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*(University of Choice)*

**MASINDE MULIRO UNIVERSITY OF  
SCIENCE AND TECHNOLOGY  
(MMUST)**

**MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS  
2023/2024 ACADEMIC YEAR**

**FOURTH YEAR FIRST SEMESTER EXAMINATIONS**

**MAIN EXAMINATION**

**FOR THE DEGREE OF  
BACHELOR OF SCIENCE IN DISASTER PREPAREDNESS AND  
ENVIRONMENTAL TECHNOLOGY (DPET)**

**&**

**BACHELOR OF SCIENCE IN DISASTER MITIGATION & SUSTAINABLE  
DEVELOPMENT (DMSD)**

**COURSE CODE: DPE 404**

**COURSE TITLE: HAZARDOUS MATERIALS AND SOLID WASTE  
MANAGEMENT**

**DATE: 20/12/2023**

**TIME: 12-2PM**

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**INSTRUCTIONS TO CANDIDATES**

- This paper contains FOUR (4) questions (overleaf)
- Answer **Question One** and **ANY other Three**

**DURATION**            2 hours

**MMUST observes ZERO tolerance to examination cheating**

This Paper Consists of 2 Printed Pages. Please **Turn** Over

## SECTION I: COMPULSORY {30 MARKS}

### Question 1

A student carrying out research on waste management in Kakamega County made the following observations on waste generation in the municipality over a 14-day period.

	Generation rate (m <sup>3</sup> /day)	
	Week 1	Week 2
Monday	34	145
Tuesday	48	93
Wednesday	290	175
Thursday	61	110
Friday	205	283
Saturday	100	120
Sunday	30	25

- What could be the most probable reasons for the observed daily variation in waste generation? **(3 marks)**
- Suppose this data was obtained during a wet season, what difference in observed would you likely observe in dry season and why? **(3 marks)**
- If half of the above waste is generated in commercial areas, and the rest in residential areas and institutions, what strategy (e.g., frequency, vehicle capacity and collection points, etc.) would you suggest waste collection in this Municipality? **(8 marks)**
- Suppose the student further observed that the waste was unsorted at the dumpsite, and consists of organic, plastic, metal, fabric, medical and other garage wastes, what management approach from collection to disposal would he advise the municipality to adopt to protect the environment? **(10 marks)**
- What are the key goals of waste management? **(6 marks)**

## SECTION II: ATTEMPT ANY OTHER TWO (2) QUESTIONS {40 MARKS}

### Question 2

Explain how they the following characteristics of Municipal Solid Waste (MSW) and influence the respective disposal methods.

- Composition by type **(4 marks)**
- Density **(4 marks)**
- Moisture content **(4 marks)**
- Particle size **(4 marks)**
- Biodegradability **(4 marks)**

### Question 3

(a) With help of *examples*, briefly discuss the effectiveness of the following instruments towards waste management

- Regulatory instruments **(5 marks)**
  - Economic instruments **(5 marks)**
- b) Explain any 4 common challenges facing MSW management in developing countries **(10 marks)**

### Question 4

- Explain the factors that must be considered in the *on-site* storage of solid wastes **(10 marks)**
- Assuming you are contracted to carry out a waste audit in MMUST, explain how you would carry out this work, outlining the necessary procedures and steps you would follow **(10 marks)**