

COURSE STRUCTURE FOR B.TECH. Fourth Year (8<sup>th</sup> Sem)

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-408	Gas Retailing- CGD	3	1	0	7	4	30	60	10	--	--	100
2	PE- 422	Pipeline Engineering	2	1	0	5	4	30	60	10	--	--	100
3	PE- 410	Regulatory and Policy Issues in Hydrocarbon Sector	3	0	0	6	3	30	60	10	--	--	100
4	PE XXX	Elective-2	2	0	0	4	2	30	60	10	--	--	100
5	PE-419	Management in Hydrocarbon Industry	3	0	0	6	3	30	60	10	--	--	100
6	PE 412	Major Industrial Project Work	0	6	4	8	10	--	--	--	80	20	100
7	PE 426	Grand Viva	0	0	8	4	8	--	--	--	80	20	100
Total			<b>13</b>	<b>8</b>	<b>12</b>	<b>40</b>	<b>33</b>						700

MS = Mid Semester, ES = End Semester;

IA = Internal assessment (like quiz, assignments etc)

LW = Laboratory work; LE = Laboratory Exam

Elective-2

**PEXXX-Petroleum Production Engineering**

**PEXXX-Unconventional Energy Resources**

PE-408 Gas Retailing- CGD										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	7	4	30	60	10			100
<p>Unit 1 Introduction and Historical Background <b>Hours: 12</b>            Energy Resources for CGD – Conventional Natural Gas, CBM, CMM, Bio Gas, LNG By tanker            Natural Gas value Chain Gas Retail Business (i) Introducing Gas Retailing ; (ii) Terminology used in CGD ; (iii) Various components of CGD Network (iv) CGD Business Segments (v) CGD Projects- Status in India; CGD Stake holders.</p> <p>Unit 2 <b>Hours: 10</b>            CGD Business Model- (i) Regulated return from Infrastructure- tariff, CNG Compression; (ii) unregulated business- Gas sales, OFC connectivity business, ATM, convenience store , Gas appliances; (iii) Single switch Solution; (iv) CGD seeding operation-High way CNG filling Station, LNG by Tanker</p> <p>Unit 3 <b>Hours: 10</b>            Designing of CGD network-(i) CGS; (ii) Steel ring Main; (III) PE network; (iv)CNG System; (v)PNG including last mile connectivity Regulatory framework in India for Oil &amp; Gas Sector; (i) Upstream Regulator; (ii) Downstream Regulator; (iii) PNGRB Act 2006, Functions of the board;(iv) Regulations covering Registration, Authorization, Design, Operation and Safety including ERDMP</p> <p>Unit 4 <b>Hours: 10</b>            Market research for assessing Gas demand, preparing Feasibility Report Learning from failures-(i) Accidents Analysis;(ii)Intricate Problems in CGD implementation Accelerators and Retarders of CGD, Socio-economic benefits, Legal Issues concerning CGD</p> <p style="text-align: right;"><b>Total Hours : 42</b></p> <p><b>Reference Books</b></p> <ol style="list-style-type: none"> <li>1. City Gas in India(BS Negi)</li> <li>2. Natural Gas (AK Jain)</li> </ol>										

PE 410 Regulatory and policy issues in hydrocarbon sector										
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><b>Unit – 1: Petroleum Policy and laws Hours: 12</b>            Constitution, Petroleum Laws and regulations, E&amp;P business regime – concession, joint ventures, service contract, production sharing contract</p> <p><b>Unit – 2: Policy Mechanism Hours: 10</b>            PMO, MOPNG, Planning Commission, upstream regulator: DGH, Downstream; Gas regulator, Public sector undertaking: ONGC, OIL, GAIL, GSPC, Private Sector: Reliance, Jubliant, Videocon, ESSAR; Foreign Sector: BG, ENI, CAIRN, NIKO, Petroleum Regulatory Board Bill, 2002, regulation benefits, role as arbitrator, resource exploitation – approach.</p> <p><b>Unit -3: Legal Framework Hours: 10</b>            Constitution of India 1950, Oil Field Act – Regulation and Development (1948), The petroleum and National Gas rules Act (1959), Territorial waters, Continental Shelf and exclusive Economic Zones Act(1976), Income Tax Act (1961), customs Act (1962), Foreign Exchange Management Act(1999), Environmental Protection Act(1986), Arbitration and Conciliation Act(1996)</p> <p><b>Unit – 4: Legal Terminologies Hours: 10</b>            Title Transfer, Despite resolution, Force Majeure, Form in/Farm out, Share acquisition, Swaps, Licensing/ bidding, Policy making, revenue management, Audit, optimal hydrocarbon utilization, technical advisory, OISD – safety monitoring, technical advisory, OISD – Safety monitoring, PNGRB – Downstream regulation issues.</p> <p style="text-align: right;"><b>Total Hours : 42</b></p> <p><b>Text Books and References</b></p> <ol style="list-style-type: none"> <li>1. Petroleum and natural Gas regulatory Board Act 2006</li> <li>1. Various Regulations notified by PNGRB on Authorization, Designing Construction and safety of Pipelines and CGD</li> <li>2. Government policy on FDI in Oil &amp; Gas retail Sector</li> <li>3. Government Policy on Natural gas Pipeline, Petroleum Products Pipelines</li> </ol>										

**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	3	30	60	10	--	--	100

**Unit – 1: 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 – 2: Pipeline Drawings Hours: 10**

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

**Unit – 3: 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 – 4: 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**

**Text books and 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 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 (10Hrs)**

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 (8Hrs)**

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.

