

Roll No																			
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION- JAN 2023

Course Code: PET 213

Course Name: Petroleum Production Engineering

Program & Sem: B. Tech

Date: 30-JAN-2023

Time: 01.00 PM-04.00PM

Max Marks: 100

Weightage: 50 %

Instructions:

- (i) Read the all questions carefully and answer accordingly.
 - (ii) Question paper consists of three parts.
 - (iii) All the questions are mandatory to attend.
 - (iv) Assume the missing values, if any.
-

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TEN marks.

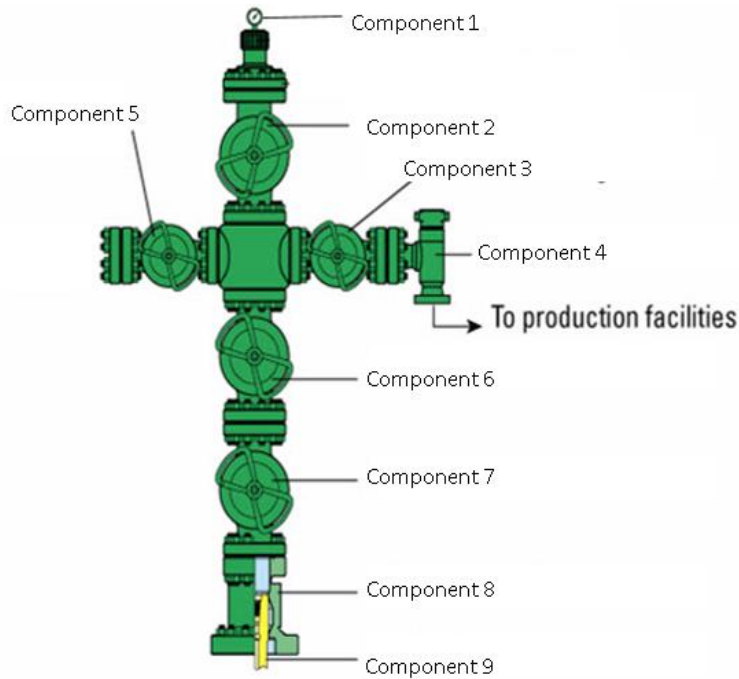
(3Qx 10M= 30M)

1. Fill in the blanks. Each part carries 1 mark

- a. SRP includes _____. (C.O. No.2, Knowledge)
- b. _____ reduces the rotation speed generated by the prime mover in SRP. (C.O. No.2, Knowledge)
- c. Packer and standing valve are not used in _____ installation. (C.O. No.3, Knowledge)
- d. _____ artificial lift can be used for gassy wells. (C.O. No.3, Knowledge)
- e. _____ valve is needed to allow flow of fluid from tubing to annulus in ESP. (C.O. No.4, Knowledge)
- f. _____ is used as breathing apparatus in ESP. (C.O. No.4, Knowledge)
- g. _____ is a type of corrosion found in petroleum industry. (C.O. No.5, Knowledge)
- h. Scale can be formed due to _____. (C.O. No.5, Knowledge)
- i. WAT referrers to _____. (C.O. No.5, Knowledge)
- j. HCl can be used to dissolve _____ scale. (C.O. No.5, Knowledge)

2. Identify any 5 components in given diagram and mention their function.

(C.O. No.1, Knowledge)



3. Answer the following questions. Each part carries TWO marks

- a) What is the working principle of gas lift? (C.O. No.3, Knowledge)
- b) Discuss the function of protector in ESP system. (C.O. No.4, Knowledge)
- c) What are necessary components for the corrosion to take place? (C.O. No.5, Knowledge)
- d) Mention some measures that can be adopted to prevent wax deposition. (C.O. No.5, Knowledge)
- e) Discuss difference between self-scaling and incompatible mixing. (C.O. No.5, Knowledge)

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries FIFTEEN marks. (2Qx15M=30M)

