



[University of Choice]

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY**

[MMUST]

MAIN EXAMINATION

2021/2022 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

**MASTER OF SCIENCE IN INDUSTRIAL ENGINEERING
AND MANAGEMENT**

COURSE CODE: IEM 851

COURSE TITLE: INDUSTRIAL POLLUTION CONTROL

DATE: 25-04-2022

TIME: 08:00-10:00

INSTRUCTIONS TO CANDIDATES

1. This paper consists of **FIVE** questions
2. Answer any **THREE** Questions
3. All symbols have their usual meaning

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over

QUESTION ONE **[20 marks]**

- a] Explain why stratospheric ozone important **[4 marks]**
- b] Using relevant equations, explain how stratospheric ozone can be depleted **[4 marks]**
- c] Using relevant equations, explain how chlorofluorocarbons [CFCs] worsen stratospheric ozone depletion **[12 marks]**

QUESTION TWO **[20 marks]**

- a] With the aid of a diagram, explain the principle of operation of a settling chamber as an equipment for Particulate matter control **[14 marks]**
- b] Explain how secondary air pollutants are formed **[6 marks]**

QUESTION THREE **[20 marks]**

- a] Using a schematic, describe the principle operation of a thermal incinerator **[16 marks]**
- b] Ozone is both good and bad. Explain. **[4 marks]**

QUESTION FOUR **[20 marks]**

- a] State and explain any four factors that can lead to an increase in cyclone efficiency **[8 marks]**
- b] State any four methods through which the control of nitrogen oxides [NO_x] emissions can be achieved **[4 marks]**
- c] Fuel denitrogenation is one of the methods for control of nitrogen oxides emissions. Using a schematic, briefly explain how this process takes place **[8 marks]**

QUESTION FIVE **[20 marks]**

- a] State any four factors the National Environment Management Authority may consider when determining whether to issue a licence in the case where noise is a concern. **[4 marks]**

b] State and explain any four causes of industrial waste generation

[8 marks]

c] Explain any three obstacles to achievement of cleaner production

[6 marks]

