



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

THIRD YEAR FIRST SEMESTER EXAMINATION FOR

DIPLOMA IN MECHANICAL ENGINEERING

DIPLOMA IN MOTOR VEHICLE ENGINEERING

2502/106WT; 2503/106WT:MATERIALS TECHNOLOGY & METALLURGY

DATE: 14/12/2020

TIME: 2.30-5.30 PM

INSTRUCTIONS TO CANDIDATES

Answer all questions

All questions carry equal marks

1. (a) Explain **two** effects of each of the following elements on the properties of steel
 - i. Nickel
 - ii. Chromium
 - iii. Manganese (6 marks)
- (b) State any **four** properties of stainless steels which make them have numerous applications in the industry (4 marks)
- (c) Give an account for the high corrosion resistance offered by stainless steels (4marks)
- (d) Explain **three** effects of silicon on the properties of iron. (6 marks)
2. (a) List any four properties of a good bearing material. (4 marks)
- (b) Describe the following bearing materials stating the application of each:
 - i. white metal alloys;
 - ii. aluminium based alloys. (6 marks)
- (c) List any four advantages of plastic materials. (4 marks)
- (d) Describe the following plastic materials and state the application of each:
 - i. polyethylene;
 - ii. nylon. (6 marks)

3. (a) State any four effects of alloying elements in plain carbon steels. (4 marks)
- (b) Describe the following corrosion resistant steels:
- i. ferritic stainless steels;
 - ii. martensitic stainless steels;
 - iii. austenitic stainless steels. (6 marks)
- (c) Illustrate any five forms of sections in which steel materials are supplied (10 marks)
4. (a) List and explain the two broad classifications of engineering materials. (4 marks)
- (b) List three non-metals and explain their uses in engineering. (12 marks)
- (c) Differentiate between a metal and an alloy giving an example in each. (4marks)
5. (a) Explain how cast iron is obtained by smelting. (10marks)
- (b) Describe the following types of cast iron;
- i. Grey cast iron. (3marks)
 - ii. Malleable cast iron. (4marks)
 - iii. Nodular cast iron. (3marks)