

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF INDUSTRIAL TECHNOLOGY
DEPARTMENT OF CIVIL AND WATER ENGINEERING
BACHELOR OF ENGINEERING (HONOURS) DEGREE**

PART II SECOND SEMESTER EXAMINATIONS – MAY 2011

CIVIL ENGINEERING MATERIALS AND PRACTICE: TCW 2205

TOTAL MARKS = 100

TIME = 3 HOURS

INSTRUCTIONS

ANSWER ANY FOUR QUESTIONS

QUESTION 1

- (a) Define composite material in civil construction and state their merits and demerits. **[10 Marks]**
- (b) What are the dangers of using sea water as mixing water? **[3 Marks]**
- (c) State four main compounds contained in cement. **[4 Marks]**
- (d) Define the following terms in relation to concrete:
- (i) False set
 - (ii) Segregation
 - (iii) Bleeding
 - (iv) Setting and hardening
 - (v) Hydration
 - (vi) Permeability
- [8 Marks]**

QUESTION 2

- (a) Describe with aid of diagrams two methods used for testing workability of concrete and explain their importance in concrete construction. **[8 Marks]**
- (b) Explain the process of natural seasoning of timber and mention its advantages and disadvantages. **[6 Marks]**
- (c) Brickwork and mortar:
- (i) State the constituents of the mortar in brickwork/block work.

- (ii) Describe the recommended properties of the mortar. **[2 Marks]**
- (iii) Define efflorescence in brickwork and its control. **[4 Marks]**
- [2 Marks]**
- (d) What are the steel properties that makes it a superior construction material for bridge construction compared to fibrous composites? **[3 Marks]**

QUESTION 3

- (a) Describe with aid of diagrams three non-destructive methods used for testing hardened concrete strength. **[12 Marks]**
- (b) Describe the major processes in the manufacture of clay bricks in their correct sequences. **[7 Marks]**
- (c) State the advantages and disadvantages of bricks over block. **[2 Marks]**
- (d) You are required to cast a 3 m³ foundation footing for a house. Given the mix proportions of a concrete mix are to be 1:2:3 for cement, sand and stone, respectively. Estimate the quantity of cement, sand and stone required to cast this concrete footing. **[4 Marks]**

QUESTION 4

- (a) Grading or size distribution of aggregate determines the paste requirement for workable concrete. Discuss this statement and its implication on the economy of a concrete mix. **[4 Marks]**
- (b) The durability of concrete is defined as its ability to resist weathering action, chemical attack, abrasion, or any other process of deterioration. Discuss the common durability problems in concrete. **[8 Marks]**
- (c) What are the advantages of prestressed concrete over reinforced concrete? **[6 Marks]**

- (d) Discuss the factors that affect the setting of concrete. **[5 Marks]**
- (e) Describe four methods of converting timber. **[2 Marks]**

QUESTION 5

- (a) Name four properties of timber that should be known in order to design a timber structure properly? **[4 Marks]**
- (b) Define concrete durability and explain the four factors that reduce it. **[8 Marks]**
- (c) Admixtures can be broadly divided into two types: chemical admixtures and mineral admixtures. List these chemical and mineral admixtures and discuss their importance in concrete. **[8 Marks]**
- (d) Why is density of brickwork important? **[2 Marks]**
- (e) What are the three common varieties of clay brick? **[3 Marks]**

END