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**PRESIDENCY UNIVERSITY  
BENGALURU**

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

**Semester :** Semester V - 2021

**Course Code :** PET3006

**Course Name :** Sem V - PET3006 - Advanced Petroleum Reservoir Engineering

**Program :** B. TECH

**Date :** 6-NOV-2023

**Time :** 9:30AM - 11:00AM

**Max Marks :** 50

**Weightage :** 25%

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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. State the equation of fractional flow of water for horizontal reservoir having negligible capillary pressure.  
(CO2) [Knowledge]
2. Describe the effect of Dip angle on fractional flow curve with a neat diagram.  
(CO2) [Knowledge]
3. List the various primary drive mechanisms which controls the oil recovery from the reservoirs.  
(CO2) [Knowledge]
4. Describe the different type of flooding patterns used in waterflooding. Draw a neat diagram of Crestal and Basal injection pattern.  
(CO2) [Knowledge]
5. Define Displacement efficiency.  
(CO2) [Knowledge]

**PART B**

**ANSWER ALL THE QUESTIONS**

**(2 X 10 = 20M)**

6. Water influx in a reservoir refers to the movement of water into the reservoir, which could be natural or artificial. Understanding water influx is crucial in the context of managing reservoirs. Water influx rate can be equivalently expressed in terms of material balance equation. Using the same concept, Predict the water influx rate ( $ew$ ) in a reservoir whose pressure is stabilized at 2500 psi.

Given: initial reservoir pressure= 3500 psi;  $dNp/dt= 32,000$  STB/day;  $Bo= 1.4$  bbl/STB,  $GOR= 900$  scf/STB,  $R_s= 700$  scf/STB,  $B_g= 0.00082$  bbl/scf,  $B_w= 1.0$  bbl/STB.

Also, predict the Schlithuis water influx constant.

(CO1) [Comprehension]

7. Recovery of crude oil from the reservoirs is the main concern of a reservoir engineer. For this a reservoir engineer uses many tools to estimate the efficiency of the process. One of the major tools is to quantify the recovery efficiency. You have been assigned to quantify the recovery efficiency. Briefly discuss about the recovery efficiency. Express the equation for cumulative oil production in terms of recovery efficiency. Draw and discuss in detail about areal and vertical sweep efficiency.

(CO2) [Comprehension]

**PART C**

**ANSWER THE FOLLOWING QUESTION**

**(1 X 20 = 20M)**

8. For a reservoir-aquifer system, the boundary pressure history is given below:

Time (days)	Boundary Pressure (psi)
0	3000
30	2956
60	2917
90	2877
120	2844

Given the following data:;  $F_k = 0.04$ ,  $T=140$  °F;  $r_a = \text{infinite}$ ;  $r_e = 2000$  ft.  $k= 80$ md,  $h = 200$  ft ;  $\phi= 10\%$ ;  $\mu_w= 0.395$  cp;  $C_f = 5 \times 10^{-6}$  psi<sup>-1</sup>;

$C_w = 3 \times 10^{-6}$  psi<sup>-1</sup>

Identify the water drive model in the abovementioned scenario and compute the cumulative water influx.

Use the following chart:

Dimensionless time	Fluid influx
12	7.104
24	11.996
36	34.360
48	43.520

(CO1) [Application]