



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF INDUSTRIAL TECHNOLOGY**

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY**

**Bachelor of Engineering Honours Degree Industrial and Manufacturing Engineering**

**ERGONOMICS AND INDUSTRIAL SAFETY I**

**TIE 1104**

**First Semester Examination Paper**

**December 2014**

This examination paper consists of 3 pages

**Time Allowed:** 3 hours  
**Total Marks:** 100  
**Special Requirements:** None  
**Examiner's Name:** Eng. Sipiwe Trinity Nyadongo

**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           |
| 6.              | 20           |
| 7.              | 20           |
| <b>TOTAL</b>    | <b>100</b>   |

## QUESTION 1

Musculoskeletal Disorders (MSDs) are common disorders that occur among workers in an engineering environment.

- a) Describe 'Eye strain' as an MSD. [5]
- b) Describe in detail using illustrations and/or examples five (5) risk factors that lead to the development of MSDs. [10]
- c) Highlight five (5) benefits of Ergonomics. [5]

## QUESTION 2

- a) What are the common reasons why employees do not report incidents? [5]
- b) What are the 5 main types or categories of information/ evidence that need to be collected when an accident investigation begins? [5]
- c) List and explain the steps for conducting an accident investigation. [10]

## QUESTION 3

- a) Distinguish between safety and ergonomics. [4]
- b) Briefly explain the importance of safety in a manufacturing organisation. [4]
- c) Why is a good factory design a pre-requisite for achieving a safe working environment? [2]
- d) State any TEN principles of factory design for safety. [10]

## QUESTION 4

- a) Whether your tasks are performed while sitting or standing, always maintain proper posture & angles. Explain how the following body parts should be oriented with respect to the whole for a person who is seated whilst working:
  - i) Head, [2]
  - ii) Shoulders, [2]
  - iii) Elbows, [2]
  - iv) Hands. [2]
- b) There are three (3) categories of controls that can be taken in an organisation to reduce MSDs.
  - i) State these categories of control. [3]
  - ii) For each control category highlight three (3) examples of controls that can be taken. [9]

### QUESTION 5

- a) State any four (4) factors considered in selecting safety gear. [4]
- b) State the safety gear required for the following protection
  - i) Eye and ear, [3]
  - ii) Feet and Legs, [3]
- c) Identify hazards in the following and their prevention
  - i) Metal Cutting, [2]
  - ii) Gas Welding, [3]
  - iii) Arc Welding, [3]
  - iv) Electrical. [2]

### QUESTION 6

A workshop is to be occupied by new owners:

- a) Identify six (6) factors that should be considered by the new owners when assessing the suitability of lighting within the building. [3]
- b) Other than lighting, outline and explain three (3) factors associated with the working environment that may affect the health and safety of employees. [9]
- c) Discuss the four (4) requirements with respect to the welfare facilities that should be provided in the building. [8]

### QUESTION 7

- a) A drill press operator who was wearing gloves was drilling holes for metal fasteners to be used in an aircraft wing gas tank assembly. She then attempted to make a tool change while the machine was operating at a slow speed. While she was doing so, the glove on her right hand caught on the revolving drill and caused an amputation of the middle finger on her right hand.
  - i. Determine the cause of the accident. [2]
  - ii. State the corrective actions required. [4]
  - iii. Suggest the follow up action required. [6]
- b) Identify the four methods of heat transfer and explain how each can cause the spread of fire. [8]