



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR DIPLOMA IN
MECHANICAL ENGINEERING

MED-PR 219: MATERIAL SCIENCE III

DATE: 19/12/2017

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 Macro and Micro examinations (4 marks)
- b) Define Polymeric materials (2 marks)
- c) i define ceramics (2 marks)
ii State any four properties of ceramics (4 marks)
- d) Describe the following classes of plastics;
i Thermosetting
ii thermoplastics (4 marks)
- e) i State four properties of Polymeric materials (4 marks)
ii State any four applications of Polymeric materials (4 marks)
- f) Describe briefly the principle of micro-examination using a sketch (6 marks)

SECTION B: ANSWER ANY TWO QUESTIONS

2. Describe the following thermal equilibrium diagrams using sketches;
- a) Simple eutectic type;
 - b) Combination type;
 - c) Solid solution type; (20 marks)
3. Explain the following material testing processes using sketches;
- a) Ultra-sonic testing
 - b) Eddy current
 - c) Magnetic particles
 - d) Gamma rays method (20 marks)
4. a) Discuss the following types of ceramic materials;
- i. crystalline
 - ii. non-crystalline (6 marks)
- b) Describe any three applications of and three products of ceramic engineering. (6 marks)
- c) Using sketches describe the etching process in metallography (8 marks)
5. Describe the following types of plastics stating properties, use and its application.
- a) Urea formaldehyde
 - b) Melamine formaldehyde
 - c) Phenolic formaldehyde
 - d) Polypropylene
 - e) Polytetrafluoroethylene (20 marks)