Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

School of Engineering

Mid - Term Examinations - November 2024

Semester: V | **Date**: 07/11/2024

Course Code: PET2006 | **Time**: 11:45am – 01:15pm

Course Name: Fundamentals of Oil and Gas Production Technology | **Max Marks**: 50

Program: B.Tech. (Petroleum) | **Weightage**: 25%

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. **5Qx2M=10M**

1	State any two role of Well Head in a producing well.	**2 Marks**	**L1**	**CO1**
2	Give two examples each for “Standard API grade tubing” and “Special Grade tubing”. How much is the minimum yield strength of “High Strength Grade” tubing?	**2 Marks**	**L1**	**CO1**
3	_________type of Xmas tree is most common however _______________are used in HPHT conditions. (Fill up the blanks)	**2 Marks**	**L1**	**CO1**
4	Define “Specific Productivity Index”. Mention its unit and mathematical expression.	**2 Marks**	**L1**	**CO2**
5	A Sucker Rod Pump (SRP) unit is designated by “**C-228D-200-74**”. What do you understand by this designation?	**2 Marks**	**L1**	**CO2**

Part B

Answer ALL Questions. Each question carries 10 marks. **4QX10M=40M**

6	Discuss the process of installing wellhead equipment in an oil or gas well. Explain the key components involved in the wellhead assembly, such as the casing head, tubing head, and Christmas tree. Describe the steps involved in ensuring proper alignment, sealing, and pressure control during installation.	**10 Marks**	**L2**	**CO1**

Or

7	Draw a well-labeled diagram of a Christmas tree used in oil and gas production. Identify its key components, such as the master valve, wing valve, choke, swab valve, and gauge. Explain the function of each component in controlling the flow, pressure, and safety of the well. How does the Christmas tree contribute to efficient well operations and what role does it play in well maintenance and intervention?	**10 Marks**	**L2**	**CO1**
8	Construct the Inflow Performance Relationship (IPR) for a vertical well in an oil reservoir, taking into account transient flow conditions as of November 2024. You are provided with the following data: porosity of 25%, effective horizontal permeability of 10 mD, pay zone thickness of 70 feet, reservoir pressure of 6,200 psia, bubble-point pressure of 60 psia, fluid formation volume factor of 1.2, fluid viscosity of 2.0 cp, total compressibility of 0.000015 psi^{-1}, drainage area of 800 acres, wellbore radius of 0.4 feet, and a skin factor of 2. Students must calculate the Pwf (producing fluid pressure) values for five different flow rates.	**10 Marks**	**L2**	**CO1**
	Or			
9	Construct the Inflow Performance Relationship (IPR) for a vertical well in an oil reservoir, considering pseudo-steady-state flow conditions as of November 2024. You are provided with the following data: porosity of 22%, effective horizontal permeability of 12 mD, pay zone thickness of 60 feet, reservoir pressure of 5,800 psia, bubble-point pressure of 55 psia, fluid formation volume factor of 1.3, fluid viscosity of 1.5 cp, total compressibility of 0.0000105 psi^{-1}, drainage area of 720 acres, wellbore radius of 0.35 feet, and a skin factor of 1. Students must calculate the Pwf (producing fluid pressure) values for five different flow rates.	**10 Marks**	**L2**	**CO1**
10	A reservoir has the following data: average reservoir pressure of 2,500 psi, tubing size of 2.5 inches, tubing length of 5,000 feet, Gas-Oil Ratio (GOR) of 100 scf/STB, a productivity index of 1, and a bubble point pressure of 50 psi. Using this information, construct the Wellhead Performance curve for the well by utilizing the Gradient curve method. Use the following flow rate: 800 BPD, 1000 BPD, 1500 BPD, 2000 BPD.	**10 Marks**	**L2**	**CO2**
	Or			

11	Construct a Tubing Performance Relation (TPR) curve for producing reservoir with a 2 inch tubing of length 4000 ft flowing at rate of 200 BPD, 400 BPD, 600 BPD, 800 BPD. GOR of the well is 100 scf/bbl and Well head pressure is 400 PSi	**10 Marks**	**L2**	**CO2**
12	Draw a well-proportioned diagram (landscape mode) of a Sucker Rod Pump (SRP) and label all its major components, including the surface unit and the subsurface components. Use a pencil for clarity and accuracy. Ensure that key elements such as the sucker rod, plunger, standing valve, traveling valve, pump barrel, and surface pumping unit are clearly labeled. In addition to the diagram, explain the operating principle of the Sucker Rod Pump. Discuss how the movement of the sucker rod induces fluid flow from the reservoir to the surface, emphasizing the roles of the traveling and standing valves in this process.	**10 Marks**	**L2**	**CO2**
	Or			
13	In a Sucker Rod Pump (SRP) system, it has been observed that there is a considerable difference between the stroke length of the polished rod at the surface and the actual plunger stroke length downhole. This discrepancy is suspected to be caused by both tubing stretch and rod stretch, which are influenced by various factors such as the weight of the fluid column, dynamic forces during pumping, and material properties. Derive the equations to calculate the stretch in both the tubing and the rod. Consider axial stress, material elasticity, and operational loads in your derivation. Explain how these stretches affect the overall system efficiency and fluid production, and why understanding these factors is critical for optimizing pump performance.	**10 Marks**	**L2**	**CO2**