



## TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

**UNIVERSITY EXAMINATION FOR:**

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2206 : CIVIL ENGINEERING MATERIALS I

END OF SEMESTER EXAMINATION

**SERIES:** DECEMBER 2016

**TIME:** 2 HOURS

**DATE:** 15 Dec 2016

### Instructions to Candidates

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

*-Drawing instruments.*

This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

### **QUESTION ONE**

- (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. (4 marks)
- (c) Explain the advantages of good aggregates. (5 marks)
- (d) Explain **SEVEN** qualities of a good building stone. (7 marks)
- (e) Cement quality may be affected by various errors. Explain. (8 marks)

### **QUESTION TWO**

- (a) Give **SIX** factors affecting concrete strength and explain each. (6 marks)
- (b) Describe **FOUR** partially – destructive methods 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) Give four common types of cement admixtures briefly explaining functions of each admixture. (4 marks)
- (b) Explain 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. Compactability, mobility, and stability. Discuss these properties vis-a-vis the standard workability tests. (6 marks)
- (d) Discuss bulking of sand and its effect on batching of concrete: (4 marks)
- (e) Discuss the role silica in clay used for brick making. (2 marks)

### **QUESTION FOUR**

- a) Explain the following properties of concrete and state the factors that influence them.
  - i. Bleeding
  - ii. Durability
  - iii. Segregation(9 marks)
- b) State the differences between fine and coarse aggregate. (4 marks)
- c) Given a concrete mix of 1:1.5:3:0.4 of Cement: Fine aggregate: Coarse aggregate: Water, calculate the weights of materials required to produce 1m<sup>3</sup> batch of compacted concrete using;

- i. The Volumetric method.
  - ii. The density method.
- (7marks)

(Assume Specific gravity of cement=3.15 and of aggregate to be 2.65 and take the density of concrete to be 2300g/m<sup>3</sup>).

### **QUESTION FIVE**

- (a) List **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)