Question Paper

Exam Date & Time: 06-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

VI SEMESTER B.TECH END SEMESTER EXAMINATIONS, APRIL 2024

OIL AND GAS RESERVOIR ENGINEERING [CHE 4052]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) Analyze the influence of porosity and permeability on fluid flow within oil & gas reservoirs. (3)

A)

B) Distinguish between flash and differential expansion. (3)

C) List the traps based on structural classification and explain any two traps along with neat sketch. (4)

2) Outline the various methods used to calculate z-factor and explain any two methods. (4)

A)

B) Construct the PT behaviour of the following reservoir fluids (a) Black Oil and (b) Wet Gas. (4)

C) Derive $E = 35.37\frac{p}{ZT}$. (2)

3) The ONGC Mehsana field is a combination-drive reservoir. The current reservoir pressure is 2500 psia. Volume of bulk oil zone is 100,000 ac-ft and that of gas zone is 30,000 ac-ft. The reservoir production data and PVT information are given below: (3)

A)

	Pressure, psia	B_o, rb/stb	R_s, scf/stb	N_P, MMstb	G_P, MMMscf	B_g, rb/scf	B_w, rb/stb	W_e, MMrb	W_p, MMrb	C_f, C_w
Initial Conditions	5000	1.35	600	0	0	.0011	1	0	0	0
Current Conditions	2500	1.33	500	5	5.5	.0015	1	5	0.5	0

Estimate the initial oil in place "N".

B) Derive the Schilthuis material balance and list the assumptions clearly. (4)

C) Propose an action plan for a reservoir engineer to address a crude oil spill event in the ocean. (3)

4) Derive the basic radial flow equation or well diffusivity equation. List all the assumptions and notations clearly. (4)

A)

B) Distinguish between pressure build-up test and pressure draw down test. (3)

C) Derive Darcy's law using fluid potential and asses the importance of the Klinkenberg effect. (3)

5) Compare the steps involved in (a) single carbon number analysis (b) SARA analysis. (2)

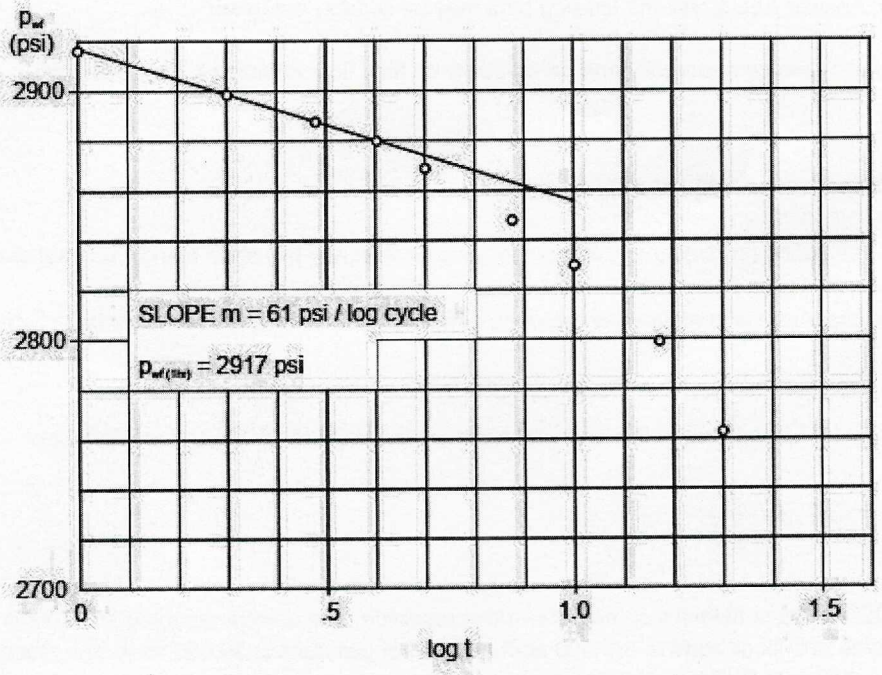
A)

B) Analyse the role of the CO_2 injection in the reservoir along with any one CO_2 EOR technique with neat sketch. (4)

C) A well is tested by producing it at a constant rate of 1500 stb/d for a period of 100 hours. It is suspected, from seismic and geological evidence, that the well is draining an isolated reservoir block which has approximately a 2:1 rectangular geometrical shape and the extended drawdown test is intended to confirm this. Estimate the effective permeability and skin factor of the well. (4)

The following reservoir data and bottom-hole pressures recorded plot is available:

h = 40 ft, r_w = 0.33 ft, ø= 0.3, c = 15X 10^{-6}/psi, μ= 3 cp, y=1.781 and B_o = 1.20 rb/stb



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