



*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)  
UNIVERSITY EXAMINATIONS (MAIN PAPER)  
2023/2024 ACADEMIC YEAR  
THIRD YEAR FIRST SEMESTER EXAMINATIONS  
FOR THE DEGREE  
OF  
BACHELOR OF SCIENCE IN MEDICAL BIOTECHNOLOGY**

**COURSE CODE: BMB 313**

**COURSE TITLE: ENVIRONMENTAL BIOLOGY**

**DATE: 7<sup>TH</sup> DECEMBER 2023**

**TIME: 2.00-4.00PM**

---

**INSTRUCTIONS TO CANDIDATES**

This paper is divided into three sections, A B and C, carrying respectively: Multiple Choice Questions (MCQs), Short Answer Questions (SAQs) and Long Answer Questions (LAQs). Answer all questions. **DO NOT WRITE ON THE QUESTION PAPER**

**TIME: 2 Hours**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

**SECTION A: Multiple Choice Questions (20 Marks)**

1. The natural place of an organism or community is known as-----
  - A. Niche
  - B. Biome
  - C. Habitat
  - D. Habit
2. Which one of the following is the renewable exhaustible natural energy resource?
  - A. Coal
  - B. Petroleum
  - C. Kerosene
  - D. Biomass
3. According to Shelford's Law of Tolerance, the organisms wide environmental factor tolerance limit show-----
  - A. Narrow distribution with low population size
  - B. Wide distribution with high population size
  - C. Narrow distribution with high population size
  - D. Wide distribution with low population size
4. Plants growing under direct sunlight are known as-----
  - A. Heliophytes
  - B. Sciophytes
  - C. Psamophytes
  - D. Dicots
5. Plants growing under shade are known as-----
  - A. Psamophytes
  - B. Sciophytes
  - C. Heliophytes
  - D. Monocots
6. An orchid living on a tree exhibits
  - A. Predator
  - B. Mutualism
  - C. Commensalism
  - D. Parasitism
7. Which one of the following statements is correct with respect to the food chain?
  - A. Every component of the food chain forms a trophic level
  - B. Inter-relation between different food chains is known as a food web
  - C. All the chains formed by nutritional relations is used to understand energy flow.
  - D. All of the above
8. The process of vernalization is practised in-----
  - A. Cold countries
  - B. Hot countries
  - C. Only in sub-tropical countries
  - D. Only in tropical countries
9. Which one of the following requires maximum energy?
  - A. Secondary consumer
  - B. Decomposer
  - C. Primary consumer
  - D. Primary producer

20. Which one of the following is a 'K' selected species?

- A. Aspergillus
- B. Human
- C. Taraxacum
- D. Grass

**SECTION B: Short Answer Questions (40 Marks)**

1. Describe the 'ecosystem' origination from Arthur Tansley (5 Marks)
2. Explain the roles of external factors in ecosystems (5 Marks)
3. Describe commensal interactions in ecosystems (5 Marks)
4. Explain meanings of phoresy, inquilism and metabiosis (5 Marks)
5. Explain the meaning of parabiosis (5 Marks)
6. Explain the meaning of foraging cycles (5 Marks)
7. Describe the various types of competition that exist in ecosystems (5 Marks)
8. State features of the Hutchinsonian n-dimensional hypervolume niche (5 Marks)

**SECTION C: Long Answer Questions (60 Marks)**

1. Discuss energy flow, energetics and the carbon cycle in ecosystems (20 Marks)
2. Describe ambush, ballistic interception and pursuit in animal interactions (20 Marks)
3. Explain the Lotka – Volterra predator-prey dynamics principles in ecosystems (20 Marks)

10. The bottom area where production is less than respiration in a pond ecosystem is termed as-----
- Profundal zone
  - Tidal zone
  - Benthic zone
  - Limnetic zone
11. Which one of the following is not a characteristic of 'r' selected species?
- Reproduce quickly
  - Parental care
  - A low survival rate of progenies
  - Produce a large number of progenies
12. Which one of the following is not the characteristic of a population?
- Natality
  - Mortality
  - Stratification
  - Sex ratio
13. Lincoln index measures-----
- Population mortality rate
  - Population natality rate
  - Population size
  - Population density
14. Allelopathy refers to-----
- Inhibition of growth of one species by another by the production of toxins
  - Inhibition of sporulation of pathogen by the host
  - Altering the reproductive cycle of one organism by another
  - Inhibition of growth of one species by another by preventing reproduction
15. The ratio between energy flow at different points in a food chain is known as-----
- Ecological capacity
  - Ecological efficiency
  - Ecological assimilation
  - Ecological potential
16. The ability of a population to increase under ideal environmental conditions is called-----
- Natality
  - Carrying capacity
  - Biotic potential
  - Absolute natality
17. In an ecosystem, the energy flow is always-----
- Always unidirectional
  - Always bidirectional
  - In any direction
  - Always down directional
18. In thermal stratification, the middle region which shows vertical temperature change is called-----
- Mesolimnion
  - Epilimnion
  - Metolimnion
  - Hypolimnion
19. which one of the following is a non-denitrifying bacteria
- Pseudomonas aeruginosa*
  - Thiobacillus*
  - Thiobacillus denitrificans*
  - Bacillus ramosus*