

Name:
Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2023

Programme Name: B.Tech., APE GAS

Semester : VI

Course Name : Formation Evaluation and Well Testing

Time : 03 hrs

Course Code : PEAU 3036

Max. Marks : 100

Nos. of page(s) : 2

Instructions: 1. Assume any data missing.
2. Maintain a minimum of three decimal accuracy.

SNo	SECTION A (5*4=20M)	Marks	CO																																																					
Q 1	List various laboratory methods for measuring porosity of a core.	4	CO1																																																					
Q 2	Explain Formation Factor, F .	4	CO2																																																					
Q 3	Demonstrate on the transit time in acoustic log operation.	4	CO3																																																					
Q 4	Describe shale index.	4	CO4																																																					
Q 5	Elaborate hydraulic diffusivity.	4	CO5																																																					
SECTION B (4*10=40M)																																																								
Q 6	Describe with a neat diagram the borehole environment during logging operation	10	CO2																																																					
Q 7	Compare and contrast between various electrical log tool operations.	10	CO3																																																					
Q 8	Elaborate with a neat diagram the working of a dual receiver sonic log tool	10	CO4																																																					
Q9	A Flow-After-Flow test in a gas well reported the following data.	10	CO5																																																					
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">P_{wf} (psig)</td> <td style="padding: 2px;">403</td> <td style="padding: 2px;">394</td> <td style="padding: 2px;">379</td> <td style="padding: 2px;">363</td> </tr> <tr> <td style="padding: 2px;">q_g (MMscf/D)</td> <td style="padding: 2px;">4.288</td> <td style="padding: 2px;">9.265</td> <td style="padding: 2px;">14.552</td> <td style="padding: 2px;">20.177</td> </tr> </table>			P_{wf} (psig)	403	394	379	363	q_g (MMscf/D)	4.288	9.265	14.552	20.177																																											
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At each rate, pseudo-steady state was reached. Initial shut-in bottom hole pressure was determined to be 408 psi. Estimate the Absolute Flow Potential (AOF) of the tested well.																																																								
SECTION-C (2*20=40M)																																																								
Q10	Derive for the diffusivity equation describing the three-dimensional flow of oil with a constant compressibility C_t and viscosity μ through an iso-tropic cartesian porous medium.	20	CO4																																																					
	<p style="text-align: center;">OR</p> <p>A pressure build-up test on an oil well producing at a final production rate of 250 STB/D and above the bubble point for an effective time of 13,630 hours with liquid level in well during shut in has resulted in the following data.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Δt, hrs</th> <th>P_{ws}, psia</th> <th>Δt, hrs</th> <th>P_{ws}, psia</th> <th>Δt, hrs</th> <th>P_{ws}, psia</th> <th>Δt, hrs</th> <th>P_{ws}, psia</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>3534</td> <td>0.5</td> <td>3920</td> <td>7</td> <td>4344</td> <td>24</td> <td>4384</td> </tr> <tr> <td>0.15</td> <td>3680</td> <td>1</td> <td>4103</td> <td>8</td> <td>4350</td> <td>30</td> <td>4393</td> </tr> <tr> <td>0.2</td> <td>3723</td> <td>2</td> <td>4250</td> <td>12</td> <td>4364</td> <td>40</td> <td>4398</td> </tr> <tr> <td>0.3</td> <td>3800</td> <td>4</td> <td>4320</td> <td>16</td> <td>4373</td> <td>50</td> <td>4402</td> </tr> <tr> <td>0.4</td> <td>3866</td> <td>6</td> <td>4340</td> <td>20</td> <td>4379</td> <td>60</td> <td>4405</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>72</td> <td>4407</td> </tr> </tbody> </table>			Δt , hrs	P_{ws} , psia	Δt , hrs	P_{ws} , psia	Δt , hrs	P_{ws} , psia	Δt , hrs	P_{ws} , psia	0	3534	0.5	3920	7	4344	24	4384	0.15	3680	1	4103	8	4350	30	4393	0.2	3723	2	4250	12	4364	40	4398	0.3	3800	4	4320	16	4373	50	4402	0.4	3866	6	4340	20	4379	60	4405					
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Determine the formation permeability and the skin factor, from the following well and reservoir data $\mu = 0.8$ cp; $\Phi = 0.039$; $B = 1.136$ RB/STB; $C_t = 17 \times 10^{-6}$ psi ⁻¹ ; $r_w = 0.198$ ft; $r_e = 1,489$ ft (well centered in a square drainage area, 2,640x2640 ft; r_e is the radius of																																																								

	circle with same area); $\rho = 53 \text{ lbm/ft}^3$; $A_{wb} = 0.0218 \text{ sq ft}$; and $h = 69 \text{ ft}$																																														
Q11	Derive for the diffusivity equation describing the one-dimensional radial flow of compressible gas through an iso-tropic porous medium. OR An Isochronal test in a gas well reported the following data	20	CO5																																												
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