



(University of Choice)

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

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR**

THIRD YEAR SEMESTER ONE EXAMINATION

**FOR THE DEGREE
OF
BACHELOR OF TECHNOLOGY EDUCATION (BUILDING AND
CIVIL TECHNOLOGY)
AND
BACHELOR OF TECHNOLOGY IN BUILDING CONSTRUCTION**

COURSE CODE: BTB 231 / TEB 321

COURSE TITLE: CONCRETE TECHNOLOGY

DATE: MONDAY 13TH JANUARY 2020 TIME: 3.00 – 5.00 PM

INSTRUCTIONS:

1. This paper contains FIVE questions
2. QUESTION ONE IS COMPULSORY
3. Attempt any other Two questions
4. Marks for each question are indicated in the parenthesis.

Examination duration is **2 Hour**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

QUESTION ONE

- a) Explain the process of the manufacture of cement from the stage of inputting the raw materials into the Kiln (8marks)
- b) Describe the six broad classification of particle shapes (9marks)
- c) Explain the following with respect to water for mixing concrete;
 - i) The importance of water quality
 - ii) Why it is generally considered inadvisable to use sea water (5marks)
- d) Outline the following terms used to describe the state of fresh concrete;
 - i) Workability
 - ii) Consistence (4marks)
- e) Explain the following terms;
 - i) Head back with respect to charging the drum mixer with very dry mixes
 - ii) The procedure of charging small laboratory pan mixers (4marks)

QUESTION TWO

- a) Distinguish between an additive and an admixture in concrete production (2marks)
- b) Outline the use of calcium chloride as an admixture in concrete (5marks)
 - i) Explain the mechanism of the retarding action of retarding admixture
 - iii) Outline the use of sugar as a retarding admixture (5marks)
- c) i) State the use of water-reducer admixture
 - iii) Explain the working mechanism of water- reducing admixture (8marks)

QUESTION THREE

- a) Outline problems associated with hot-weather concreting (6marks)
- b) Outline the effect of gypsum in cement (4marks)
- c) Explain the laboratory procedure for the determining the following setting;
 - i) Initial setting
 - ii) Final setting (4marks)
- d) Outline the ground granulated blast furnace slag type of cement (6marks)

QUESTION FOUR

Concrete is required for foundation where it will be very severely exposed to sulphates. The average strength is 34.5 MPa at 28 days, with a slump of 80mm to 100 mm. The available coarse aggregate has a maximum size of 70mm, a dry – rodded bulk density of 1600kg/m³, a bulk specific gravity (SSD) of 2.70, absorption of 0.5% and total moisture content of 4%. The fine aggregate has a bulk specific gravity (SSD) of 2.62, absorption of 0.85 and total moisture content

of 8% and fineness modulus of 3.0. Use the ACI method of design to prepare the mix design required for this foundation concrete.

QUESTION FIVE

- a) Explain how damage to concrete as a result of repeated freezing and thawing can be prevented (3marks)
- b) i) Explain the working principals of air entraining admixture
iii) State THREE types of air entraining agents (6marks)
- c) i) Explain the reason for the whitish appearance on concrete surfaces attacked by sulphates
iii) Explain the occurrence of efflorescence (6marks)
- d) Explain how expanded clay, shale and slate are obtained (5marks)