20PEB222					Drilling Engineering - I					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- Demonstrate the equipment and practices of oil well drilling
- Illustrate the Casing practices and Cementing techniques
- Imbibe skills to prepare a Geo-Technical order
- Develop skills to address problems in drilling oil wells

UNIT 1 Basic Drilling Practices **14 Hrs.**

Well Planning, Drilling Rig: Components, Selection and Operating systems - Hoisting, Circulation and Rotary systems, Power transmission, Rig control system. Wire lines and service life evaluation, Drilling Fluids – Basics, Functions, Classification, Properties and Nature. Drilling fluids equipment related to pressure and separation. Formulations of drilling fluid, Mud systems like Pneumatic, Synthetic oil based, Inhibitive and Non-inhibitive Rheology models of drilling fluids Mud Hydraulics and Mud weight and Pressure loss calculations in round trip circulation cycle Water and Oil based drilling fluid testing procedures. Latest advances and emerging trends in drilling fluid like use of NDDF. Advanced mud Technology, Balanced/Underbalanced drilling. Pore Pressure prediction, Fracture pressure, abnormal pressure. Well Planning, GeoTechnical Order (GTO)

UNIT 2 Drill string, Casing and Bit Design **12 Hrs.**

Drill String - Components, functions and design, Casing Practices – Configuration, operation, properties, types and design, casing setting depth and hole sizes, liner design, casing handling practices Drill Bits – Types, Performance and Criteria for design.

UNIT 3 Cementation Techniques **07 Hrs.**

Cementing, Cements & cement slurry: Objectives of cementing, oil well cements, Classification of cement, Slurry design, Slurry additives, Factors influencing cement slurry design, Cementing equipments. Cementing Methods - Primary cementing, Stage cementing, Liner cementing, Plugging, Squeeze Cementing techniques in practice. Deep well cementing, Characteristics of good quality cementation. Cementing calculations.

UNIT 4 Drilling Problems and Remedies **06 Hrs.**

Pipe sticking and failure, Lost circulation, Hole Deviation, Sloughing shale, Formation damage, Bore hole instability. Drill string fatigue failure. Bit failure, wire line failure etc. Fishing and coring operations. Well kick and Blow outs: Problem, symptoms and controlling measures, Hole Cleaning. General equipment and Personnel. Safety and Environmental Impact of Drilling fluid. Waste management, classification of drilling waste, approaches of drilling waste minimization.

Total 39 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Recognise the drilling practices on drill site
CO2 - Express information with increased technical clarity
CO3 - Relate changes with Change in drilling parameters
CO4 - Investigate drilling bottlenecks during drilling
CO5 - Plan a drilling program
CO6 - Recommend optimum conditions to drill a well

TEXT/REFERENCE BOOKS

1. Carl Gatlin (1960), Petroleum Engineering: Drilling and Well Completion, Prentice Hall; 1st Ed.
2. Bourgoyne , Adam T. Jr., Martin E. Chenevert, Keith K. Millheim and F.S. Young Jr. Richardson, TX (1991), Applied Drilling Engineering, Society of Petroleum Engineers
3. Neal J.Adams (1985), Drilling Engineering: A Complete Well Planning and approach, PennWell Books
4. H Rabia (1986), Oil Well Drilling Engineering Principles and Practices, Kluwer Law International
5. Gray and Darley (1988), Composition and properties of drilling and completion fluids, Gulf Professional publishing.
6. ASME Shale Shaker Committee (2004), Drilling fluids processing handbook, Gulf Professional publishing
7. James L. Lummus (1986), Drilling fluids optimization: a practical field approach, PennWell Books

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100 **Exam Duration: 3 Hrs**

PART A: <Question: <Short Notes, Problems, Numerical> **20 Marks**

PART B:<Justification, Criticism, Long answers, Interpretation > **80 Marks**