CEPE3005 PETROLEUM REFINERY ENGINEERING (3-0-0)

Overall course Objective:
The main objective of the course is to teach students various processes occurring in petroleum refinery industries to purify product and to achieve desired quality of petroleum product. Develop concept of biorefineries and carbon footprint.

Module I: (08 hrs)
Origin and formation of petroleum, reserves and deposits of the world, Indian petroleum industries, composition of petroleum. Crude pre-treatment: dehydration and desalting. Pipestill heater, atmospheric and vacuum distillation of crude oil.
Important products, properties, and test methods: natural gas, associated gas, dissolved gas, refinery off gas, LPG, Reid vapour pressure, ASTM distillation, octane and cetane numbers.

Module II: (07 hrs)
Treatment of products, additives, blending of gasoline. Treatment of gasoline, kerosene, lubes and lubricating oils, waxes.

Module III: (07 hrs)
Thermal and catalytic cracking, hydro cracking and hydro treating, Coking, vis-breaking, alkylation, isomerization, asphalt, and air blown asphalt.

Module IV: (07 hrs)
Desulfurization and hydro-desulfurization of petroleum products, Sweetening Processes, Desulphurisation of sour water, sulphur recovery.

Module V: (07 hrs)
Biofuel, gas to liquid technology, carbon footprints in petroleum refining, concept of Petrochemical refinery, gas-refinery and Biorefinery.

Course Outcomes:
On the completion of course students would;
CO1: Develop understanding about the formation, composition and characterization of crude oil deposits and its products.
CO2: know about the various processes existing to remove various impurities like salt, sulphur and water from crude oil.
CO3: Know about the processes from which various petroleum cuts can be obtained.
CO4: Know about the concept of biorefineries and carbon footprint in petroleum refining.

Textbooks:
1. Petroleum Refinery Engineering, W L Nelson, McGraw-Hill.
2. Modern Petroleum Refining Processes, 5th ed. by B K B Rao, Oxford & IBH.

Reference Books:
1. Petroleum Refining: Technology and Economics, 5th ed. by J H Gary, G E Handwerk and M J Kaiser, CRC Press.
2. Handbook of Petroleum Processing, 2nd ed. by S A Treese, P R Pujado, and D S JJones, Springer.
3. Modern Petroleum technology, Hobson, G.D, Volume I &II Wiley.

Web Learning references:
1. Petroleum Refinery Engineering by Prof. K. K. Pant, Department of Chemical Engineering, Link: IIT Delhi: https://nptel.ac.in/courses/103/102/103102022/