THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

((A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2206: CIVIL ENGINEERING MATERIALS I

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2012
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Mathematical Table/Pocket Calculator*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **TWO** printed pages

SECTION A (COMPULSORY – 30 MARKS)

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

b) Explain **THREE** broad classifications of hydraulic cements. **(6 marks)**

c) Explain the role of tricalcium silicate, diclacium silicate and tricalcium illuminate and tetracalcium alluminanoferrite in the hydration process of cement. **(4 marks)**

d) Describe the standard test for the determination of:

i) Soundness of cement

ii) Compressive strength of cement as per current Kenya standard **(8 marks)**

e) (i) Briefly explain carbonation shrinkage.
(ii) Give **THREE** factors influencing the rate of carbonation. **(6 marks)**

SECTION B (ANSWER ANY TWO QUESTIONS FROM THIS SECTION)

Question Two (20 marks)

a) Describe briefly **THREE** main brick work and block work mortars. **(6 marks)**

b) Newly introduced Kenya standard 1725 groups' cements into **FIVE** main types. Discuss them. **(8 marks)**

c) Discuss the significance of cement quality control tests, such as fineness, setting time and soundness tests. **(6 marks)**

Question Three (20 marks)

a) List and describe **FOUR** common types of concrete admixtures under the heading given in the table below. **(12 marks)**

	Types of Admixture	Effect on Concrete	Typical Materials	Advantages	Disadvantages
(i) **(ii)** **(iii)** **(iv)**					

b) Bulking of sand is not recommended in mixing of concrete. Clearly explain this statement. **(2 marks)**

c) Differentiate between absolute specific gravity and apparent specific gravity. **(2 marks)**

d) Outline **FOUR** functions of mortar for use in masonry work. **(4 marks)**

Question Four (20 marks)

a) State the factors that influence the choice of concrete mixers. **(4 marks)**

b) Describe **FOUR** types of Batch mixers. **(8 marks)**

c) Explain **THREE** ways of delivering ready mixed concrete. **(6 marks)**

d) State the specification required for ready mixed concrete. **(2 marks)**

Question Five (20 marks)

a) Given a concrete mix ratio 1:0.8:2.4:0.4 of cement: fine aggregate: coarse aggregate: water, calculate the weights of material required to produce $1m^3$ of compacted concrete using:
i) Volumetric method
ii) The density method
iii) (NB:SG Cement = 3.15, SG Aggr = 2.65 and density of plain concrete is $2300kg/m^3$).
(7 marks)

b) Explain the factors governing the selection of mix proportions in a design mix. **(4 marks)**

c) Briefly describe **THREE** method of determining concrete workability namely:

i) Slump test

ii) Compacting factor test

iii) Vebe (V-B) test **(9 marks)**