Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – May / June 2026

Date: 23- 05- 2026 **Time:**09:30am – 12:30pm

School: SOE	**Program:** B.Tech. (PET)	
Course Code: PET2108	**Course Name**: Fundamentals of Petroleum Reservoir Engineering	
Semester: IV	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**04**	**04**	**24**	**44**	**24**

Instructions:

(i) Read all questions carefully and answer accordingly.

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

Part A

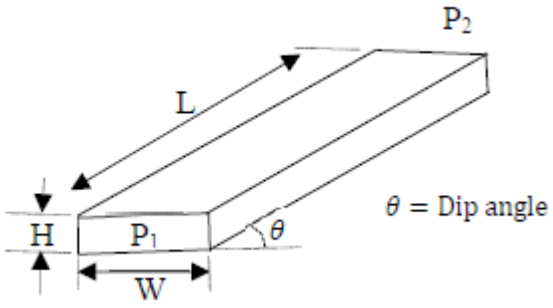
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

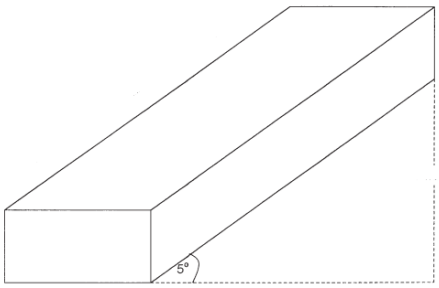
1.	State the difference between Bubble Point and Dew point.	**2 Marks**	**L1**	**CO1**
2.	Define Cri-Condentherm and Cri-Condenbar.	**2 Marks**	**L1**	**CO1**
3.	Distinguish between “Compressibility” and “Compressibility factor”.	**2 Marks**	**L1**	**CO2**
4.	Define Gas Formation Volume Factor (GFVF). State its unit.	**2 Marks**	**L1**	**CO2**
5.	Define “Fluid Potential” and state its unit.	**2 Marks**	**L1**	**CO3**
6.	Define steady state and Pseudo steady state flow.	**2 Marks**	**L1**	**CO3**
7.	Define Drive Mechanisms.	**2 Marks**	**L1**	**CO4**
8.	Identify True/False (Only write TRUE or FALSE): 1. In a solution gas drive reservoir, the pressure declines rapidly after production starts. (True / False) 2. Water drive reservoirs usually maintain reservoir pressure better than gas cap drive reservoirs. (True / False)	**2 Marks**	**L1**	**CO4**

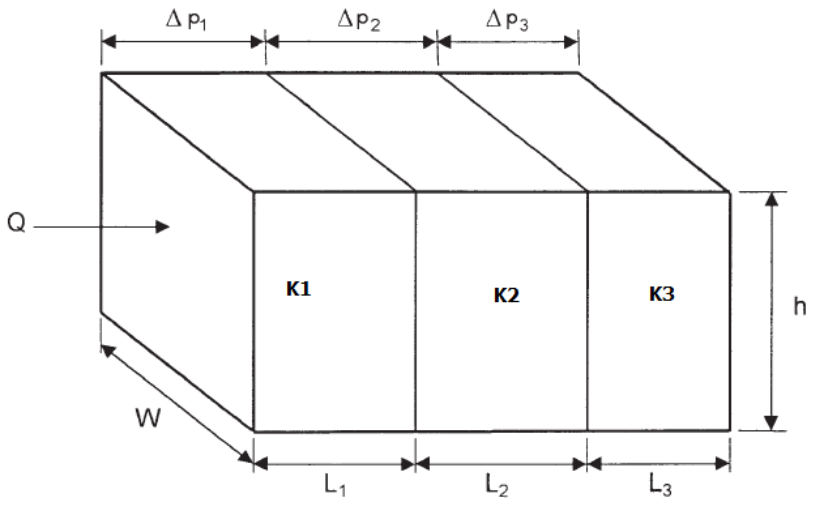
	3. Gravity drainage is most effective in reservoirs with horizontal layering. (True / False) 4. Gas cap expansion contributes to pressure maintenance in a gas cap drive reservoir. (True / False)			
9.	Mention examples of Secondary and Tertiary Recovery mechanism.	**2 Marks**	**L1**	**CO5**
10.	Order the following reservoir drive mechanisms based on their typical recovery percentages (from highest to lowest recovery): A) Gas Cap Drive B) Water Drive C) Solution Gas Drive D) Gravity Drainage.	**2 Marks**	**L1**	**CO5**

