

# BIOLOGY II

012

27/07/ 2023 08.30 AM – 11.30 AM



## ADVANCED LEVEL NATIONAL EXAMINATIONS, 2022-2023

### SUBJECT: BIOLOGY II

### PAPER II: THEORY

#### COMBINATIONS:

- BIOLOGY-CHEMISTRY-GEOGRAPHY (**BCG**)
- MATHEMATICS-CHEMISTRY-BIOLOGY (**MCB**)
- PHYSICS-CHEMISTRY-BIOLOGY (**MCB**)

#### 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 of paper 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:** Answer **ALL** questions. (70 marks)

**Section B:** Answer **THREE** questions. (30 marks)

- 4) Use **blue** or **black** pen.

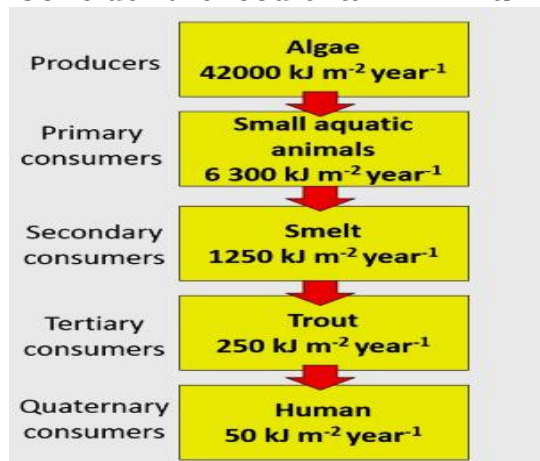
**SECTION A: ANSWER ALL QUESTIONS (70 marks)**

- 1) Identify the following kingdoms:
  - i) No nuclear membrane bound mitochondria. **(1 mark)**
  - ii) Organelles surrounded by membrane found inside thread like hyphae. **(1 mark)**
  - iii) The organisms are either unicellular or multicellular and contain organelles with membrane. **(1 mark)**
  - iv) Multicellular organisms have autotrophic nutrition. **(1 mark)**
  - v) Multicellular organisms have heterotrophic nutrition. **(1 mark)**
- 2) a) Ribosomes are important in which process? **(1 mark)**  
b) In each of the following, name the organelle being referred to.
  - i) Powerhouse of the cell. **(1 mark)**
  - ii) Contains chromatin. **(1 mark)**
  - iii) Synthesizes glycoproteins. **(1 mark)**
- 3) Name the chemical reagents which are used in the laboratory to test for the presence of each of the following food substances:
  - i. Starch. **(1 mark)**
  - ii. Reducing sugars. **(1 mark)**
  - iii. Non-reducing sugars. **(1 mark)**
  - iv. Vitamin C (Ascorbic acid). **(1 mark)**
- 4) Explain how guard cells are adapted for stomatal opening and closure. **(3 marks)**
- 5) State four functions of the vertebrate's skeleton. **(4 marks)**
- 6) a) Define diffusion. **(1 mark)**  
b) List the factors that affect the rate of diffusion of a molecule into a cell. **(3 marks)**
- 7) Distinguish between the following terms: centrosome, centriole and centromere. **(3 marks)**
- 8) Explain how a change in DNA sequence would result in production of non-functional protein. **(2 marks)**
- 9) Distinguish between:
  - a) Cyclic and non-cyclic photophosphorylation. **(2 marks)**
  - b) Photophosphorylation and oxidative phosphorylation. **(2 marks)**
  - c) The roles of NAD and NADP in a plant. **(2 marks)**
- 10) a) Give the differences between complete and incomplete metamorphosis. **(2 marks)**  
b) What is the benefit of metamorphosis to insects? **(2 marks)**

