



TECHNICAL UNIVERSITY OF MOMBASA
**Faculty of Engineering &
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DECREE IN:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE)

ECE 2213: CIVIL ENGINEERING MATERIALS II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2015

TIME ALLOWED: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Pocket Calculator*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

Use neat, large and well labeled diagrams where required

This paper consists of **TWO** printed pages

Question One (Compulsory)

a) Explain the following metallurgical characteristics:

- (i) Ductile and brittle deformation
- (ii) Elastic deformation

(6 marks)

b) (i) Outline the **THREE** main classes of timber preservatives

(ii) Describe briefly the pressure method of preserving timber

(8 marks)

c) (i) Outline the **FOUR** properties and applications of polymers as a construction material

(4 marks)

(ii) Differentiate between thermoplastic and thermosets giving **ONE** advantage and disadvantage of each

(4 marks)

- d) Explain the principles used in stress grading timber and outline the mechanical stress grading of timber process **(8 marks)**

Question Two

- a) State the effect of moisture content (M.C) of timber and outline how it is determined **(6 marks)**
- b) Define seasoning and hence with well labeled diagrams, discuss natural and artificial seasoning giving their advantages and disadvantages **(10 marks)**
- c) With well labeled diagrams discuss defects of timber during conversion **(4 marks)**

Question Three

- a) (i) Define corrosion
(ii) Briefly elaborate on the electrochemical process **(10 marks)**
- b) Briefly elaborate the following protective coating:
(i) Nickel plating
(ii) Electroplating
(iii) Zinc plating **(6 marks)**
- c) Discuss the influence of carbon in steel **(4 marks)**

Question Four

- a) Outline with the aid of suitable sketches, the following processes of manufacture of polymer materials:
(i) Moulding by compression
(ii) Transfer moulding **(10 marks)**
- b) Explain FOUR factors that are responsible for deterioration of polymeric materials **(10 marks)**

Question Five

- a) Sketch a typical stress-strain curve for steel including the case for unloading and reloading and describe the different distinct parts. **(6 marks)**
- b) Using clear sketches, describe the macroscopic structures of wood **(6 marks)**
- c) State the significance of the heat treatment processes of steel and describe the following heat treatment processes:
(i) Tempering
(ii) Annealing **(8 marks)**