

COURSE STRUCTURE FOR B.TECH. Fourth Year

SEMESTER VIII			B.TECH. Fourth year										
Sr. No	Course Code	Course Name	Teaching Scheme					Exam Scheme					Total Marks
			L	T	P	C	Hrs/wk	Theory			Practical		
								MS	ES	IA	LW	LE/Viva	
1	PE-419	Management in Hydrocarbon Industry	3	0	0	6	3	30	60	10	--	--	100
2	PE-421T	Safety, Health and Environment	3	0	0	6	3	30	60	10	--	--	100
	PE-421P		0	0	2	1	2	--	--	--	25	25	50
3	PE-422	Pipeline Engineering	2	1	0	5	3	30	60	10	--	--	100
4	PE-423	Offshore Production Operations	3	0	0	6	3	30	60	10	--	--	100
5	PE-424	Major Industrial Projectwork	0	6	4	8	10	--	--	--	80	20	100
6	PE XXX	Elective - 1	2	0	0	4	2	30	60	10	--	--	100
7	PE 426	Grand Viva	0	0	8	4	8	--	--	--	80	20	100
Total			13	7	14	40	34	--	--	--	--	--	750

MS = Mid Semester, ES = End Semester;

IA = Internal assessment (like quiz, assignments etc)

LW = Laboratory work; LE = Laboratory Exam

*Elective 1 (Upstream) The Following courses will be allotted based on availability of the faculty.

PE460: (2-0-0) Petroleum refining and Petrochemical

PE461: (2-0-0) Unit Operations in Petroleum Industry

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	6	3	30	60	10			100

Unit 1 (10 Hrs)

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 2 (8 Hrs)

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 3 (12 Hrs)

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 4 (12 Hrs)

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.

Recommended Books

- 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 421 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	--	6	3	30	60	10	--	--	100
<p>Unit – 1: Health: Occupational Hazards in Oil & Gas Industry 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, 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)</p> <p>Unit – 2: Hazard & Risk Analysis, Hours: 10 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)</p> <p>Unit – 3: HSE Management system: Hours: 10 OISD, API RP 75, ISO 14000, ISO 9000, OSHAS 18000 Standards</p> <p>Unit – 4: Environment Hours: 10 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.</p> <p style="text-align: right;">Total Hours: 42</p>										
<p>Texts and References:</p> <ol style="list-style-type: none"> 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 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	5	2	30	60	10	--	--	100

Unit – 1: Introduction Hours: 7

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 – 2: Pipeline Drawings Hours: 7

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

Unit – 3: Pipeline Specification Hours: 7

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 – 4: Stress Calculation Hours: 7

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: 28

Text / Reference

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 423 Offshore Production Operations

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	6	3	30	60	10	--	--	100

Unit 1: **12 Hrs**
 Wave forms and characteristics. Interaction with offshore structural elements. Environmental prediction and loading.

Unit 2: **10 Hrs**
 Offshore structure. Fixed, mobile and floating. Fixed platform, Steel and concrete gravity structures. Interaction with floating vessels.

Unit 3: **10 Hrs**
 Mooring systems and design. Positioning and reentry system.

Unit 4: **10 Hrs**
 Well completion- platform & subsea. Workover operations. Fluid gathering, processing, storage and dispatch.

Total Hours: 42

Text Book and References:

1. Baker, R. (1998) A Premier of Offshore Operations Petroleum Extension Service, Division of Continuing Education, University of Texas at Austin in cooperation with International Association of Drilling Contractors, Houston, Texas
2. Shippen, M and Scott, S. (2004) Offshore multiphase production operations, PennWell Books.
3. Robinson, T (1992) The Offshore: An Introduction to the Technology, terminology and operations of offshore oil Exploration.
4. Leffler, W. L., Pattarozzi, R., and Sterling, Gordon (2011) Deepwater petroleum Exploration & Production, -A nontechnical guide, Penn Well Books.

PE 412 Major industrial project work							
Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Report writing	V/V	Total
0	0	3	8	3	80	20	100
<p>Aim: To address specific industry and research related problems.</p> <p>Unit 1: Experimentation and data analysis and Synthesis</p> <p>Unit 2: Outcome, discussion and conclusion</p> <p>Unit 3: Report Writing, Presentation and Viva-Voce</p> <p>Text Books & Recommended Software:</p> <ol style="list-style-type: none"> 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. 							

