Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 17 – 12- 2025 **Time:** 01:00pm – 04:00pm

School: SOE	**Program:** B. Tech-PET	
Course Code: PET2006	**Course Name:** Fundamentals of Oil and Gas Production Technology	
Semester: V	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	4	4	20	20	26	26

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 designation of a Sucker Rod Pump (SRP) based on its torque reading, polished rod load capacity, and maximum stroke length, along with an example.	**2 Marks**	**L1**	**CO1**
2.	List out any two well bore conditions where Gas lift is not at all suitable for installation in a producing well.	**2 Marks**	**L1**	**CO1**
3.	Name the component use to connect Gas Lift Valve with the tubing.	**2 Marks**	**L1**	**CO2**
4.	List the different factors affecting injection gas breakthrough and liquid fallback.	**2 Marks**	**L1**	**CO2**
5.	Identify the correct answer and fill up the blanks from the given options: I. During the _____ procedure, the gas lift system is monitored for optimal gas injection rates, and adjustments are made to the depth and quantity of gas injection to maximize production and minimize operational costs. ***(Startup/Completion/Workover/Lift Optimization)*** II. _____ gas lift systems use a single set of valves and injection points to deliver gas into the wellbore, typically in shallow wells or low-production-rate reservoirs, to assist in fluid lifting. ***(Continuous Flow/Intermittent Flow/Dual-String/Single-String)***	**2 Marks**	**L1**	**CO5**

6.	**Match the following** **Artificial Lift System** / **Application/Limitations** **A. Sucker Rod Pump (SRP)** — 1. Best suited for deep wells with high production rates, often used in offshore platforms. **B. Electrical Submersible Pump (ESP)** — 2. Suitable for wells with high-viscosity fluids or wells with high gas-to-liquid ratio. **C. Gas Lift** — 3. Used in wells with low fluid production, operates intermittently, and is cost-effective for shallow wells. **D. Progressing Cavity Pump (PCP)** — 4. Provides continuous flow in wells with high sand or abrasive content, though limited by depth and wellbore conditions. **E. Plunger Lift** — 5. Ideal for wells with high gas-to-oil ratio, or when natural reservoir pressure is insufficient to lift fluids on its own. **F. Hydraulic Pump** — 6. Used in heavy oil production, typically for reservoirs with high viscosity and low permeability.	**2 Marks**	**L1**	**CO5**
7.	***Question 1: Identify the odd one out based on the type of energy used for operation.*** Sucker Rod Pump (SRP), Electrical Submersible Pump (ESP), Gas Lift, Progressing Cavity Pump (PCP), Plunger Lift ***Question 2: Identify the odd one out based on the well depth suitability.*** Sucker Rod Pump (SRP), Electrical Submersible Pump (ESP), Gas Lift, Progressing Cavity Pump (PCP), Plunger Lift	**2 Marks**	**L1**	**CO5**
8.	**Select TRUE/FALSE statements:** I. Gas Lift is a mechanical lift system that requires a gas compressor to inject gas into the wellbore. II. The Progressing Cavity Pump (PCP) is widely used in low-viscosity fluid applications due to its simplicity and high efficiency.	**2 Marks**	**L1**	**CO6**
9.	Identify any two components of Gas Lift values and mention its working principle in one sentence each.	**2 Marks**	**L1**	**CO6**
10.	State the process of lifting fluid by Progressing Cavity Pump (PCP) from the wellbore to the surface.	**2 Marks**	**L1**	**CO6**

