TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
(BSCE Y2 S2)

ECE 2213: CIVIL ENGINEERING MATERIALS II

END OF SEMESTER EXAMINATION
SERIES: APRIL 2014
TIME ALLOWED: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer booklet*

This paper consists of **FIVE** questions.
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
All questions carry equal marks
Maximum marks for each part of a question are as shown
This paper consists of**TWO** printedpages

Question One (COMPULSORY)

a) Outline the properties and applications of the following construction materials. **(8 marks)**
(i) Timber
(ii) Polymers

b) Discuss the influence of carbon in ferrous metals. **(6 marks)**

c) Explain the principles used in stress grading timber and outline the mechanical stress grading of timber process. **(10 marks)**

d) Outline the manufacture and properties of glass reinforced polymer materials. **(6 marks)**

Question Two

a) (i) State the effect of moisture content (m.c) of timber and outline how it is determined.
(ii) Describe the Kiln seasoning of timber and with the aid of suitable sketches, show the probable defects which could result from the process: **(12 marks)**

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

(ii) Describe briefly the pressure methods of preserving timber. **(8 marks)**

Question Three

a) Discuss the increasing pireferance in use of polymer materials in civil engineering relative to the traditional construction materials. **(6 marks)**

b) Outline with the aid of suitable sketches, the following processes of manufacture of polymer materials:
(i) Intrusion moulding
(ii) Injection moulding
(iii) Rotational moulding **(8 marks)**

c) Describe the characteristics properties and uses of the following polymer materials:
(i) Cellular polymer
(ii) Membrane
(iii) Emulsions **(6 marks)**

Question Four

a) Explain the structure of metals with emphasis to:
(i) Covalence bonding
(ii) Ionic bonding, and
(iii) Metallic bonding **(8 marks)**

b) With the aid of suitable sketches, describe the crystalline structure of metals. **(6 marks)**

c) Explain the following metallurgical characteristics:
(i) Ductile and brittle deformation;
(ii) Elastic deformation **(6 marks)**

Question Five

a) State the significance of the heat treatment processes of steel and describe the following heat treatment processes:
(i) Tempering
(ii) Hardening, and
(iii) Annelling **(8 marks)**

b) Outline the properties of the following ferrous metals:
   (i) Steel
   (ii) Wrought iron **(12 marks)**