JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

UNIVERSITY EXAMIMATION FOR THE DEGREE IN SCIENCE IN CONSTRUCTION MANAGEMENT

1ST YEAR 2ND SEMESTER 2023/2024 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TCB 1102

COURSE TITLE: MATERIAL SCIENCE II

EXAM VENUE: **STREAM: BSc. CONSTRUCTION MGT**

DATE: /04/2024 **EXAM SESSION:**
DURATION: 2 HOURS

Instructions

1. **Answer ANY three questions**
2. **Candidates are advised not to write on question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE (20 Marks)

a) Explain how discovery of new materials have influenced historical dating referencing of human civilization.

(2 Marks)

b) List any THREE construction materials and explain your assessment of their suitability in reference to:

i. Sustainability
ii. Health safety

(6 Marks)

c) Define the following mechanical properties of materials and comment on their relevance in construction materials.

i. Elasticity.
ii. Plasticity.
iii. Ductility.
iv. Malleability.

(12 Marks)

QUESTION TWO (20 Marks)

a) Compare and contrast any FOUR advantages and disadvantages of concrete as construction material

(8 Marks)

b) Explain how the following factors affect workability of concrete

i. Water content
ii. Surface texture of aggregate
iii. Use of admixtures
iv. Mix proportions

(12 Marks)

QUESTION THREE (20 Marks)

a) How does water-cement ratio affect strength of concrete

(4 Marks)

b) Explain any TWO methods of manufacturing light weight aggregate.

(6 Marks)

c) Using data in Table 1, sketch aggregate gradation curve and determine the following parameters:

i. Fineness modulus and
ii. Coefficient of uniformity.

Table 1-Sieve analysis data

BS Sieve size	Weight retained (gm)
40mm	0.0
20mm	7.0
16mm	145.0
12.5mm	510.0
10mm	120
4.75mm	133
2.36mm	51.0
1.18mm	25.0

600µm	02.0
300 µm	01.0
150 µm	01.0
Fine than 150 µm	05.0

(10 Marks)

QUESTION FOUR (20 Marks)

(a) Using a flow diagram, outline steps involved in cement manufacturing process.

(8 Marks)

(b) Using approximate percentage concentration, explain the role of the following mineral constituents of cement.

i. Tricalcium silicate
ii. Dicalcium silicate
iii. Tricalcium aluminate
iv. Tetra calcium alumino-ferrate

(8 Marks)

(c) Briefly discuss environment impact of cement manufacture.

(4 Marks)

QUESTION FIVE (20 Marks)

(a) Outline processes involved in manufacturing bricks

(6 Marks)

(b) State any THREE quality control parameters usually monitored in bricks as a construction material.

(6 Marks)

(c) State any FOUR important features of bricks which make them more preferable to building stones in general construction works.

(8 Marks)