Part B

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

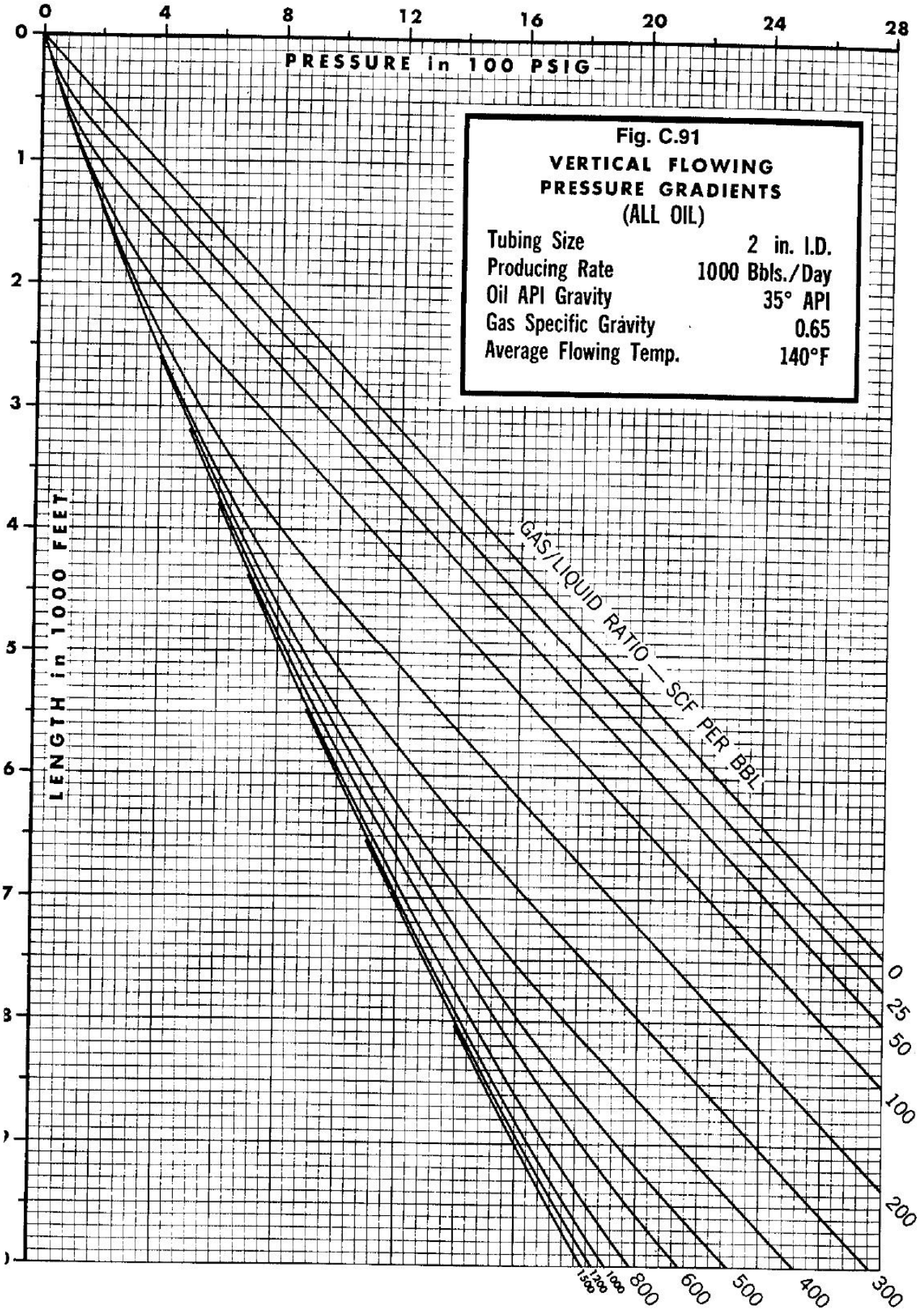
11.	Explain the essential surface components of a Sucker Rod Pump (SRP) and show their placement with an appropriate diagram, and further explain the pumping mechanism by describing how the reciprocating motion of the sucker rod lifts the fluid and how the standing and traveling valves operate during the pump cycle.	**20 Marks**	**L2**	**CO3**
	Or			
12.	Defend, with the necessary equations, how the combined effects of polished-rod stroke length, plunger over-travel, rod elongation, and tubing elongation govern the actual plunger stroke achieved downhole in a Sucker Rod Pump (SRP).	**20 Marks**	**L2**	**CO3**

13.	A well has a pump with a 1¾ in plunger is set at 5430 ft of 1¾ in rods. The fluid level is known to be low and the tubing is anchored. With pumping speed at 18 spm and a 72 in stroke length, production is 421 bbl per day of fluid of specific gravity 0.87. Calculate: I. The effective plunger stroke length. II. The maximum and minimum polished rod loads. III. Counter balance effect. IV. Theoretical pump displacement. V. Volumetric pump efficiency. Given: Ar = 0.542 sq in, Ap =2.705 sq in.	**20 Marks**	**L3**	**CO4**
	Or			
14.	Interpret the counterbalancing effect of the counterweight in a pumping unit, and support your explanation with the appropriate governing equations.	**20 Marks**	**L3**	**CO4**

15.	**a.**	Describe the key components of a gas lift valve, using a schematic diagram.	**10 Marks**	**L2**	**CO5**
	b.	Given data: Depth = 7000 ft Desired rate = 1000 B/D Tubing size 2" I.D Flowing well- head pressure = 80 psig Static bottom hole pressure = 2600 psig Productivity index = 2 Solution gas-oil ratio = 200 scf/B Specific gravity of injection gas = 0.70 Surface operating pressure = 850 psig °API = 35 Total GOR = 600 SCF/B Bottom hole temperature = 180 °F Flowing surface temperature = 140 °F Predict the following parameters based on the given data: **A.** Depth of the static level.	**10 Marks**	**L3**	**CO5**

		B. Point of gas injection. **C.** Balanced point. **D.** Volume of gas injected.			
		Or			
16.	**a.**	Explain the graphical method used to determine the spacing of balanced gas lift valves (GLVs) in a continuous gas lift system, using suitable schematics.	**5 Marks**	**L2**	**CO5**
	b.	In an oil field, all gas lift has casing pressure operated charged valve. The operating valve is located at 6500 ft depth. The pressure in the bellow is 700 psi and the tubing pressure is 600 psi at 6500 ft valve depth, the bellow area is 1 sq. inch & port size is 0.1 sq inch. The bellow pressure at 45°F is 500 psi. Solve the following using the given data: a) Casing pressure at valve depth required to open the valve. b) Tubing effect factor. c) Tubing effect. d) Valve spread. **e)** Test rack opening pressure of valve. **f)** Bellow effect.	**15 Marks**	**L3**	**CO5**

17.	Analyze the working principle of Electrical Submersible Pumps (ESP) with the help of a suitable schematic diagram. Provide a detailed description of its key components, and discuss the advantages and disadvantages of using a ESP in oil and gas operations.	**20 Marks**	**L4**	**CO6**
	Or			
18.	Compare the operational principles, efficiency, and suitability of Gas Lift, Progressive Cavity Pumps (PCP), and Electrical Submersible Pumps (ESP) for artificial lift applications.	**20 Marks**	**L4**	**CO6**


0
4
8
12
16
20
24
28
PRESSURE in 100 PSIG
0
1
2
3
4
5
6
7
8
LENGTH in 1000 FEET
Fig. C.91
VERTICAL FLOWING
PRESSURE GRADIENTS
(ALL OIL)
Tubing Size 2 in. I.D.
Producing Rate 1000 Bbls./Day
Oil API Gravity 35° API
Gas Specific Gravity 0.65
Average Flowing Temp. 140°F
GAS/LIQUID RATIO — SCF PER BBL
0
25
50
100
200
300
400
500
600
800
1000
1200
1500