PE 460 Elective- I Petroleum Refining and Petrochemical Engineering										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	4	2	30	60	10	--	--	100
Unit I:										6 Hrs
Thermal conversion processes like Visbreaking, Delayed Coking, Fluid coking, Flexicoking,: Catalytic conversion processes - fluid catalytic cracking, RFCC, DCC, Hydrocracking, Hydrotreating processes, etc.										
Unit II:										7 Hrs
Reforming, hydrogen production, Alkylation, Polymerization, Isomerisation, Evaluation of crude for LOBS, Production of lubes and waxes.										
Unit III:										8 Hrs
History and importance of Petrochemical industry, growth in India, Classification of Petrochemicals, Feedstock of the Petrochemicals, Preparation of feedstock from ethane / propane and naphtha / gas oil cracking, syngas, Petrochemicals from C1, C2, C3, C4, Syngas & aromatics.										
Unit IV:										7 Hrs
Chemistry and technology for the production of Methanol formaldehyde, Ethylene oxide , glycol and Vinyl Chloride, Chemistry and Technology for the Production of Acetone, Cumene, Acrylonitrile, Linear alkyl benzene etc										
										Total 28 Hrs
BOOKS:										
1 Waddams, A.L. (1980) 'Chemicals from Petroleum', 4th edition, Gulf Publishing Company, London,										
2 Hatch, L. F., and Matar, S (1981) From Hydrocarbon to Petrochemicals, Gulf Pub. Co.										
3 Chauvel and B. Lefebvre, Petrochemical Processes 1 & 2; Gulf Publishing Co. Houston, Texas, USA.										
4. Speight, J.G. and Ozum, B. "Petroleum Refining Processes", Marcel Dekker Inc, New York, 2002.										
5. Gary, J.H. and Handiwerk, G.E., "Petroleum Refining Technology and Economics", Marcel Dekker, Inc., New York, 2001.										
3. Hobson, G.D., "Modern Petroleum Technology" Vol I & II, John Wiley & Sons, New York, 5/e, 1984										
4. Rao, B.K.B., "Modern Petroleum Refining Processes", Oxford & IBH Co. Pvt. Ltd., New Delhi, 4/e, 2002,										
5. Prasad, R., "Petroleum Refining Technology", Khanna Publishers, New Delhi, 2000										

PE 461 Elective- 1 Unit Operations in Petroleum Industry										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	4	2	30	60	10	--	--	100
<p>Unit I: 6 Hrs</p> <p>General Introduction: Mass transfer operations and its classifications, Diffusion mass transfer, Mass transfer coefficient, Mass transfer models, Mass transfer with chemical reactions.</p>										
<p>Unit II: 7 Hrs</p> <p>Gas Absorption Operations: Equilibrium, Choice of solvents, co-solvents, co-current and counter current operations, packed bed and staged columns.</p>										
<p>Unit III: 8 Hrs</p> <p>Humidification Operations: Psychrometry, Adiabatic humidification and dehumidification operations, Packed bed columns, Humidification equipments.</p>										
<p>Unit IV: 6 Hrs</p> <p>Drying: Fundamentals, drying curves, equipment for drying, Equipment for Gas-Liquid Operations: Sparged vessels, mechanically agitated vessels</p>										
Total 28 Hrs										
Text Book and References:										
<ol style="list-style-type: none"> 1. Treybal, R.E., "Mass Transfer Operations, Mc. Graw Hills, New York, 3/e, 1983 2. Geankoplis, C.J., "Transport Processes and Unit Operations", Prentice Hall of India, New Delhi, 4/e, 2003. 3. Mc. Cabe, W.L., Smith, J.C., and Harriot, P., "Unit Operations of Chemical Engineering", Mc. Graw Hills, New York, 6/e, 2001 4. Skelland, A.H.P., "Diffusional Mass Transfer", John Wiley and Sons, New York, 1974 										

PE 426 Grand Viva

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	0	4	2				80	20	100

Aim: to evaluate the students at the end of their four year studies.