Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 09- 12-2025 **Time:** 01:00pm – 04:00pm

School: SOE	**Program:** B.Tech.-PET	
Course Code : PET3005	**Course Name:** Multilateral and Horizontal Well Technology	
Semester: VII	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	Nil	26	24	26	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.	Define 'Effective Wellbore Radius' of a horizontal well.	**2 Marks**	**L1**	**CO2**
2.	Outline the deflection tools used for Ultrashort radius well.	**2 Marks**	**L1**	**CO2**
3.	State two petrophysical or reservoir architectural inputs reliable in horizontal wells.	**2 Marks**	**L1**	**CO2**
4.	Define LWD/MWD tools.	**2 Marks**	**L1**	**CO3**
5.	State the Liquid Junction Potential in SP log.	**2 Marks**	**L1**	**CO3**
6.	List the flow regimes associate with vertical two-phase flow in a well.	**2 Marks**	**L1**	**CO4**
7.	Recognise the situation under which Tubing Head Pressure shows frequent variations even if the production rate remains the same in inflow performance.	**2 Marks**	**L1**	**CO4**
8.	Describe choke performance as the third phase of flowing well.	**2 Marks**	**L1**	**CO4**
9.	State the relation between 'Productivity Improvement Factor' with 'Permeability Anisotropy'.	**2 Marks**	**L1**	**CO5**
10.	State the reasons behind the occurance of oil and gas coning mathematically.	**2 Marks**	**L1**	**CO5**

Part B

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

11.	Generalize the well completion tools used in different build up radius of horizontal wells.	**10 Marks**	**L2**	**CO2**
Or				
12.	In a 80-acre lease size, classify the maximum length of a well of different build up radius located within the area that can be drilled using different drilling techniques. *Condition: Under most state laws in the U.S.A., one cannot cross the lease boundary. Moreover, in some states, one may have to stop the well at a certain distance from the lease boundary (typically 150 ft), specified by the state regulatory body.)* *Ultra short radius, Short radius – Well centrally from all sides of the drainage plane; i.e., center point* *Medium radius, Long radius – Centrally located well along the x-x and y-y axis of the drainage plane 'or' well along the diagonal of the drainage plane but not centrally located in the drainage plane*	**10 Marks**	**L2**	**CO2**

13.	A 600-acre lease is to be developed with 10 vertical wells. Another alternative is to drill 1000-ft and 2000-ft-long horizontal wells. Estimate the possible number of horizontal wells that will drain the leases effectively.	**10 Marks**	**L2**	**CO2**
Or				
14.	The following parameters apply to an oil well having an estimated drainage are of 80 acres. k = 1md h = 60 ft P_e = 2500 psi P_{wf} = 900 psi Bo = 1.25 RB/STB μ_o = 0.6 cp Calculate a) steady state flow rate and b) the skin factors, for effective wellbore radii of 0.35, 0.1, and 20 ft. The drilled wellbore radius is 0.3 ft.	**10 Marks**	**L2**	**CO2**

15.	Illustrate the working mechanism of NMR Log. Also examine the reservoir condition under different relaxation time.	**10 Marks**	**L3**	**CO3**
Or				

16.	Classify the low and high natural radioactivity rock formations and its response to Gamma Ray Log. Demonstrate how porosity (Density, Neutron & Sonic) logs help to interprete the hydrocarbon trap zones.	**10 Marks**	**L3**	**CO3**

17.	Illustrate the major `challenges encountered in well test analysis in horizontal wells based on well performance.	**10 Marks**	**L3**	**CO3**
	Or			
18.	Describe the key logging tools (traditional and advanced) mostly prefered in formation evaluation of Horizontal wells.	**10 Marks**	**L3**	**CO3**

19.	a.	A flowing well with 3000 ft of tubing in the hole exhibits a casing head pressure (CHP) of 550 psig when the production rate is 42 bbl/day and of 320 psig when the production rate is 66 bbl/day. Calculate the PI of this well, its static pressure, its potential and BHP when production rate increase to 75 BPD.	**10 Marks**	**L4**	**CO4**
	b.	Diagramatically breakdown the possible pressure losses in various nodes of all the three phases (Inflow performance, Vertical lift performance and bean performance).	**10 Marks**	**L4**	**CO4**
		Or			
20.	a.	Analyze how the relative positioning of the Inflow Performance Relationship (IPR) and Vertical Lift Performance (VLP) curves governs the natural flow capability of a well. Evaluate the production conditions when both curves coincide at a common point and assess the operational implications when they remain apart, suggesting appropriate remedial actions.	**14 Marks**	**L4**	**CO4**
	b.	Calculate the tubing pressure (THP) of well completed with 8000 ft of 2 3/8 in. tubing that is flowing at 600 bbl/day, gas/liquid ratio of 0.4 mcf/bbl, if the pressure at the bottom of the tubing is 2200 psi? (Use Gilbert's Curve)	**6 Marks**	**L4**	**CO4**

21.	A heavy oil reservoir underlain by a strong bottom aquifer has experienced early water breakthrough in vertical wells due to severe water coning. To improve recovery, the operator designs a horizontal well placed 5 meters above the oil–water contact (OWC). (a) Illustrate the mechanisms responsible for water coning in vertical wells. (b) Identify how the placement of a horizontal well above the OWC mitigates coning and enhances oil recovery.	**20 Marks**	**L3**	**CO5**
	Or			

22.	A mature sandstone reservoir has entered the late stage of production through several vertical wells. These wells now show declining oil rates, early water breakthrough, and low overall recovery efficiency (≈25%). The operator is considering a horizontal well development plan to rejuvenate production and enhance ultimate recovery. (a) Illustrate the main problems and limitations observed in the existing vertical wells. (b) Interpret the advantages of horizontal wells in improving reservoir performance and recovery. (c) Determine the technical challenges and operational issues associated with horizontal wells, and suggest possible mitigation measures.	**20 Marks**	**L3**	**CO5**