TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
(BSCE 13M – Y2 S1/S-FT)

ECE 2206: CIVIL ENGINEERING MATERIALS I

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 **THREE** printed pages

Question One (Compulsory)

a) List FOUR advantages or ready mix concrete over normal concrete. **(4 marks)**

b) Explain the FIVE key stages in concrete mix design as per the British Department of Environment (DOE) procedure. **(10 marks)**

c) Describe TWO methods of non-destruction testing of concrete. **(10 marks)**

d) Outline the functions of mortar for use in masonry work **(6 marks)**

Question Two

a) Explain the following properties of concrete state the factors that influence them. **(9 marks)**
- **(i)** Bleeding
- **(ii)** Durability
- **(iii)** Segregation

b) State the differences between fine and coarse aggregate **(4 marks)**

c) Given a concrete mix of 1:15:3:0:4 of cement, find aggregate, coarse aggregate; water, calculate the weights of materials required to produce $1m^3$ of batch of compacted concrete using:

- **(i)** The volumetric method
- **(ii)** The density method

(Assume specific gravity of cement = 3.15 and of aggregate to be 2.65 and take the density of concrete to be $2300kg/m^3$) **(7 marks)**

Question Three

a) Give FOUR types of admixture. **(4 marks)**

b) State significance of water in a concrete mix. **(4 marks)**

c) It has often been proposed that workability of concrete should be defined by at least three separate properties viz. Compactibility, mobility and stability. Discuss these properties vis-à-vis the standard workability tests. **(6 marks)**

d) Discuss the role of Silica in clay used for brick making **(2 marks)**

e) Discuss bulking of sand and its effect on batching of concrete. **(4 marks)**

Question Four

a) Give SIX factors affecting concrete strength and explain each. **(6 marks)**

b) Describe FOUR partially-destructive methods of testing concrete **(10 marks)**

c) Explain TWO types of concrete shrinkages Viz, autogenous and drying shrinkage **(4 marks)**

d) Explain the types of deleterious substances in aggregate that interfere with concrete performance. **(6 marks)**

Question Five

a) Using a sketch, illustrate the wet process of manufacture of cement. **(6 marks)**

b) State and explain the advantages and disadvantages of the dry process of manufacture of ordinary Portland cement. **(2 ½ marks)**

c) Explain the advantages of good aggregates. **(2 ½ marks)**

d) Explain SEVEN qualities of good building stone. **(3 ½ marks)**

e) Cement quality may be affected by various errors. Explain: **(4 marks)**