



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

**FOURTH YEAR SUPPLEMENTARY/SPECIAL EXAMINATION FOR
BACHELOR OF SCIENCE IN BIOLOGY**

SZL 409: ENVIRONMENTAL PHYSIOLOGY

DATE: 9/3/2023

TIME : 8.30 – 10.30 AM

INSTRUCTIONS

1. Answer Question 1 (compulsory) and **any two** questions
2. Use clean well labelled diagrams wherever appropriate.

QUESTION ONE (30 MARKS)

- a) Define homeostasis and outline its significance in the life of an animal (2 marks)
- b) Differentiate between isosmotic organisms and osmo-conformers (2 marks)
- c) Explain how cartilaginous fishes are able to have plasma that is approximately
d) iso-osmotic to sea water (3 marks)
- e) Explain why terrestrial animals chose to incur more energy cost to excrete their
nitrogenous wastes in form of urea rather than less costly ammonia (3 marks)
- f) Describe three (3) mechanisms adopted by endotherms to save on energy costs of
thermoregulation (3 marks)
- g) Explain three mechanisms by which amphibians are adapted to life in desert
(3 Marks)
- h) Explain why breathing is more costly for aquatic animals than for terrestrial animals
(2 marks)
- i) Explain how vertebrates living in high altitude environments are adapted to continued
efficiency in respiration (3 Marks)
- j) Describe three (3) animal adaptations to seasonal changes in diet (3 marks)

- k) Explain how a bird respiratory system is adapted to flight (3 marks)
- l) Explain how the environment affects reproduction in animals (3 marks)

QUESTION TWO (20 MARKS)

- a) Define homeostatic regulation and explain its principle mechanism of operation (5 marks)
- b) Explain how homeostatic regulation works to maintain thermal homeostasis in endotherms living in various environments (15 marks)

QUESTION THREE (20 MARKS)

Describe the following in vertebrates living in various environments

- a) Reproductive adaptations (10 marks)
- b) Digestive adaptations (10 marks)

QUESTION FOUR (20 MARKS)

Explain

- a) osmotic challenges encountered by animals in their diverse environments (9 marks)
- b) Mechanisms by which terrestrial organisms are able to maintain osmotic balance in their environments (11 marks)

QUESTION FIVE (20 MARKS)

Discuss

- a) Respiration mechanisms in animals (15 marks)
- b) Factors affecting respiration in animals (5 marks)