



MACHAKOS UNIVERSITY

University Examinations for 2024/2025 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIFTH YEAR FIRST SEMESTER EXAMINATION FOR DEGREE IN
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECV 505: ENVIRONMENTAL ENGINEERING

DATE: 21ST JANUARY, 2025

TIME: 11.00 AM – 1.00 PM

INSTRUCTIONS:

Answer question ONE (Compulsory) and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) What were the major milestones in wastewater treatment development from the 19th to the 20th century, and how did they influence current practices? (4 Marks)
- b) What is the greenhouse effect and how does it contribute to global warming? (4 Marks)
- c) Identify and describe TWO criteria proposed by Herman Daly for achieving ecological sustainability. (4 Marks)
- d) How does the Environmental Management and Coordination Act (EMCA, 1999) support environmental conservation in Kenya? (3 Marks)
- e) What are the key factors in determining the size of a disaster? (3 Marks)
- f) Evaluate the effectiveness of drought monitoring and early warning systems in preventing water crises. What are the key indicators used in these systems? (4 Marks)
- g) Briefly discuss the importance of 'Mitigation' in the EIA process and provide an example of a mitigation strategy for a project in an urban area. (2 Marks)
- h) Analyze the effects of accidental oil spills on marine ecosystems. (4 Marks)

- i) Name an introduced weed in Kenya. (1 Mark)
- j) Name any one challenge the country faces in implementing environmental conservation policies. (1 Mark)

QUESTION TWO (20 MARKS)

- a) Explain how deforestation and urban development exacerbate water pollution. (4 Marks)
- b) Define global environmental conservation and explain its multidisciplinary nature. (4 Marks)
- c) What is the definition of a natural hazard, and how does it differ from a disaster? (4 Marks)
- d) Discuss the concept of multimedia pollution and provide examples of how pollutants can cross the boundaries of air, water, and soil systems. (5 Marks)
- e) Name two acids that are present in acid rain. (1 Mark)
- f) State four bodies that play environmental conservation roles in Kenya (2 Marks)

QUESTION THREE (20 MARKS)

- a) Discuss the relationship between global warming and water pollution. (3 Marks)
- b) Discuss the interdependence of the social, economic, and environmental dimensions of sustainable development. How does each dimension support the overall goal of sustainability? (6 Marks)
- c) Discuss the role of Integrated Water Resources Management (IWRM) in drought protection. How does it enhance resilience to water scarcity? (5 Marks)
- d) How do high-technology fishing methods impact marine biodiversity? (4 Marks)
- e) Enumerate at least 3 environmental issues that confront us today. (2 Marks)

QUESTION FOUR (20 MARKS)

- a) Discuss any TWO types of droughts. Give an example of how each type affects different sectors of the economy. (4 Marks)
- b) Explain how nuclear disasters affect the environment and human health. (4 Marks)
- c) What are the main strategies to mitigate the greenhouse effect? (4 Marks)
- d) Define sustainable development and identify its two key concepts.

(4 Marks)

- e) Evaluate the impact of human consumption on natural ecosystems. What are two approaches for reducing negative impacts on ecosystems, and how might these approaches be implemented in a developing nation? (4 Marks)

QUESTION FIVE (20 MARKS)

- a) Describe the five main phases of a disaster management continuum. (5 Marks)
- b) Explain how the field of environmental engineering integrates both natural science and engineering principles to address environmental sanitation issues. (4 Marks)
- c) Explain the term water pollution and discuss its main causes. (4 Marks)
- d) Describe the concept of the ecological footprint and its relationship with carrying capacity. (4 Marks)
- e) List the main functions of the Environmental Impact Assessment (EIA). (3 Marks)