



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

**SECOND YEAR SECOND SEMESTER EXAMINATIONS
FOR THE DIPLOMA**

IN

CIVIL ENGINEERING / BUILDING CONSTRUCTION

COURSE CODE: DCE / DBC 076

COURSE TITLE: CONCRETE TECHNOLOGY

DATE: TUESDAY 26TH APRIL 2022 TIME: 8.00AM- 10.00AM

INSTRUCTIONS:

1. This paper contains FOUR Questions
2. Attempt Question ONE and any other TWO Questions
3. Marks for each question are indicated in the parenthesis.
4. Examination duration is **2 Hours**
5. It is to the best interest of the candidate to write legibly

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over.

QUESTION ONE – COMPULSORY (30 MARKS)

- a) Define the term cement as used in concrete technology [2 Marks]
- b) Define concrete and provide the approximate percentage for each constituent [3 Marks]
- c) A dam is to be constructed along River Nzoia to mitigate against the frequent floods. Discuss **THREE** types of cement that an engineer would recommend for use and give reasons for each. [9 Marks]
- d) Give any **FOUR** advantages of concrete as a construction material [4 Marks]
- e) Aggregates suitable for making concrete should have desirable qualities. Explain [6 Marks]
- f) The Bogue composition of cement is governed by the following set of equations
 $C_3S = 4.07(CaO) - 7.6(SiO_2) - 6.72(Al_2O_3) - 1.43(Fe_2O_3) - 2.85(SO_3)$
 $C_2S = 2.87(SiO_2) - 0.75(Cao, SiO_2)$
 $C_3A = 2.65(Al_2O_3) - 1.69(Fe_2O_3)$
 $C_4AF = 3.04(Fe_2O_3)$

Determine the Bogue composition of the following brands of cement [6 Marks]

Oxide	Content (%)		
	<i>Simba</i>	<i>Kifaru</i>	<i>Ndovu</i>
SiO ₂	23	25	20.7
CaO	68	61	64.2
Fe ₂ O ₃	0.3	3	5.3
Al ₂ O ₃	4.6	4	3.9
SO ₃	2.4	2.5	2

QUESTION TWO (20 MARKS)

- a) Discuss the functions of any **THREE** ingredients of cement [6 Marks]
- b) Define hydration of cement and briefly describe its two mechanisms of action [5 Marks]
- c) State why you would recommend to a client the use of Portland slag cement [4 Marks]
- d) Describe any **TWO** field tests carried out to roughly ascertain the quality of cement [5 Marks]

QUESTION THREE (20 MARKS)

- a) Differentiate between a rich, lean and harsh concrete mix [3 Marks]
- b) Give the main factors governing the desired grading for aggregates [4 Marks]
- c) Explain any **FIVE** factors that affect creep in concrete [5 Marks]
- d) Discuss the tremie method of underwater concreting aided by a well labeled diagram [8 Marks]

QUESTION FOUR (20 MARKS)

- a) The quality of water to be used for concrete works should be fit for drinking. Discuss [5 Marks]
- b) Explain the **THREE** main categories of curing methods for concrete [6 Marks]
- c) Workability can be measured indirectly using five tests. Briefly describe them [5 Marks]
- d) Differentiate between bleeding and segregation in fresh concrete [4 Marks]