Course code and Title: PE-419 Water Flooding and Enhanced Oil Recovery

Course Contents:

Water-flooding

Mobility ratios, displacement efficiency, sweep efficiency, factors to consider in water flooding, optimum time to water flood, performance predictions using fractional flow and frontal advance equations and water sources. Oil displacement by water in a layered reservoir using Dykstra-Parson´s method.

Introduction to Enhanced oil recovery (EOR)

Introduction and Overview of EOR methods and EOR status worldwide. Basic petro-physical properties; Permeability/porosity, Relative permeability, capillary pressure and residual oil saturation.

Polymer flooding

Polymers, polymer properties and rheology, fractional flow and laboratory results. Field projects.

Surfactant flooding

Surfactants, surfactant-brine-oil phase behavior, surfactant solution properties, trapped oil and oil mobilization. Relative permeability and capillary pressure and laboratory results. Field projects.

Alkaline flooding

Laboratory screening, soap generation and phase behavior. Laboratory tests, field examples.

Conformance control Methods

Bulk gels, micro gels, foam, field projects.

Gas flooding

Immiscible and Miscible gas injection. CO2 properties. Phase diagrams, continuous, slug and WAG injection. Relative permeability models. Field examples.

Thermal methods

Steam flooding, cyclic and continuous steam injection. Thermal properties of rock and fluids. Effect of temperature on fluid and rock properties. SAGD. In situ combustion and evaluation of heat losses. Field examples.

<u>EOR simulators</u>

Overview of commercial simulators for EOR methods.

Text book

1. Don W. Green and G. Paul Willhite, “Enhanced Oil Recovery”, Society of Petroleum Engineers, 2nd Edition, 2018.

Reference Books

1. Ahmed, Tarek, “Reservoir engineering handbook” Gulf professional publishing, ISBN: 9780080480688, 2018.
2. Carcoana, Aurel. "Applied enhanced oil recovery." Prentice Hall, ISBN-13: 978-0130442727, 1992.