

PE 316 Natural Gas Engineering

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	30	60	10	--	--	100

Unit I : Introduction

Hours: 12

Composition, Physical & Thermal properties, Phase Behavior; Fields & reserves in India and energy scenario; major NG producing industries of India and their contribution to Indian economy; techniques of utilization

Unit II : Gas Processing

Hours: 10

Conventional and advanced separation techniques; sulphur recovery; LPG, LNG & CNG systems; specifications of NG for transportation in pipelines , NG Utilization: uses, underground storage, conservation & concept of peak shaving etc.

CBM, NG hydrates & in-situ coal gasification, conversion of gas to liquid (GTL)

Unit III : Natural Gas Development Engineering

Hours: 10

Compression calculations; gas flow measurement; compressor sizing, development and operation in gas fields; Gas from condensate and Oil fields; Field separation and oil absorption process; Low temperature processing; Dehydration and Sweetening;

Unit IV : Marketing, Retailing and Gas Trading

Hours: 10

Gas station and marketing; City gas distribution system; Government regulations; Natural Gas demand and supply; Natural gas – Spot and Future Markets; End User engineering

Total Hours: 42

Texts and References:

1. Bradley, H. B. (1987) Petroleum Production Handbook. SPE Publication.
2. Skimmer, D. R. (1982) Introduction to Petroleum Production Volume 1, 2 and 3, Gulf Publishing
3. Katz: D. L. and Lee, R. L.(1990), Natural Gas Engineering-Production and Storage, McGraw-Hill Publishing Company, New York.
4. Kumar, S (1987) Gas production Engineering., Gulf Publishing

PE 317T Petroleum Production Engineering										
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 : Petroleum Production Engineering Fundamentals										Hours: 12
Petroleum Production System- Role of Production Engineer, Well Completion, Well tests and Well test analysis										
Unit II : Production Testing										Hours: 10
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.										
Unit III : Artificial Lift Methods										Hours: 10
Overview of artificial lift technology, Criteria for selection of artificial lift system, Reservoir performance, Artificial lift screening , Sucker Rod Pump (SRP), Gas Lift System, PCP, ESP system, Gas lift design: mandrels, valves, injection gas requirements, temperature, chokes, spacing, equilibrium curve, continuous flow design.										
Unit IV : Production Enhancement										Hours: 10
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										
										Total Hours: 42
Texts and References:										
<ol style="list-style-type: none"> 1. Dr. Guo Boyun , Computer Aided Petroleum Production Engineering 2. H Dale Begg , Production Optimization , OGCI Publication,tulsa. 3. Kermit Brown, Technology of artificial lift method –. Vol 2a ,2b. Penwell publishing company, Tulsa. 										

PE 317P Petroleum Production Engineering Laboratory										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
0	0	2	1	2	--	--	--	25	25	50
Laboratory Courses: Practical classes shall be based on theory course content of the corresponding courses.										
Aim: Familiarization of various petroleum production operations.										

PE 318 Reservoir Engineering

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	30	60	10	--	--	100

Unit I : Reservoir Properties & Darcy's Law

Hours: 12

Bulk volume, Grain Volume, Effective Pore Volume and Net Volume. Porosity, Compressibility, Darcy's Law. Absolute and Effective Permeability, Permeability averaging, Transmissibility, Measurements of Permeability heterogeneity, Darcy's law of directional permeability, rock fluid interactions.

Unit II : Fluid and Rock properties

Hours: 10

Wettability, Capillary Pressure, correlation of capillary pressure to rock properties, Equivalent height and transition zone, mobility, relative mobility and flow capacity. Drivers of reservoirs

Unit III : Reserve Estimation

Hours: 10

Reservoir Drive Mechanism, Reserve determination, Volumetric, and Material Balance, gas well deliverability, Production Performance ratio, Production Stages,

Unit IV : Fluid Displacement

Hours: 10

Flow in porous media, flow units, Fractional flow, The Buckley-Leverett Theory, Welge's Method, Frontal Advance, Linear Stability Analysis, Well patterns, Fluid Coning, Pressure maintenance. Productivity Index, Specific Productivity Index, Continuity equation and its derivation; Diffusivity equation and its different forms

Total Hours: 42

Texts and References:

1. Ahmed T, Reservoir Engineering Handbook, Gulf Publishing, Houston.
2. Amyx J W, Bass DH, Whiting R L , Petroleum Reservoir Engineering, McGraw Hill, New York.
3. Reinhold, Flow of fluids through porous materials, Petroleum Publishing, Tulsa
4. Craft and Hakins , Applied petroleum Reservoir Engineering, Second edition, Prentice and Hall.

PE 306 Heat and Mass Transfer

Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	30	60	10	--	--	100

Unit I: Heat Transfer

Hours: 12

Conduction: Steady-state and transient flow through various geometries, Convection: LMTD and NTU, overall heat transfer coefficient. Application of dimensional analysis to convection. Heat transfer rate and Heat transfer coefficient calculations. Double pipe parallel and counter-flow heat exchangers, natural and forced convection through tubes and outside tubes, Shell and tube heat exchanger, and finned tube heat exchanger. Boiling of liquids and condensation of vapors

Unit II : Radiation

Hours: 10

Radiation from black and real surfaces, radiation transfer between black and grey surfaces, view factor, radiation shield, and multi-sided enclosures., Thermal insulation, Economic and critical thickness of lagging.

Unit III : Mass Transfer

Hours: 10

Diffusion in gases: Fick's law, determination and estimation of diffusion coefficient; diffusion through stagnant gas and equimolecular counter-diffusion. Diffusion in liquids: Mass transfer across phase boundaries, two-film theory and mass transfer coefficient.

Unit IV

Hours: 10

Gas Absorption, adsorption, and Distillation (flash and differential): Basic principles, laws, and calculations. Equilibrium, co-current and counter-current operations. Ideal stage concept and calculation of number of ideal stages. Efficiency. Packed bed and tray columns

Total Hours: 42

Texts and References:

1. Coulson and Richardson's Chemical Engineering Vol-1, 6th Ed, Elsevier (Butterworth and Heinemann).
2. Warren L. McCabe, Julian C. Smith, Unit Operations of Chemical Engineering, McGraw Hill.
3. Donald Q. Kern, Process heat transfer, Tata-McGraw-Hill.
4. Badger and Banchero, Introduction to Chemical Engineering, McGraw-Hill.

PE 319 Industrial Orientation

Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Report writing	V/V	Total Marks
0	0	6	3	0	80	20	100

Aim: To Familiarization of students in Upstream, Midstream and Downstream Hydrocarbon industry.

PE 320 Group Assignment and Presentation

Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Report writing	V/V	Total Marks
0	0	4	2	4	80	20	100

Aim: To train students in developing inter and intra personal skills in professional world.