

**Department of Petrochemical Engineering**  
**Courses under Minor Degree list**

S.N.	Sem.	Name of the course	Name of equivalent NPTEL course	NPTEL Sem. (Even/Odd)	Instructor's Name	Duration (weeks)	Credits
1	V	Introduction to Petroleum and Petroleum Geology	--	--	--	12	4
2	V	Introduction to Petroleum Refinery and Refining	--	--	--	12	4
3	VI	Petroleum Products	--	--	--	12	4
4	VII	Basics of Petrochemicals	--	--	--	12	4
5	VII	Energy Management in Petrochemical Engineering	--	--	--	12	4

**All above proposed courses are of specialized type. Therefore mapping and level of content match are difficult. Hence for these courses study material and digital content will have to be developed separately.**

# **Detailed Syllabus**

## **Introduction to Petroleum and Petroleum Geology**

### **Unit I**

Petroleum Geology and its scope, origin of Petroleum, brief review of petroleum, its formation and composition of crude oil. Oil and gas traps.

### **Unit II**

Geophysical and Geochemical Methods in oil exploration, the role of stable isotones, biomarkers and geomicrobiology in petroleum exploration.

### **Unit III**

Drilling methods (vertical, deviated and horizontal), drilling fluids, platform.

### **Unit IV**

Geochemical prospecting methods, Field reservoir studies (static and flowing bottom pressures, build up curves, draw dawn tests), methods of recovery ( Activation and stimulation tests).

### **Unit V**

Case histories of geophysical exploration in India for Petroleum resource development.

### **Text/ References**

1. B. G. Deshpande, World of Petroleum
2. P. K. Mukharjee, Text Book of Geology

# **Introduction to Petroleum Refinery and Refining**

## **Unit I**

Brief review of Petroleum, its formation and composition of crude oil.

## **Unit II**

Characterization of crude oil, pretreatment of crude, removal of moisture, salts etc.

## **Unit III**

Types of refineries such as simple, intermediate and complex

## **Unit IV**

General refinery set – up and function of various units, refinery flow diagram

## **Unit V**

Statistical information on Indian petroleum and petrochemical industry, future trends and developments.

## **Texts / References**

1. Hobson G.D., 'Modern Petroleum Technology, Volume – II' John Wiley & Sons 1986
2. Speight J.H., 'The Chemistry and Technology of Petroleum Hydrocarbons' MerceL Dekker, Inc,1982
3. Bhaskar Rao, 'Modern Petroleum Refining'

## **Petroleum Products**

(Major petroleum products, specifications and test)

### **Unit I**

LPG, Gasoline

### **Unit II**

Industrial solvents, naphtha, Kerosene, aviation turbine fuel (ATF)

### **Unit III**

High speed diesel (HSD), LDO, furnace fuel,

### **Unit IV**

Lubricants, Wax, tar and bitumen.

### **Unit V**

Blending of various petroleum fractions to meet require specification

### **Text Books / Reference Books:**

1. Hobson G.D., 'Modern Petroleum Technology, Volume – II' John Wiley & Sons 1986
2. Speight J.H., 'The Chemistry and Technology of Petroleum Hydrocarbons' Mercel Dekker, Inc,1982

## **Basics of Petrochemicals**

### **Unit I**

Scenario of Petrochemical Industries and its feed stock. Product pattern of paraffin's, olefins, diene and acetylene.

### **Unit II**

Manufacture of important paraffin's, olefins, acetylene, butadiene, isoprene and oligomers and aromatics: Techniques, Equipment, Reactions, Catalyst, Solvents, Operating conditions, Separation and purification and developments in these areas.

### **Unit III**

Production of synthesis gas: Various routes, reactions, mechanism, condition, thermodynamics, kinetics, coal gasification and hydrogenation.

### **Unit IV**

Conversion of -

Ethylene to ethylene oxide, ethylene glycol, ethanol amine

Propylene to acrylic acid, methyl ethyl ketone, acrylonitrile

### **Unit V**

Conversion of –

Butenes to iso and n butanols, MIBK, MTBE

Aromatics to maleic and phthalic anhydride, DMT, phenols and acetones

### **Texts /References**

1. Dryden, Charles E., Outlines of Chemical Technology, affiliated East-West Press Pvt. Ltd.  
New Delhi
2. B.K. Bhaskarrao, "A text on Petrochemicals" 2<sup>nd</sup> Ed, Khanna publishers, New Delhi.

# **Energy Management in Petrochemical Industry**

## **Unit I**

General energy problems, energy use patterns and scope for conservation

## **Unit II**

Energy management principles, needs of organization and goal setting, energy audit in plant metering, review of conservation technologies.

## **Unit III**

Properties of Hydrogen with respect to its utilization as a renewable form of energy

## **Unit IV**

Energy conservation economics, basic discounting life cycle, costing and other methods, factors affecting economics

## **Unit V**

Energy pricing and incentives for conservation of energy, energy conservation of available work in the plants, identification of irreversible processes

Primary energy sources, optimum use of prime movers, energy efficient housekeeping, energy recovery in thermal systems, energy storage and thermal insulation

## **Texts/References**

1. D.A.Reay, Industrial Energy Conservation, Pergamon press, 1980
2. T.L. Boyen, Thermal Energy Recovery, Wiley, 1980