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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION - JULY 2024

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| **Semester :V** | **Date :02-07-2024** |
| **Course Code : PET227** | **Time :9:30 AM-12:30PM** |
| **Course Name : Well Test Analysis** | **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 | State Darcy’s Law with its mathematical expression. | (CO 1) | [Knowledge] |
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| 2 | Define Skin factor. Write down its mathematical expression. | (CO 2) | [Knowledge] |
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| 3 | State the significance of Horner’s Plot in well test analysis. | (CO 2) | [Knowledge] |
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| 4 | Describe the effective wellbore radius. | (CO 1) | [Knowledge] |
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| 5 | Define radius of investigation. Write down formula to calculate it. | (CO 1) | [Knowledge] |
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| 6 | Describe wellbore storage. | (CO 2) | [Knowledge] |
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| 7 | State the different method used to solve diffusivity equation for compressible fluid. | (CO 5) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | The Flow After Flow test is a critical method in well testing, offering valuable insights into a well's deliverability and reservoir characteristics. Illustrate Flow After Flow Test for gas well. | (CO 4) | [Comprehension] |
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| 9 | An interference test is a powerful tool for understanding reservoir dynamics and the interaction between wells. Elucidate the Interference Test. | (CO 5) | [Comprehension] |
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| 10 | Pressure Build-Up Test is a fundamental method in well testing that provides essential insights into reservoir properties and well performance. Discuss Pressure Build-up Test. | (CO 1) | [Comprehension] |
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| 11 | Pressure Drawdown Test is a fundamental method in well testing that provides essential insights into reservoir properties and well performance. Elucidate Pressure Drawdown Test. | (CO 2) | [Comprehension] |
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| 12 | An isochronal test is a vital method in well testing that provides detailed insights into the deliverability and productivity of gas wells. Explain Isochronal Test. | (CO 5) | [Comprehension] |
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| 13 | A Drill Stem Test is a critical well testing method that provides essential data for evaluating a formation's potential and making informed decisions about well development and production. Expound Drill Stem Test. | (CO 5) | [Comprehension] |
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| 14 | A gas well is producing at a constant rate of 7454.2 Mscf/day under transient flow conditions. The following data are available: k = 50 md; h = 10 ft; φ = 20%; Pi = 1600 psi; T = 600 °R; rw = 0.3 ft; Ct = 6.25 X 10-4 psi-1. The gas properties are tabulated below:    Calculate the bottom hole pressure after 4 hours by using the P2 method. | (CO 4) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | A new oil well produced 400 stb/day for 2.5 days; then it was shut-in for a pressure build-up test, during which the following data in the table were recorded:   |  |  | | --- | --- | | **Shut-in Time (i.e., Δt (hours))** | **Shut-in Pressure (i.e., Pws (psi))** | | 0 | 1,150 | | 2 | 1,795 | | 4 | 1,823 | | 8 | 1,850 | | 16 | 1,876 | | 24 | 1,890 | | 48 | 1,910 |   The other well and reservoir data were:  µ = 2 cp; c_{t} = 19.5 x 10^{-6} psi^{-1}; r_{w} = 0.29 ft; B = 1.25 rb/STB; h = 20 ft; φ = 0.20 Compute (a) the slope of Horner’s Plot; (b) formation permeability (k); (c) initial reservoir pressure (Pi); and (d) skin factor (s).  (*Provide Semi-Log Graph paper for this Question*) | (CO 2) | [Application] |
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| 15 | Figure shows a fault is located at 100ft from a production well.    The well is flowing under transient flow conditions at a constant flow rate of 200 STB/day. The well and reservoir data are as follows: µ = 2 cp; k = 60 md; Pi = 5000 psi; c_{t} = 25 x 10^{-6} psi^{-1};  r_{w} = 0.3 ft; B = 1.1 bbl/STB; h = 25 ft; φ = 17%; S = 0; Ei (-0.54) = -0.525. Estimate the bottom hole flowing pressure after 10 hours. | (CO 1) | [Application] |
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| 16 | The following data are recorded for pressure drawdown in the table given below along with the reservoir data. Reservoir data: h = 130 ft; rw = 0.25; q = 348 STB/day; B = 1.14 bbl/day; µ = 3.93 cp; Ct = 8.74 X 10-6; φ = 20%; Pi = 1154;  Assume that wellbore storage effects are not significant, calculate:   1. Permeability 2. Skin Factor 3. Pressure drops due to skin.  |  |  |  |  | | --- | --- | --- | --- | | **Time**  **(hr)** | **Pwf**  **(psi)** | **Time**  **(hr)** | **Pwf**  **(psi)** | | 2 | 950 | 11 | 931 | | 3 | 947 | 12 | 930 | | 4 | 942 | 13 | 929 | | 5 | 939 | 15 | 928 | | 6 | 937 | 16 | 927 | | 7 | 936 | 20 | 923 | | 8 | 934 | 30 | 915 | | 10 | 932 | 40 | 907 |   (*Provide Semi-Log Graph paper for this Question*) | (CO 3) | [Application] |
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