- 11) With reference to endocrine and nervous system, identify the role played by feedback mechanism in homeostasis. **(3 marks)**
- 12) At the end of a sprint race, a runner continues to breathe rapidly for some time. Evaluate the advantage of this. **(3 marks)**
- 13) Differentiate between grafting and cutting. Provide an example for each method. **(3 marks)**
- 14) Construct a table that compares sperm and ovum. **(4 marks)**
- 15) Bacteria maintain the balance in the environment. Justify this statement. **(3 marks)**
- 16) Classify the following variations as either caused entirely by genetic effects or caused by a combination of genetic and environmental effects
- i) Obesity **(0.5 mark)**
  - ii) Eye colour **(0.5 mark)**
  - iii) Tallness **(0.5 mark)**
  - iv) Ability to sing **(0.5 mark)**
  - v) Maleness **(0.5 mark)**
  - vi) Masculinity **(0.5 mark)**
  - vii) Blood group **(0.5 mark)**
  - viii) Natural hair colour **(0.5 mark)**
  - ix) Sickle-cell anaemia **(0.5 mark)**
  - x) Agility **(0.5 mark)**

17) K

Consider the food chain in Kivu Lake.



Calculate the percentage efficiency of the transfer of energy between

- a) Primary consumers and secondary consumers. **(2 marks)**
- b) Tertiary consumers and quaternary consumers. **(2 marks)**
- c) Producers and quaternary consumers. **(2 marks)**

18) Define the following terms:

a) Biotechnology

**(2 marks)**

b) Genetic engineering

**(2 marks)**

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

19) A plant with hairy stems and yellow flowers was crossed with a plant hairy stems and white flowers. Yellow flower colour is dominant over white. Seeds from F1 were sown and plants with the following characteristics were obtained:

28 plants with hairy stems and yellow flowers

35 plants with hairy stems and white flowers

10 plants with smooth stems and yellow flowers.

11 plants with smooth stems and white flowers.

a) Which is dominant Hairy stems or smooth stems? Why? **(2 marks)**

b) What is the genotype of parents? **(2 marks)**

c) Draw the genetic cross to show the genotype and phenotypes of F1 plants. **(4 marks)**

d) What is the ratio of hairy stem to smooth stems? **(1 mark)**

e) What is the ratio of yellow to white flower? **(1 mark)**

20) Make a list of different causes of evolution and write short summary in your own words on the meaning of each cause. **(10 marks)**

21) (a) What is meant by

(i) Greenhouse effect? **(1 mark)**

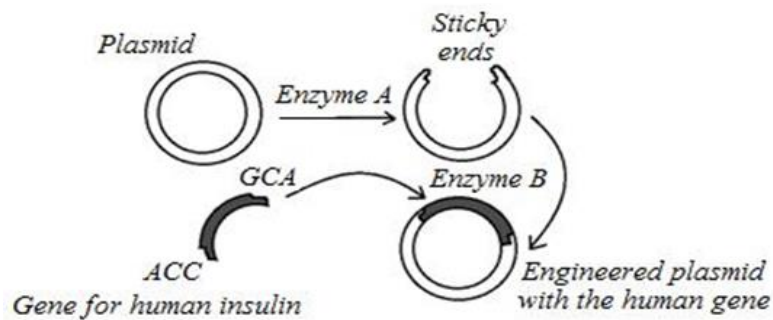
(ii) Eutrophication? **(1 mark)**

(b) Explain how human activities have contributed to the increased greenhouse effect. **(4 marks)**

(c) Suggest practical remedies to the greenhouse problem. **(4 marks)**

22) Compare blood, tissue fluid and lymph. **(10 marks)**

23) The diagram below shows the stages in the insertion of the gene for insulin into a bacterium.



- Name the substance that makes up the plasmid. **(1 mark)**
- Identify the enzyme labelled **A**. what is its role? **(2 marks)**
- Identify the sticky ends of the plasmids that are complementary to those shown on the gene. **(2 marks)**
- Identify enzyme **B** on the diagram. What is its role? **(2 marks)**
- What term is given to a length of DNA formed from different sources? **(1 mark)**
- How is the plasmid inserted into the bacterium? **(1 mark)**
- How do scientists identify the bacteria which have taken the plasmid? **(1 mark)**

**-END-**