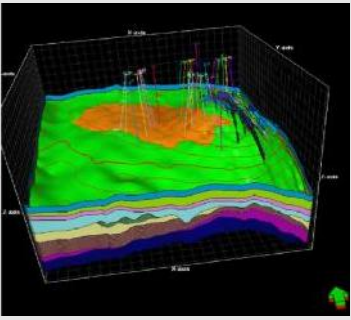


16PL403 PETROLEUM RESERVIOR ENGINEERING-II



Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	20	20	40	-	-	5	5

Course Description and Objectives:

This course covers the fundamentals and methodologies in the petroleum refining processes. The objective of this course is to train students on the concepts of petrochemicals, polymerization and the unit operations involved in it.

Course Outcomes:

The student will be able to:

- gain knowledge on the unit process involved in petroleum refining process
- understand the production methods for manufacturing industrial polymers
- familiarize with the various issues arising in petroleum refining operations

SKILLS:

- ✓ *Identify equipments required for production and refining of crude oil.*
- ✓ *Analyze crude oil quality using standardized test methods*
- ✓ *Suggest catalyst for refining operations*
- ✓ *Proficiency on petrochemicals production methods.*

UNIT - 1

L-9

The constant terminal rate solution of the radial diffusivity equation and its application to oil well testing : The constant terminal rate solution – Transient, semi steady state and steady state flow conditions – Dimensionless variables – General theory of well testing – The Mathews, Brons, Hazebroek pressure build up theory - Pressure build up analysis techniques – Multi Rate Drawdown testing – The effects of partial well completion – After flow analysis.

UNIT - 2

L-9

Gas well testing : Linearization and solution of the basic differential equation for the radial flow of a real gas – The Russel, Goodrich et. al. Solution technique – The Al Hussainy, Ramey Crawford solution techniques – Non-Darcy flow – Determination of the non- Darcy coefficient F - The constant terminal rate solution for the flow of a real gas – General theory of gas well testing – Multi rate testing of gas wells.

UNIT - 3

L-9

Pressure build up testing of gas wells : Pressure build up analysis in solution gas drive reservoirs- Analysis of well tests using type curves- Interference and Pulse Tests - Flow after flow tests in gas wells- Isochronal & modified isochronal tests- Use of pseudo pressure in gas well test analysis- Injection Well Testing.

UNIT - 4

L-9

Natural water influx : The unsteady state water influx theory of Hurst and Van Everdingen and its application in history matching – The approximate water influx theory of Fetkovich for finite aquifers predicting the amount of water influx – Application of influx calculation techniques to steam soaking.

UNIT - 5

L-9

Immiscible displacement : Physical assumptions and their implication – The fractional flow equation – Buckley-Leverette one dimensional displacement – Oil recovery calculation – Displacement under segregated flow conditions – Allowance for the effect of finite capillary transition zone in displacement calculations – Displacement in stratified reservoir.

LABORATORY EXPERIMENTS

List of Experiments :

Total hours : 20

1. Construction of Black oil P-T Phase envelope diagram and generate quality lines.
2. Creating water flooding reservoir simulation in 3D layered model.
3. Simulating a single layered reservoir with reservoir properties.
4. Creating heavier hydrocarbon plus fraction splitting calculation.
5. Creating a Chemical core flood dataset for STARS chemical simulator.
6. Prediction of reservoir fluid properties using reservoir phase behavior simulator like PVTsim, Winprop.
7. Prediction of reservoir properties like permeability, relative permeability, saturation.
8. Predict the volumetric performance of the reservoir and validate the reservoir model, adjust parameters, Pressure, GOR-WOR behavior for History matching.
9. Study the basic theory and mathematics calculation behind the reservoir simulator.
10. Study different reservoir simulator and their objective, applications.

TEXT BOOK:

1. Petroleum and Gas Field Processing, H.K.Abdel-Aal and Mohamed Aggour and M.A. Fahim, Marcel Dekkar Inc., 2003
2. Aziz, K. Settari, A. Petroleum Reservoir Simulation, Applied Science Publisher, 1983.

REFERENCE BOOK:

1. Surface Production Operations, Ken Arnold & Maurice Stewart, Vol. 1 & 2, 3rd Edition, Gulf Professional Publishing, 2008.
2. Petroleum Reservoir Engg by Amyx, McGraw Hill 1998.

ACTIVITIES:

- Case study on Darcy's law applications in petroleum reservoir.
- Minor projects on gas well testing applications.