



MACHAKOS UNIVERSITY

University Examinations for 2022/2023 Academic Year

SCHOOL OF AGRICULTURE, ENVIRONMENT AND HEALTH SCIENCES

DEPARTMENT OF ENVIRONMENTAL SCIENCES

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF ENVIRONMENTAL SCIENCE

ENS 436: INDUSTRIAL ECOLOGY AND CLEANER PRODUCTION

Date:

Time:

INSTRUCTIONS: Answer Question **ONE (Compulsory)** and any other **TWO** Questions

QUESTION ONE (30 Marks)

- a) Explain the meaning of the following
- i. Industrial ecology (2 marks)
 - ii. Eco-labeling (2 marks)
 - iii. Source reduction (2 marks)
- b) 'Consumer choice and power are both critical in achieving the objectives of cleaner production in Kenya.' Critically evaluate this claim. (9 marks)
- c) Using an example, discuss the concept of industrial symbiosis and its relevance in pollution prevention (15 marks)

QUESTION TWO (20 MARKS)

Discuss the concept of cleaner production that can be applied in a tannery plant and the barriers that may arise during its application

QUESTION THREE (20 MARKS)

Portland Cement Ltd in Athi River town has approached you as an environmental science expert to consult on how they can tackle the industrial plant's environmental impacts by initiating and implementing ISO 14001. Discuss how you would undertake this exercise.

QUESTION FOUR (20 MARKS)

- a) Discuss any three sustainable development goals (SDGs) relevant to environmental sustainability and the efforts Kenya has put towards their implementation. (12 marks)
- b) Explain the role of eco-labeling in environmental protection (8 marks)

QUESTION FIVE (20 MARKS)

Using examples, discuss the main challenges of industrial waste management in Kenya and their implications to ecological and human health