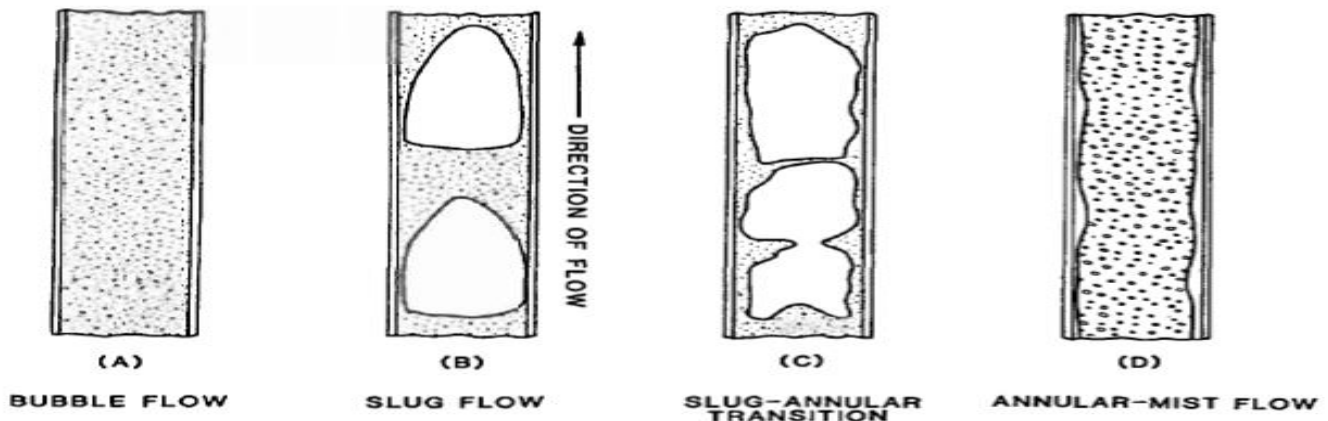
4 Sultan was given a case study for XYZ field by his lecturer to understand use of different type of gas lift. He prepared a summary of the case study as:

The XYZ reservoir is a gas cap reservoir providing a mix stream production of oil, water and gas. As the production continued the pressure of the reservoir continued to decrease. From the installation of gas lift to the abandonment of well, the three types of gas lift used included: Continues gas lift, Chamber lift, Intermittent gas lift. The change of gas lift from one type to another was accompanied by change in well completion.

Based on the summary provided by sultan answer the following:

- What should be the order of use for different type of gas lift? Provide an appropriate reason for your answer.
- Sultan has suggested that ESP should not be used for this reservoir. Present an argument in favor or against the suggestion as per your understanding.
- What can be a possible change in completion as the gas lift type is changed?
(C.O. No.3,4 Comprehension)

5 As the crude oil passes for the reservoir to the well bore it has to flow through vertical pipe line i.e. tubing. As the crude flows from the bottom of the hole to the surface, the phase of the crude may change. As the phase changes the flow pattern of the flow stream also changes as shown:



The flow pattern is majorly effected by the superficial velocity of the oil and gas. Consider a reservoir that is nearing its bubble point pressure, answer the following questions based on your understanding of fluid flow:

- Suggest the flow pattern at the bottom of the flow tubing with an appropriate reason for your suggestion.
- What is expected series of flow patter as the gas velocity increases from minimum to maximum.
- If the gas lift is installed in the well to promote crude production, will it change the flow patter. If yes, why?

Part C [Problem Solving Questions]

Answer the Question. The question carries TWENTY marks. (2Qx20M=40M)

6. Productivity of the well is generally defined by its productivity index, given by the formula: $J = Q / (P_r - P_{wf})$. While this formula works well for an undersaturated reservoir, the answers are erroneous for saturated reservoir. So instead of using simple straight line equation, derived from productivity index formula, saturated reservoirs use different correlations for constructing the IPR. Consider a well producing from a saturated reservoir with an average reservoir pressure of 2500 psig. Stabilized production test data indicated that the stabilized rate and wellbore pressure are 350 STB/day and 2000 psig, respectively. Construct and compare IPR using Vogel's method and straight line method.

(C.O.No.1) [Application]

7. Well CA-4 is producing using an ESP system with suction pressure 200 psi. The reservoir is present at depth of 8000 ft and has pressure of 4000 psi with well bore flowing pressure 2500 psi. The fluid having density 7.89 ppg has to be produced against well head pressure of 50 psi and friction pressure of 150 psi. Considering yourself production engineer for the well, suggest pressure/head capacity expected from the pump and the minimum depth above which the pump will not be able to function. (C.O.No.4) [Application]