



**KENYATTA UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2011/2012**  
**SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF**  
**SCIENCE (CIVIL ENGINEERING)**

**ECV 210: CIVIL ENGINEERING MATERIALS II**

**DATE: TUESDAY, 17<sup>TH</sup> APRIL 2012**

**TIME: 2.00 P.M – 4.00 P.M**

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**INSTRUCTIONS:** Answer Question 1 and ANY TWO questions

1. (a). Write short notes on the following :

- Differential corrosion of steel (4marks )
- Fibre Saturation Point (FSP) and Equilibrium Moisture Content in timber and their significance to structural application of timber in construction. (4marks)
- Thermoplastics and thermosetting polymers ( 3marks)

(b). Kivu Steel Enterprises is a new company set to start production of steel in the Eastern part of the DRC Congo where iron ores Haematite , magnetite and Siderite are in abundance to meet the growing demand of steel for construction in the region. The company intends to apply the Bessemer process in the production of steel in all the mines. Using appropriate sketches where necessary, describe in details this process citing specific properties of steel obtained from the process of manufacturing compared to other processes such as open hearth process. (12 marks)

(c). Explain the various techniques that can be used for water proofing of brickworks (7marks).

2. Strength of wood depends on the nature of defects occurring during its growth, processing or service. Discuss the natural and seasoning defects occurring in timber explaining how they affect strength properties of timber. (20marks)

3. (a) Discuss in details the dry mud process of manufacturing of structural clay products. How does the firing temperature affect porosity and the compressive strength of structural bricks. **(12marks)**
- (b).When plastics are use in the building industry, surface hardness is often the main criteria owing to the need to avoid wear. Giving specific examples describe the various categories of plastics based on surface hardness. Describe the process of manufacture and main uses of epoxy resins. **(8 marks)**
4. (a) Plastics are produced through a chemical process called polymerization requiring which bring together monomers through different reaction initiation mechanisms. Describe these mechanism details **(8marks)**
- (b) Define the term Net Dry Salt Retention (NDSR) with regard to wood preservation. Giving specific examples describe the desirable properties of a good wood preservative. **(6marks)**
- (c). Steel is widely produced and used in the construction industry more than any other metal. What properties accounts for widespread use compared with other materials such as Aluminium or copper? **(6marks)**
5. (a). Aluminium is the second most produced metal pure form after steel. Although Aluminium is an extremely common and widespread element, the common Aluminium minerals are not economic sources of the metal. Almost all metallic Aluminium is produced from the ore bauxite ( $\text{AlOx(OH)}_{3-2x}$ ). Describe in details the process of extraction of pure aluminium from bauxite stating in details the salient conditions and reactions that take place. What are the advantages of using Aluminium and its alloys compared to steel. **(12 marks)**
- (b) Define the term sacrificial timber. Giving examples, describe the mechanism of how fire retardants improve fire resistance properties of timber members. **(8marks)**