



KENYATTA UNIVERSITY
EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE
SMB 303: AGRICULTURAL MICROBIOLOGY

2ND SEMESTER 2020/2021

TIME: 2 HOURS

INSTRUCTIONS: Answer ALL Questions in section A and B, and any TWO Questions in Section C

SECTION A: ANSWER ALL QUESTIONS (15 MARKS)

1. The microbial ecosystem of soil includes
 - A. Biotic components of soil
 - B. Abiotic components of soil
 - C. Biotic and abiotic components of soil
 - D. Soil bacteria and fungi

2. Nitrite is converted into nitrate by _____ bacteria
 - A. Nitrosomonas
 - B. Nitrosocytos
 - C. Nitrobacter
 - D. Azotobacter

3. *Bacillus* is an example of
 - A. Gram positive bacteria
 - B. Gram negative bacteria
 - C. Soil bacteria
 - D. Fungi

4. The term mycorrhiza was coined by
 - A. Frank
 - B. van Leeuwenhoek
 - C. De bary
 - D. Winogradsky

5. Which of the following is a phosphorus solubilizing bacterium?
 - A. *Bacillus megaterium*
 - B. *Clostridium pasteurianum*
 - C. *Micrococcus* spp.
 - D. All of the above

6. In the process of nitrogen fixation, which of the following microorganism is involved?
- Non symbiotic microorganisms
 - Symbiotic microorganisms
 - Both non symbiotic and symbiotic microorganisms
 - None of the above
7. A nitrogen fixing cyanobacteria is
- Spirogyra*
 - Rhizobium*
 - Ulothrix*
 - Anabaena*
8. The differences between Gram positive and Gram negative bacteria is shown to reside in the
- Cell wall
 - Nucleus
 - Cell membrane
 - Mesosomes
9. Which of the of the following forms symbiotism on soybean?
- Azotobactor paspali*
 - Rhizobium*
 - Nostoc
 - Bradyrhizobium*
10. Most soil-borne bacteria are considered.
- Thermophiles
 - Pyschrotophs
 - Mesophiles
 - Microphiles
11. Arbuscular mycorrhizal fungi belongs to _____ fungal divisions.
- Ascomycota
 - Deuteromycota
 - ~~Glomeromycota~~ *Glomeromycota*
 - Mycorrhizal fungi
12. Which one of the following bacteria has found extensive use in genetic engineering work in plants?
- Clostridium septicum*
 - Xanthomonas oryzae*
 - Bacillus coagulans*
 - Agrobacterium tumefaciens*

13. In leghaemoglobin the heme portion is produced by
A. Plant genes
B. Bacterial genes
C. Both A and B
D. None of these
14. What type of relationship exists between *Acetobacter diazotrophicus* and sugarcane?
A. Symbiotic
B. Associative
C. Endophytic
D. Free living
15. Which of the following is capable of oxidizing sulfur to sulfates?
A. *Thiobacillus thiooxidans*
B. *Desulfotomaculum*
C. *Desulfuromonas acetoxidans*
D. *Desulfurobacterium thermolithotrophum*

Section B. Answer all questions (each 5 marks)

1. Describe the use of viable plate counts in the determination of soil bacteria population.
2. Describe the nodule formation process in legume plants.
3. Explain factors that affect microbial degradation of pesticides
4. Describe how you can estimate the percentage mycorrhizal root colonization on a sample of maize roots using gridline intersect method.
5. Giving specific examples, outline five agroecological services delivered by soil microbial communities in agriculture.

Section C. Answer any TWO questions (each 15 marks)

1. Describe how environmental conditions affect the distribution of microorganisms in an agroecosystem.
2. Discuss the functions of plant growth promoting rhizobacteria.
3. Write an essay on microbial biocontrol agents.