



# MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CRAFT CERTIFICATE IN MECHANICAL ENGINEERING (PRODUCTION OPTION)

1501/105B: MATERIAL SCIENCE AND METALLURGY

DATE: 17/04/2019

TIME: 8.30-11.30 AM

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## INSTRUCTIONS:

*Answer all questions in this exam.*

### QUESTION ONE (20 MARKS)

With the aid of a labelled diagram describe the production of steel by use of electric furnace.

### QUESTION TWO (20 MARKS)

- a) Explain the purpose of each of the following elements in their respective steels.
- Nickel
  - Chromium
  - Tungsten
  - Vanadium
  - Manganese
- (15 marks)
- b) State FIVE common properties with non-ferrous metals and alloys (5 marks)

### QUESTION THREE (20 MARKS)

- a) State EIGHT properties of bearing materials. (8 marks)
- b) Differentiate between thermosetting and thermoplastics plastics. (6 marks)
- c) State six types of rubber (6 marks)

### QUESTION FOUR (20 MARKS)

- a) Explain FOUR benefits of stainless steel (8 marks)
- b) Explain FOUR reasons for curing timber. (8 marks)
- c) State FOUR methods of seasoning timber (4 marks)

### QUESTION FIVE (20 MARKS)

- a) Explain any FIVE methods for corrosion prevention (10 marks)
- b) Describe each of the following heat treatment processes.
- Hardening
  - Annealing
- (10 marks)