



# MACHAKOS UNIVERSITY

## SCHOOL OF ENGINEERING AND TECHNOLOGY

### DEPARTMENT OF MECHANICAL & MANUFACTURING ENGINEERING

### FIRST YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

### EMC 105 MATERIALS, METALLURGY & WORKSHOP TECHNOLOGY

DATE: 15//12/2017

DATE:

---

#### INSTRUCTIONS

*This paper consists of two sections. Section A is compulsory, and then answer any other two questions from section B*

#### SECTION A: COMPULSORY.

1. a) Describe briefly the following mechanical properties
  - i. Tensile strength
  - ii. Hardness
  - iii. Malleability
  - iv. Impact strength
  - v. Ductility (10 marks)
- b) List four types of heat treatment processes (4 marks)
- c) In 1 (b) above explain four purposes of the processes in each. (16 marks)

#### SECTION B: ANSWER ANY TWO QUESTIONS

2. a) Define marking out as used in workshop processes (3 marks)
- b) Using clear sketches, illustrate the following marking out tools;
  - i. Vee block
  - ii. Angle block
  - iii. Centre punch (9 marks)
- c) Using a sketch, explain how vee blocks are used in marking out the centre of a round bar (8 marks)

3. a) Sketch a vernier caliper and name its main parts. (10 marks)
- b) Show a reading of 13.44mm on a 0.02mm accuracy vernier caliper. (4 marks)
- c) Explain how the accuracy of 0.02mm is achieved in a vernier caliper. (6 marks)
4. a) Differentiate between inspection and measuring as used in electrical workshop. (3 marks)
- b) Using sketches illustrate the following inspection tools stating where they are used;
- i. Radius gauge
  - ii. Try square
  - iii. Feeler gauge (12 marks)
- c) Show a reading of 10.64mm on a vernier micrometer. (5 marks)
5. a) State any five objectives of industrial safety. (5 marks)
- b) Highlight any three causes of accidents in workshop. (3 marks)
- c) Discuss any three metals used in sheet metal work. (6 marks)
- d) Describe the following sheet metal operations;
- i. Measuring and marking,
  - ii. Riveting. (6 marks)