PRPE4001 STORAGE AND TRANSPORTATION OF CRUDE OIL AND NATURAL GAS (3-0-0)

Course Objective:

- To Analyze the commercial and logistical aspects of crude oil trade, port selection, shipyard capabilities, and natural gas sourcing
- To Master the technologies involved in LNG regasification, cold utilization, and pipeline integration
- To Focus on midstream transportation networks, specifically crude oil pipeline mechanics, pressure drops, pumping requirements, and flow assurance.
- To Cover the basic engineering aspects of oil and gas terminal design, liquefaction trains, and surface storage facilities.
- To Explore subsurface hydrocarbon storage, focusing on inventory verification, gas flow performance, and deliverability.

Module I: (10 Hours)

Crude oil Trade. Selection of Port Location, Ship Building/Shipyards. Commercial Sourcing of Natural Gas, Different Kinds of Regasification Techniques, Regasification Process & Cold Utilization, Synchronization of Degasified gas and Pipelines, Current Status in India

Module II: (10 Hours)

Transportation techniques of crude oil, Pipeline specification, Corrosion Prevention techniques, Pressure drop, Pumps and Booster station, Wax deposition and prevention, Chemical treatment.

Module III: (8 Hours)

Basic Engineering Aspects of Terminal Design, Design of Liquefaction Train, Ship Building/Shipyards, Storage Facilities. Supply& Demand, Variation Gas Field & Aquifers, Technical Qualities and Storage, Properties of storage Reservoir, Rocks & Fluids.

Module IV: (10 Hours)

Flow through Storage Reservoir; Inventory Concept, Pressure- Content Hysteresis, Inventory Verification, Gas Flow Performance, Gas Deliverability. Design & Development of Underground Storage Fields: Operation of Storage Fields. Threshold Pressure. Water Influx/Efflux Quantities. Aquifer Equilibrium Pressure. Error and Uncertainty. Gas Storage in Salt Cavity & Caverns: "thermodynamics, Temperature and Pressure Effect. Recent Developments Advanced Storage Techniques, Case Histories.

Course Outcomes:

- Students can evaluate ideal port and shipyard locations, differentiate between regasification technologies.
- Students will be able to calculate pressure drops, design pumping/booster stations, and apply chemical or engineering techniques to prevent wax deposition and pipeline corrosion.
- Students can design key components of a liquefaction train and define the technical qualities of both reservoir rocks and fluids required for surface storage.
- Students can calculate gas flow performance, determine threshold pressures.

Books:

1. Oilfield Processing: Crude Oil (Oilfield Processing of Petroleum) R. Solvay, PennWell Books 1995.
2. Advances in Environmental Control Technology: Storage Tank Paul Cheremisinoff, Gulf Professional Publishing; 1 ST edition (May 9, 1996)