodic Protection- pipe to soil protection (CP-PSP) system, which suggested mechanical discontinuity in the pipe section. Due to high flow conditions, the physical verification of the pipe section could not be done. 10.Downstream sectionalizing valve across river could not be closed on remote mode from Control Room, as there was no pressure in the pipeline after closing of upstream valve. Functioning of charged hydraulic system was not evident for emergency handling. **Analyze the case study and explain the reasons for failure or the root cause for the failure and suggest recommendations.**		

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