



TECHNICAL UNIVERSITY OF MOMBASA  
**Faculty of Engineering &  
Technology**

DEPARTMENT OF BUILDING & CIVIL ENGINEERING  
UNIVERSITY EXAMINATION FOR BACHELOR OF SCIENCE IN CIVIL  
ENGINEERING (BSCE 12J/M)

ECE 2206: CIVIL ENGINEERING MATERIALS I

**SPECIAL/SUPPLEMENTARY EXAMINATION**

**SERIES: JUNE 2013**

**TIME ALLOWED: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions.

Answer any **THREE** questions

Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages

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**Question One**

- a) State the main chemical constituents of Portland cement and their contributions to the properties of cement. **(8 marks)**
- b) Explain the following properties of aggregates:  
(i) Shape and surface texture  
(ii) Cleanliness **(4 marks)**
- c) State **SIX** precautions to be taken during placing of concrete. **(6 marks)**
- d) Describe the following properties of fresh concrete:  
(i) Consistency  
(ii) Mobile  
(iii) Compatibility  
(iv) Segregation **(8 marks)**
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- e) Explain the following properties of concrete and state the factors that influence them:  
(i) Durability  
(ii) Creep (4 marks)

### Question Two

- a) Briefly describe the following tests done on fresh concrete:  
(i) Slump test  
(ii) Compacting factor test (12 marks)
- b) Using suitable sketches, explain the **THREE** types of slump obtainable in a slump test. (6 marks)
- c) State the **TWO** aims of compacting concrete (2 marks)

### Question Three

- a) Explain the development of strength in concrete with age. (6 marks)
- b) Explain the following moisture content states of an aggregate.  
(i) Saturated and surface dry  
(ii) Wet state  
(iii) Air dry state  
(iv) Bone dry state (8 marks)
- c) Explain permeability of hardened concrete and state **SIX** factors that influence permeability. (6 marks)

### Question Four

- a) Describe hydration and state the factors which affect the rate of hydration (5 marks)
- b) (i) Explain the importance of curing in concrete work (2.5 marks)  
(ii) Explain **FIVE** methods of curing (7.5 marks)
- c) Explain the following types of mixes and where they are used:  
(i) Nominal mix  
(ii) Designed mix (5 marks)

### Question Five

- a) Explain the following properties of clay bricks:  
(i) Compressive strength  
(ii) Efflorescence (4 marks)
- b) (i) Outline **FOUR** functional requirements of masonry mortars. (6 marks)
- (ii) State **FOUR** advantages of block work over brick work and **FOUR** disadvantages of clay blocks. (4 marks)

c) Describe the following types of concrete:

(i) Heavy concrete

(ii) Shotcrete

**(6 marks)**