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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester: III & VI** | **Date: 10.07.2024** |
| **Course Code: PET3002** | **Time: 1.30PM TO 4.30PM** |
| **Course Name: Directional Drilling Technology** | **Max Marks: 100** |
| **Program: B. Tech.** | **Weightage: 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *The question paper consists of 3 parts.*
3. *Scientific and non-programmable calculators are permitted.*
4. *Do not write any information on the question paper besides Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | Define Azimuth and its application in the Directional Oil & Gas well drilling. | (CO 1) | [Knowledge] |
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| 2 | Illustrate a schematic of a Positive Displacement Motor (PDM) with proper labeling. | (CO 1) | [Knowledge] |
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| 3 | Describe the “nudging” of the conductor and surface casing of a well in two points. | (CO 2) | [Knowledge] |
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| 4 | Briefly describe a Magnetic Single-Shot Survey and its application in surveying for directional drilling. | (CO 3) | [Knowledge] |
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| 5 | Explain the concept of a dogleg severity index in directional drilling. | (CO 3) | [Knowledge] |
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| 6 | Describe the process of positioning a wellbore in multi-lateral directional drilling projects. | (CO 4) | [Knowledge] |
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| 7 | Explain the function of a tool used to guide the drill bit in a specific direction. | (CO 4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Compare and contrast rotary steerable drilling with conventional mud motor techniques. | (CO 1) | [Comprehension] |
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| 9 | Assess the key factors influencing the selection of appropriate directional drilling methodologies. | (CO 1) | [Comprehension] |
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| 10 | Investigate the importance of wellbore surveying techniques in directional drilling accuracy. | (CO 2) | [Comprehension] |
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| 11 | Examine the applications and advantages of Measurement-While-Drilling (MWD) tools in directional drilling. | (CO 4) | [Comprehension] |
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| 12 | Surface coordinate: 15.32 ft. N, 5.06 ft. E  Target Coordinate: 1650 ft. N, 4510 ft. E  VT = 9880 ft. VB = 1650 ft. ɸ = 1.5o / 100 ft.  Work out the trajectory of the Type 1 profile well. | (CO 2) | [Comprehension] |
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| 13 | VT = 12000 ft. HT = 6000 ft. VB = 1500 ft.  ɸ1 = 2o / 100 ft. ɸ2 = 1.5o / 100 ft. Ve = 11000 ft. α2 = 200  Work out the trajectory of the Type 2 profile well. | (CO 2) | [Comprehension] |
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| 14 | Articulate the purpose and operation of whipstocks in directional drilling applications. | (CO 3) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | VT = 7000 ft. HT = 8000 ft. MDB = 1500 ft. ɸ = 2o / 100 ft. α1 = 300  Work out the trajectory of the Slanted profile well. | (XXX) | [Application] |
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| 15 | L = 200 ft. α1 = 80 α2 = 110 ß1 = 600 ß2 = 700  Calculate the change in coordinates using the Radius of Curvature Method. | (XXX) | [Application] |
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| 16 | A 400-acre lease is to be developed using 10 vertical wells. An engineer suggested drilling either 1000 ft. or 2000 ft. long horizontal wells. Calculate the possible number of horizontal wells that will drain the lease effectively. Assume that a single vertical well effectively drains 40 acres. | (XXX) | [Application] |
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