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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023**

Semester : Semester V - 2021

Course Code : PET2001

Course Name : Sem V - PET2001 - Drilling Fluids and Cements

Program : B. TECH

Date : 30-OCT-2023

Time : 2:00PM - 3:30PM

Max Marks : 50

Weightage : 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART C

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Describe the importance of mud cake during drilling?
(CO1) [Knowledge]
2. Define "KICK" and "BLOW OUT".
(CO1) [Knowledge]
3. State the condition for TIER-2 and TIER-3 well with respect to Pressure and Temperature.
(CO1) [Knowledge]
4. Match the following:
SET-A: Aggregation, Dispersion, Flocculation, De-flocculation
SET-B: FACE-FACE, FACE-EDGE, EDGE-EDGE
(CO2) [Knowledge]
5. Define Electrostatic Double layer of clay in suspension. What is the overall charge of a Bentonite clay?
(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

6. Based on your knowledge select the most appropriate Drilling fluid with an expectation that it will work perfectly at the respective depth with the given wellbore conditions and complete the table. Do mention the reason why you've selected that drilling fluid for that condition. Give your own judgment and don't copy (Student need to draw a table for COLUMN 1, COLUMN-4 & COLUMN-5 only and write their answers)

COLUMN-1	COLUMN-2	COLUMN-3	COLUMN-4	COLUMN-5
ZONE	DEPTH (ft.)	Wellbore condition	Selected mud	Reason for selection
A	0-1500	Weak & Unconsolidated formation	?	?
B	1500-3500	Possible aquifer nearby	?	?
C	3500-4500	A thief zone	?	?
D	4500-7000	Water sensitive zone but policies are strict against uses of Diesel	?	?
E	7000-10000	HPHT condition	?	?

(CO1) [Comprehension]

7. Although all forms of particle association are termed as flocculation in classical chemistry, in drilling fluid technology it is necessary to distinguish between two forms of association, because they have a profoundly different effect on the rheology of drilling fluid. Briefly illustrate and distinguish these two forms of particle association with relevant diagrams

(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. All 3PET-1 students were assign to an exploratory well, drilled near Presidency University boys' hostel. That formation is very infamous for its varying formation characterizes. Initially students JN, SCA, AB, AP drilled the well with fresh water mud of volume 100 gal upto depth 1500 feet but once they cross the depth mark 1500 feet suddenly the surface indicators alert the rig crew about a possible gas kick. The CR of the class ATG and RKMR of the class, immediately activated the annular BOP followed by the closure of the pipe ram. Then the only female crew members SGS, ASN and AHA noted down the shut in pressure from the pressure gauge and which indicates pressure of 5000 Psi was. They conveyed the same to the mud engineer duo LKG, AM and AA and asked them to prepare a kill mud to counter 5000 Psi kick. The kill mud was prepared with a weighting material of 80 ppg density and injected into the well. The well was killed successfully and the well condition was again brought back to normal. Now to drill the next hole section, the kill mud is required to be replaced with a mud of higher density of 80 ppg. This responsibility was given to the remaining students SS, ALL, FAK and MP. They were given a weighting material of density to 94 ppg. By the end of the Drilling operation SB has to submit the report to the Instructor In-charge BJG, where they have mention the following details.

- Density of the kill mud weight is _____ppg.
- Amount of weighting material required to prepare the kill mud weight is _____lbs.
- Amount of weighting material required to prepare the kill mud weight is _____ sacks (1 Sack=94 lb.)
- Mass of new weighting material (of density 94 ppg) required to increase the density for the next hole section is _____lb.
- Number of sack required for the new weighting material (of density 94 ppg) is _____lb.
- Fill up the blanks and show the correct calculation for every statements.

(CO1) [Application]

