

## **PCP5I103**

## **PETROLEUM REFINING ENGINEERING**

### **MODULE I**

Occurrence of Petroleum, formation of Petroleum by Physical and Biological Methods. Origin and Reserves and Deposits of World, Estimation of Reserves Exploration and Production of Petroleum. Composition of Petroleum. Global and Indian Refining Scenario. Overview of Refinery Products, Refinery Configuration and Development. Paraffinic, Mixed and Naphthenic Based Crude Oil, Characterization Factor, Viscosity Index and Correlation Index. Distillation Characteristics, Thermal Properties of Petroleum Fractions and Important Product Properties. Testing of Petroleum Crude.

### **MODULE II**

Dehydration and Desalting of Crudes - Settling and Electric Desalting, Heating of Crude - Pipe Still Heaters, Distillation of Petroleum - Arrangement of Towers, Atmospheric Distillation Unit and Vacuum Distillation Unit. Topping operations and Blending of Gasoline. Treatment Techniques: Physical and Chemical Impurities, Destruction of Sulphur Compounds and Catalytic Desulphurization, Dehydration of Gases and Sweetening Operations for Gases.

### **MODULE III**

Gasoline Treatment- Copper Chloride Process, Unisol Process, Merox Sweetening, Sulphuric Acid Treatment and Catalytic Desulphurization. Treatment of Kerosene. Treatment of Lubes- Sulphuric Acid Treatment, Clay Treatment and Solvent Treatment. Wax Purification, Dewaxing with Solvents.

### **MODULE IV**

Need and significance, types and functions of Secondary Processing. Cracking, Thermal Cracking and Visbreaking. Different Feed Stocks, Products Yields, Qualities and Recent Development. Catalytic Cracking, Commercial Catalyst, Feedstock and Catalytic Cracking Conditions, Types and Processes- Fixed Bed Cracker, Fluid Catalytic Cracking (FCC), Flexi Cracking. Theory, Reaction Conditions and Catalyst for Catalytic Reforming, Platforming, Houdri Forming, Rhein Forming, Power Forming, Selecto Forming. Ultra Forming and Rex Forming. Naphtha Cracking, Feedstock Selection and Effect of Steam.

### **MODULE V**

Feed Stocks and Reactions for Alkylation Process- Cascade Sulphuric Acid Alkylation, Hydrofluoric Acid Alkylation. Isomerization Process- Isomerization with Platinum Catalyst and Aluminium Chloride Process. Methods of Petroleum Coke Production - Koppers, Thermal Cracking, Delayed Coking, Fluid Coking and Contact Coking. Hydro Cracking- principles, reactions in Hydro Cracking, Catalyst, Hydro Cracking Reaction Conditions, Iso Max Processes and Hydro Desulphurization Processes.

### **TEXT BOOKS**

- Jones, D.S.J. and Pujadó, P.R., Handbook of petroleum processing, Springer, The Netherlands, 2006
- Nelson, W. L "Petroleum Refinery Engineering", McGraw Hill Publishing Company Limited, 1985.
- Watkins, R. N "Petroleum Refinery Distillations", 2nd Edition, Gulf Publishing Company, Texas, 1981.

### **REFERENCES**

- Parkash, S., Refining processes handbook, Gulf Professional Publishing, 2003
- Hobson, G. D “Modern Petroleum Refining Technology”, 4th Edition, Institute of Petroleum, U. K. 1973.