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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023**

Semester : Semester VI - 2020

Course Code : PET2024

Course Name : Sem VI - PET2024 - Wellbore Problems and Mitigation

Program : PET

Date : 12-JUN-2023

Time : 9.30AM - 12.30PM

Max Marks : 100

Weightage : 50%

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 A

ANSWER ALL THE QUESTIONS

(10 X 3 = 30M)

1. State leak off test and write down the steps to conduct a leak off test. (CO4) [Knowledge]
2. State the causes of lost circulation. (CO2) [Knowledge]
3. List the symptoms of a micro dogleg caused pipe stuck. (CO1) [Knowledge]
4. Describe the kick tolerance graph with a neat sketch. (CO4) [Knowledge]
5. Define Abnormal Pressure conditions in the drilling operation. (CO3) [Knowledge]
6. State the methods used for the determination of free point. (CO1) [Knowledge]
7. Describe the creation of the salt dome in the context of abnormal pressure. (CO3) [Knowledge]
8. List the classes of lost circulation. (CO2) [Knowledge]
9. Define Sub-Normal Pressure Conditions in the drilling operation. (CO3) [Knowledge]
10. List the elements that determine the magnitude of kick tolerance. (CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(2 X 15 = 30M)

11. In the following figure, a gas has entered an open tube. The stages of gas traveling in mud have been shown in the figure. Parameters at the gas entry and when gas reaches the top of the tube are given in the figure. Calculate the change in volume of the gas when it comes to the surface.
(CO4) [Comprehension]
12. "Tectonic activity can result in the development of abnormal pore pressure due to various mechanisms, including salt diapirism, folding, faulting, and uplift". Elucidate the statement with a relevant diagram.
(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 20 = 40M)

13. As following parameters are given for a well: 9.625" casing =14,500 ft; Next TD = 17000 ft; Fracture Gradient (FG) at 9.625" shoe = 15.2 ppg; Temperature gradient = 0.02 F°/ft; Max. mud weight for next hole =14.5 ppg; Max formation pressure at next hole= 14 ppg; Assume next hole 8.5" and there is 5" drillpipe from surface to TD. Also assume gas pressure gradient (G) = 0.1 psi/ft; Surface Temperature = 60 F°. Calculate
- Volume of the kick fluid at casing shoe.
 - Kick tolerance volume without considering the temperature gradient.
 - Kick tolerance volume with considering temperature gradient.
 - Comment on the values of kick tolerance volume (i.e., with and without considering temperature)
- (CO4) [Application]
14. Determine the overburden gradient at various depths for the following offshore well: Water Depth= 500 ft; RKB/MSL (Kelley Bushing or drilling floor/Mean Sea level) = 65 ft; Specific gravity of sea water= 1.03 gm/cc; Rock density= 1.9 gm/cc from seabed to 1000 ft, and 2.1gm/cc from 1000-3000 ft; Calculate the overburden gradient of the formations: At seabed, 200 ft and at 2000 ft below seabed.
(CO3) [Application]