



KENYATTA UNIVERSITY

EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN PETROLEUM ENGINEERING

EPL 400: PETROLEUM PRODUCTION ENGINEERING II

3RD TRIMESTER 2022/2023

TIME: 2 HOURS

INSTRUCTIONS:

- The examination consists of **TWO** sections (A and B).
- Answer **SECTION A (COMPULSORY)** and **ANY TWO QUESTIONS** from **SECTION B**.

SECTION A: Compulsory (30 Marks)

QUESTION 1

- Assume that a well in the reservoir has a radius of $r_w = 0.35\text{ft}$ and is perforated with 2 SPF, $r_{\text{perf}} = 0.3\text{in. (0.025ft)}$, $l_{\text{perf}} = 0.4\text{in. (0.033ft)}$, and $\varphi = 120^\circ$. Calculate the perforation skin effect if $k_H/k_V = 12$. Given that $a_0 = 0.648$, $a_1 = -2.018$, $a_2 = 0.063$, $b_1 = 1.614$, $b_2 = 1.7770$, $c_1 = 6.6 \times 10^{-3}$ and $c_2 = 5.32$. (10 marks)
- Name four formation types you know and outline their major constituents. (8 marks)
- Mention four fracturing fluid and their major characteristics. (12 marks)

SECTION B: Answer any TWO Questions (Each question 20 Marks)

QUESTION 2

- Write the three major reaction found in Sandstone acidizing. (4 marks)
- Outline the general steps in acidization. (6 marks)
- Perforation can be done in three major ways which constitutes a pressure difference b/w the wellbore and the reservoir. Name and write short notes on them. (10 marks)

QUESTION 3

- a) Write a short note on shot phasing with respect to perforation. (6 marks)
- b) The perforation hole size depends on casing grade. State the different sizes with the nature of completion. (8 marks)
- c) The extent of perforation damage is a function of: (6 marks)

QUESTION 4

- a) Name four types of clay the method of acidizing can handle. (8 marks)
- b) What is there nature and how they handled. (6 marks)
- c) Name some non-acid fracturing fluids and non-conventional processes for fracturing. (6 marks)

QUESTION 5

- a) What is a Christmas tree? (5 marks)
- b) State two (2) functions of a Christmas tree? (6 marks)
- c) Write short notes on the following downhole equipments (9 marks)
 - i. Packer
 - ii. Gas lift valve
 - iii. Safety valve