

PE 421T Safety, Health and Environment

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	30	60	10	--	--	100

Unit I

Hours: 12

Physical Hazards Noise, Heat, Vibration, Illumination, Radiation, extreme climatic conditions etc, Chemical 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)

Unit II : Hazard & Risk Analysis,

Hours: 12

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)

Unit III : HSE Management System:

Hours: 6

OISD, API RP 75, ISO 14000, ISO 9000, OSHAS 18000 Standards

Unit IV : Environment

Hours: 12

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

Total Hours: 42

Texts and References:

1. Less, F. P., Loss Prevention in the Process Industries, 2nd ed., Butterworth Heinemann, UK.
2. Peavy, H. S., Rowe, D. R. and Tchobanoglous, G., Environmental Engineering, McGraw Hill, New York.
3. Sanders, R. E., Chemical Process Safety, Butterworth Heinemann, UK, Year.
4. NFPA, API 14 G & OISD Standards.
5. Marchell, V. and Ruchemann, S., Fundamentals of Process Safety, Institution of Chemical Engineers, Warwickshire, UK.

PE 421P Safety, Health and Environment Laboratory

Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	LW	LE/Viva	Total
0	0	2	1	2	25	25	50

Aim: To get exposure on day- to-day Safety, Health and Environmental activities of various segments of hydrocarbon industries.

PE 422 Pipeline Engineering

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	1	0	3	3	30	60	10	--	--	100

Unit I : Introduction

Hours: 12

Introduction to Pipelines, Responsibilities of pipeline engineers and designers, scope of pipeline, inputs and outputs, process diagram (PFD, PNID), course and standards, oil and gas terminology, types of platforms, pipeline elements, pipeline materials, material takeoff for onshore and offshore pipelines

Unit II : Pipeline Drawings

Hours: 10

Field layouts, alignment sheet, riser and spool, GAD'S, crossing details, trench details, anode details, monel sheathing

Unit III : Pipeline Specification

Hours: 10

Pipeline valve thickness calculations, cathodic protection, valves specifications & specialties, pipeline supports, clamps, configuration of equipments, pipeline installation methods, on bottom stability, free span calculations

Unit IV : Stress Calculation

Hours: 10

Pipe stress Requirements, fatigue failure, stress intensification factor, code compliance, pipe support span calculations, piping design for leading types (sustain load – pressure, weight, expansion loads, hanger design, occasional loads), piping configuration, loops – types and sizing, cold spring, underground pipe, flange leak analysis, thrust force calculations, code compliances

Total Hours: 42

Texts and References:

1. Alkazraji Duraid, (2008) A quick guide to pipeline engineering Woodhead Publishing Limited
2. Vincent, Jecques (2010) Fundamentals of Pipeline Engineering, Gulf Publishing
3. Antaki, G. A. (2003) Piping and Pipeline Engineering , Marcell Dekker.

PE 419 Management in Hydrocarbon Industry

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	30	60	10	--	--	100

Unit I

Hours: 10

Personnel Function: Scope and Organization; Wage and Salary Administration; Recruitment, Selection, Induction, Promotion, Transfer and Separation. Industrial Relations: Concept and importance; Trade Unions: Their growth and role, Problem of Multiplicity of Trade Unions; Industrial Dispute: Definition, Prevention and Settlement. Various legislations regarding labour issues: Wage & Bonus, social security, industrial relations. Workers participation in Management. Conflict Resolution & Employee Discipline. Welfare schemes for Employees and its Importance in the Changed Scenario.

Unit II

Hours :8

Introduction to accounting; Accounting equation; Preparation of financial statements & Analysis; Accounts for Joint Stock Companies; Introduction to International Accounting standards; GAAP; Annual reports; Cash flow reporting; Cost concepts: Absorption & Marginal Costing, CVP Analysis, Standard Costing and Variance analysis.

Unit III

Hours:12

Supply Chain Management – genesis, definitions and basic structure; Value Chain concept; Relevant issues in supply chain; Strategy formulation; Product type- Supply Chain Matrix; Strategic sourcing and management of supply, Suppliers evaluation and development, Outsourcing strategy. Logistic Management – functions and basic issues, Indian Scenario; Areas of logistical decision making, Design of transportation network; Warehousing; Introduction to e-commerce; Performance measurement of Supply Chain Management.

Unit IV

Hours: 12

Introduction to Operations Management; Production Systems, Capacity Planning, Forecasting Models, Facilities Management; Operations Planning and Control – Job Shop scheduling and Aggregate Planning; Line Balancing, Production scheduling and sequencing.

