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**W1-2-60-1-6**

## JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS 2020/2021**

**YEAR 3 SEMESTER 2 EXAMINATIONS FOR THE DEGREE OF BACHELOR OF SCIENCE IN MICROBIOLOGY**

**SBT 2381: SOIL MICROBIOLOGY**

**DATE: MAY 2021 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) 48 MARKS AND ANY OTHER ONE QUESTION (22 MARKS)**

QUESTION ONE (48 MARKS – COMPULSORY)

a) Based on pH, soil micro-organisms are classified into three categories. Name the categories (3 marks)

b) List three factors that may affect survival of micro-organisms in the soil (3 marks)

c) Describe each of the following types of asexual fungal spores:

i) Sporangiophose (2 marks)

ii) Conidio spore (2 marks)

iii) Blastosphore (2 marks)

d) The shape of a bacterium is defined by its rigid cell wall. Outline the typical shapes of bacteria (4 marks)

e) Highlight four basic functions of cysts in protozoa (4 marks)

f) Explain the following processes in relation to nitrogen cycle.

i) Nitrogen fixation (2 marks)

ii) Nitrification (2 marks)

iii) Denitrification (2 marks)

g) i) Highlight four general characteristics of viruses (3 marks)

ii) Highlight the key steps in viral replication and reproduction (3 marks)

h) Explain the difference between prokaryotic and Eukaryotic cells (5 marks)

i) Outline the advantages of the soil plate dilution (serial dilution) method (3 marks)

j) State four functions of soil fungi (4 marks)

k) Outline two challenges associated with isolation of soil micro-organisms (4 marks)

QUESTION TWO (22 MARKS)

a) i) Define the term virus (2 marks)

ii) Outline four differences between viruses and living cells (4 marks)

b) Describe the structure and function of flagella (3 marks)

c) Differentiate between gram positive and gram negative bacteria (4 marks)

d) Explain the different …………………in “sexual reproduction in fungi”

e) Define the following terms:

i) Nucleo-capsid (2 marks)

ii) Helical symmetry (2 marks)

iii) Viral purification (2 marks)

QUESTION THREE (22 MARKS)

a) State four general characteristics of algae (4 marks)

b) Outline the economic importance of algae which are commercially important (4 marks)

c) List three lecometery organelles in protozoa (3 marks)

d) State four features of biogeochemical cycle of elements (4 marks)

e) Highlight four reasons why the population of micro-organisms decreases with increase in depth of soil (4 marks)

f) Based on temperature requirements, name the different classes of soil microbes (3 marks)

QUESTION FOUR (22 MARKS)

a) i) Highlight methods of sexual reproduction in fungi (3 marks)

ii) Outline three types of asexual spores of fungi produced by fusion of two nuclei

(3 marks)

b) State factors that determine the amount of solar energy absorbed by the soil (3 marks)

c) Explain the role of soil water (4 marks)

d) Highlight limitations of the Rossi-cholodny method (3 marks)

e) Outline four factors affecting microbial growth in the soil (4 marks)

f) State three uses of biogeochemical cycles (2 marks)