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

Course: Reservoir Development & Simulation **Semester: III**
Programme: M. Sc Petroleum Geosciences
Course Code: PEGS8009
Time: 03 hrs. **Max. Marks: 100**
Instructions: All questions are compulsory. There is no overall choice. However, internal choice has been provided. You have to attempt only one of the alternatives in all such questions.

SECTION A

S. No.		Marks	CO
1	"When a wetting and a non-wetting phase flow together in a reservoir rock, each phase follows separate and distinct paths." Justify and explain this statement with the help of a graph.	**4**	**CO1**
2	Describe Reservoir Simulation. Explain in detail, its purpose, objectives and uses.	**4**	**CO4**
3	Elaborate the different categories of reserve. Explain in brief about proven reservoir.	**4**	**CO3**
4	List the advantages and disadvantages of IMPES reservoir simulation.	**4**	**CO4**
5	The phase diagram of an oil reservoir is characterized by the quality lines which are closer to the bubble point curve. Identify the type of the above mentioned reservoir and define its properties. How will the phase behavior change with decrease in pressure?	**4**	**CO1**
	SECTION B		
6	Explain briefly the following terms as applied to reservoir simulation (short sentence and/or a formula for each. a) Oil formation volume factor b) Gas Solubility c) History matching d) Black Oil e) Productivity Index	**10**	**CO4**
7	Write short notes on the following: a. Cricondentherm pressure and Cricondenbar temperature b. Role of reservoir engineer	**10**	**CO2**
8	A combination-drive reservoir contains 10 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 0.25. The initial reservoir pressure is 3000 psia at 150°F. The reservoir produced 1 MMSTB of oil, 1100 MMscf of 0.8 specific gravity gas, and 50,000 STB of water by the time the reservoir pressure dropped to 2800 psi. The following PVT is available: B_o, bbl/STB: 1.58 / 1.48 R_s, scf/STB: 1040 / 850 B_g, bbl/scf: 0.00080 / 0.00092 B_t, bbl/STB: 1.58 / 1.655 B_w, bbl/STB: 1.000 / 1.000 The following data is 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 2800 psi	**10**	**CO4**

9	State the primary natural drive indices encountered in a typical petroleum reservoir with their expected range of percentage recovery.	**10**	**CO3**
	SECTION C		
10	Treating the reservoir pore as an idealized container derive the volumetric balance expressions for all volumetric changes which occurs during the natural productive life of the reservoir.	**20**	**CO3**
11	Assuming steady-state flow and incompressible fluid, calculate the oil flow rate under the following conditions: pe = 2500 psi pwf = 2000 psi re = 745 ft rw = 0.3 ft μo = 2 cp Bo = 1.4 bbl/STB h = 30 ft k = 60 md OR An incompressible fluid flows in a linear porous media with the following properties. L = 2500 ft h = 30 ft width = 500 ft k = 50 md phi = 17% viscosity= 2 cp inlet pressure = 2100 psi Q = 4 bbl/day density = 45 lb/ft3 Calculate the pressure at 0.25ft, 500ft, 1000ft and 2000ft. Identify the zone where the pressure drop is maximum.	**20**	**CO2**