



# MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN MECHANICAL ENGINEERING

MED-PR 2502/106: MATERIALS AND METALLURGY 1

DATE: 15/4/2019

TIME: 8.30-11.30 AM

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## INSTRUCTIONS:

*Answer all questions*

### QUESTION ONE (20 MARKS)

- a) With the aid of a sketch, explain the structural changes that occur when austenitic stainless steels are heated through a temperature range from (650<sup>0</sup>c-800<sup>0</sup>c) giving two methods of minimizing the defect. (12 marks)
- b) State two properties of each of the following
  - i. Heat resisting steels
  - ii. Free cutting steels (4 marks)
- c) State two uses of high speed steels (2 marks)

### QUESTION TWO (20 MARKS)

- a) Aluminium oxide is extracted from bauxite by the Bayer process. Explain the Bayer process. (12 marks)
- b) List any two aluminium alloys stating two properties and two uses of each. (8 marks)

**QUESTION THREE (20 MARKS)**

- a) State and explain the two broad classifications of plastics. (10 marks)
- b) List five ways in which plastics are superior to metals in engineering (5 marks)
- c) State the use of each of the following plastics
  - i. Polyvinylchloride.
  - ii. Phenol formaldehyde. (4 marks)
- d) Give one example of crystalline plastics. (1mk)

**QUESTION FOUR (20 MARKS)**

- a) State any four characteristics of good timber. (4 marks)
- b) Differentiate between exogenous and endogenous tress. (2 marks)
- c) Define 'seasoning' in reference to timber. (2 marks)
- d) List four advantages of timber seasoning. (4 marks)
- e) Describe the following methods of timber seasoning;
  - i. Air seasoning.
  - ii. Kiln seasoning. (6 marks)

**QUESTION FIVE (20 MARKS)**

- a) State any four properties of stainless steels which make them have numerous applications in the industry (4 marks)
- b) State the three classes of stainless steels with regard to composition giving two properties and two applications of each. (12 marks)
- c) Give an account for the high corrosion resistance offered by stainless (4 marks)