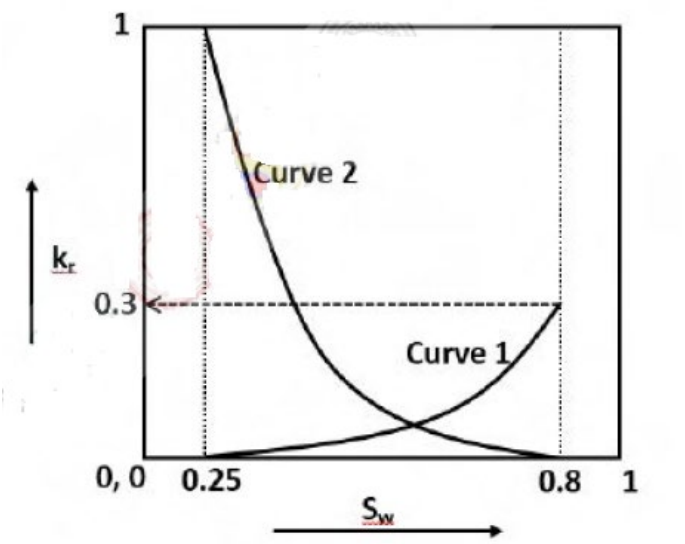
Part B

Answer the Questions. **Total Marks 80M**

11.	An incompressible fluid (density = 40 lb/cf) flows at a steady state through a linear porous media with the following properties: A core sample has the following dimensions and fluid properties: • The length of the core is 1500 feet, the height is 15 feet, and the width is 30 feet. • The porosity of the core is 18%. • The permeability of the porous medium is 150 millidarcies (mD). • The fluid has a viscosity of 1.5 centipoise (cP). • The inlet pressure at the starting point (P_1) is 1600 psi, while the outlet pressure at the endpoint (P_2) is 1590 psi. • The core is inclined at an angle θ, referred to as the dip angle, as illustrated in the diagram.  Compute the absolute value of the difference in fluid velocity (ft/day) between θ = 0° and θ = 10°.	**20 Marks**	**L3**	**CO3**
	Or			
12.	An incompressible fluid flows in a linear porous media with the following properties: L = 2000 ft h = 20′ width = 300′ k = 100 md = 15% μ = 2 cp p1 = 2000 psi p2 = 1990 psi Assume that the porous media is tilted with a dip angle of 5° as shown in Figure and fluid has a density of 42 lb/ft^3 Calculate: a. Flow rate in bbl/day	**20 Marks**	**L3**	**CO3**

		b. Apparent fluid velocity in ft/day c. Actual fluid velocity in ft/day 			

13.	**a.**	Produce the expressions for gas compressibility for: (a) Ideal Gas (b) Real Gas in terms of pressure and temperature. Clearly state the assumptions involved for each case.	**10 Marks**	**L3**	**CO4**
	b.	Examine the average permeability for the rock system shown below. The notations used represent the usual standard nomenclature. Clearly explain whether the average permeability should be taken as arithmetic mean, harmonic mean, or geometric mean based on the rock configuration. 	**10 Marks**	**L3**	**CO4**
		Or			
14.	**a.**	With the help of proper diagrams, illustrate the relationship between: (a) Gas Solubility and Reservoir Pressure (b) Oil Formation Volume Factor (Bo) and Reservoir Pressure.	**15 Marks**	**L3**	**CO4**

		Clearly illustrate how these properties change with decreasing reservoir pressure during production.			
	b.	Relative permeability curves are shown in the following figure for a water-oil system in a porous medium. S_w is water saturation and k_r is relative permeability. Curve 1 is relative permeability of water and Curve 2 is relative permeability of oil. Assuming the porous medium is at irreducible water saturation initially, calculate the maximum possible recovery of oil by water flooding (write answer with one decimal place).  	**05 Marks**	**L3**	**CO4**

15.	Analyze the different types of reservoir drive mechanisms and evaluate how each mechanism influences the efficiency and extent of oil recovery under varying reservoir conditions.	**20 Marks**	**L4**	**CO4**
	Or			
16.	Analyze how the general law of conservation of mass can be applied to derive the material balance equation for a reservoir system, and evaluate the impact of the underlying assumptions on its accuracy and applicability.	**20 Marks**	**L4**	**CO4**

17.	An oil reservoir initially contains oil at a pressure of 3000 psi. The bubble point pressure of the reservoir is 2500 psi. The following data are available: Initial Oil Formation Volume Factor,Boi=1.25 rb/stb Oil Formation Volume Factor at current pressure (2000 psi), Bo=1.35 Initial Solution Gas-Oil Ratio, Rsi= 600 scf/stb Solution Gas-Oil Ratio at 2000 psi, Rs=400 scf/stb Gas Formation Volume Factor at 2000 psi, Bg=0.005 rb/scf	**20 Marks**	**L3**	**CO5**

	Cumulative Oil Production, Np=5×10^6 stb Cumulative Gas Production, Gp=3×10^9 scf Water production and water influx are negligible Rock and water compressibility effects are negligible a) Using the material balance equation for a solution gas drive reservoir, calculate the Original Oil in Place (OOIP), N b) Determine the drive mechanism based on the given data and justify your answer. c) Comment on how the neglect of water influx and compressibility might affect the accuracy of the result.			
	Or			
18.	An oil reservoir has the following data: Initial reservoir pressure = 3200 psi Current reservoir pressure = 2500 psi Initial Oil Formation Volume Factor, Boi=1.20 rb/stb Oil Formation Volume Factor at current pressure, Bo=1.28 rb/stb Initial Solution GOR, Rsi=500 scf/stb Solution GOR at current pressure, Rs=420 scf/stb Gas Formation Volume Factor, Bg=0.0045 rb/scf Cumulative Oil Production, Np=4×10^6 stb Cumulative Gas Production, Gp=2.2×10^9 scf Cumulative Water Influx, We=2×10^6 rb Water and rock compressibility effects are negligible a) Using the material balance equation, calculate the Original Oil in Place (OOIP), N b) Determine whether water drive support is significant. c) Analyze how the presence of water influx alters reservoir performance compared to a depletion-type reservoir.	**20 Marks**	**L3**	**CO5**