



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF AGRICULTURAL AND FOOD SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN
ANIMAL SCIENCE, FOOD SECURITY, 3rd YEAR, 2nd SEMESTER
2024/2025 ACADEMIC YEAR

SIAYA CAMPUS

COURSE CODE: APB 1310

STREAM: SOIL SCIENCE

COURSE TITLE: SOIL CONTAMINATION AND REMEDIATION

Date:

Instructions:

- 1. Answer Question 1 and ANY other TWO questions.**
- 2. Answers to Questions must be written in the Answer Booklets**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION 1

- a) Describe one contamination scenario for each of the five common site specific contaminants. **(5 Marks)**
- b) How does site hydrology and hydrogeological characteristics influence the migration of contaminants in different contaminated site scenarios? **(5 Marks)**
- c) A site with buried waste is under consideration for redevelopment. Based on site characterization parameters, suggest three key data points that should be collected to assess contamination risks, and explain why they are important. **(5 Marks)**
- d) Compare and contrast the contamination mechanisms of lined surface impoundments and unlined waste piles. How do these mechanisms affect remediation strategies? **(7 Marks)**
- e) A company is considering constructing a building on a reclaimed site. Based on the site characterization process, critically evaluate the potential risks associated with residual contaminants and recommend whether the construction should proceed. Support your answer with relevant factors. **(8 Marks)**

QUESTION 2

Taking into consideration their principles of operation, advantages, limitations, and their suitability for contaminated zone delineation, discuss the key differences between ground-penetrating radar (GPR), electromagnetic resistivity, and seismic methods in site characterization. **(20 Marks)**

QUESTION 3

Describing their processes, influencing factors, and potential environmental impacts, discuss the primary contaminant release mechanisms. **(20 Marks)**

QUESTION 4

Using the principles of contaminant intrinsic biodegradability, oxygen requirements, and soil conditions, critically analyze how an in-situ bioreclamation system can be optimized for the effective degradation of a petroleum hydrocarbon spill in groundwater. In your analysis, take into account the factors that influence microbial activity and suggest possible interventions to enhance bioremediation efficiency. **(20 Marks)**

QUESTION 5

Providing examples of scenarios where each method would be most suitable, discuss the key differences between in-situ and ex-situ treatment methods for contaminated sites, including their advantages and limitations. **(20 Marks)**