

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

SET B

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

Semester : Semester V - 2021

Course Code : PET3005

Course Name : Multilateral and Horizontal Well Technology

Program : B.Tech.

Date : 10-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.

PART A

ANSWER ALL THE QUESTIONS

5 X 2M = 10M

1. List the objective of Multilateral well
(CO1,CO3) [Knowledge]
2. Define sidetracking.
(CO4,CO1) [Knowledge]
3. Enlist the various steps involved in the sidetracking of a well
(CO3) [Knowledge]
4. State the three forces affecting fluid flow distributions around the wellbores.
(CO4) [Knowledge]
5. Enumerate the primary objectives of the wireline logging.
(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

6. Borehole geophysics is the science of recording and analyzing the well, by using different geophysical techniques. Many different sources are used to record the well properties by knowing the different properties of the well formation. Discuss the principle and applications of the Density log in case of horizontal well bore hole.
(CO3) [Comprehension]

7. Geological aspects play a crucial role in various stages of drilling and production in the oil and gas industry. Understanding the geological formations and characteristics is essential for successful exploration, drilling, and production of hydrocarbons. Understanding this highlight some of the geological aspects to be considered for drilling a horizontal well.

(CO3) [Comprehension]

8. Well logging allows a detailed record of the geologic formations penetrated by a borehole. The log is based on physical measurements made by geophysical tools lowered into the hole. Discuss qualitative and quantitative interpretation of well log data

(CO3,CO1) [Comprehension]

9. Horizontal wells are a type of oil or gas well that deviates from the traditional vertical drilling method by drilling horizontally through the reservoir rock formation. Instead of drilling straight down into the earth, horizontal wells curve or bend at an angle, allowing for a longer section of the wellbore to be exposed to the productive formation. Keeping this information in mind and your understanding about the subject draw a neat and clean diagram clearly showing various section and important points of a deviated well as well as define those sections.

(CO2,CO4) [Comprehension]

10. Logging refers to the process of collecting data and information about subsurface formations by using various tools and techniques. This data is crucial in understanding the geological characteristics of a well, assessing the potential for hydrocarbon presence, and making informed decisions during drilling, completion, and production phases. SP is one of the simplest logging techniques which is primarily used in the industry. Describe in detail the working principle of the SP logging and how it is performed.

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 20M = 40M

11. A 1640 ft long horizontal well is drilled in the lowest zone of an oil reservoir. The reservoir has gas cap. Determine critical oil production rates for horizontal wells using Giger and Efros method. The wells are placed at 160 acres well spacing. The reservoir is isotropic with following data: $K_v=K_h = 70\text{md}$ and density difference is 0.48 g/cc

$$L=1640\text{ ft}$$

$$2X_e = 2Y_e = 2640\text{ ft}$$

$$H = 72\text{ft}$$

$$B_o = 1.1\text{ RB/STB}$$

$$\mu_o = 0.42\text{ cp}$$

$$r_w = 0.328\text{ ft}$$

(CO4) [Application]

12. A 2000-ft-long horizontal well is drilled in an oil reservoir producing by a solution gas-drive mechanism. At a bottom hole pressure of 2000 psia, the well produced 400 STB/day. The reservoir pressure was 2500 psia and the recovery factor was 4%. If the bubble point pressure is 2500 psia: $V= 0.1$ and $n= 1$

1. calculate the maximum oil flow rate, q_{max}

2. calculate the oil rate for $p_{\text{wf}} = 1500\text{ psia}$

3. construct the IPR curve.

(CO4) [Application]