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**PRESIDENCY UNIVERSITY
BENGALURU**

SET A

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester V - 2021

Course Code : PET2006

Course Name : Fundamentals of Oil and Gas Production Technology

Program : B.Tech.

Date : 04-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

4 X 5M = 20M

1. A well is producing 1000 STB/D of liquid with a pressure drawdown of 500 psi. Determine the productivity index value. Write down Vogel's equation of IPR and mention the units of different terms.
(CO1) [Knowledge]
2. A well's IPR's shape is determined by a number of variables, including viscosity, perforation density, bubble point pressure, and reservoir pressure. For the following instances, illustrate how the IPR pattern will change:
 - a) in the case of two distinct crude oils with various viscosities.
 - b) for three distinct wells with varying densities of perforations.(CO2) [Knowledge]
3. Mention different types of unloading valves used in gas lift operation.
(CO3) [Knowledge]
4. Define and explain the following:
 - a) Absolute open flow potential
 - b) Specific productivity index
 - c) Operating point in relation to IPR and TPR.(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

5. A common artificial lift system used worldwide is the rod lifting system, which lifts liquid using a variety of downhole and surface components. Discuss various sucker rod pump surface components and talk about the benefits and drawbacks of the rod lifting mechanism.
(CO1) [Comprehension]
6. Describe the operational principles of a PCP and detail scenarios where this pumping mechanism is particularly advantageous. Additionally, discuss the limitations or challenges associated with PCPs in certain reservoir conditions or operational environments.
(CO2) [Comprehension]
7. Make a comparative assessment amongst gas locking, gas interference, and a pumped off condition in oil well production systems having sucker rod pump. Detail the specific scenarios with diagram.
(CO3) [Comprehension]
8. With the help of a gas lift valve schematic, make an analytical assessment of the force, pressure and area relationships responsible for opening and closing the gas lift valves.
(CO4) [Comprehension]
9. Explain the operational principles and differences between Casing Pressure Operated (CPO) gas lift valves and Tubing Pressure Operated (TPO) gas lift valves used in oil well operations. Detail how each valve operates based on pressure differentials within the casing or tubing, respectively, to optimize gas injection for artificial lift.
(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 15M = 30M

10. A saturated reservoir with an average reservoir pressure of 2500 psig is the source of production for a well. The data from the stabilized production test showed that the wellbore pressure and stabilized rate are 2000 psig and 350 STB/day, respectively. Make the following parameter predictions using the relevant equation:
a) Oil flow rate using Vogel's approach at $P_{wf} = 1850$ psig
b) Oil flow rate at $P_{wf} = 1850$ psig, assuming constant J
c) Construct the IPR by using Vogel's method.
(CO3) [Application]
11. Demonstrate an optimized unloading sequence for a gas lift valve in a high-pressure gas well scenario using figures. Consider the reservoir characteristics, wellbore conditions, and production requirements to outline a step-by-step strategy for effectively utilizing gas lift valves at different depths and stages. Justify the sequence by explaining how this approach leads to change in casing and tubing pressure.
(CO4) [Application]