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**PRESIDENCY UNIVERSITY  
BENGALURU**

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

**Semester :** Semester VI - 2020

**Course Code :** PET2024

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

**Program :** PET

**Date :** 13-APR-2023

**Time :** 11:30AM - 01:00PM

**Max Marks :** 60

**Weightage :** 30%

**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**

**(5 X 2 = 10M)**

1. State the Hooke's Law and its application. (CO1) [Knowledge]
2. Define pore pressure and fracture pressure. (CO1) [Knowledge]
3. Outline the preventive actions for stuck pipe due to the key seat. (CO1) [Knowledge]
4. Define lost circulation and state when it happens. (CO2) [Knowledge]
5. With suitable examples, describe lost circulation materials. (CO2) [Knowledge]

**PART B**

**ANSWER ALL THE QUESTIONS**

**(3 X 10 = 30M)**

6. "Freeing differentially stuck pipe is a complex and challenging process that requires specialized equipment and expertise." Being a drilling engineer, suggest and describe the methods you would adopt to free a differentially stuck pipe. (CO1) [Comprehension]
7. "When the pressure of the drilling fluid in the wellbore is greater than the pressure of the formation being drilled, it causes the drill string to become stuck". Identify the sticking problem and suggest the preventive steps to avoid the identified sticking. (CO1) [Comprehension]

8. "All rock types are susceptible to lost circulation, but weak and cavernous formations are particularly vulnerable." Concerning the above statement, discuss the preventive measure you would incorporate to minimize the lost circulations.

(CO2) [Comprehension]

### PART C

#### ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

9. For a given well data :

- Drill collar = 8 inch
- Cake Thickness = 5 mm
- Length of the drill collar stuck = 50 m
- Mud weight = 1.55 g cm<sup>-3</sup>
- MWE of formation: 1.5 g cm<sup>-3</sup>
- TVD: 4000 m
- CoF: 0.3

1. Predict the arc length of the stuck collar.
2. Determine the area of contact.
3. Compute the force to pull the stuck pipe (*Assume any missing data*).

(CO1) [Application]