INTERNATIONAL UNIVERSITY OF EAST AFRICA
'Learning to Succeed'

FACULTY OF ENGINEERING

END OF SEMESTER EXAMINATIONS - APRIL 2025

PROGRAMME: BACHELOR OF PETROLEUM ENGINEERING

YEAR/SEM: YEAR 3/SEMESTER 2

COURSE CODE: PTE3263

NAME: PETROLEUM PRODUCTION ENGINEERING II

DATE: 2025-04-14

TIME: 2:00-5:00PM

INSTRUCTIONS TO CANDIDATES:

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

DO NOT WRITE ANYTHING ON THE QUESTION PAPER

Section A Attempt any TWO (2) Questions from Section A. Each question carries 20 marks. Any unclear handwriting will lead to loss of marks

Question 1:

(a) What is matrix acidizing, and how does it differ from fracture acidizing in petroleum engineering?
(b) Briefly explain the principle behind matrix acidizing and its purpose in improving well productivity.
(c) Describe the general procedure of performing a matrix acidizing treatment in a well.
(d) What are the typical challenges encountered during matrix acidizing operations?

Question 2:

a) How does formation damage affect reservoir productivity and recovery efficiency?
b) What is the relationship between formation damage and skin factor in well performance analysis?
c) How do formation damage costs impact the economic feasibility of oil and gas projects?
d) What are the long-term consequences of untreated formation damage in a field?

Question 3:

a) Describe the general production process scheme used in an oil and gas production facility.
b) Outline the key components involved in the design and operation of a petroleum production facility.
c) Discuss the importance of facility design in ensuring the efficient and safe operation of the production system.
d) How does the integration of subsurface and surface facilities influence the overall production efficiency?

Question 4:

a) What role does rock mechanics play in supplying basic design data for a hydraulic fracturing treatment?
b) Describe the key rock properties needed for designing a hydraulic fracturing treatment.
c) How does the in-situ stress affect fracture initiation and propagation in hydraulic fracturing?
d) What is the significance of Youngâ??s Modulus and Poissonâ??s Ratio in fracture propagation modeling?

Section B Attempt any THREE (3) Questions from Section B. Each question carries 20 marks. Any unclear handwriting will lead to loss of marks

Question 1:

a) What is the significance of oily water treatment in oil and gas production?
b) Describe the main techniques used in oily water treatment.
c) What are the disposal options for treated oily water in oil and gas operations?
d) Explain the source of injection water and the importance of surface preparation in water injection operations.

Question 2:

a) What are the common sand control options used in oil and gas wells?
b) Explain the advantages and disadvantages of each sand control method.
c) In what types of reservoirs is gravel packing generally preferred over other sand control methods?
d) What factors should be considered when selecting the appropriate sand control technique for a given well?
e) Describe the benefits of incorporating sand control from the beginning of well design.

f) Explain the risks and costs associated with delayed installation of sand control

Question 3:

a) What is the purpose of a 3-phase separator in a production facility?
b) Describe the operation of a 3-phase separator, explaining the separation of oil, gas, and water.
c) What factors influence the efficiency of a 3-phase separator?
d) How is the performance of a 3-phase separator evaluated, and what common operational issues can occur?

Question 4:

a) What types of production-related formation damage are most common in oil and gas reservoirs?
b) Describe the processes of scale deposition, wax deposition, and asphaltene precipitation in the context of production-related damage.
c) How can scale inhibitors be used to prevent or mitigate scale-related formation damage?
d) What operational procedures can be used to handle wax and asphaltene deposition in production wells?
e) What are the typical remedial treatments for formation damage in an oil or gas well?