PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Weightage: 20 %   Max Marks: 20   Max Time: 1 hr.   Tuesday 25th September, 2018

TEST – 1

Odd Semester 2018-19   Course: **PET 221 Drilling Fluid and Cements.**   III Sem. Petroleum

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Instruction:

(i)   Read the question properly and answer accordingly.
(ii)   Question paper consists of 3 parts.
(iii)   Scientific and Non-programmable calculators are permitted.

Part A

(1 Q x 5 M = 5 Marks)

1. Answer the following:

i.   Which metal ion present in the tetrahedral structure of clay?

ii.   Which kind formation is suitable for Ca added drilling mud?

iii. Which type of clay is preferable with sea water?

iv.   What do you understand by Hydration of clay?

v.   What is chemical formula for Sodium tetra phosphate and Barite?

Part B

(2 Q x 4 M = 8 Marks)

2. Write minimum two difference of the following:

i.   Emulsion based mud and Oil based mud
ii.   Chrome Lignosulphonate (as an Drilling fluid additive) and Sodium Polyacrylamide (as an Drilling fluid additive)

3. Explain in short the following statements:

i.   "Bentonite is more preferable over Attapulgite."
ii.   "After Hydration of clay for sodium bentonite, the distance between layers increased from 9.8 to 40 Angstrom"

(1 Q x 7 M = 7 Marks)

4. An oil reserve is discovered The upper Assam shelf, a southeast dipping shelf is the foreland part of Assam-Arakan Basin.

Well Depth= 1170 ft.

Reservoir type= Oil Reservoir

Based on the given information design a suitable mud plan for the formations.

The below diagram is the Logging Sheet for the given formation.

Depth (ft.)	Formation Type
0-1120	Normal formation contain aquifer
1120-1130	Lose Circulation Zone
1130-1140	Gypsum/Anhydrite bearing formation
1140-1150	Clay sensitive Zone
1150-1160	Abnormal Pressure zone
1160-1170	HPHT environment ($>150^0$)
1170 beyond	HPHT ($>200^0$)

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GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS
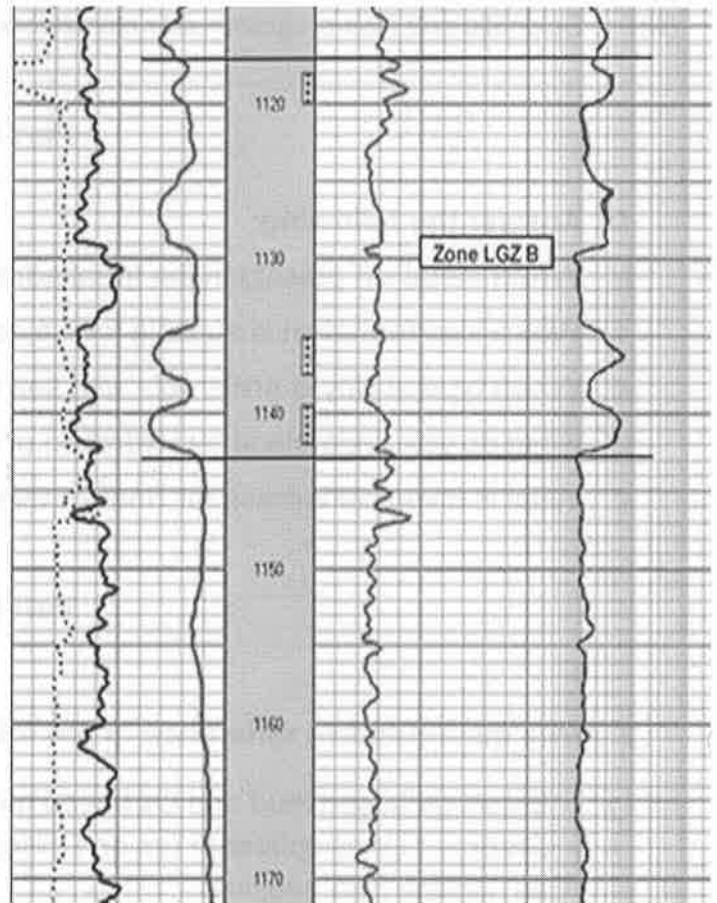
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TEST 2

Odd Semester: 2018-19

Course Code: PET 221

Course Name: Drilling Fluids And Cements

Branch & Sem: Petroleum & III Sem

Date: 28 November 2018

Time: 1 Hour

Max Marks: 20

Weightage: 20%

Instructions:

(i) *Read the question properly and answer accordingly.*

(ii) *Question paper consists of 3 parts.*

(iii) *Scientific and Non-programmable calculators are permitted.*

Part A

Answer **all** the Questions. **Each** question carries **one** marks.   (8x1=8)