Total Hours: 42

Texts and references:

1. David Jacob (2012) Optimal supply chain management in oil, gas and power generation, Penn Well Pub. Company
2. Barry Richards (1993) Management of International oil operation, Penn Well Publishing Company.
3. Wright, C. J and Gallum, R. A (2008) Fundamentals of Oil and gas accounting, Penn Well Pub. Company

PE 480 Industrial Instrumentation & Control

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	30	60	10	--	--	100

UNIT I : Temperature, pressure, level measurements

Hours:10

Temperature measurement: Temperature scales, Non electrical methods, Electrical methods, Radiation methods.

Pressure measurement: Moderate pressure measurement, High pressure measurement, vacuum measurement

Level measurement: measurement techniques for Liquids and slurries, advance measurement techniques

UNIT II : Flow Measurements and Study of Valves

Hours:12

Flow measurement: Introduction, Review of Venturi meter, orifice meters, rota meters, Pitot tube, working of turbine, vortex shedding, electromagnetic flow meters.

Introduction to Advanced flow measurement techniques: Hot Wire anemometer, Laser Doppler anemometer, Ultrasound, Particle image Velocimetry

Study of Valves: Types of Valves, Actuators, Petitioners, Valve characteristics, Controllability and Rangeability, Cavitations, Flashing, choking, Valve Sizing for incompressible fluids, compressible fluids, Two phase flows.

UNIT III : Introduction to Quality Control and Analytical Techniques

Hours:10

Need for Chemical analysis in Petroleum industry, Crude Assay, Standard Test Methods. Introduction to principles of Analytical techniques: Spectroscopic Techniques, Chromatographic techniques, Crystallography, electrochemical analysis, thermal analysis, Electrophoresis, calorimeter, Hybrid techniques.

Miscellaneous measurements and analysis: density, viscosity, Refractrometer, pH and redox potential measurements. Thermal conductivity gas analyzers. Oxygen determination. Orsat analysis

UNIT IV : Working and Interpretation of Instrumental Analytical Methods

Hours:10

Spectroscopic techniques: Atomic Absorption, X-ray, inductively coupled argon plasma (ICAP), ultraviolet – visible (UV-VIS), fluorescence, infrared (IR), Raman spectroscopy, mass Spectrometry (MS), nuclear magnetic resonance (NMR).

Chromatographic Techniques: gas chromatography (GC), high pressure liquid chromatography, gel permeation chromatography (GPC), thin layer chromatography (TLC), super critical fluid chromatography (SFC) Classification of spectroscopic and chromatographic techniques for Analysis of fuels

Total Hours : 42

Texts and References:

1. Nakra, B.C. and Chaudhry, K.K., “Instrumentation, Measurement and Analysis”, 2nd Edition, Tata McGraw-Hill, 2004.
2. Singh, S.K., “Industrial Instrumentation and Control”, 2nd Edition, Tata McGraw–Hill, 2007

PE 482 Process Plant Simulation

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	1	0	3	3	30	60	10	--	--	100

Unit I

Hours: 12

Introduction to modelling and simulation, Classification of models and their comparison: Linear vs nonlinear, Steady state vs unsteady state, Lumped Parameter vs distributed parameter, Continuous vs discrete variables
Model building-steps, selection of variables; Mathematical forms of models, Fundamental laws in modelling

Unit II

Hours: 12

Total continuity and component continuity equation models for macroscopic and microscopic systems; Parameter estimation techniques in theoretical as well as numerical models, Basics of simulators, structure of simulator, modular mode and equation oriented mode, Degree of freedom analysis of various unit operations
Types of simulation problems: Design, Rating, Flow sheeting, Basic Flow Diagram, P&ID, Development of flow diagram, Flow sheeting, Usefulness and Limitation of Process Simulation.

Unit III

Hours: 12

Partitioning and tearing, various algorithms for Decomposition of Networks, Basics of various solution models for single variable non linear models, multivariable models and their solution strategies, Steady state process simulation: Case Studies.

Unit IV

Hours: 6

Introduction to professional simulator like Aspen HYSYS and Mathematical tools like Excel, MATLAB, POLYMATH

Total Hours: 42

Texts and References:

1. B. V. Babu, Process Plant Simulation, Oxford University Press, 2004.
2. M. M. Denn, Process Modelling, John Wiley, 1987.
3. Process Dynamics: Modeling, Analysis and Simulation, B Wayne Bequette, Prentice Hall International Inc

PE 424 Major Industrial Project Work

Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Report writing	V/V	Total
0	6	4	8	10	80	20	100

Aim: To address specific industry and research related problems.

Unit 1: Experimentation and data analysis and Synthesis

Unit 2: Outcome, discussion and conclusion

Unit 3: Report Writing, Presentation and Viva-Voce

Text Books & Recommended Software:

1. Kothari, C. R. (2008) Research Methodology: Methods and techniques,
2. Murray, R (2002) How to write a thesis, McGrawal Hill Publication
3. Recent ENDNOTE Software for referencing
4. JABREF for Referencing.