THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

University Examination 2010

SECOND YEAR/FIRST SEMESTER EXAMINATION
FOR THE DEGREE IN BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2206: CIVIL ENGINEERING MATERIALS I

SERIES: APRIL/MAY 2010 **TIME:** 2 HOURS

Instructions:

You should have the following for this examination:
- Answer booklet
- Mathematical table/pocket calculator

Question **ONE** is Compulsory. Answer any other **TWO** questions from the remaining FOUR questions.

QUESTION ONE

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

(b) Explain the role of triclacium silicate, dicalcium silicate, tricalcium alluminate and tetracalcium alluminoferrite in the hydration process of cement. (4 marks)

(c) Describe the standard test for the determination of:-

(i) Soundness of cement
(ii) Compressive strength of cement as per current Kenya Standard. (8 marks)

(d) Explain the advantages of good aggregates. (5 marks)

(e) Explain **SEVEN** quality of a good building stone. (7 marks)

QUESTION TWO

(a) Give **SIX** factors affecting concrete strength and explain each. (9 marks)

(b) Describe **FOUR** partially – destructive method of testing concrete. (4 marks)

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

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

QUESTION THREE

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

	Type of admixture	**Effect on concrete**	**Typical Materials**	**Advantages**	**Disadvantages**
(i)					
(ii)					
(iii)					
(iv)					

(b) Discuss bulking of sand and its effect on batching of concrete: (4 marks)

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

QUESTION FOUR

(a) Explain **FOUR** advantages of 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-destructive testing of concrete. (2 marks)

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

QUESTION FIVE

(a) Given a concrete mix ratio of 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 (7 marks)

(**NB:** SG Cement = 3.15, SG Aggr = 2.65 and density of plain concrete is $2300Kg/m^3$)

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

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

(i) Slump test
(ii) Compacting factor test
(iii) Vebe (V-B) test (9 marks)