

BIOLOGY

BIO 01

01/08/ 2022 8:30 AM-11:30 AM



TTC NATIONAL EXAMINATIONS, 2021-2022

SUBJECT: BIOLOGY

OPTION: SCIENCE AND MATHEMATICS EDUCATION (SME)

DURATION: 3 HOURS

INSTRUCTIONS:

- 1) Write your names and index number on the answer booklet as written on your registration form, and **DO NOT** write your names and index number on additional answer sheets if provided.
- 2) Do not open this question paper until you are told to do so.
- 3) This paper consists of two sections: **A** and **B**
SECTION A: Attempt **all** questions. **(70 marks)**
SECTION B: Attempt any **three** questions. **(30 marks)**
- 4) Use a **blue** or **black** pen.

SECTION A: ATTEMPT ALL QUESTIONS (70 marks)

- 1) a) Define the term Parasitism. (2 marks)
b) State the types of parasitism. (2 marks)
- 2) Match the facts in the **Column A** to their concepts in **Column B**. (4 marks)

A	B
a) A relationship in which individuals of both species benefit.	(i) Parasitism
b) A relationship in which one individual of one species benefits while the other species is unaffected.	(ii) Commensalism
c) The snake is swallowing a whole lizard alive.	(iii) Predation
d) An adult round worm clogging part of a human small intestines.	(iv) Mutualism

- 3) Choose whether the following statements are **True (T)** or **False (F)** (5 marks)
- a) Organisms interaction does only harm.
b) Commensalism harms both species.
c) Competing for food is an example of interspecific competition.
d) Predation never promotes species richness.
e) Parasitism does not promote coexistence of biodiversity.
- 4) Describe the abiotic and biotic factors. (6 marks)
- 5) Differentiate between intraspecific and interspecific competition. (4 marks)
- 6) a) Distinguish between carrying capacity and biotic potential. (4 marks)
b) Explain how environmental resistance affects the population growth. (3 marks)
- 7) Explain what is meant by the following terms:
- a) A density-dependent factor. (3 marks)
b) A density-independent factor. (3 marks)

- 8) Identify at least three natural resources found in Lake Kivu and state their impact on the economic growth of Rwanda. **(6 marks)**
- 9) a) Describe the effects of human activities on the environment. **(5 marks)**
 b) Suggest possible measures to solve the above problems. **(3 marks)**
- 10) a) Use a chemical equation to explain the synthesis and hydrolysis of ATP in a living cell. **(4 marks)**
 b) The hydrolysis and synthesis of ATP are reversible reactions. Estimate the amount of energy for each process. **(3 marks)**
- 11) Measurement of oxygen uptake and CO₂ production by germinating seeds in a respirometer showed that 25 cm³ of O₂ was used and 17.5 cm³ of CO₂ was produced over the same period.
 (i) Calculate the RQ for these seeds. **(2 marks)**
 (ii) Identify the respiratory substrate used by the seeds. **(2 marks)**
- 12) a) Explain why energy value of lipid is more than twice that of carbohydrate. **(2 marks)**
 b) Explain what is meant by respiratory quotient (RQ). **(2 marks)**
- 13) What are the major differences between Cellular respiration and Photosynthesis?
(5 marks)

SECTION B: ATTEMPT ANY THREE QUESTIONS. (30 marks)

- 14) In your own words, explain the importance of maintaining constant temperature for efficient metabolism. **(10 marks)**
- 15) a) Define variation. **(2 marks)**
 b) What is the difference between continuous variation and discontinuous variation? **(4 marks)**
 c) Meiosis contributes to genetic variation. Explain. **(4 marks)**

- 16) A student ate meat. Explain fully how the meat eventually becomes part of the body tissue. **(10 marks)**
- 17) a) What is homeostasis? **(2 marks)**
b) Discuss the homeostatic functions of the liver. **(8 marks)**
- 18) a) State two ways by which a baby may acquire Immunity. **(2 marks)**
b) Distinguish between naturally acquired passive immunity and artificially acquired passive immunity. **(4 marks)**
c) What is the importance of vaccination against diseases? **(4 marks)**

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