



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF INDUSTRIAL TECHNOLOGY**

**DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING**

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

**WORKSHOP TECHNOLOGY I**

**TIE 1103**

**First Semester Main Examination Paper**

**December 2014**

This examination paper consists of 3 pages

**Time Allowed: 3 hours**

**Total Marks: 100**

**Special Requirements: Nil**

**Examiner's Name: Eng. Vennan Sibanda**

**INSTRUCTIONS**

1. Answer any five (5) questions
2. Each question carries 20 marks

**MARK ALLOCATION**

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

### Question 1

- a) Why should safety be observed in the work place? [5]
- b) For an organisation of your choice, identify safety rules that are applicable and explain. [5]
- c) If you consider that a work place is not safe, would you continue working there? Give reasons to justify your answer. [5]
- d) You are the Engineer of an organisation and you are tasked with the responsibility of looking at the safety of workers. What would you do in pursuance of this? [5]

### Question 2

- a) Name and explain the five (5) types of iron and steel produced as a result of the steel making process. [10]
- b) Differentiate between ferrous and non-ferrous metals, giving examples of each? [5]
- c) Explain the two major groups of plastics, giving examples of where they are used. [5]

### Question 3

- a) Differentiate between calipers and vernier calipers. [5]
- b) Where and why do you use a surface table? [5]
- c) With the aid of a diagram explain how a micrometer is used to take a measurement, clearly stating and showing the reading. [10]

### Question 4

- a) Brittleness is the property of breaking without much permanent distortion. Explain what causes a metal to become brittle and how you would minimise brittleness. [5]
- b) With the aid of a diagram explain elasticity and the elastic limit of a metal, giving the importance of this property in engineering. [10]
- c) With the aid of a labeled diagram show, for carbon steel, the extension curves for:
  - i. A Normalised steel. [1]
  - ii. A hardened steel. [1]
  - iii. A hardened and tempered steel [1]
- d) With the aid of a labeled diagram show, for a non-ferrous alloy, the extension curves for:
  - i. An annealed non-ferrous alloy. [1]
  - ii. A cold worked non-ferrous alloy. [1]

### Question 5

- a) A scraper is a workshop hand tool, where and why is it used? [5]
- b) Name and explain five (5) marking out tools used in the workshop. [10]
- c) Which machine tool is suitable for drilling large work pieces and why? [5]

### Question 6

- a) Explain why work must be clamped when drilling or when machining. [5]
- b) With the aid of a diagram show a screw cutting tool indicating the thread angle, explaining the reason for the angle and how it is achieved. [5]
- c) With the aid of a diagram show a screw cutting operation on the lathe. [10]

### Question 7

With the aid of diagrams, show a plane milling operation and explain the type of milling cutter/s used and the type of coolant, if any, giving supporting reasons. [20]

End of Examination