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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

END TERM EXAMINATION, SUMMER TERM - August 2024

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| **Semester: Summer Term** | **Date: 05/08/2024** |
| **Course Code: PET228** | **Time: 1.00 pm - 4.00 pm** |
| **Course Name: Workover and Stimulation** | **Max Marks :100** |
| **Program: B.Tech. in Petroleum Engineering** | **Weightage: 50%** |

**Instructions:**

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

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | Name the two main stages of a hydraulic fracturing job, and state the primary purpose of each stage | (CO3) | [Knowledge] |
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| 2 | Identify the different causes of sand production. | (CO4) | [Knowledge] |
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| 3 | List the common causes of formation damage during workover operations. | (CO1) | [Knowledge] |
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| 4 | State the importance of proppants in hydraulic fracturing. | (CO3) | [Knowledge] |
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| 5 | State the importance of water shut off job in workover operations. | (CO1) | [Knowledge] |
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| 6 | Briefly describe the gas shut off, and name the commonly used methods to achieve it in workover operations | (CO2) | [Knowledge] |
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| 7 | Outline the basic steps involved in workover planning. | (CO1) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 4 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Discuss the various mechanisms for controlling sand production in oil and gas wells. How do these mechanisms contribute to the overall effectiveness of sand control? | (CO4) | [Comprehension] |
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| 9 | Explain the KGD model for a vertical fracture in a well-confined pay zone. How does this model simplify the solution to the fracture problem, and what are its key assumptions regarding the fracture width and pressure distribution? . | (CO3) | [Comprehension] |
| 10 | Provide a detailed explanation of fracture geometry. Discuss the factors that influence fracture length, height, and width, and how these factors impact the effectiveness of a hydraulic fracturing treatment. | (CO3) | [Comprehension] |
| 11 | Demonstrate the methods used for water shut-off in wells. Briefly describe the techniques employed to seal off water production effectively. | (CO1) | [Comprehension] |
| 12 | Demonstrate the role of gravel packing in preventing sand production. How does gravel packing address the challenges associated with sand control in different reservoir conditions? | (CO4) | [Comprehension] |
| 13 | Explain different workover techniques used to improve oil well production and explain the specific problems each technique addresses. | (CO2) | [Comprehension] |
| 14 | Explain the concept of acid fracturing. How does it differ from conventional hydraulic fracturing, and what are the primary benefits and challenges associated with acid fracturing treatments? | (CO2) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 15 | Demonstrate the procedure for designing a hydraulic fracturing job to maximize the net present value (NPV) of fractured wells. Explain the steps involved in selecting fracturing fluid, proppant, and maximum treatment pressure. Also, outline the components required for a complete hydraulic fracturing design. | (CO3) | [Application] |
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| 16 | A sandstone at a depth of 10,000 ft has a Poison’s ratio of 0.25 and a poro-elastic constant of 0.72. The average density of the overburden formation is  165 lb=ft3. The pore pressure gradient in the sandstone is 0.38 psi/ft. Assuming a tectonic stress of 2,000 psi and a tensile strength of the sandstone of 1,000 psi, predict the breakdown pressure for the sandstone. | (CO3) | [Application] |
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| 17 | A sandstone with a porosity of 0.2 containing 10 v% calcite (CaCO3) is to be acidized with HF/HCl mixture solution. A preflush of 15 wt% HCl solution is to be injected ahead of the mixture to dissolve the carbonate minerals and establish a low pH environment. If the HCl preflush is to remove all carbonates in a region within 1 ft beyond a 0.328-ft radius wellbore before the HF/HCl stage enters the formation, what minimum preflush volume is required in terms of gallon per foot of pay zone? | (CO2) | [Application] |
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