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**PRESIDENCY UNIVERSITY
BENGALURU**

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

Semester : Semester III - 2022

Course Code : PET3002

Course Name : Sem III - PET3002 - Directional Drilling Technology

Program : B. TECH

Date : 2-NOV-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. Name the full form of the following: TVD, MD, HD for Directional Drilling. (CO1) [Knowledge]
2. Mention the use of "Bent Sub" in directional drilling. Write its offset ranges. (CO1) [Knowledge]
3. Define Longitude and Latitude. State the reason for expressing them in angles. (CO1) [Knowledge]
4. List any four Non-Petroleum application of Directional Drilling. (CO2) [Knowledge]
5. State any four characteristics of Long Radius/Extended Reach horizontal Wells. (CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

6. Directional wells present a number of drilling problems in addition to those encountered in vertical wells. These additional problems are related to factors such as the well profile and the reduced axial component of gravity acting along the borehole. Despite having so many issues we have to go after directional drilling. Discuss any five reasons for selection of Directional drilling over vertical drilling with relevant diagrams. (CO1) [Comprehension]

7. A well site, X is located at exactly at $0^{\circ}\text{N } 0^{\circ}\text{E}$. Then the drilling process began vertically upto point Y ($40^{\circ}\text{S } 0^{\circ}\text{E}$). Then the wellbore takes a curve path upto 150 ft. and finishes this curvature path at exactly Z ($45^{\circ}\text{S } 55^{\circ}\text{E}$). From Z, wellbore followed a straight line with constant angle upto point P ($55^{\circ}\text{S } 110^{\circ}\text{E}$). Based on the given location draw a rough sketch of the well path indicating all the points with their coordinates.

Select the most appropriate BHA for drilling the section YZ and ZP. Specifically mention the contribution of each and every component used in both BHAs along with their position from drill bit. Also draw a rough sketch of the BHA.

(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. A directional well is to be drilled from an offshore platform to intersect a target whose HD is 10000 ft. A Type I profile (build and hold) is to be used with a KOP = 1000 ft. and a build-up rate of 3° per 400 ft. Length of the holdup section is 9000 ft. With the help of geometric interpretation decide and show with a diagram the inclination at the end of the build section; the exact location of the end of buildup section as well as the target. Your diagrammatic representation must contain HD, TVD and MD.

(CO2) [Application]