COURSE STRUCTURE
PETROLEUM ENGINEERING-DOWNSTREAM (SEMESTER VI)

SEMESTER-VI		PETROLEUM ENGINEERING-DOWNSTREAM										
Course Code	Course Name	Teaching Scheme					Exam Scheme					
							Theory			Practical		Total
		L	T	P	C	Hrs/wk	MS	ES	IA	LW	LE/Viva	Marks
PE- 641	Gas Processing	3	1	0	7	4	30	60	10	--	--	100
PE- 642	Due Diligence of Petroleum Resources	2	0	0	4	2	30	60	10	--	--	100
PE- 643	Petrochemical Engineering – I	3	0	0	6	3	30	60	10	--	--	100
PE-644	Petroleum Refinery Engineering	3	1	0	7	4	30	60	10	--	--	100
PE-645	Strategic Storage of Petroleum	3	0	0	6	3	30	60	10	--	--	100
PE-646P	Petroleum Product Testing Lab	0	0	2	1	2	--	--	--	25	25	50
PE 647	Mini Project	0	0	0	4	0	--	--	--	80	20	100
PE-327	Seminar	0	0	4	2	4	--	--	--	80	20	100
	Total	**14**	**2**	**6**	**37**	**19**						**750**

ES: End Semester, MS: Mid Semester IA: Internal Assessment (quiz, assignment etc.)

LW: Laboratory Work, LE: Laboratory Exam

PE 641GAS PROCESSING										
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

Unit 1:- **Hours: 12**

- Introduction- Defining Gas processing, Historical background
- General processes in Gas Processing
  - Water and Hydro Carbon Liquid Separation
  - De-hydration
  - Carbon Di Oxide(CO_2) removal
  - H_2 S Removal
  - Mercury Removal
  - Butane plus Extraction
  - Propane and Butane (LPG) Extraction
  - Ethane Extraction
  - Helium Extraction

Unit 2:- **Hours: 10**

- Gas processing for pipeline transportation (Corrosion protection, limits for water contents and CO_2 contents)
- Gas processing for LNG Production (limits of components like Water, CO_2, and Mercury etc.)

Unit 3:- **Hours: 10**

- Gas process for Value added fraction extraction- Removing C_2 ; C_3 ; C_4 ; and other components
- Extent of extraction- Percentage removal from the feed, cost of extraction, limitation

Unit 4:- **Hours: 10**

- Chemicals and Catalysts used in gas Separation-, Absorbers, Molecular Sieves; Glycol; Amines

Total Hours: 42

PE 643Petrochemicals Engineering-I										
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

UNIT I **Hours: 12**

Prominent unit-operations and unit-processes in chemical industry, Chemistry and process technology for the production of-

- Ammonia manufacture using Haber's process,
- Methanol from Synthesis gas route,
- Formaldehyde from Methanol,
- Chloromethane from methane

UNIT II **Hours: 10**

Chemistry and technology for the production of

- Ethylene and acetylene production via steam cracking of hydrocarbons
- Vinyl chloride from ethylene using two-step process
- Ethanolamine from ethylene

UNIT III: **Hours: 10**

Chemistry and technology for the production of

- Isopropanol from Propylene.
- Cumene from propylene.
- Acrylonitrile from propylene.
- Hydrodealkylation of Toluene.
- Pthalic anhydride from o-xylene

UNIT IV **Hours: 10**

Properties, applications and production technologies of the following commodity polymers –polyethylene, LLDPE, HDPE, polypropylene, polystyrene, PVC

Total Hours: 42

Text Books and References

1.Waddams, A.L., 'Chemicals from Petroleum', 4th edition, Gulf Publishing Company, London, 1980.
2. Lewis F. Hatch & S Matar, From Hydrocarbon to Petrochemicals
3. B.K. BhaskaraRao, A Text on Petrochemicals, 2/e, Khanna Publishers, Delhi, 1998.
4. Mall, I.D., "Petrochemical Process Technology", Macmillan India Limited, Delhi, 2007.
5. F.A. Lowenheim and M. K. Moran; Industrial Chemicals, John Wiley & Son Inc.,USA

PE 644 Petroleum Refinery Engineering										
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: Origin, Formation and Composition of Petroleum Hours 12

Origin and Formation of Petroleum, Production Statistics, Reserves and Raw Materials, Composition of Petroleum

Unit- 2: Properties of Petroleum FractionsHours: 10

Evaluation of Petroleum, Thermal Properties of Petroleum Fractions, Important products- Properties and Test Methods

Unit – 3: Fractionation of PetroleumHours: 10

Dehydration and Desalting of Crudes, Distillation of Petroleum

Unit – 4: Treatment TechniquesHours: 10

Fractions- Impurities, Gasoline Treatment, Treatment of Kerosene, Treatment of Lubes
Wax and PurificationCatalytic Cracking, Catalytic Reforming, Coking, Alkylation, Isomerisation Processes Air Blowing of Bitumen

Total Hours: 42

Texts and References:

1. Dr. B.K. BhaskaraRao,Modern Petroleum refining Processes (5th Edition) .
2. Dr. B.K. BhaskaraRao,A Text Book on Petro-Chemicals.
3. Marshall Sittig,Drden'S Outlines of Chemical Technology.
4. George T. Austin, Shrieve's Chemical Process Industries.

PE 646P Petroleum Product Testing 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**: Theory courses which are taught will be practiced in the laboratory.										

PE 327 Seminar							
Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Report writing	V/V	Total
0	0	2	2	2	80	20	100
Aim: To improve the presentation and inter-personal skill of the students							

PE 647 Mini Project							
Teaching Scheme					Examination Scheme		
L	T	P	C	Hrs/Week	Report writing	V/V	Total
0	0	0	4	0	80	20	100
Aim: To develop the team work, inter and intra personal skills of students.							

PE 645Strategic Storage of Petroleum

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: Introduction Hours 12

(i) Defining strategic Storage; requirement and options- for the(a) Security of the Country, and (b) Business requirement

(ii) Concept of strategic storage for Petroleum, Petroleum Products and Natural Gas in India

(iii) Introduction to Types of Tanks for Storage of Petroleum Products.

Unit- 2: Types of strategic storage Hours: 10

(i) Strategic Storage for Petroleum, Petroleum Products and Natural Gas in India

(ii) Initiative of Government so far

(iii) Status of the projects in hand

Unit – 3: Global experienceHours: 10

(i) US Experience- Number of storages, Operation philosophy, economics

(ii) European Experience- scattering, security of supply, management and economics

Unit – 4: Imperative for IndiaHours: 10

(i) Status of LPG and other petroleum products storage, Crude Oil storages
(ii) Progress in Gas Storage
(iii) Economics of Strategic Storage
(iv) Operation

Total Hours: 42