



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of BUILDING & Civil engineering
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

TCV 4228: ENGINEERING MATERIALS II

END OF SEMESTER EXAMINATION

SERIES: APRIL 2025

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Exam booklet, examination pass and student ID

This paper consists of five questions.

Attempt question ONE (Compulsory) and any other TWO questions

Do not write on the question paper.

QUESTION ONE (COMPULSORY) 20 Marks

- Describe the chemical reactions that occur in the rotary kiln during the clinkering stage of cement manufacture. Name the resulting Bogue compounds.
(10 marks)
- Discuss the classification of Portland cement types CEM I to CEM V according to the main constituents. For each type, state the approximate percentage of clinker and other key materials, and suggest one practical application. (10 marks)

ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 Marks)

- Compare the initial and final setting time tests of cement. Explain the apparatus, test procedure, influencing factors, and practical implications of setting time in construction. (10 marks)

- b) Classify aggregates based on geological origin, size, and shape. For each category, describe the different types, give examples, and explain their significance in construction. (10 marks)

QUESTION THREE (20 Marks)

- a) Explain the effect of sea water on concrete. Under what conditions may sea water be used in concrete, and when is its use prohibited? (10 marks)
- b) Define concrete mix design. Explain the objectives of mix design and list five factors that influence the choice of mix proportions in a concrete mix. (10 marks)

QUESTION FOUR (20 Marks)

- a) Compare natural and artificial pozzolanas. (2 marks)
- b) Describe FOUR types of concrete mixers, explaining their operation and suitability for different types of projects. (8 marks)
- c) Discuss FIVE key factors that influence the selection of concrete transportation methods on site. Provide examples of appropriate transport methods based on these factors. (10 marks)

QUESTION FIVE (20 Marks)

- a) Explain FOUR key qualities of a good building stone. (4 marks)
- b) Describe THREE tests used to determine the suitability of building stones for structural use. (6 marks)
- c) Describe the process of seasoning timber. Compare natural and artificial seasoning methods, highlighting their advantages, disadvantages, and impact on timber performance. (10 marks)