



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION**

**DEPARTMENT OF TECHNICAL AND ENGINEERING EDUCATION AND TRAINING**

**ENVIRONMENTALLY CONSCIOUS ENGINEERING PTE 6146**

**Main Examination Paper**

**NOVEMBER 2024**

-This Examination Paper consists of pages 3

Time Allowed: 3 hours

Total Marks: 100

Internal Examiner: Ms L Chimbani

External Examiner: Dr C Kahanji

**INSTRUCTIONS**

1. The paper consists of seven (7) questions. Answer any five questions in any order.
2. Each question carries 20 marks.
3. The use of calculators is permissible.
4. Show all workings.

**MARK ALLOCATION**

QUESTION	MARKS
1.	20
2.	20
3.	20
4.	20
5.	20
6.	20
7.	20

### Question 1

- a. Define the term Cleaner Production (CP). [2 Marks]
- b. Identify four CP strategies. [4 Marks]
- c. Differentiate between CP and End- Pipe-Approach. [4 Marks]
- d. Define the term eco-design and describe the aspects considered in eco-design. [10 Marks]

### Question 2

- a. What is an Environmental Management System (EMS)? [2 Marks]
- b. Explain the purpose of the key elements of the Environmental Management System (EMS). [10 Marks]
- c. Highlight and explain the role and benefits of Environmental Auditing. [8 Marks]

### Question 3

- a. Briefly explain the following terms:
  - i. Environmental monitoring [4 Marks]
  - ii. Environmental assessment [4 Marks]
- b. Identify the effects of toxic fumes and gases to the following and suggest ways to minimize these effects:
  - i. The worker [6 Marks]
  - ii. The environment [6 Marks]

### Question 4

- a. List any four pro-active environmental strategies. [4 Marks]
- b. Explain how the waste disposal methods depicted in Fig Q4(b) can affect the environment and give recommendations on how this can be corrected. [10 Marks]

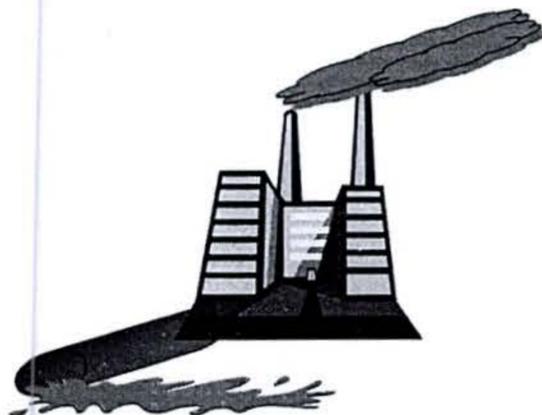


Fig Q4(b)

- c. Describe the difference between vitiated air and dust in the workplace. [6 Marks]

**Questions 5**

- a. What is waste? Give examples of three classes of waste. [5 Marks]  
b. Draw and explain the waste hierarchy. [13 Marks]

**Question 6**

- a. Identify and explain any two Cleaner Production principles. [4 Marks]  
b. Name any three hazardous substances found in a Mechanical and Industrial Engineering workshop and explain how they are handled. [6 Marks]  
c. Illustrate and explain the five steps of Eco-Design. [10 Marks]

**Question 7**

- a. What are the benefits of CP? [4 Marks]  
b. Describe the difference between recycling and reuse [4 Marks]  
c. Why is conducting environmental audit beneficial to an organisation? [4 Marks]  
d. Illustrate the possible causes of waste generation. [8 Marks]

**END OF EXAMINATION PAPER**