| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| DE2 | PED403 | Drilling System Design | 3 | 0 | 0 | 9 |

**Course Objective**

The objective of the course is to provide Advanced knowledge of design of different drilling systems as per requirement and field conditions.

**Learning Outcomes**

Upon successful completion of this course, students will:

have a capability to select proper rig suitable to for the field applications as per criteria set by the company.

Proper knowledge of well design.

Ability to handle the unbalanced hydraulic situations.

| Unit No. | Topics to be Covered | Lecture Hours | Learning Outcome |
|---|---|---|---|
| 1 | Drilling Rig Selection and Design: Environmental loading and stability of rig. Design of Block and Tackle System, Design of Draw works Drum, Top drive drilling. | 6 | Ability to select drilling rig suitable and compatible to the formation |
| 2 | **Casing Design:** Conventional and conditional Casing Design Practices, Deep well strings, Design practices for high inclined, Horizontal and Slanted wells. Liner design and setting. | 6 | knowledge of conditional casing design operation and handling |
| 3 | **Casing Buckling and Well Head Loads:** Casing landing practices, Buckling criteria and Calculation of well head loads. | 5 | Analytical capability of effective load on casing and its ensuring the stability |
| 4 | Drill String Design for vertical, directional and horizontal wells. | 5 | Understanding of conditional string design |
| 5 | **Mud Hydraulics Design:** Rheology of drilling fluids and compatibility to borehole conditions, Hydraulic horse power and Rig horse power calculations. Jet impact force, Hydraulics design in High inclines wells. Bit Hydraulics, Bottom drive hydraulics design. | 5 | Ability of proper hydraulics balance and well handling |
| 6 | **Rotary System Design:** Design and performance of Kelly drive, Bottom Drive and Top Drive Systems. | 4 | Awareness of different power drive drilling systems and their applications |
| 7 | **Special Methods of Drilling:** Aerated drilling, Under-balanced drilling, Overbalanced drilling, HPHT Drilling, Variable pressure regime, Plasma drilling, Electrical Drilling, Re-entry drilling, Jet Drilling, Drilling automation. Smart wells Design, Managed Pressure Drilling. | 5 | Exposure of advances in drilling technology |
| 8 | **Drilling Economics.** | 3 | knowledge of drilling cost and financial balance |
| 9 | **Computer Application in Drilling** | 3 | Development of interactive software for drilling systems |
| | **Total contact hours:** | **42** | |

**Text Books:**

i. Applied Drilling Engineering, Adam T. Bourgoyne Jr. et al., SPE Text Book Series, 1991

ii. Drilling Engineering: A Complete Well Planning and Approach, Neal J. Adams, Pennwell, 1985.

**References:**

i. Well Control Problems Solutions, Neal J. Adams, Pennwell, 1980

ii. Oil Well Drilling Engineering: Principles and Practice, H Rabia, Springer, 1986