

## Directional Drilling

1.1 Course Number: PE313

1.2 Contact Hours: 3-0-0 Credits: 9

1.3 Semester-offered: 3<sup>rd</sup> Year -Even

1.4 Prerequisite: Drilling Technology

1.5 Syllabus Committee Member: Dr. Amit Saxena & Dr. Shailesh Kumar

### 2. Objective:

To analyze the necessity of directional drilling and understand working of deflection tools

To understand the basics of directional well planning and surveying procedure

To understand the basics of special methods of drilling

### 3. Course Content:

Unit	Topics	Sub-topic	Lectures
1	Introduction	Introduction, Reasons, Reservoir aspect, types	3
	Deflection Tools	Deflection Tools, Orientation of deflection tools, Mud Motors, RSS	8
2	Directional Well Planning	Well planning, Design of optimum well bore trajectory, Planning kick off	9
3	Directional Surveying and Trajectory Calculations	Survey tools, Survey methods, Trajectory calculation techniques, Dog-leg angle, Vertical section	7
4	LWD and MWD	Introduction, Telemetry channels, Transmission System, Power Source, MWD Sensors, Surface System.	5
5	Underbalanced and Aerated Fluid Drilling	Underbalanced Drilling, overbalanced drilling, underbalanced drilling fluids, aerated liquid drilling, surface and downhole equipment	4
6	Coiled Tubing drilling	Coil Tubing Drilling, surface and downhole equipment	4
		<b>Total</b>	<b>40</b>

### 4. Readings

4.1 Textbook:

- Hussain Rabia, Oil Well Drilling Engineering, Principles & Practice, Graham &

Trotman, ISBN No: 0860107140.

- Editors: Robert F. Mitchell Halliburton Stefan Z. Miska: Fundamentals of Drilling Engineering, SPE Text Book Series, 2011
- Jr. Adam T. Bourgoyne, Keith K. Millheim, Martin E. Chenevert, Jr. F. S. Young : Applied Drilling Engineering, SPE Textbook Series, Vol 2, 1987
- T.A. Inglis, Directional Drilling, Petroleum Engineering and Development Studies, Vol 2, Graham and Trotman, 2010

#### 4.2 Reference books:

- Mc Ray, A; Cole Frank W: Basic Drilling Engineering, New India Publication
- Azar, J.J.; and Samuel G.R.; Drilling Engineering, Pennwell Corp., 2007
- Editor-in-Chief: Larry W. Lake: Petroleum Engineering Handbook-Volume-II (Drilling Engineering), SPE, 2007
- Walter Francis Rogers: Composition and Properties of Oil Well Drilling Fluids: Gulf Publishing Company

## 5 **Outcome of the Course:**

Ability to plan and monitor a directional well trajectory and perform trajectory calculations based on surveying data.

Analyze and plan the underbalanced drilling procedure using appropriate tools.