



# **NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF INDUSTRIAL TECHNOLOGY**

**DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING**

**ENVIRONMENTAL CONSCIOUS MANUFACTURING**

**TIE 6221**

**Main Examination Paper**

**December: 2014**

This examination paper consists of 3 pages

**Time Allowed: 3 hours**

**Total Marks: 100**

**Special Requirements: N/A**

**Examiner's Name: Eng. D. Zimwara**

## **INSTRUCTIONS**

1. Answer any five(5) questions
2. Each question carries 20 marks
3. Use of calculators is permissible

## **MARK ALLOCATION**

<b>QUESTION</b>	<b>MARKS</b>
1.	20
2.	20
3.	20
4.	20
5.	20
<b>TOTAL</b>	<b>100</b>

### **Question 1**

- a).Discuss the impacts on environmental by air pollution [ 5]
- b).What methods are used to control air pollution? [5]
- c).What is the criteria of pollutants that determine the air quality [5]
- d). Identify and discuss the sources of water pollution. [10]

### **Question 2**

- a).Discuss the hierarchy of waste management. [5]
- b).Explain the various definitions of waste minimisation. [5]
- c). Give an account of waste reduction techniques that are available. [5]
- d).How would do you convince your management at a company the advantage of applying waste minimisation techniques in the organisation. [5]

### **Question 3**

- a).Define sustainable development [2]
- b).Explain the concept of sustainable development [8]
- c).Discuss the controversy of sustainable development [10]

### **Question 4**

Explain in detail the various pollution control techniques. [20]

### **Question 5**

- a).Define life cycle assessment [LCA] [2]
- b).How would you explain the LCA methodology to an engineer who intends to implement it? [18]

### **Question 6**

- a).Explain the concept of lean manufacturing [2]
- b).Give an account of the various sources of waste or types of waste that are found in a manufacturing plant.[18]

**Question 7**

a).What role is played by environmental indicators in keeping the environment clean? [2]

b).Explain the key environmental indicators. [18]



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**TIE 6221**

**Supplementary Examination Paper**

**August 2015**

This examination paper consists of 3 pages

**Time Allowed: 3 hours**

**Total Marks: 100**

**Special Requirements: N/A**

**Examiner's Name: Eng. D. Zimwara**

#### **INSTRUCTIONS**

1. Answer any five(5) questions
2. Each question carries 20 marks
3. Use of calculators is permissible

#### **MARK ALLOCATION**

<b>QUESTION</b>	<b>MARKS</b>
1.	20
2.	20
3.	20
4.	20
5.	20
<b>TOTAL</b>	<b>100</b>

### **Question 1**

- a).What are the key elements of an environmental management system [5]
- b).Explain the mandate of EMA in Zimbabwe and what challenges can they be facing [15]

### **Question 2**

Give a detailed account of the following concepts as applied to manufacturing environment

- a).Eco design [5]
- b).Eco efficiency [5]
- c).Green manufacturing [5]
- d).chimney design [5]

### **Question 3**

Explain the concept of design for environment [20]

### **Question 4**

- a).What is cleaner production [2]
- b).What are the elements of cleaner production? [4]
- c).What are the applications of cleaner production? [5]
- d).Identify and explain the cleaner production practices. [9]

### **Question 5**

Explain the issues that are discussed in agenda 21 [20]

### **Question 6**

- a).Discuss the elements of ISO 14001 Standard [8]
- b).Explain the following terms in relation to Sustainable development

- |      |                       |     |
|------|-----------------------|-----|
| i.   | Life cycle analysis   | [4] |
| ii.  | Pollution prevention  | [4] |
| iii. | Material substitution | [4] |

**Question 7**

a).Discuss those aspects which are affected by a manufacturing environment. [15]

b). How are these aspects of environment affected? [5]