NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF CIVIL AND WATER ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONOURS) DEGREE
PART II SECOND SEMESTER EXAM.- AUGUST- 2009
CIVIL ENGINEERING MATERIALS – TCW 2205

INSTRUCTIONS

Answer question 1 and any other three questions. Time: 3 Hours
Total Marks: 100

QUESTION 1

(a) Given a concrete mixer is a 750/500 and the required mix proportions for a 1 – bag batch of concrete are:

Cement	50kg
Sand	160kg
Stone	120kg
Water	28*l*

Calculate the mass of each material that can be loaded into the mixer to use it to its maximum capacity. **(7 marks)**

(b) Given a concrete mixer is a 750/500 and the required mix proportions for a 1 –bag batch of concrete are:

Cement	50kg
Sand	130*l*
Stone	90*l*
Water	28*l*

Calculate the maximum volume of each material that can be loaded into the concrete mixer. **(7 marks)**

(c) Differentiate between the following terms:
(i) voids and pores,
(ii) construction joints and expansion joints,
(iii) wrought iron and cast iron,
(iv) endogenous timber and exogenous timber,
(v) water requirement and water demand. **(10 marks)**

(d) Define the following terms:
(i) laitance,
(ii) quoin,
(iii) austempering,
(iv) spar,
(v) consistency. **(10 marks)**

QUESTION 2

(a) Describe the main operations in the wet process manufacture of cement. Explain how the performance of the ball mill can be improved. **(17 marks)**

(b) Stonework is superior to brickwork. Explain giving reasons. **(5 marks)**

QUESTION 3

(a) Define the term bleeding and permeability in relation to concrete. Discuss how impermeability in concrete can be achieved. **(7 marks)**

(b) Given that the mix proportions of a concrete mix are to be 1:3:3 for cement, sand and stone respectively, estimate the quantity of cement, sand and stone required to produce $1m^3$ of concrete. **(8 marks)**

(c) Outline the main factors that affect the strength of timber. **(7 marks)**

QUESTION 4

(a) State any five methods of artificial seasoning of timber. **(5 marks)**

(b) Write short notes on the precautions to be taken when steel is to be case hardened. **(12 marks)**

(c) With the aid of a diagram, state the major processes in the manufacture of clay bricks in their correct sequences. **(5 marks)**

QUESTION 5

(a) Give a reason why artificial seasoning of timber is preferred to natural seasoning. **(14 marks)**

(b) Explain the process of mechanically treating steel by drawing. **(4 marks)**

(c) Discuss the limitations of the slump test. **(4 marks)**

APPENDIX (Useful information)

1. 1 bag of cement = 40 Litres
2. Yield of mix = 0.6x (loose volume of cement + sand + stone)
3. Density of concrete = 2400kg/m^3.

Table 1: Typical examples of concrete mixer capacities.

Charge ***(litres)***	**Yield** ***(litres)***
50	35
150	100
250	175
375	250
500	325
750	500
1000	675
1250	825
1500	1000