

Roll No.



**PRESIDENCY
UNIVERSITY**
BENGALURU

Department of Research & Development
Mid - Term Examinations - SEPTEMBER 2024

Odd Semester: Ph.D. Course Work	Date: 27/09/2024
Course Code: PET5002	Time: 10:00am – 11:30am
Course Name: Advanced Drilling Fluid	Max Marks: 50
Department: Petroleum Engineering Department	Weightage: 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 5 marks.		4Qx5M=20M
1	Describe the primary functions of drilling fluids in the oil and gas industry. How many different types of drilling fluids contribute to these functions?	5 Marks
2	Differentiate between Oil-Based Muds (OBM) and Water-Based Muds (WBM) the composition, benefits, drawbacks, and effects on the environment of during the drilling process.	5 Marks
3	Explain the conditions in which pneumatic drilling fluids are preferred over conventional liquid-based drilling fluids.	5 Marks
4	Which type of drilling fluid is more often? Explain the rheology and flow properties of that drilling fluid w.r.t its application in petroleum industry.	5 Marks

Part B

Answer ALL Questions. Each question carries 15 marks.		2Qx15M=30M
5	Examine the idea of non-damaging drilling fluids, paying particular attention to the varieties, design philosophies, and methods by which they reduce formation damage. Describe the uses and advantages of several drilling fluid systems that are thought to be non-damaging in sensitive reservoirs, giving examples of each.	15 Marks
6	During a drilling operation, an oil rig encountered two critical challenges that required adjustments to the mud weight. Challenge 1: While drilling through a high-pressure formation, the drilling crew noticed the mud density, which was originally 12.53 ppg, was insufficient to balance	15 Marks

the pressure in the well. To maintain well control and prevent a blowout, the density of the mud needed to be increased to 16.7 ppg. The initial volume of mud in the pit was 63 barrels. The drilling engineer was tasked with determining how much barite, a heavy mineral commonly used to increase mud density, would be needed to raise the mud weight to the desired level. Additionally, they needed to calculate how much the pit volume would increase due to the addition of the barite.

Challenge 2: In another well section, the drilling team faced a lost circulation issue due to a highly permeable formation. The mud weight, which was initially 25.1 ppg, needed to be reduced to 22.6 ppg to mitigate the loss of drilling fluid into the formation. The engineer was asked to calculate the volumes of water and oil required to reduce the mud weight. The initial volume of mud was 629 barrels, and the density of oil was 6.87 ppg. If oil was used to reduce the mud weight, the engineer also needed to determine the percentage of oil in the final mud mixture.

The drilling team needs your help to solve these challenges and ensure the operation proceeds safely and efficiently!