MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 101: MATERIALS SCIENCE

DATE: **TIME:**

INSTRUCTIONS:

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE (compulsory) (30 Marks)

a) Describe the characteristics of cast iron which make it a valuable material for engineering application. (3 marks)

b) State any three alloys of copper (3 marks)

c) Discuss the different chemical properties of materials (6 marks)

d) Draw a Stress-strain diagram for a ductile materials and show salient features on it (5 marks)

e) Differentiate between ionic and metallic bonds (2 marks)

f) Discuss briefly three stages of an ideal creep curve (3 marks)

g) Calculate modulus of elasticity and percentage elongation of a hollow tube given the follow

Applied load	40kN ,	Outer diameter	80mm
Thickness	10 mm ,	Gauge length	30mm
Extension	0.5 mm		

(5 marks)

h) What is fatigue limit of a material (3 marks)

QUESTION TWO (20 MARKS)

a) List and discuss the properties of any four nonferrous metals (10 marks)

b) There is a range of standardized testing methods to characterize the mechanical properties of materials as precisely as possible: Discuss any five of them. (10 marks)

QUESTION THREE (20 MARKS)

a) Differentiate between thermoplastics and thermosetting polymers with suitable example (6 marks)

b) Describe the four common problems associated with plastics (8 marks)

c) Discuss the important properties of ceramics (8 marks

QUESTION FOUR (20 MARKS)

a) How can composites be classified (6 marks)

b) Write the advantages of composite materials over traditional engineering alloys (6 marks)

c) Describe three ways of determining hardness of engineering materials. (6 marks)

d) Mention two desirable characteristics of glasses (2 marks)

QUESTION FIVE (20 MARKS)

a) Discuss different types of fibers (8 marks)

b) Describe different types of bitumen stating their uses (8 marks)

c) Explain the three forms of tar (6 marks)