

Subject Code: 1ET4060403	Subject Title: Health Safety and Environment
Pre-Requisite	--

RATIONALE:

The students of petroleum engineering are mainly involved in survey of land for finding petroleum, drilling of oil well and production of crude from the earth. During exploration and production process the issues related to health of worker, engineers and people surrounded will come. It will also hazardous to the environment. For the safety of all, it is very important to give the knowledge about taking care for health and environment.

This course has been introduced at Diploma level in order to develop the skills in student so that they can understand the various health, safety and environment issues near petroleum rig. It will also helpful to reduce the hazardous incidents.

COMPETENCY:

The course content should be taught and implemented with the aim to develop awareness so that students are able to acquire knowledge of Health, Safety and Environment

COURSE OBJECTIVE:

1. Describe the various hazard associated with oil and gas industry
2. Demonstrate the requirement for safety
3. Perform case studies on hazards and risk analysis
4. Develop the skills to address Safety issue

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
2	-	-	2	--	--	20	30

DETAILS OF COURSE CONTENTS:

UNIT	TOPIC	Total Hrs.	Weightage %
1	Introduction Physical Hazards - Noise, Heat, Vibration, Illumination, Radiation, extreme climatic conditions etc, Chemical	08	35

	Hazards Hydrogen sulfide gas, Hydrocarbons, Ammonia, Chlorine, Formaldehyde, Hydrochloric Acid, Methanol, Sulphur, Sulphuric acid, Sodium Hydroxide, etc. Biological Hazards, Psychological Hazards, Ergonomic Hazards, Injuries, Burns etc Prevention & Remedial controls of Occupational Hazards In Oil & Gas Industry for each type of Hazards Engineering Control, Administrative Control, Medical Control, Use of Personal Protective Equipment (PPE) Understanding Fire: Fire triangle/tetrahedron, Stages of development of fire Flammability, Concept of flash / Fire point, volatility, Flammable Limits, Fire Detection; Fire signature, Smoke, Heat, Flame, Combustible Gas Detection Fire Prevention, Fire suppression , Process Safety: Safety Analysis Table, Safety Analysis Checklist & SAFE Chart (ref API 14 C)		
2	Hazard & Risk Analysis Risk Matrix, HAZID, HAZOP, QRA (API 14 J, OISD), Safe Work Practices: PTW, MOC, SIMOPS etc. (ref API RP 75, OISD, OMR), Electrical Safety; Classification of Hazardous locations, use of electricity I Hazardous area (Ref IER, OISD, OMR, API RP 500 & 14 F) Accident Investigations: Study of major Accidents like Piper Alpha, Flixborough, Bhopal etc., Investigation techniques Emergency Response planning Audits & Inspection. Audit methodology, protocol, typical check lists for Drilling rigs, Work over activities, logging, etc. (ref OISD Standards)	08	35
3	HSE Management System OISD, API RP 75, ISO 14000, ISO 9000, OSHAS 18000 Standards, OMR and Petroleum Rules (by PESO).	02	10
4	Environment Environment Concepts: Effect on eco-system; Air, Water, & Soil of HC"s. Impact of Exploration & Exploitation of Hydrocarbon on Environment Environmental studies (Off shore & On Shore) - Environmental Impact Assessment Oil Spills Control and their management. State, Government of India and international Maritime Environmental Rules & Regulations. Drilling / Oil Storage / Effluent water / waste (solid & sludge) treatments their disposal and remediation of soil etc. Upstream safety: Implementing Agency OISD (for on-land blocks) Directorate of Mine Safety (for Off Shore Blocks), Safety in Rig operation; Safety in Exploration and Production. Downstream Safety: Implementing Agency	06	20

	PNGRB; Safety Regulations (Technical Standard, Specification and Safety Standards T4S), Emergencies, Mutual Aida; Emergency Response and Disaster Management Plan ERDMP)		
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COURSE OUTCOME:

On completion of the course, student will be able to

CO1- Understand the various hazard associated with oil and gas industry.

CO2- Apply the control methods & safety measures for preventing hazards and risk.

CO3- Analyze the various risk matrixes, safe work practices and accident investigations.

CO4- Implement the standards of HSE management systems

CO5- Evaluate the various environmental issues in oil and gas industry and safety regulations.

CO6- Demonstrate the various safety issues during drilling and refinery operations.

LIST OF REFERENCES:

Sr. No.	Title of Books	Author	Publication
01	Loss Prevention in the Process Industries	Less, F. P.,	2nd ed., Butterworth Heinemann, UK.
02	Environmental Engineering	Peavy, H. S., Rowe, D. R. and Tchobanoglous, G.,	McGraw Hill, New York.
03	Chemical Process Safety	Sanders, R. E.,	Butterworth Heinemann, UK
04	NFPA, API 14 G & OISD Standards		
05	Fundamentals of Process Safety	Marchell, V. and Ruchemann, S.,	Institution of Chemical Engineers, Warwickshire, UK