Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NPEC508	**Advanced Drilling Technology**	3	1	0	4

Course Objective

Modern drilling technologies including horizontal and high-pressure, high-temperature drilling (HPHT) techniques To apply and/or develop drilling simulators

Learning Outcomes

Upon successful completion of this course, students will:
Ability to predict of the drilling environment (pore and rock breakdown pressures)
Ability to design drill-strings, casing strings, well hydraulics, well control and drill bits
Ability to design bottom-hole pressure (BHP) for directional wells

Unit No.	Topics to be Covered	Lecture Hours (L+T)	Learning Outcome
1	Drilling Integrity: formation pore pressures & prediction methods, formation breakdown & methods to estimate fracture gradient, and rock strength.	6	Understanding of Formation Pressure and its role in drilling.
2	Geo monitoring: geo steering and real-time measurements, and smart well drilling techniques. Drill String Design: design of stabilized string, bending moments, length of drill collars, drill pipe selection and design procedure.	6+1	This unit will help student understanding the role of geo-steering and design od drill string.
3	Casing design: conventional and conditional casing design, casing performance, failures & repair, casing stability and buckling.	5+2	This will help is designing of casing as per field conditions.
4	Drilling hydraulics: Rheological models, pipe, annular and jet hydraulics, hydrostatic pressure in liquid and gas wells, swabbing and surge impacts, and borehole cleaning mechanism.	5+2	Proper utilization of hydraulic balance in drilling and combat the bore hole problems.
5	Well control: secondary control methods.	5+2	To understand the proper well control techniques.
6	Drill bits: rock failure mechanism, bit tooth wear and dullness mechanism, bit bearing and its failures, factors affecting penetration rate. Modeling and optimization of bit selection. Real-time data analysis for bit wear monitoring and prediction.	5+2	This will help student to be familiar with the bit technology and the monitoring the drilling.
7	High-pressure and high-temperature (HP/HT) drilling technology: application of drilling fluids in HP/HT, managed pressure drilling for HP/HT wells, casing and drill string for HP/HT wells, integrity risk and its surveillance in HP/HT wells.	5+2	To know all about the high pressure and high temperature environment and its impact during the drilling.
8	Directional drilling: well kick-off and trajectory control, well monitoring and bottom-hole assembly (BHA) modelling to detect doglegs. Horizontal and multilateral wells. Application/ development of drilling simulators.	5+3	Help in understanding the details of directional drilling and the proper monitoring of the wells to avoid the unwanted deflections.
	Total contact hours:	42 +14 = 56	

Text Books:

1. Applied Drilling Engineering, Adam T. Bourgoyne Jr. et al., SPE Text Book Series, 1991
2. Drilling Engineering: A Complete Well Planning and Approach, Neal J. Adams, Pennwell, 1985.

References:

1. Well Control Problems Solutions, Neal J. Adams, Pennwell, 1980
2. Oil Well Drilling Engineering: Principles and Practice, H Rabia, Springer, 1986 1. Raghu Ramkrishnan and Johannes Gehrke, "Database Management Systems", TMH.