



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

University Examination 2010

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

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) Explain **THREE** broad classification of hydraulic cements. (6 marks)
- (b) Using a sketch illustrate the wet process of manufacture of cement. (6 marks)
- (c) State and explain the advantages and disadvantages of the dry process of manufacture of ordinary Portland cement. (6 marks)
- (d) Cement quality may be affected by variety errors. Explain. (6 marks)
- (e)
 - (i) Briefly explain carbonation shrinkage
 - (ii) Give **THREE** factors influencing the rate of carbonation. (6 marks)

QUESTION TWO

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

- (b) Newly introduced Kenya Standard KS 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

- (a) Give **FOUR** common types of concrete admixtures. (4 marks)
- (b) Describe 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 compatibility, mobility and stability. Discuss these properties vis-à-vis the standard workability tests. (6 marks)
- (d) Outline **FOUR** functions of mortar for use in masonry work. (4 marks)
- (e) Discuss the role of silica in clay used for brick making (2 marks)

QUESTION FOUR

- (a) Describe the factors that influence the choice of concrete mixers. (4 marks)
- (b) Describe **FOUR** types of batch mixers. (8 marks)
- (c) (i) Explain **THREE** ways of delivering ready mixed concrete. (6 marks)
- (ii) Describe the specification required for ready mixed concrete. (2 marks)

QUESTION FIVE

- (a) Explain the following properties of concrete and state the factors that influence them:
- (i) Bleeding (3 marks)
- (ii) Durability (3 marks)
- (iii) Segregation (3 marks)
- (b) Analyze 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 1m³ batch of compacted concrete using:-

(i) The volumetric method (7 marks)

(ii) The density method (6 marks)

(Assume specific gravity of cement = 3.15 and of aggregate to be
2.65 and take the density of concrete to be 2300 kg/m³.)