

Q1: A new well is drilled in a middle of reservoir. The aquifer is very weak. Given the following data:

$$\bar{P}_r = 3000 \text{ Psig}, \text{GOR}=200 \text{ SCF/BBL}, \text{THP}=200 \text{ Psig}, \text{well depth}=5000 \text{ ft}$$

$$P_b = 1450 \text{ Psig}, k = 30 \text{ md}, H = 60 \text{ ft}, R_e = 2000 \text{ ft}, R_w = 0.4 \text{ ft}, B_o = 1.2, \mu_o = 0.68 \text{ cp}, S = 2.$$

Find:

1.
 - a) q_b
 - b) q_{max}
 - c) q_o for $p_{wf} = 2500 \text{ Psig}$ and $p_{wf} = 1000 \text{ Psig}$
 - d) Productivity index (P_i).
 - e) Draw the IPR above and below the bubble point (Straight line and Vogel equation).
 - f) Calculate the flow capacity of the well for 4 in. and 3 in. ID tubing using the attached gradient curves.
 - g) Draw the out flow (vertical left performance) with the IPR and comment on the results.
2. If reservoir pressure dropped from 3000 psig to 2500 psig
 - a) Draw the IPR
 - b) Compare the initial and current results and add your comments?

(20 MARKS)

Q2: An oil well in the middle of a large reservoir which is actively supported by a huge aquifer has been open-hole tested and yields the following data:

$$B_o = 1.2, \mu_o = 0.68 \text{ cp}, R_w = 3 \text{ inches}, K = 70 \text{ md.}$$

$$H = 50 \text{ m}, p_{wf} = 3800 \text{ Psig at } q = 3000 \text{ STB/d}$$

The drainage radius is estimated to be 1000 ft and the original static reservoir pressure, is obtained from pressure build up test, is 4500 Psig.

- Calculate the flowing reservoir pressure if:
 - a. $S=0$
 - b. $S=2$
 - c. $S=-2$
- Illustrate the results and explain the three cases?

(7.5 MARKS)

Q3: A production test to an oil well giving the following results:

Pr: 1500 Psia

Pb: 700 Psia

	Production Test	
	Pressure Psia	Oil Rate bbl/day
1	1200	900
2	1000	1500
3	800	2100

Find:

- Productivity index
- Production rate at the bubble point and at $P = 400$ Psia.
- The maximum flow rate.
- If well thickness is 30 ft calculate the Productivity Index per each foot.
- If the thickness is 20 ft, calculate the flow rate at $P=1000$ Psia and compare the results.

(12.5 MARKS)

Q4: Explain NODAL Analysis Technique for Well Production System Optimization.

(10 MARKS)

Good luck

Note: correlation charts to be attached with the exam.

1meter= 3.281 ft