Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 08-10-2025 **Time:** 02.00pm to 03.30pm

School: SOE	**Program:** B.Tech. (PET)	
Course Code: PET1501	**Course Name:** Fundamentals of Petroleum Engineering Calculations	
Semester: III	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	16	22	12			

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks. **5Q x 2M=10M**

1.	Explain the difference between field units and SI units in petroleum engineering.	**2 Marks**	**L2**	**CO1**
2.	A reservoir has a length of 500 ft and width of 300 ft. Explain how you would calculate its area in acres.	**2 Marks**	**L2**	**CO1**
3.	Explain the relationship between API gravity and specific gravity. Outline how API gravity is used to classify crude oils as light, medium, or heavy.	**2 Marks**	**L2**	**CO1**
4.	Summarize the concept of shrinkage in petroleum reservoirs.	**2 Marks**	**L2**	**CO2**
5.	Describe how a Saturation vs. Capillary Pressure graph is used to determine irreducible water saturation.	**2 Marks**	**L2**	**CO3**

Part B

Answer the Questions. **Total Marks 40M**

6.	**a.**	A reservoir contains 5000 m^3 of natural gas with the composition: 80% methane, 10% ethane, and 10% propane. Using stoichiometric principles, calculate the number of moles of each component and the total moles in the reservoir. Show all steps.	**4+4+2 Marks**	**L3**	**CO2**
	b.	An oil reservoir has 10,000 STB of oil in place at reservoir	**10**	**L3**	**CO2**

		conditions. If the formation volume factor Bo is 1.2 bbl/STB, calculate the surface volume of oil produced. the concept of shrinkage and how it affects production estimation.	**Marks**		
		Or			
7.	**a.**	Oil is produced from a reservoir where the pressure drop along the wellbore is measured to be 1200 psi over 2000 ft. If the well has a radius of 0.5 ft, permeability of 150 mD, thickness 25 ft, oil viscosity 2 cp, and formation volume factor 1.1 bbl/STB, (i) Calculate the flow rate using Darcy's law. (ii) Explain the significance of pressure gradients in controlling production with all the calculations	**5+5 Marks**	**L3**	**CO2**
	b.	An incompressible fluid flows in linear porous media. L=2500 ft, h=10ft, width= 300ft, k= 100md, porosity= 15%, viscosity= 2 cp, P_1=3000Psi, P_2=2990Psi. Calculate (i) Flow rate in bbl/day (ii) Apparent fluid velocity (iii) Actual fluid velocity	**4+4+2 Marks**	**L3**	**CO2**

8.	**a.**	A petroleum engineer receives reservoir data in field units: pressure = 2500 psi, temperature = 212°F, and volume = 10,000 bbl. (i) Explain step by step how you would convert these values into SI units. (ii) Justify why accurate unit conversion is critical in petroleum engineering operations.	**5+5 Marks**	**L2**	**CO1**
	b.	A Saturation vs. Capillary Pressure curve is provided for a sandstone core. (i) Apply your knowledge to determine the irreducible water saturation and Critical oil saturation. (ii) Explain how this value would be used to estimate the hydrocarbon in place.	**5+5 Marks**	**L3**	**CO3**
		Or			
9.	**a.**	(i) Explain the concept of API gravity and its relationship with specific gravity. (ii) Describe how API gravity is used to classify crude oils as light, medium, or heavy. (iii) Show an example of converting API gravity to specific gravity and interpret the result.	**4+4+2 Marks**	**L2**	**CO1**
	b.	A production vs. time graph for an oil well shows declining production rates over the past 5 years. (i) Apply decline curve analysis techniques to estimate the expected production over the next 3 years. (ii) Explain each step and assumptions made during your calculation.	**5+5 Marks**	**L3**	**CO3**