



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY**

**SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES**

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN  
BIOLOGICAL SCIENCES**

**2<sup>nd</sup> YEAR 2<sup>nd</sup> SEMESTER 2018/2019 ACADEMIC YEAR**

**MAIN CAMPUS - REGULAR**

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**COURSE CODE: SBI 3221**

**COURSE TITLE: MICROBIOL ECOLOGY**

**EXAM VENUE: LR 1** **STREAM: (BIO)**

**DATE: 02/05/2019** **EXAM SESSION: 12.00-2.00PM**

**TIME: 2 HOURS**

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**Instructions:**

- 1. Answer ALL questions in Section A and Any two questions 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**
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## SECTION A: SHORT ANSWER QUESTIONS (30 MARKS)

1. State three forms in which inorganic nitrogen can be available for use by microorganism (3 marks)
2. Name three biochemical function of hydrogen in microbial cells (3 marks)
3. Differentiate between the following terms as used in microbial ecology (3 marks)
  - a) Lithotrophs and organotrophs
  - b) Psychrophiles and mesophiles
  - c) Thermocline and hypolimnion
4. Despite low nutrient supplies in aquatic ecosystem, microorganisms are still occur there. Explain (3 marks)
5. Outline three ways by which aerobic bacteria protect themselves against oxygen toxicity (3 marks)
6. Explain the effect of using phosphates to increase agricultural yield of aquatic ecosystem (3 marks)
7. Explain the role of microorganisms at three trophic levels of energy flow in the ecosystem. (3 marks)
8. Describe the relationship between ammonia oxidizers and nitrite oxidizers (3 marks)
9. Give examples of free-living symbiotic nitrogen-fixing microorganisms and state whether they are prokaryotic or eukaryotic. (3 marks)
10. Explain why temperate lakes undergo thermal stratification during summer (3 marks)

## SECTION B: ESSAY QUESTIONS (40 MARKS)

11. A) Giving relevant examples, discuss the following microbial association
  - i. Mutualism (4 marks)
  - ii. Cooperation (3 marks)
  - iii. Predation (3 marks)

b) Write short notes on

  - i. Rhizosphere (5 marks)
  - ii. Microorganism and ruminants (5 marks)
12. A) Describe the changes that take place in microbial communities until a climax community is attained in unpasteurized milk (6 marks)

B) Explain how pour plate method may be used to determine microbial diversity in a given habitat (5 marks)

C) Classify bacteria based on their temperature and gaseous requirement (9 marks)
13. Discuss factors that affect the microbial flora of the rhizosphere (20 marks)
14. Describe the role of microorganisms in nitrogen cycling (20 marks)