Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

END Semester Examination, May 2022

Course : Formation Evaluation and Well Testing
Programme : B.Tech., APE GAS
Course Code : PEAU 3016
Nos. of page(s) : 2

Semester : VI
Time : 03 hrs
Max. Marks : 100

Instructions: *Assume any data missing*

SNo	SECTION A (4Qx5M=20 Marks)	Marks	CO
Q 1	Sketch the typical relative resistivity condition in water-bearing formation invaded by water and oil mud filtrate	5	CO1
Q 2	Define Hydrogen Index (HI). Calculate HI of Calcite with bulk density of ρ_b.	5	CO2
Q 3	A flow test run on an exploratory well for a period of 75.8 hours suggests the following data: k = 100 md; Φ =0.2; C_t = 2x10^{-5} psi^{-1}; and μ = 0.5 cp. Estimate the radius of investigation.	5	CO3
Q 4	Define: a. Stabilized flow; b. Absolute Open Flow (AOF)	5	CO4
	SECTION B (4Qx10M=40 Marks)		
Q 5	List various types of acoustic logs and explain with neat diagram the working principle of dual receiver sonic tool.	10	CO1
Q 6	Compare and contrast between formation density and compensated neutron log operation	10	CO2
Q 7	Derive for the diffusivity equation describing the one-dimensional flow of oil with a constant compressibility C_t and viscosity μ through an iso-tropic cartesian porous medium with constant pore volume. **OR** A well located in a reservoir of 4000 ft is producing oil at a constant rate of 200 STB/Day. The following is the data describing well abd formation: μ_o = 0.72cp; Bo = 1.475 RB/STB; k = 0.1 md; C_t = 1.5*10^{-5}/psi; r_w = 0.5ft; h = 150ft; Φ = 0.23; P_i = 3000psi; S=0. Calculate the reservoir pressure at a radius of 1 ft after 3 hours of production.	10	CO3
Q 8	A Flow-After-Flow test in a gas well reported the following data. P_{wf} (psig): 403, 394, 379, 363 q_g (MMscf/D: 4.288, 9.265, 14.552, 20.177 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 using the empirical plot method.	10	CO4
	SECTION-C (2Qx20M=40 Marks)		
Q 9	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.	20	CO3

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
						72	4407

Determine the formation permeability, the skin factor and the effective well bore radius, from the following well and reservoir data μ = 0.8 cp; Φ = 0.039; B = 1.136 RB/STB; C_t = $17x10^{-6}$ 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); ρ = 53 Ibm/ft^3; A_{wb} = 0.0218 sq ft; and h = 69 ft.

Q10

Derive for the diffusivity equation describing the one-dimensional radial flow of oil with a constant compressibility, C_t and viscosity, μ through an iso-tropic porous medium.

OR

A modified Isochronal test in a gas well reported the following data

Test	**Duration (Hours)**	**P_{wf} or P_{ws} (psig)**	**q_g (MMscf/D)**
Pretest shutdown	20	1948	-
1st flow	12	1784	4.50
1st shut-in	12	1927	-
2nd flow	12	1680	5.60
2nd shut-in	12	1911	-
3rd flow	12	1546	6.85
3rd shut-in	12	1887	-
4th flow	12	1355	8.25
Extended flow (stabilized)	81	1233	8.00
Final Shut in	120	1948	-

Estimate the Absolute Flow Potential (AOF) of the tested well by empirical and theoretical analysis

20 **CO4**