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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKEUP EXAMINATION - JULY 2024

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| **Semester:5 & 6** | **Date: 09/07/2024** |
| **Course Code: PET3005** | **Time: 9:30 AM -12:30 PM** |
| **Course Name: Multilateral and Horizontal Well Technology** | **Max Marks: 100** |
| **Program: B.Tech** | **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 4M=20M** | | | |
| 1 | Describe the phenomenon of coning and its impact on oil production. | (CO 1) | [Knowledge] |
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| 2 | List the methods of drilling horizontal well. | (CO 1) | [Knowledge] |
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| 3 | Define wellbore storage. | (CO 3) | [Knowledge] |
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| 4 | State the critical properties of reservoir rock that affect horizontal well drilling decisions. | (CO 1) | [Knowledge] |
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| 5 | Define sidetracking. List the typical steps of sidetracking | (CO 1) | [Knowledge] |
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| 6 | Define practical reasons for choosing horizontal well for gas reservoirs. | (CO 4) | [Knowledge] |
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| 7 | Differentiate between horizontal and vertical well tests. | (CO 3) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Horizontal wells are well-suited for reservoirs with low porosity and permeability. As a completion engineer, outline the various types of completions used in horizontal wells, including a clear diagram. | (CO 3) | [Comprehension] |
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| 9 | MPD can be used in situations where traditional drilling techniques would not be effective or would pose a risk to the wellbore”. Explain the above statement with help of suitable diagram and state the advantages of MPD techniques. | (CO 3) | [Comprehension] |
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| 10 | There is a multilateral well in unconsolidated formation with unstable lateral and a installed junction with potential cross flow control. Based on the description of the formation, identify the TAML level for completion, draw the diagram of multilateral and enumerate the advantages and disadvantages. | (CO 1) | [Comprehension] |
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| 11 | The successful completion of a horizonal well depends on several considerations.” Discuss the statement highlighting the considerations | (CO 2) | [Comprehension] |
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| 12 | Demonstrate the process and typical steps involved in directional drilling to bypass an obstruction or repair a damaged wellbore. Provide examples of conditions where this technique is used. | (CO 1) | [Comprehension] |
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| 13 | Three flow regimes are typically recognized: steady state, pseudosteady state, and transient state. The flow regime is determined by the boundary condition, identifiable by the rate of change in pressure over time. Describe the different flow regimes in a horizontal well test, using a clear diagram | (CO 4) | [Comprehension] |
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| 14 | After evaluating the geological factors for horizontal wells, the development phase begins. Discuss this statement by outlining the subsequent steps involved in the development of a horizontal well. | (CO 2) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 15 | A 1500 ft long horizontal well has been drilled in the lowest zone of an oil reservoir, which has a gas cap. Using the Giger and Efros method, determine the critical oil production rates for horizontal wells. The wells are spaced at 200 acres. The reservoir is isotropic with the following data:  Vertical and horizontal permeability, Kv=Kh = 80md  Reservoir dimensions, 2Xe = 2Ye = 3000 ft  Reservoir thickness, H = 100 ft  Oil formation volume factor, Bo = 1.2 RB/STB  Oil viscosity, μo= 0.35 cp  Wellbore radius, rw = 0.4 ft  Δρ=0.48 gm/cc | (CO 4) | [Application] |
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| 16 | Hawkins (1956) suggested that the permeability in the skin zone is uniform and can be approximated by Darcy’s equation. Based on the given statement,  a. Apply Darcy’s equation to obtain the pressure drop due to skin and hence obtain the equation for skin factor.  b. Illustrate the skin damage caused by drilling fluid invasion on low and high permeability formation.  c. Compute the pressure drops in the skin zones, in vertical and 1500-ft-long horizontal wells. The well tests show skin factor +1 for vertical as well as horizontal well. The following reservoir properties are given:  s = + 1 Bo = 1 .06 RB/STB  h = 50 ft kv = kh = 10 md  qh = 3000 BOPD qv = 1250 BOPD  μo= 0.8 cp | (CO 4) | [Application] |
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| 17 | With reference to the figure given below, answer the following questions:    a. Identify the TAML Level of the completion.  b. List the application of the identified completion.  c. State the limitations of the identified completion.  d. Describe the configurations of the identified completions.  e. State the advantage and disadvantages of the identified completions.  f. State the drilling technique used for drilling the identified completion. | (CO 1) | [Application] |
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