

2nd SEM.2009/2010



**UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER**

**PROGRAMME: BSC ANIMAL SCIENCE YEAR 4
BSC LAND AND WATER
MANAGEMENT YEAR 4.**

COURSE CODE: LUM 405

TITLE OF PAPER: SANITATION AND WASTE MANAGEMENT

TIME ALLOWED: TWO (2) HOURS

SPECIAL MATERIAL REQUIRED: CALCULATOR

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO
OTHER QUESTIONS.**

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GRANTED BY THE CHIEF INVIGILATOR**

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SECTION ONE: COMPULSORY

QUESTION ONE

- a) What is biogas and what are its applications? **(5 Marks)**
- b) Given that the specific energy content of carbon = 33.7 MJ/kg and that of hydrogen = 144 MJ/kg. Calculate the energy content 60 kg of biogas which consists of methane and carbon dioxide in a 2: 1 mixture. **(10 Marks)**
- c) Explain why there is a need to monitor C:N ratio, moisture, aeration, temperature and pH in making compost. **(10 Marks)**
- d) List four major municipal solid waste management options practiced in Swaziland. **(5 Marks)**
Discuss the possible improvements of the waste management option that you perceive to be the best for the country. **(10 marks)**

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SECTION II: ANSWER ANY TWO QUESTIONS

QUESTION TWO

- a) List the factors considered in determining the required capacity of a landfill.
(10 Marks)
- b) What is the environmental relevance of packaging waste in the country?
(10 Marks)
- c) Give a brief description of waste recycling giving examples that are relevant to Swaziland.
(10 Marks)

QUESTION THREE

- (a) What is medical waste and why is it of great concern to the general public?
(5 Marks)
- (b) Describe how waste segregation is applied in the management of medical waste. Indicate why it is difficult to fully apply the system in Swaziland government hospitals.
(10 Marks)
- (c) Give a full description of the design features of a ventilated improved pit latrine (VIP). Your answer should clearly explain the science behind each design aspect.
(15 Marks)

QUESTION FOUR

- (a) Give a detailed description of the design and operation features of a landfill that make it the most environmentally friendly waste disposal method.
(15 Marks)
Highlight the environmental limitations of landfills.
(5 Marks)
- (b) Discuss the environmental effects of poor solid waste management in Swaziland.
(10 Marks)