MACHAKOS UNIVERSITY

University examinations 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR BACHELOR IN CIVIL ENGINEERING

ECV 101: MATERIAL SCIENCE

Date **time**

INSTRUCTIONS

- *This paper comprises of four questions. Answer **two** questions*
- *Question one is **compulsory** and carry 30 marks*
- *Answer any other **one** questions*

Question 1

a) Differentiate between the following terms:

i) Structure and Composition (4 marks)

ii) Ionic bonding and Covalent bonding (4 marks)

iii) Atomic number and Atomic mass (4 marks)

b) Describe the checklist for general selection of material for engineering application. (10 marks)

c) A 14.5 mm diameter round sample of carbon steel is pulled to failure in a tensile testing machine. The diameter of the sample was 8.0mm at the fracture surface. Calculate the percent reduction in the area of the sample: (8 marks)

Question 2

a) Describe the term electronegativity. (6 marks)
b) Discuss and compare Brinell hardness test and Knoops hardness test technique. (14 marks)

Question 3

a) Define malleability and give its importance in material application (6 marks)
b) With examples explain how alloy components are classified (14 marks)

Question 4

a) Discuss the difference between weldability and machinability (6 marks)
b) Describe in engineering on what basis are metallic selected (14 marks)

Question 5

a) Define strain aging (3 marks)
b) Discuss seven types of corrosion in engineering materials (14 marks)