

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

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

Semester : Semester IV - 2021

Course Code : PET2004

Course Name : Sem IV - PET2004 - Fundamentals of Petroleum Reservoir Engineering

Program : PET

Date : 18-MAY-2023

Time : 10.30AM -
12.00PM

Max Marks : 50

Weightage : 25%

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.*

PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Define surface tension and Interfacial tension.

(CO2) [Knowledge]

2. Define porosity of reservoir rock. Write its SI unit.

(CO1) [Knowledge]

3. List minimum two rock properties and two fluid properties.

(CO1) [Knowledge]

4. Classify the types fluid flow based on reservoir geometry.

(CO2) [Knowledge]

5. Define permeability. What are its different types? Write its units.

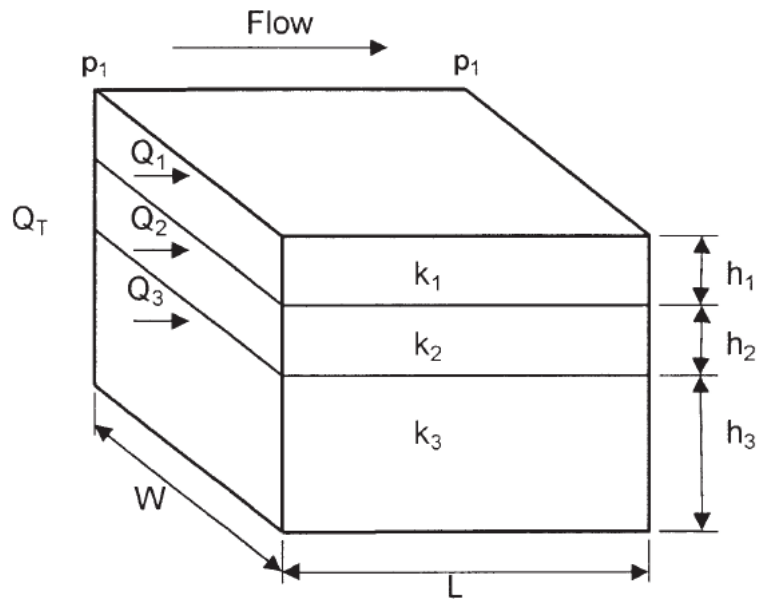
(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

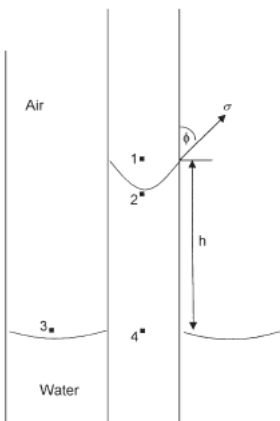
(2 X 10 = 20M)

6. Weighted averaging method is used to determine the average permeability of layered-parallel beds with different permeabilities. Consider the case where the flow system is comprised of three parallel layers that are separated from one another by thin impermeable barriers, i.e., no cross flow, as shown in Figure. Formulate one mathematical relation to find the average permeability for the given reservoir.



(CO1) [Comprehension]

7. Surface tension is depend on radius of capillary tube, hight of capillary rise h , density of the liquid and contact angle between liquid and capillary tube. Establish a methematical relation for surface tension for the given figure where r is the radius of capillary, h is the hight of capillary rise, θ is the contact angle and ρ_w is the density of water.



(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. An oil well is producing at a constant flow rate of 300 STB/day under unsteady-state flow conditions. The reservoir has the following rock and fluid properties:
- | | |
|---|-----------------------------|
| Oil formation volume factor $B_o = 1.25$ bbl/STB, | Viscosity $\mu_o = 1.5$ cp, |
| Total compressibility $c_t = 12 \times 10^{-6}$ psi ⁻¹ , | Permeability $k_o = 60$ md, |
| Height of pay zone $h = 15$ ft, $p_i = 4000$ psi, | Porosity $\phi = 15\%$, |
| Wellbore radius $r_w = 0.25$ ft | |

Calculate pressure at radii of 0.25, 5, 50, 100, 500, 1000, and 2500 feet, for 1 hour.
Plot the results as: Pressure versus radius

(CO2) [Application]