

COURSE STRUCTURE
PETROLEUM ENGINEERING-DOWNSTREAM (SEMESTER V)

SEMESTER V			PETROLEUM ENGINEERING- DOWNSTREAM										
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-301	Petroleum Process Unit Operations	3	1	0	7	4	30	60	10	--	--	100
2	CH 306	Transport Phenomena	3	1	0	7	4	30	60	10	--	--	100
3	PE - 302	Role of Petroleum & Natural Gas in National Economy	2	0	0	4	2	30	60	10	--	--	100
4	PE -303	International Sourcing of Oil & Gas	2	0	0	4	2	30	60	10	--	--	100
5	PE-304	Industrial Orientation	0	0	0	3	0	--	--	--	80	20	100
6	PE-373P	Product Application Lab	0	0	2	1	2	--	--	--	25	25	50
7	PE 320	Group Assignment	0	0	4	2	4	--	--	--	80	20	100
8	PE 353	TimeSeries Analysis (Elective)	3	0	0	6	3	30	60	10	--	--	100
		Total	13	2	6	34	21						750

MS = Mid Semester, ES = End Semester;
LW = Laboratory work; LE = Laboratory Exam

IA = Internal assessment (like quiz, assignments etc)

PE 301 Petroleum Process Unit Operations										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	--	7	4	30	60	10	--	--	100
<p>Unit -1: Distillation Hours: 12 Flash Distillation, Continuous Distillation with Reflux-Material Balances in plate columns / Mc. Thiele Method, Batch Distillation and Distillation Equipment.</p> <p>Unit 2: Gas Absorption Hours: 10 Gas Absorption Principles of Absorption, Packed Tower Design, Material Balances, Calculation of Tower Height, Desorption or Stripping</p> <p>Unit – 3: Adsorption Hours: 10 Adsorption Processes, Principles of Adsorption, Basic Equations of Adsorption, Adsorption Equipment, Ion Exchange</p> <p>Unit – 4: Membrane Separation Processes Hours: 10 Separation of Gases, Separation of Liquids</p> <p style="text-align: right;">Total Hours: 42</p>										
<p>Texts and References:</p> <ol style="list-style-type: none"> 1. Warren L. McCabe, Unit Operations of Chemical Engineering. 2. Robert E. Trybal, Mass Transfer Operations. 3. R.D. Noble, Membrane Separation Technology, Principles and Application 4. Anil K. Pabby, Syed S.H. Rizvi, Hand Book of Membrane Separations 										

CH 306 Transport Phenomenon

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

Unit – 1: Momentum Transport Hours: 12

Viscosity and the mechanisms of momentum transport, Shell Momentum Balances and velocity distributions in laminar flow, equations of change for isothermal systems, velocity distribution with more than one independent variable, velocity distribution in turbulent flow, interphase transport in isothermal systems, macroscopic balances for isothermal flow systems, polymeric liquids

Unit – 2: Energy Transport Hours: 10

Thermal conductivity and the mechanics of energy transport, Shell energy balances and temperature distribution in solids and laminar flow, equation of change for non-isothermal system, temperature distribution with more than one independent variable, temperature distributions in turbulent flow, Interphase transport nonisothermal systems, macroscopic balances for nonisothermal systems, energy transport by radiation

Unit – 3: Mass Transport 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 4:-Distillation

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. Bird, R. B; Stewart, W. E. and Lightfoot, E. N. (2007) Transport Phenomena, John Willy
2. Warren L. McCabe, Julian C. Smith, Unit Operations of Chemical Engineering, McGraw Hill.
3. Donald Q. Kern, Process heat transfer, Tata-McGraw-Hill.

PE 302 Role of Petroleum and Natural Gas in National Economy

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

Hours: 5

Introduction- Describing terminology used; National Economy; Intent of the subject;
Resources base, present production, Present Consumption and forecast for future of Production and consumption of Petroleum Products and Natural gas
Indian Context: GDP

UNIT-II Hours:12

Contribution of Petroleum and Petroleum Products- to CDP and foreign exchange out go.
Contribution of Natural Gas- to CDP and foreign exchange out go.
Trend- study of decadal growth and way forward as extrapolation and expected constraints.
Fiscal Regime concerning Petroleum Sector: Elements of cost of Petroleum Products.

