

UNIVERSITY OF ESWATINI
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING

FINAL EXAMINATION, DECEMBER 2019

BSc., B.Ed. (Secondary) Science

TITLE OF PAPER: WASTE MANAGEMENT PLANNING

COURSE NUMBER: GEP317

TIME ALLOWED: THREE (3) HOURS

INSTRUCTIONS:

1. ANSWER THREE QUESTIONS
2. SECTION A IS COMPULSORY
3. ANSWER ANY TWO QUESTIONS FROM SECTION B
4. ILLUSTRATE YOUR ANSWERS WITH EXAMPLES AND USE APPROPRIATE TERMINOLOGY

ALLOCATION OF MARKS: QUESTION 1 (COMPULSORY) CARRIES 40 MARKS, WHILE THE REST CARRY 30 MARKS EACH

THIS QUESTION PAPER SHOULD NOT BE OPENED UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

GEP327: WASTE MANAGEMENT PLANNING - DECEMBER 2019

**SECTION A
COMPULSORY**

QUESTION 1

- a) You have been hired as a waste management engineer to design a landfill to dispose of hazardous wastes. All the waste accepted by the landfill will be received in 200-litre drums (drum dimensions: 855mm x 572mm diameter) and assume that the total landfill capacity will be 10,000 drums. Sketch a cross-section of the final landfill, showing the dimensions of the initial excavation, final cap, and including cap and liner details. (Remember to list any assumptions that may have been used in your estimations). (20 marks)

(a) The populations of Matsapha, Ezulwini and Malkerns municipalities are projected to reach an estimated 75000, 20000 and 45000, respectively, in 2029. A survey conducted recently indicated that the waste generation rate is 1.45kg per capita day for Matsapha, 1.6kg per capita day for Ezulwini and 2.1kg per capita day for Malkerns. The waste from all the municipalities have a mean compacted density of 400kg m^{-3} .

Upon conducting studies in various parts of the country and after consultations with engineers, the Matsapha Town Council could only find an unused squared-shaped farm for a sanitary landfill whose average below-ground depth should be 4m and have a maximum airspace of 5m. This landfill is also expected to serve all three municipalities. Assuming equal human birth and death rates, and constant waste generation rates until 2029, calculate the perimeter of the landfill required to accommodate 10 year's waste.. (20 marks)

(40 Marks)

SECTION B
ANSWER ANY TWO QUESTIONS

QUESTION 2

- a) Discuss the process followed when conducting a waste analysis and characterization study. (20 marks)
- b) Discuss the key considerations in the planning of waste collection and transportation. (10 marks)
- (30 Marks)**

QUESTION 3

- a) Describe the key sources of municipal solid waste generation and types of waste generated. (10 marks)
- b) Briefly discuss current solid waste management practices in Eswatini and related future challenges. (20 marks)
- (30 Marks)**

QUESTION 4

- a) List FOUR (4) different ways that plants could be used for phytoremediation. (8 marks)
- b) Briefly discuss the “4Rs” as applied in waste management. (10 marks)
- c) State THREE (3) types of incinerators. Briefly describe the operation, advantages and disadvantages of any ONE (1) of the incinerators. (12 marks)
- (30 Marks)**

QUESTION 5

Discuss the following methods of final waste disposal:

- a) Composting (10 marks)
- b) Controlled tipping (10 marks)
- c) Open burning (10 marks)
- (30 Marks)**