Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2022

Programme Name: B.Tech APE UP **Semester : VI**

Course Name : Reservoir Engineering II **Time : 03 hrs**

Course Code : PEAU 3005 **Max. Marks: 100**

Instructions :

- All questions are compulsory. However, internal choice has been provided. You have to attempt only one of the alternatives.

SECTION A

(5Qx4M=20Marks)

S. No.		Marks	CO
1	The reservoir fluid has an oil formation volume factor of 1 572 bbl /STB at the initial reservoir pressure 4400 psia and 1 600 bbl /STB at the bubble point pressure of 3550 psia If the reservoir produced 680000 STB when the pressure dropped at 3550 psia calculate the initial oil in place Also calculate the of oil recovered so far.	4	CO4
2	Discuss the effect of water and oil viscosity on the fractional flow.	4	CO4
3	a) At the irreducible water saturation, the water flow rate q w is zero and, therefore, the water cut is ____. b) In ideal case for a water flood, the volume of oil recovered is exactly equal to the _________. c) If the displacing fluid has a tendency to move faster than the displaced fluid, the fluid interface is unstable. Tongues of displacing fluid propagate at the interface This process is called _______.	4	CO2
4	Draw the water cut versus water saturation curve.	4	CO3
5	Enumerate the stages of filed development.	4	CO4

SECTION B

(4Qx10M= 40 Marks)

6	An oil field having combination drive reservoir with current reservoir pressure at 2500 psi The reservoir production data and PVT information are given below. Differentiate between the isochronal and modified isochronal gas well test with the help of graph.	10	CO2

Volume of bulk oil zone 100 000 ac ft

Volume of bulk gas zone 20 000 ac ft

Calculate the initial oil in place.

	Initial reservoir condition	Current reservoir condition
p, psi	3000	2500
B_o, bbl/STB	1.35	1.33
R_s, scf/STB	600	500
N_p, MMSTB	0	5
G_p, MMMscf		5.5
B_w, bbl/STB	1.00	1.00
W_e, MMbbl	0	3
W_p, MMbbl	0	0.2
B_g, bbl/scf	0.0011	0.0015
c_f, c_w	0	0

7	Describe the formula for the reserve estimation under following conditions: a) volumetric saturated reservoirs b) water drive reservoirs c) gas cap drive reservoirs	**10**	**CO1**
8	The following data are available for a linear reservoir system Oil formation volume factor Bo= 1.25 bbl /STB Water formation volume factor Bw 1.02 bbl /STB Formation thickness h =20 ft Cross sectional area A =26 400 ft Porosity= 25 Injection rate i w= 900 bbl /day Distance between producer and injector 660 ft Oil viscosity μo= 2 cp Water viscosity μw= 1 cp Dip angle =0 Connate water saturation Swc= 20 Initial water saturation Swi= 20 Residual oil saturation Sor= 20 $\left(\frac{df_w}{dS_w}\right)_{S_{wf}}$ 1.973 Calculate • Time to breakthrough • Cumulative water injected at breakthrough • Total pore volumes of water injected at breakthrough	**10**	**C03**
9	A saturated oil reservoir is under consideration to be water flooded immediately after drilling and completion Core analysis tests indicate that the initial and residual oil saturations are 70 and 35 respectively Calculate the displacement efficiency when the oil saturation is reduced to 65,	**10**	**CO4**

60, 55. 50 and 35 Assume that Bo will remain constant throughout the project life

SECTION-C
(2Qx20M=40 Marks)

10 The production history and the PVT data of a gas-cap-drive reservoir are given.

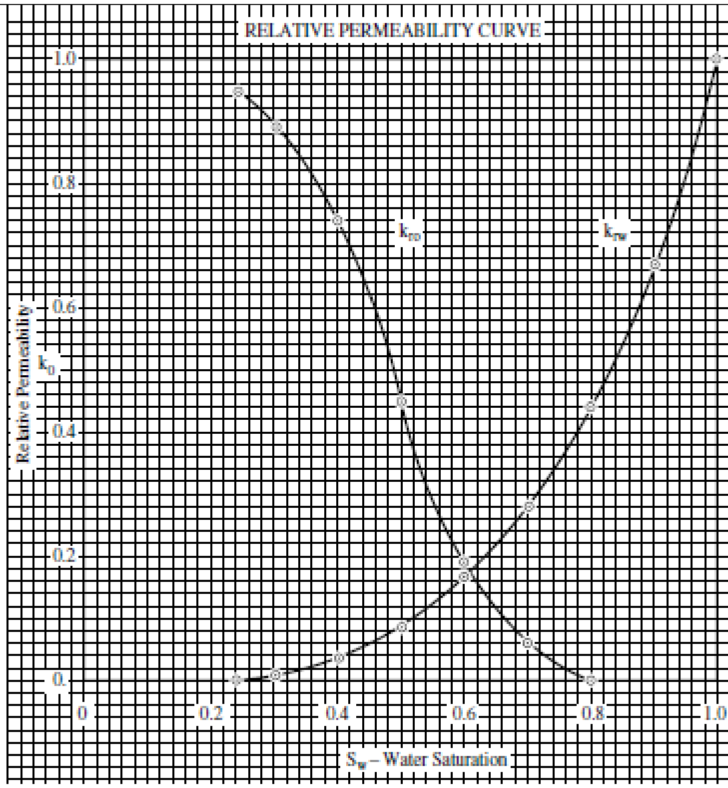
5+5+10=20 | **CO2**

Date	$\bar{p}$ psi	N_p MSTB	Gp MMscf	B_t bbl/STB	B_g bbl/scf
5/1/89	4415	—	—	1.6291	0.00077
1/1/91	3875	492.5	751.3	1.6839	0.00079
1/1/92	3315	1015.7	2409.6	1.7835	0.00087
1/1/93	2845	1322.5	3901.6	1.9110	0.00099

The initial gas solubility Rsi is 975 scf /STB Estimate the initial oil and gas in place

11 Use the data given in the table to plot the fractional flow curve for a linear reservoir system with the following properties
Dip angle= 0 Absolute permeability 50 md Bo= 1.20 bbl/STB, Bw =1.05 bbl/STB ρo= 45 lb/ft 3 ρw 64 0 lb/ft3
µw 0.5 cp Cross sectional area A= 25 000 ft 2
Perform the calculations for the following values of oil viscosity 0.5,1,5 and 10 cp.

20 (10+5+5) | **CO3**



S_w	k_{ro}	k_{rw}
0.24	0.95	0.00
0.30	0.89	0.01
0.40	0.74	0.04
0.50	0.45	0.09
0.60	0.19	0.17
0.65	0.12	0.28
0.70	0.06	0.22
0.75	0.03	0.36
0.78	0.00	0.41