



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR FIRST 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:

TIME:

INSTRUCTIONS

Answer all questions

1. (a) Explain **three** effects of nickel on the microstructure of cast iron. (6 marks)
(b) (i) Explain **three** properties of grey cast iron. (6 marks)
(ii) State **two** applications of grey cast iron. (2 marks)
(c) Describe the process of producing malleable cast iron (6 marks)
2. (a) Pure copper is rarely found in nature, but is usually combined with other chemicals in the form of copper ores. Explain sequentially the process of manufacturing copper from copper pyrite. (16 marks)
(b) State the composition and **two** application of the following copper alloy
(i) Copper-beryllium. (4 marks)
3. (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)
4. (a) (i) Differentiate between iron and steel in materials and metallurgy. (2 marks)
(ii) Describe **three** classifications of plain carbon steels. (6 marks)

(iii) Explain **three** effects of silicon on the properties of iron. (6 marks)

(b) Explain two effects of each of the following elements on the properties of steel

(i) Nickel

(ii) Chromium

(iii) Manganese

(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 n giving two properties and two applications of each. (12 marks)

(c) Give an account for the high corrosion resistance offered by stainless steels

(4

marks)