



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

SECOND YEAR FIRST SEMESTER EXAMINATION FOR DIPLOMA IN

MECHANICAL ENGINEERING

MED -PR 202: MATERIAL SCIENCE II

DATE: 18/12/2017

TIME: 8:30 – 10:30 AM

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) Differentiate between grey and white cast iron (4 marks)
 - b) Define surface hardening (2 marks)
 - c)
 - i Define corrosion (2 marks)
 - ii State any four factors which influence corrosion (4 marks)
 - d) Describe the following methods of timber seasoning;
 - i. Kiln
 - ii. Air (4 marks)
 - e)
 - i state four properties of glasses (4 marks)
 - ii state any four types of glasses (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. Gas carburizing;
 - ii. Induction hardening;
 - iii. Liquid carburizing;
 - iv. Flame hardening; (16 marks)
- b) Describe the effects of the following elements on cast iron;
- i. Manganese
 - ii. Phosphorus (4 marks)
3. Explain the following material testing processes;
- a) Rockwell hardness
 - b) Izod test
 - c) Vickers' test
 - d) Shore scleroscope (20 marks)
4. a) Discuss the following types of corrosion;
- i. intergranular corrosion
 - ii. Galvanic corrosion (4 marks)
- b) Describe the following types of composites with regard to properties, composition and applications for each;
- i. Fibre-reinforced composites
 - ii. Laminated composites
 - iii. Dispersion reinforced composites (12 marks)
- c) Describe the following timber defects;
- i. Knots
 - ii. Shakes (4 marks)
5. a) Describe the following methods of controlling and preventing corrosion;
- i. Plating
 - ii. modification of corrosive environment
 - iii. Corrosion inhibitors (6 marks)
- b) Using a sketch describe the production of Copper (8 marks)
- c) Describe the term “growth” in cast iron and state its remedy. (6 marks)