



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

SECOND SEMESTER EXAMINATION FOR

DIPLOMA (I) IN MECHANICAL ENGINEERING (PRODUCTION, PLANT &
AUTOMOTIVE)

MATERIALS TECHNOLOGY & METALLURGY 1

2501/106/MT- (PRODUCTION OPTION)

2502/106/MTLS- (PLANT OPTION)

2503/106/MTLS- (AUTOMOTIVE OPTION)

DATE: 2/9/2021

TIME: 8:30 – 11:30 AM

INSTRUCTIONS

Answer all questions

1. a) With the aid of a sketch, explain the structural changes that occur when austenitic stainless steels are heated through a temperature range from $(650^{\circ}\text{C}-800^{\circ}\text{C})$ giving two methods of minimizing the defect. (14 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)
2. 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)
3. a) State and explain the two broad classification 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. (1 mark)
4. a) State any four characteristics of good timber. (4 marks)
- b) Differentiate between exogenous and endogenous stress. (4 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)
- 5 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)