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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SET B**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION - JAN 2024**

**Semester :** Semester III -2022

**Course Code :** PET3002

**Course Name :** Directional Drilling Technology

**Program :** B.Tech.

**Date :** 0J-JAN-2024

**Time :** 9:30AM - 12:30 PM

**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**

**5 X 2M = 10M**

1. Write the importance of Dump valve in PDM.  
(CO3) [Knowledge]
2. State the principle of "Acid Bottle Survey Tool".  
(CO2) [Knowledge]
3. List out any two characteristics of turbine motor.  
(CO3) [Knowledge]
4. Mention the best fishing practices.  
(CO4) [Knowledge]
5. Classify fishing tools based on their catching techniques.  
(CO4) [Knowledge]

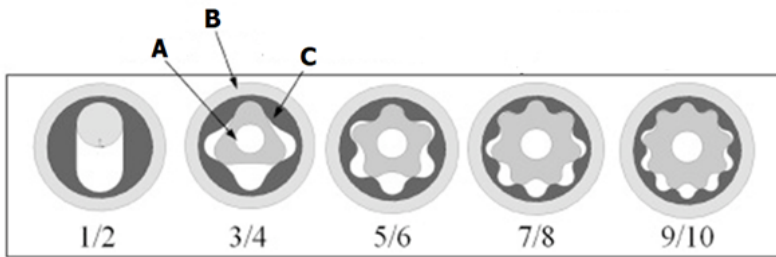
**PART B**

**ANSWER ALL THE QUESTIONS**

**5 X 10M = 50M**

6. Bit balling represents a potential operational challenge that can arise during drilling activities at any point. This issue has the potential to create various complications throughout the drilling process. To address bit balling, drilling personnel may find it necessary to retrieve the Bottom Hole Assembly (BHA) to rectify the balling issue at the bit. As a drilling engineer, what preventive measures would you incorporate during the planning phase to minimize the occurrence of bit balling? Additionally, how would you efficiently detect and clear a balled-up bit before it escalates into a more severe problem?  
(CO4) [Comprehension]

7. Do as directed:
- Provide a description about A, B, and C in Figure 1.
  - How does the intricate design and interaction of the A, B and C arrangement in positive displacement motors for directional drilling pave the way for unprecedented precision and control in navigating complex subsurface formations, and what implications does this hold for optimizing resource extraction and minimizing environmental impact?



**Figure 1**

- (CO3) [Comprehension]
8. Distinguish PDM and Turbine motors in terms of their tolerance, applicability, components, longevity, and operational ranges.
- (CO3) [Comprehension]
9. *“Introduction to directional drilling into O&G industry helps and Oil-Man to explore those areas which were not possible with conventional drilling”*-Comment on the quoted statement with relevant points.
- (CO2) [Comprehension]
10. How do the strategic choices among directional drilling well profiles — ranging from the complex curvature of S-shaped profiles to the simplicity of straight-hole trajectories — impact not only the technical challenges of resource extraction but also the broader ecological considerations, and how can innovations in directional drilling design strike a balance between maximizing energy recovery and minimizing the environmental footprint in today's dynamic energy landscape?
- (CO1) [Comprehension]

## PART C

**ANSWER ALL THE QUESTIONS**

**2 X 20M = 40M**

11. Illustrate the trajectory of an exploratory directional well with a Type-1 profile near an XYZ location, having a slot coordinate of 15.32 ft. N, 5.06 ft. E, and a target coordinate of 1650 ft. N, 4510 ft. E. Target is 4792.35 ft. away. The wellbore is kicked off at a depth of 1400 ft. with a Build-Up Rate (BUR) of 3.5 ft./100 ft. The measured depth at the target is 6000 ft. Using the Balance Tangential method, sketch the well profile with a pencil, and annotate the lengths of significant points along the wellbore trajectory.
- (CO4) [Application]
12. Following information are for a Type I well profile:  
 Horizontal displacement (HD): 5500 ft.,  
 TVD of the target: 9200 ft., KOP: 1800 ft.  
 Build-up rate: 2.0° per 100 ft.  
 Estimate the coordinates of all important section of the well profile.

(CO3) [Application]