

Roll No



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
MID TERM EXAMINATION - APR 2023**

**Semester :** Semester VI - 2020

**Course Code :** PET2019

**Course Name :** Sem VI - PET2019 - Oil and Gas Well Test Analysis

**Program :** PET

**Date :** 12-APR-2023

**Time :** 9.30AM - 11.00AM

**Max Marks :** 60

**Weightage :** 30%

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**Instructions:**

- (i) Read all questions carefully and answer accordingly.*
  - (ii) Question paper consists of 3 parts.*
  - (iii) Scientific and non-programmable calculator are permitted.*
  - (iv) Do not write any information on the question paper other than Roll Number.*
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**PART A**

**ANSWER ALL THE QUESTIONS**

**(5 X 2 = 10M)**

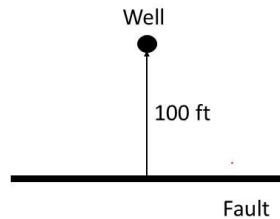
1. Describe principle of superposition. (CO1) [Knowledge]
2. List the differences between steady state and pseudo-steady state flow with respect to petroleum reservoirs. (CO1) [Knowledge]
3. Define the radius of the investigation. Write down formula to calculate it. (CO1) [Knowledge]
4. State pressure build-up test. (CO2) [Knowledge]
5. List any two applicability of Horner's plot. (CO2) [Knowledge]

**PART B**

**ANSWER ALL THE QUESTIONS**

**(3 X 10 = 30M)**

6. Figure shows a fault is located at 100ft from a production well.



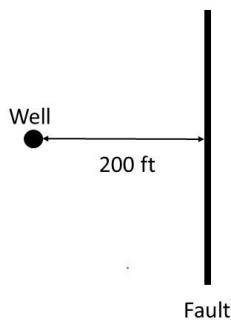
The well is flowing under transient flow conditions at a constant flow rate of 200 STB/day. The well and reservoir data are as follows:

$\mu = 2$  cp;  $k = 60$  md;  $P_i = 5000$  psi;  $c_t = 25 \times 10^{-6} \text{ psi}^{-1}$ ;  $r_w = 0.3$  ft;  $B = 1.1$  bbl/STB;  $h = 25$  ft;  $\phi = 17\%$ ;  $S = 0$ ;  $E_i(-0.54) = -0.525$ .

Estimate the bottom hole flowing pressure after 10 hours.

(CO1) [Comprehension]

7. A fault is located at 200ft from a production well as shown in the figure.



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:

$\mu = 2$  cp;  $k = 60$  md;  $P_i = 5000$  psi;  $c_t = 25 \times 10^{-6} \text{ psi}^{-1}$ ;  $r_w = 0.3$  ft;  $B = 1.1$  bbl/STB;  $h = 25$  ft;  $\phi = 17\%$ ;  $S = 0$ ;  $E_i(-2.1) = -4.26 \times 10^{-2}$

Estimate the sand face pressure after 10 hours.

(CO1) [Comprehension]

8. Explain concept of skin factor along with its formula. Is it true that skin factor can be positive, negative and zero? If yes, explain significance.

(CO1) [Comprehension]

## PART C

### ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

9. A new oil well produced 400 stb/day for 60 hours; 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., $\Delta t$ (hours))	Shut-in Pressure (i.e., $P_{ws}$ (psi))
0	1,165
2	1,801
4	1,838
8	1,865
16	1,891
24	1,905
48	1,925

The other well and reservoir data were

$\mu = 2$  cp;  $c_t = 19.5 \times 10^{-6} \text{ psi}^{-1}$ ;  $r_w = 0.29$  ft;  $B = 1.25$  rb/STB;  $h = 20$  ft;  $\phi = 0.20$

Calculate (a) the slope of Horner's Plot; (b) formation permeability (k); (c) initial reservoir pressure ( $P_i$ ); and (d) skin factor (s).

(CO2) [Application]

