



TECHNICAL UNIVERSITY OF MOMBASA

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

TCV 4228: ENGINEERING MATERIALS II

END OF SEMESTER EXAMINATION

SERIES: JULY 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

- a) Define “soundness of cement” and explain its importance. *(5 marks)*
- b) What factors in the chemical composition of cement influence soundness and setting time?
(5 marks)
- c) Explain the composition, properties, advantages, and limitations of the following special types of cement:
 - i) Rapid Hardening Cement *(5 marks)*
 - ii) Sulphate Resisting Cement *(5 marks)*

ANSWER ANY TWO QUESTIONS

QUESTION TWO (20 Marks)

- a) Describe the compressive strength test for cement mortar cubes. Include procedure, apparatus, mix proportions, curing, and the significance of test results in structural design. *(10 marks)*

- b) Describe at least FIVE specific impurities that must be avoided in water used in concrete, and explain how each affects concrete properties. *(10 marks)*

QUESTION THREE (20 Marks)

- a) Define admixtures and classify the types used in concrete. Discuss the mechanism, advantages, and disadvantages of any THREE types. *(12 marks)*
- b) Discuss the influence of aggregate shape and surface texture on the workability and strength of concrete. *(8 Marks)*

QUESTION FOUR (20 Marks)

- a) Describe the process and importance of concrete compaction. Compare the use of immersion vibrators and surface vibrators, including their applications and limitations. *(10 marks)*
- b) Identify and explain any FIVE natural or biological defects found in timber. How do these defects affect the strength and durability of timber? *(10 marks)*

QUESTION FIVE (20 Marks)

- a) Explain FIVE key qualities of a good building stone. *(5 Marks)*
- b) Describe FIVE advantages of adding lime to mortar. *(5 Marks)*
- c) What is Fibre Reinforced Concrete (FRC)? Discuss the types of fibres used, their influence on mechanical properties, and applications of FRC. *(10 marks)*