AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

ACP 302: SOIL BIOLOGY

END OF SECOND SEMESTER FINAL EXAMINATIONS

MAY 2021

LECTURER: W. MANYANGARIRWA

DURATION: 7 HOURS

INSTRUCTIONS

a) Choose and Answer **ONE** Question Only.
b) Read the Questions Carefully to find out exactly what is required before Answering.

Question 1

a) With the use of relevant examples, discuss the concept that the soil is a repository of biodiversity. [40]

b) Part of the solution to global warming lies in Soil Biology. Examine this statement and explain the role of Soil Biology in ameliorating global warming. [20]

c) Discuss the challenges that are limiting the full scale adoption of biological nitrogen fixation as a technology for enhancing Nitrogen capture in smallholder cropping. [20]

d) You have been tasked to evaluate the recovery of a soil that had been damaged through extensive pollution from coal mining. The soil is earmarked for farming. As part of the assessment, it was noted that soil bacteria will be important for the breakdown of Sulphur which is a major soil contaminant in coal mining areas. Discuss the technique that you would use to evaluate the **quantity of soil bacteria** that will breakdown the sulphur in the soil. [20]

Question 2

a) Agriculture and the environment are at loggerheads. Discuss how carbon is released from agricultural activities and suggest how the activities can be modified to reduce the release of carbon into the atmosphere. [20]

b) Discuss the procedure used to measure the amount of **fungal activity** in a given volume of soil. [20]

c) With the use of relevant examples, discuss the concept that the soil is a repository of biodiversity. [40]

d) Explain how soil mycorrhiza fungi are contributing towards improving soil health.[10]

e) Some farmers believe in feeding the soil with artificial fertilizers to supply nutrients (NPK), sterilizing the soil with pesticides and deriving maximum yields from the soil. Other farmers believe in the use of organic sources of nutrients and maximizing on local biological competition to eliminate soil pests. The yields are however lower. In your view, which approach will lead to a reduction in world hunger and why? [10]

Question 3

a) Suggest a method to characterize **bacteria** in an oil contaminated soil. [20]

b) Discuss the concept that the soil is a repository of biodiversity. Cite relevant examples to strengthen your answer. [40]

c) Explain the relationship between soil organic matter content and soil microbial load in a given soil. [10]

d) Minimum tillage systems in Agriculture are said to be more friendly to the improvement of soil health when compared to conventional tillage systems. Provide evidence to support this statement. [20]

e) Explain the role played by earthworms in improving soil health. [10]

END OF EXAMINATION PAPER