UGANDA MARTYRS UNIVERSITY

FACULTY OF AGRICULTURE

BACHELOR OF SCIENCE AGRICULTURE (DL) YEAR 1- 2021/2022

MODULE BSAG 1207: SOIL MANAGEMENT AND PLANT NUTRITION

MODULE BSEOA 1208: SOIL ECOLOGY MANAGEMENT

DATE: 8TH AUGUST 2022 **TIME: 9:30 AM – 12:30 PM**

Instructions:

- *Question **ONE** is **Compulsory***
- *Attempt any **other THREE (3)** questions*
- *Start every question on a **new** page*
- *Do not write on the question paper*

Question 1: (40 marks) Compulsory

"In order to manage a soil well, one must know the nature and properties of that soil very well". With this statement in mind, answer the following questions:

(a) List and briefly discuss the key components of soil. What is the proportion of each of those key components in an "ideal soil"? **(8 marks)**

(b) Briefly discuss **three (3)** physical and **three (3)** chemical properties of soils. **(18 marks)**

(c) Is soil a renewable or non-renewable resource? Give clear reasons for your answer. **(4 marks)**

(d) What is the difference between **an organic soil** and **soil organic matter**? **(4 marks)**

(e) Using clear examples, explain the difference between **soil forming factors** and **soil forming processes**. **(6 marks)**

Question 2

In addition to several other environmental factors, plants need 17 elements, called nutrients to grow and complete their life cycles.

a) Name those **other environmental factors** that influence plant growth and briefly explain their **sources** and the **roles** that each plays in supporting plant growth. **(15 marks)**

b) **Three (3)** of those 17 nutrient elements make-up approximately 95% of plant biomass. Name those **three** and explain why they are given no attention in soil management despite that very important role that they play in plants nutrition. **(5 marks)**

Question 3

a). Soil organic matter is considered to be an excellent source of nutrients for plants. Is this statement true or false? Give reasons to support your answer. **(5 marks)**

b). Briefly discuss **at least five (5)** different methods that small-holder farmers in your home area can use to build up soils organic matter in their fields. **(15 marks)**

Question 4

a). Using **specific examples**, discuss the roles played by soil organisms in soil fertility and plant nutrition. **(10 marks)**

b). Write short notes on the roles played by the following soil organisms in soil fertility **(i) Mycorrhiza, (ii) Earth worms, (iii) Nitrifying bacteria, (iv) Termites and (v) Decomposers**. **(10 marks)**

Question 5

a). Define **soil solution** and discuss the significant role that it plays in plant nutrition. **(15 marks)**

b). What is **transpiration stream** and what role does it play in plant nutrition? **(5 marks)**

Question 6

a). Soil is sometimes described as **"the skin of the earth"**. Explain what this description means. **(5 marks)**

b). Soil functions as a major component of the earth's ecosystem. Discuss **five (5)** natural processes which take place in the soil. **(15 marks)**

Question 7

Small holder farmers in your home area decide to come to you for advice on how to manage soil in their gardens. They have heard of **inorganic fertilizers** and **organic manures**. They want you to help them to choose between these two.

a). Write a convincing presentation that will help these farmers to choose between **inorganic fertilizers** and **organic manures. (15 marks)**

b). If a 50 kg bag of 17:17:17 NPK fertilizer costs Shs. 150,000/= in the area and a 100 kg bag of chicken manure costs Shs. 30,000/-, what advice would you give to a farmer who wants to plant 5 hectares of maize using either 5 bags of NPK fertilizer or 5 metric tons of chicken manure per hectare? **(5 marks)**

Question 8

Atmospheric air contains approximately 78% nitrogen, 21% oxygen and 0.03% carbon dioxide.

a). Explain why this nitrogen at 78% is not available for plant use and yet carbon dioxide at 0.03% is readily available to plants. **(5 marks)**

b). Briefly discuss the two methods through which atmospheric nitrogen is made available for plant use. **(10 marks)**

c). Explain how a small holder farmer in your home area can directly tap into this huge pool of atmospheric nitrogen. **(5 marks)**