**Text Books 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 412 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
<p><b>Aim:</b> To address specific industry and research related problems.</p> <p><b>Unit 1:</b> Experimentation and data analysis and Synthesis</p> <p><b>Unit 2:</b> Outcome, discussion and conclusion</p> <p><b>Unit 3:</b> Report Writing, Presentation and Viva-Voce</p> <p><b>Text Books&amp;RecommendedSoftware:</b></p> <ol style="list-style-type: none"> <li>1. Kothari, C. R. (2008) Research Methodology: Methods and techniques,</li> <li>2. Murray, R (2002) How to write a thesis, McGraw Hill Publication</li> <li>3. Recent ENDNOTE Software for referencing</li> <li>4. JABREF for Referencing.</li> </ol>							

PE 426 Grand Viva-Voce										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	8	4	8				80	20	100
<p><b>Aim:</b> to evaluate the students at the end of their four year studies.</p>										

PE XXX Unconventional Energy Resources (Elective)										
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-1 6Hrs.

Introduction- Energy resources; Conventional Energy Resources; Un-Conventional Energy Resources; Difference between Conventional and un Conventional, HC resources, Conventional Energy Resources (Simple introduction) (a). Crude Oil (b). Natural Gas (c) Coal

### Unit-2

12Hrs.

Unconventional Energy Resources: CBM formation; Resource potential mapping status of CBM bidding round; Current CBM Production; Future prospects; Players in India; Global Scenario, CMM- formation; Resource potential mapping; methods for assessing the potential; Award procedure for CMM block in India ; status of CMM; Current CMM Production; Future prospects; Players in India; Global Scenario, Shale Gas- Introducing Shale Gas; Shale Rock formation; History of Shale Gas; US success Story; Replication possibilities US experience in India; Shale gas Global Potential ; Shale Gas initiatives in Europe and Asia; Shale Gas Potential in India; major Shale Plats in India; Shale Gas a game changer; Status of Regulatory regime in India for shale gas.

### Unit-3

6Hrs.

Gas hydrates. Indian and Global Scenario. Gas Hydrates formation and production. Prevention methods for gas hydrate formation in gas flow pipelines. Estimation of Unconventional Energy Resources Methods of estimation, Indian scenario' potential of various unconventional sources,

### Unit-4

4Hrs.

Detail study of CBM and Shale Gas Exploration, Technology, Land and water requirement, Environmental issues, Global Experience- US, Europe, China, Australia and India

**Total: 28 hrs**

### Text Bookand References

1. Zou, C et al (2013) Unconventional Petroleum Geology, Elsevier
2. Max, M. D. (2003) Natural Gas Hydrate in Oceanic and Permafrost Environments, Kluwer Academic Publication
3. Nash, K. M. (2010) Shale gas Development, Nova Science Publishers, Incorporated
4. Rogers, R. (1994) Coal bed methane: principles and Practices, PTR Prentice Hall

PE XXX Petroleum Production Engineering (Elective)										
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><b>Unit - 1:</b> <span style="float: right;"><b>Hours: 6</b></span>  <b>Petroleum Production Engineering Fundamentals</b> Petroleum Production System- Role of Production Engineer, Well Completion, Well tests and Well test analysis</p> <p><b>Unit – 2:</b> <span style="float: right;"><b>Hours: 7</b></span>  <b>Production testing:</b> Inflow Performance Relationship (IPR), Construction of IPR curve using Test Point, IPR for Two phase reservoir using Vogel’s equation, concept of Productivity Index, Future IPR, Various flow regimes in wellbore.</p> <p><b>Unit – 3:</b> <span style="float: right;"><b>Hours: 8</b></span>  <b>Artificial Lift Methods:</b> Overview of artificial lift technology, Criteria for selection of artificial lift system, Reservoir performance, Artificial lift screening , Sucker Rod Pump (SRP), Gas Lift System,</p> <p><b>Unit – 4:</b> <span style="float: right;"><b>Hours: 7</b></span>  <b>Production Enhancement:</b> Introduction, Well Analysis and Remedial Measures, Low Productivity – Stimulation, Excessive Production of unwanted fluid, Water Control, Sand Control, Production Optimization, Best practices for installation and maintenance, Economic analysis</p> <p><b>Texts and References:</b></p> <ol style="list-style-type: none"> <li>1. Dr. GuoBoyun, Computer Aided Petroleum Production Engineering</li> <li>2. H Dale Begg, Production Optimization , OGCI Publication, tulsa.</li> <li>3. Kermit Brown, Technology of artificial lift method –. Vol2a ,2b. Penwell publishing company, Tulsa.</li> </ol>										