Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 11-10-2025 **Time:** 09.30am to 11.00am

School: SOE	**Program:** B.Tech. (PET)	
Course Code: PET2019	**Course Name:** Oil and Gas Well Test Analysis	
Semester: V	**Max Marks**: 50	**Weightage**: 25%

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

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. **5Q x 2M=10M**

1.	Outline the Radius of Investigation in a finite-acting reservoir.	**2 Marks**	**L1**	**CO1**
2.	Describe the uses of the Ideal Reservoir Model.	**2 Marks**	**L1**	**CO1**
3.	Recognize the situation under which the reservoir flow geometry will be spherical and hemispherical in nature.	**2 Marks**	**L1**	**CO1**
4.	List the different principles of superposition to find the CTR and CTP solutions to the diffusivity equation.	**2 Marks**	**L1**	**CO2**
5.	State the Interference test and the DST.	**2 Marks**	**L1**	**CO3**

Part B

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

6.	**a.**	Describe which phase of an exploratory well the well-test analysis is conducted. Generalize the transient state for an infinite acting reservoir and pseudo-steady state conditions for a bounded reservoir.	**10 Marks (3+7)**	**L2**	**CO1**

	b.	Demonstrate the linear diffusivity equation for transient flow in a porous medium using partial differential equations, where the total time is considered in hours.	**10 Marks**	**L3**	**CO2**
		Or			
7.	**a.**	Review whether BHP and sandface pressure are the same. Distinguish the radius of investigation under different pressure disturbances as a function of time across a reservoir: i) Constant flow rate, ii) Constant bottomhole pressure, iii) Shut-in	**10 Marks (2+8)**	**L2**	**CO1**
	b.	Well completion has taken place in a reservoir, and its properties have been calculated: - Oil Formation volume factor, B_o: 1.32 RB/STB - Total compressibility, c_t: 18×10^{-6} psi^{-1} - Porosity, φ: 16% - Initial reservoir pressure, p_i: 2,500 psia - Oil viscosity, μ: 0.44 cp - Permeability, k: 25 md - Thickness, h: 43 ft Calculate the pressure drop in the shut-in well, which is 500 ft from the flowing well, when the flowing well has been shut in for 1 day following a flow period of 5days at 300STB/day?	**10 Marks**	**L3**	**CO2**

8.	**a.**	A new oil well produced 500 STB/D for 3 days before being shut in for a pressure buildup test, during which the pressure data in the table below were recorded.	**10 Marks (7+3)**	**L4**	**CO3**

Time After Shut-In Δt (hr)	**pws (psig)**
0	**1150**
2	**1794**
4	**1823**
8	**1850**
16	**1876**
24	**1890**
48	**1910**

		For this well, the following reservoir and fluid properties are known: • Net sand thickness, h = 22 ft • Formation volume factor, B_o = 1.3 RB/STB • Porosity, φ = 0.20 • Total compressibility, $c_t = 20 \times 10^{-6}$ psi^{-1} • Oil viscosity, μ_o = 1.0 cp • Wellbore radius, r_w = 0.3 ft Analyze the Horner semi-log plot to determine the slope of the straight-line fit, estimate the reservoir static pressure, and calculate the reservoir pressure 1-hour after shut-in.			
	b.	From the given data and plot generated in Question no **8a,** calculate the following: 1. Formation permeability 2. Skin factor 3. Pressure drop due to skin 4. Formation capacity 5. Damage ratio	**10 Marks** **(2X5)**	**L4**	**CO3**
		Or			
9.	**a.**	Graphically examine how the pressure build-up test works. Analyse mathematically the pressure behaviour in the well during the shut-in period using Horner's correlations.	**10 Marks** **(5+5)**	**L4**	**CO3**
	b.	Differentiate between wellbore storage and wellbore damage, and identify the types of skin that can develop in the reservoir. Using the Horner plot from the actual build-up test, graphically differentiate the early-time, mid-time region, and late-time regions.	**10 Marks** **(5+5)**	**L4**	**CO3**