



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

UNIVERSITY EXAMINATIONS

2019/2020 ACADEMIC YEAR

**MAIN EXAMINATIONS
MAIN CAMPUS**

THIRD YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN MEDICAL BIOTECHNOLOGY**

COURSE CODE: BMB 313

COURSE TITLE: ENVIRONMENTAL BIOLOGY

D

INSTRUCTIONS TO CANDIDATES

Answer ALL questions in section A and ANY TWO selected from section B

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.



SECTION A (MULTIPLE CHOICE QUESTIONS, 20 MARKS)

- The origin of genetic variabilities in populations include;
 - mutation and flow from other populations
 - genetic drift and frequency change
 - isolation
 - bottlenecking and founder effects
- Which of these regions harbours highest diversity of species on earth
 - Tropical regions
 - Temperate regions
 - Arctic regions
 - Boreal regions
- There are regions of the earth that have unique types of species whose distribution is localised and not found in any other parts of the world. Which term best describes such species
 - Keystone species
 - Foundation species
 - Umbrella species
 - Endemic species
- What are the three measures of diversity that conservation biologists often use to describe the different aspects of species diversity?
 - Community, Ecosystem, and Landscape
 - Delta, Tau, and Chi
 - Alpha, Beta, and Gamma
 - Ecological, Economic, and Physical
- Which one of the following is not an ethical principle of conservation biology
 - Diversity of species and biological communities should be preserved
 - The untimely extinction of populations and species should be prevented
 - Ecological Complexity should be maintained
 - Evolution should not continue
- Which decade has been designated as a **decade of biodiversity** by the United Nations
 - 2021-2030
 - 2011-2020
 - 2001-2010
 - 1991-2000
- Decomposers who specifically act on fecal matter of other organisms are called
 - Heterophagic
 - Paraphagic
 - Coprophagic
 - Allophagic
- Which of the following is not a denitrifying bacteria
 - Bacillus ramosas
 - Thiobacillus denitrificans
 - Pseudomonas aurigonsa
 - Thiobacillus
- If an individual's heterozygosity is high, then:
 - its survivability goes down
 - the individual's reproduction will likely decline
 - its overall fitness is higher
 - harmful alleles from parents are more likely to be expressed
- Species with wide geographical ranges which develop locally adapted populations are known as:
 - Ecological Species
 - Ecotypes

- c) Ecophenes
 - d) Sub-species
11. Shannon wiener index is used to measure:
- a) Population size
 - b) Species richness and diversity
 - c) Species dominance
 - d) Population density
12. The ability of a population of living species to increase under ideal environmental conditions is called:
- a) Carrying capacity
 - b) Biotic potential
 - c) Natalality
 - d) Absolute natalality
13. The most important human activity, leading to the extinction of wildlife, is
- (a) Pollution of air and water
 - (b) Hunting for valuable wildlife products
 - (c) Introduction of alien species
 - (d) Alteration and destruction of the natural habitats.
14. If we uncover half of the forest, covering of the earth, what crisis will be produced at most and at first?
- (a) Some species will be extincted
 - (b) Population and ecological imbalance will rise up
 - (c) Energy crisis will occur
 - (d) Rest half forests will maintain this imbalance.
15. Which one of the following is not included under in-situ conservation?
- (a) National park
 - (b) Sanctuary
 - (c) Botanical garden
 - (d) Biosphere reserve
16. Pneumatophores are characteristics of:
- a) Alpine plants
 - b) Mangrove plants
 - c) Desert plants
 - d) Aquatic plants
17. The population size of a certain species is declining due to habitat fragmentation and current estimates indicate that most habitat patches are approximately 1km apart. It has also been shown that this species has a maximum dispersal distance of approximately 450 meters. Of the following fragmentation effects, which one best explains why this species is in decline?
- a.) local area effects
 - b.) patch size effects
 - c.) isolation effects
 - d.) edge effects
18. Which factor affects colonization rates in the MacArthur-Wilson Theory of Island Biogeography?
- (a) island size
 - (b) island shape
 - (c) distance to mainland
 - (d) number of species in source population
19. Although some species are area sensitive, what is another explanation for the observation that some species are found only in large habitat patches?
- a.) the species is rare
 - b.) the species avoids small patches
 - c.) the species prefers edges

- d.) the species is very common
20. The group of organisms with the highest number of officially listed U.S. Federally Endangered and Threatened Species is:
- a.) mammals
 - b.) freshwater clams
 - c.) flowering plants
 - d.) birds

SECTION B (SHORT STRUCTURED QUESTIONS, 40 MARKS)

1. State and briefly explain five reasons why species endangerment is a threat to the field of medical biotechnology (5marks)
2. Define carrying capacity and give two approaches with illustrations that are used in describing carrying capacity (5marks)
3. State five reasons why species richness is the preferred measure of biodiversity (5marks)
4. Briefly explain any five effects of bottlenecks on variation and genetic diversity of organisms (5marks)
5. Distinguish between r-selected and k-selected organisms based on their growth rates and survival strategies giving an example in each case (5marks)
6. An ecological study was done in the MMUST botanical garden which was divided into an upland site and a lowland site. The upland site had species richness of 3 (Greasy grass-3, Fuzzy forb-3 and Spiney shrub-3) The lowland site had species richness of 2 (Greasy grass-7, Fuzzy forb-2 and Spiney shrub-0). Calculate species diversity for the two sites using Shannon wiener index (5marks)
7. Define population age structure. Using an illustration, briefly explain the three major stages of age structure (5marks)
8. Briefly explain with illustrations factors that explain the number of species on islands (5marks)

SECTION C (ESSAY QUESTIONS, 60 MARKS)

1. Describe with examples strategies that are applied in the conservation of species and their habitats giving examples in each case (20marks)
2. Most of the world major ecosystems are currently facing threats as a result of human activities. This has led to the loss of biodiversity which has been termed as the “sixth mass extinction” Describe the factors that have contributed to this loss and suggested measures that can be used to halt the same (20marks)
3. Describe the International Union for the Conservation of Nature of fauna and flora (IUCN) guidelines that have been developed in the management of endangered species in world's ecosystems (20marks)