UNIT-III

Hours: 5

Natural gas- Central taxation and State taxation ; discrepancies in tax structure, declared goods status, Sales tax, service tax and VAT, effect of fiscal regime on Petroleum Products and Natural gas marketing and inter/intra state movements
Study of US, China and one country from European Union w.r.t. Production and consumption of Petroleum, Petroleum and Natural Gas; Contribution to the GDP and Drainage out go of foreign exchange

UNIT- IV

Hours: 6

How country is dependent on Petroleum and Natural gas for its (i) Growth, (ii) Social responsibility, (iii) Environmental Protection
Policy issues- existing Policy, Deficiencies and Changes required

Total Hours: 42

1. Shippey, K. C. (2009) A short course on international Contracts, 4th Ed. World Trace press.
2. Tordo, S (2007) Fiscal System in Hydrocarbons: design issues. The World Bank
3. Ministry of P & G (Government of India) Model Production Sharing Contracts,
4. Johnston, D (1994) International petroleum fiscal system and Production sharing contracts, Penn Well books.

PE 322 International Sourcing of Oil & Gas

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

UNIT-I

Hours: 5

Historical background of the Oil and Gas trading, , Geopolitical history of Hydrocarbon exploration and trading, Life cycle of Petroleum Project, Fiscal System in hydrocarbon industry, Basic elements of Contracts, Basic terminologies of contract and legal. Basics of Upstream and Downstream regulatory Laws and Policies.

UNIT-II

Hours: 12

Contracts in E & P Industry, Classification of contracts, Concession style, Sharing contracts- Production Sharing Contract, Terminologies, Attributes of PSC, Different PSC Models (Indonesian, Indian, Nigerian, Chinese, Equatorial New Guinea, etc). Risk Sharing Contracts, Joint Operating Agreements, JOA attributes, JOA Models, Farmout Agreements, Rig procurement contracts-Design and Fabrication aspects

UNIT-III

Hours: 5

Elements of Transportation, Hydrocarbons transport, Contracts related to bougers, ship and pipeline, Tarrif mechanism- national and International, LNG contracts, LNG taxation and charges. Oil Tanker

UNIT- IV

Hours:6

Hydrocarbon trading-Oil trading, Physical and Paper; Crude oil Markets- Spot, Barter, Future and forward. Oil Pricing mechanism, short term and long term, Level playing and swapping. Hydrocarbon Strategic storage, Contract Arbitration and dispute settlement.

Total Hours: 42

1. Shippey, K. C. (2009) A short course on international Contracts, 4th Ed. World Trace press.
2. Tordo, S (2007) Fiscal System in Hydrocarbons: design issues. The World Bank
3. Ministry of P & G (Government of India) Model Production Sharing Contracts,
4. Johnston, D (1994) International petroleum fiscal system and Production sharing contracts, Penn Well books.

PE 319 Industrial Orientation								
Teaching Scheme					Examination Scheme			
L	T	P	C	Hrs/Week	Report writing	V/V	Total	
0	0	6	3	3	80	20	100	
Aim: To Familiarization of students in Upstream, Midstream and Downstream Hydrocarbon industry.								

PE 373P Product Application Lab										
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: To test the chemical properties such as fire point, flash point, drop point, smoke point etc of petroleum and petroleum related products.										

PE 320 Group Assignment and Presentation								
Teaching Scheme					Examination Scheme			
L	T	P	C	Hrs/Week	Report writing	V/V	Total	
0	0	4	2	3	80	20	100	
Aim: To train students in developing inter and intra personal skills in professional world.								

PE 353 Time Series Analysis (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>Unit-1</p> <p>Definition of Time series analysis, Moving Average and smoothing techniques, Auto Regressive Method, Moving Average Method, Auto Regressive Moving Average Method, Single Moving Average and Centered Moving Average,</p> <p>Unit-2</p> <p>Exponential Forecasting, Single Exponential Smoothing, Double Exponential Smoothing, Triple Exponential smoothing, Triple Exponential smoothing, Univariate Time series model, Seasonality and Stationarity, Box-Jenkins model identification, Estimation and Validation, MultiVariate Time Series Analysis</p> <p>Unit-3</p> <p>Identification of Pattern in Time series data, Trend analysis, Auto correlation, Cross correlation, Convolution , Semblance, Parameter estimation, Indices of lack of fit, single spectrum analysis, cross spectrum analysis, squared coherency, Gain and Phase shift</p> <p>Unit-4</p> <p>Frequency and Period, Periodogram, Problem of Leakage, padding the Time Series, Tapering, analysis of result when no periodicity exists in data, Fast Fourier Transform (FFT), Computation of FFT in time series analysis, Decomposition of data, Data analysis , modeling and forecasting of events from petroleum field where periodicity and non-periodicity exists.</p> <p style="text-align: right;">Total 28 Hrs</p> <p>Books and References</p> <ol style="list-style-type: none"> 1. Box, G. E. P, Jenkins G M and Reinsel, G. C., 2009, Time Series Analysis: Forecasting and Control, Wiley Publication 2. Madsen, H (2008) Time series analysis, Chapman and hall, 3. Hamilton, J. D. (1994) The time series Analysis, Princeton University Press 										