1. What is the full form of ECD?

2. Which component of mud conditioning system cannot be used if it is "Weighted Mud"?

3. How can you prevent Anhydrite and Gypsum contamination of Drilling mud?

4. Which P^H range is suitable for clay dispersion?

5. Convert 78.5 ppg to pcf.

6. What is the range of Reynolds's number for Turbulent flow?

7. Which are the two models applicable for Non Newtonian fluid?

8. What is the maximum capacity of Marsh funnel?

Part B

Answer the Question. Question carries **four** marks.   (1x4=4)

9. Draw a neat sketch of Mud Circulatory system and label each and every component.

Answer **all** the Question. Each question carries **four** marks.   (2x4=8)

10. Solve the following questions

   (i) A mud engineer measured the density of the drilling fluid as 10 ppg in the rig side area. Calculate the specific gravity in gm/cm^3, mud gradient in psi/ft

   (ii) Two drilling fluids have the same effective viscosity when measured using marsh funnel. Fluid A has a density of 10.1 ppg and read 49 seconds using the March funnel. If fluid B read 44 seconds in the March funnel, estimate the fluid B density in ppg.

11. Final volume of 1,750 bbl of drilling mud was planned to be prepared. An existing mud having a mud weight of 10.2 ppg will be used. It is needed to increase its density to 10.5 ppg by adding clay of 21 ppg density. Calculate the volume of the old mud to be taken and the amount of clay required in tons to get the desired mud weight.

[1 bbl=42 gal; 1kg=2.2 lb.]

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END TERM FINAL EXAMINATION

Odd Semester: 2018-19   **Date**: 31 December 2018

Course Code: PET 221   **Time**: 2 Hours

Course Name: Drilling Fluid and Cements   **Max Marks**: 40

Programme & Sem: PET & III Sem   **Weightage**: 40%

Instructions:

    (i)   *Read the question properly and answer accordingly.*

    (ii)   *Question paper consists of 3 parts.*

    (iii) *Scientific and Non-programmable calculators are permitted.*

Part A

Answer **all** the Questions. **Each** question carries **two** marks.   (6Qx2M=12)

1. Write two objectives of secondary cementing.

2. What is C_4AF? Write its chemical composition.

3. Give two examples for both Cement accelerators and Cement density reducing agents.

4. Write names of two Oil well Cementing service providers.

5. Name the cement class best suitable for the following conditions:

    a. Extreme high Pressure and Temperature

    b. HPHT environment and Depth range is 12000ft. to 18000 ft.

6. What is "Walking squeeze" method?

Part B

Answer **all** the Questions. **Each** question carries **five** marks.   (3Qx5M=15)

7. Explain Single stage cementing method in short.

8. What are the advantage and disadvantages of "Breadenhead Squeeze" method?

9. Write down the process to place a Balance plug at a depth of 5000 ft.

Answer the Question. Question carries **thirteen** marks.   (1Qx13M=13)

10. Solve the following problems:

A. The cement slurry was blended using the following data: i) one sack of class G cement, and ii) 45% fresh water. Determine the slurry density. [Density of Class G cement is 26.18 ppg] **[3M]**

B. The 9 5/8" Casing of a well is to be cemented in place with a single stage cementing operation. The details of the operation are as follows:

9 5/8" casing set at: 13800', 12 1/4" hole: 13810'

13 3/8" 68 lb. /ft. casing set at: 6200'

TOC outside 9 5/8" casing: 3000' above shoe

Assume 20% excess in annulus and open hole; Shoe track length=60'

The casing is to be cemented with class C cement with the following additives:

0.2% D13R (retarder); 1 % D65 (friction reducer); Slurry density = 15.9 ppg

Calculate the following:

(i) Total cement slurry vol.

(ii) Amount of cement sack and Gal of mix water

(iii) Amount of Additives

(iv) Displacement volume

(v) Number of Stroke required if the pump capacity for Nat. pump 12-P-160, 7" liner 97% efficiency, 0.138 bbl/stk **[10M]**

TABLE   API neat cement slurries

Class	Slurry weight (lb/gal)	Mixing water/sack (ft³/sack)	Mixing water water/sack (gals/sack)	Slurry/sack cement (ft³/sack)	Slurry weight (lbm/ft³)	Percentage mixing water
A	15.60	0.696	5.20	1.18	116.70	46
B	15.60	0.696	5.20	1.18	116.70	46
C	14.80	0.844	6.32	1.32	111.10	56
D	16.46	0.573	4.29	1.05	123.12	38
G	15.80	0.664	4.97	1.15	118.12	44
H	16.46	0.573	4.29	1.05	123.12	38