



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)

University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN MECHANICAL
ENGINEERING

MED-PR 202: MATERIAL SCIENCE II

DATE: 8/8/2016

TIME: 11:00 – 1:00 PM

INSTRUCTIONS:

This paper consists of two sections. Section A is compulsory, and then answer any other two questions from section B

SECTION A: COMPULSORY.

1.
 - a)
 - i) Define corrosion (2 marks)
 - ii) State any four factors which influence corrosion (4 marks)
 - b) Differentiate between grey and white cast iron (4 marks)
 - c) Define surface hardening. (2 marks)
 - d)
 - i) differentiate between destructive and non-destructive testing of materials (2 marks)
 - ii) State two objectives of carrying out tests and inspection in an engineering industry (2 marks)
 - e)
 - i) State four properties of glasses. (4 marks)
 - ii) state any four areas where glass find use. (4 marks)
 - f)
 - i) Define a composite material. (2 marks)
 - ii) Highlight any four properties of composite material. (4 marks)

SECTION B: ANSWER ANY TWO QUESTIONS

2. a) Describe the following methods of surface hardening using sketches;
- i) Flame hardening;
 - ii) Induction hardening;
 - iii) Nitriding;
 - iv) Pack carburizing; (16 marks)
- b) Describe the effects of the following elements on cast iron;
- i. Carbon
 - ii. Silicon (4 marks)
3. Explain the following material testing processes;
- i) Brinell hardness
 - ii) Charpy test
 - iii) Shore scleroscope
 - iv) Vickers' test (20 marks)
4. a) discuss the following types of corrosion;
- i) pitting corrosion
 - ii) intergranular corrosion (4 marks)
- b) Describe the following types of glasses with regard to properties, composition and applications for each;
- i) silica glasses
 - ii) borosilicate
 - iii) aluminosilicate glass (12 marks)
- c) Describe the following methods of seasoning;
- i) kiln seasoning
 - ii) air seasoning (4 marks)

5. a) describe the following methods of controlling and preventing corrosion;
- i) modification of corrosive environment
 - ii) design against corrosion
 - iii) cathodic corrosion (6 marks)
- b) Using a sketch describe the production of aluminium. (6 marks)
- c) Describe the following cast irons with regard to properties, composition and applications;
- i) White heart iron
 - ii) Black heart iron (8 marks)