THE COPPERBELT UNIVERSITY

SCHOOL OF MATHEMATICS AND NATURAL SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

2021/2022 SESSIONAL EXAMINATION

BI 110: INTRODUCTORY BIOLOGY

DURATION: 3 HOURS **100 MARKS**

INSTRUCTIONS

1. Clearly indicate your Group, Program and SIN on the Exam Booklet used.
2. There are seven questions in this paper and you are expected to answer a total of five questions.
3. Section **A is COMPULSORY** and Answer any **THREE** questions in section **B.**
4. Each question carries 20 marks.

Section A- Answer ALL questions

1a In which situation(s) would the use of a scanning microscope be ideal, and why? (3marks)

b. What are the disadvantages of using the light and electron microscope? (4marks)

c. What are the structural and functional similarities and difference between mitochondria and chloroplasts? (4marks)

d. Describe the delivery system of the Golgi apparatus. (3marks)

e. Describe how the phase contrast microscope works (6 marks)

2 a. Explain the biological species concept and elaborate the problems associated with it. (4 marks)

b. What is the importance of using a binomial nomenclature system to name species? (3 marks). A Tiger whose scientific name is **PANTHERA TIGRIS**. Write its name in accordance with the system of binomial nomenclature (2 marks)

c. Define the following terms: (i) **couplet** (ii) **lead** (iii) **character state**(iv) **taxon** (v) **Species** (5 marks)

d. Write brief notes on the following types of bacteria; **filamentous bacteria, budding bacteria** and **spiral bacteria.** (6 marks)

Section B- Answer any Three (3) questions

3 a. What are the functions of the following structural components of viruses (i) **Capsid** (ii) **Nucleic acid core** (iii) **Spiral protein sheath** (iv) **Tail fibres** (4 marks)

b. Describe how HIV destroys CD4 cells in human beings (3 marks)

c. Explain what happens at viral assembly point stage (4 marks)

d. Explain the function of each cell **check point** in the cell cycle. (6 marks)

e. Describe the composition of plant cell walls (3 marks)

4 a. After a cow is given antibiotics to treat an infection, a vet gives the animal a drink of "gut culture" containing various prokaryotes. Why is this necessary? (3 marks)

b. Compare the structure of a fat (triglyceride) with that of a phospholipid. (4marks)

c. Why are human sex hormones considered lipids? (3marks)

d. Compare and contrast DNA and RNA nucleotide structures. (6marks)

e. What parts of a polypeptide participate in the bonds that hold together secondary structure? (1 mark) Tertiary structure? (1 mark)

f. The molecular formula for glucose is $C_6H_{12}O_6$. What would be the molecular formula for a polymer made by linking ten (10) glucose molecules together by dehydration reactions? (2marks)

5 **a.** Pea plants heterozygous for flower position and stem length (BbTt) are allowed to self-pollinate, and 400 of the resulting seeds are planted. Draw a Punnett square for this cross. How many offspring would be predicted to have terminal flowers and be dwarfs? (6marks)

b. In Mendel's pea plant crosses, some pea plants were self-pollinated. Is self-pollination considered asexual or sexual reproduction? Explain.(2marks)

c. Distinguish between pleitropy and lethality in genetics (2 marks)

d. Explain why Mendel opted for the pea plant to conduct his experiments (3marks)

e. In what ways do dominant traits differ from recessive ones? (2 mark)

f. Explain which generation of pea plants are referred to as F_2 in Mendel's experiment? (2marks)

g. Define a pedigree and explain key points on how to read it. (3marks)

6.a. State two features of the following animals Oligochaeta, Hirudinea, Polychaeta (6 marks)

b. Discus the life cycle of schitosoma (4 marks)

c. State the function of the following parts of the snail Mantle, Radula and mantle (6 marks)

d. Explain feeding in earthworms (4 marks)

7. a. Draw and label all the parts of an insect leg, what is the function of the coxa? (4 marks)

b. Describe the how the thorax and abdomen are segmented in Order hymenoptera (4 marks)

c. List three types of insect mouthparts (3 marks)

d. Give one example of insects in the following orders; orthoptera, Lepidoptera, Isoptera. (3 marks)

e. What are the key distinctive features of amoeba, state the functions of the ectoplasm in Amoeba. (4 marks)

f. Explain nutrition in basidiomycetes (2 marks)

END OF EXAMINATION