Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2021

Programme Name: M.Tech PE **Semester : I**
Course Name : Reservoir Engineering **Time : 03 hrs**
Course Code : PEAU7002 **Max. Marks: 100**

Instructions :

- All questions are compulsory. However, internal choice has been provided. You have to attempt only one of the alternatives.
- Write the answers on an A4 sheet with your name and roll number mentioned on each page. Pl scan properly so as the answers are visible.
- Submit well within time limit.

	SECTION A (20 marks)		
1	The proper ranking of average (typical, not exceptional) oil reservoir recovery efficiency (from lowest to highest) by drive mechanism is A. solution-gas drive; rock-and-fluid expansion drive; water drive; expanding gascap drive B. solution-gas drive; expanding gas-cap drive; water drive; gravity drainage drive C. rock-and-fluid expansion drive; solution-gas drive; water drive; expanding gascap drive D. rock-and-fluid expansion drive; expanding gas-cap drive; gravity-drainage drive; water drive	**4**	**CO1**
2	Graphically represent a typical oil formation factor curve, as a function of pressure for an under-saturated crude oil reservoir.	**4**	**CO2**
3	Calculate the deg API of freshwater. a. 1 b. 10 c. 20 d. 100	**4**	**CO1**
4	Describe the mechanism of depletion gas drive.	**4**	**CO2**
5	Enumerate the different types of reserves.	**4**	**CO1**
	SECTION B (40 marks)		
6	The phase diagram of an oil reservoir is characterized by the quality lines which are closer to the dew point curve. Identify the type of the above mentioned reservoir and define its properties. Describe phase behavior change with decrease in pressure.	**10**	**CO3**
7	Describe the relative permeability curve with the help of a graph.	**10**	**CO3**

8	With the help of a graph represent the characteristics of solution-gas-drive reservoirs.	**10**	**CO4**
9	Starting from Darcy's law in cylindrical geometry derive an expression for the steady state inflow of incompressible fluid into a vertical well. Assume that only single fluid phase is flowing under isothermal condition.	**10**	**CO2**
	SECTION-C (40 marks)		
10	A combination-drive reservoir contains 20 MMSTB of oil initially in place. The ratio of the original gas-cap volume to the original oil volume, i.e., m, is estimated as 0.15. The initial reservoir pressure is 3000psia at 150°F. The reservoir produced 2.2 MMSTB of oil, 1900 MMscf of 0.84 specific gravity gas, and 100,000 STB of water by the time the reservoir pressure dropped to 2900 psi. The following PVT is available: **3000 psi** **2900 psi** Bo, bbl/STB 1.58 1.48 Rs, scf/STB 1040 850 Bg, bbl/scf 0.00080 0.00092 Bt, bbl/STB 1.58 1.655 Bw, bbl/STB 1.000 1.000 The following data are also available: Swi = 0.20; cw = 1.5 × 10−6 psi−1; cf = 1 × 10−6 psi−1 Calculate: a. Cumulative water influx b. Net water influx c. Primary driving indexes at 2900 psi. OR Treating the reservoir pore as an idealized container derive the volumetric balance expression which occurs naturally during the productive life of a reservoir. Determine the relative magnitude of each of the driving mechanisms and its contribution to the production in a combination drive mechanism.	**20**	**CO4**
11	An oil well in the Nameless Field is producing at a stabilized rate of 600 STB/day at a stabilized bottom-hole flowing pressure of 1800 psi. Analysis of the pressure buildup test data indicates that the pay zone is characterized by a permeability of 120 md and a uniform thickness of 25 ft. The well drains an area of approximately 40 acres. The following additional data is available: rw = 0.25 ft A = 40 acres Bo = 1.25 bbl/STB μo = 2.5 cp Calculate the pressure profile (distribution) and list the pressure drop across 1 ft intervals from rw to 1.25 ft, 4 to 5 ft, 19 to 20 ft, 99 to 100 ft, and 744 to 745 ft.	**20**	**CO2**