JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

UNIVERSITY SPECIAL EXAMINATION FOR THE DEGREE OF BACHELOR OF BIOLOGICAL SCIENCES

SECOND YEAR SECOND SEMESTER 2020/2021 ACADEMIC YEAR

MAIN CAMPUS - REGULAR

COURSE CODE: **SBI 3221**

COURSE TITLE: **MICROBIAL ECOLOGY**

EXAM VENUE: **STREAM: (BSC)**

DATE: **EXAM SESSION:**

TIME: 2 HOURS

Instructions:

1. **Answer ALL questions in Section A and any two selected in Section B**
2. **Candidates are advised not to write on question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

SECTION A: SHORT ANSWER QUESTIONS (30 MARKS)

1. a) Some microorganisms like *Pseudomonas* bacteria are versatile nutritionally. Explain (1 mark)

   b) State two functions of amino acids containing sulfur in proteins of microorganisms (2 marks)
2. Oxygen is toxic to anaerobic bacteria but not aerobic ones. Outline the adaptations of aerobic bacteria to evade oxygen toxicity (3 marks)
3. Differentiate between the following terms as used in microbial ecology
   a) Chemoautotrophs and lithoautotrophs
   b) Psychrophiles and mesophiles
   c) Thermocline and hypolimnion (3 marks)
4. Giving an example, differentiate between obligate saprobes and facultative parasite (3 marks)
5. Aquatic ecosystems are characterized by low nutrient supplies. Outline the adaptations of microorganisms to live in such ecosystems (3 marks)
6. Describe the relationship between *Nitrosomonas* and *Nitrobacter* bacteria in the environment (3 marks)
7. Describe vertical stratification of lakes (3 marks)
8. State three main reservoirs of carbon in nature (3 marks)
9. State three function of hydrogen in cellular metabolism (3 marks)
10. Giving examples, differentiate between synergism and antagonism (3 marks)

SECTION B: ESSAY QUESTIONS (40 MARKS)

11. Describe the role of microorganisms in nitrogen cycling (20 marks)
12. Discuss factors that affect the microbial flora of the rhizosphere (20 marks)
13. In natural habitats, there exists microbial succession based on the environmental changes.
    a) Using appropriate example, describe succession amongst microorganisms (10 marks)
    b) Using pour plate method, describe a procedure to determine microbial diversity in an environmental soil sample (10 marks)
14. Discuss how microorganisms interact in nature for their survival (20 marks)