



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL 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: JANUARY 2025

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer 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) Give **TWO** reasons why the flexural strength of concrete important in road pavement (2 marks)
- b) Explain how aerated cement products are produced and state **TWO** areas where they are used (4 marks)
- c) What is the purpose of the filler material in concrete (2 marks)
- d) Explain reaction wood and its effect on the structural properties of wood (3 marks)
- e) With the aid of diagrams illustrate **THREE** forms of warping in timber (3 marks)



- f) Describe **TWO** major compounds in wood - cellulose and lignin (4 marks)
- g) Give **TWO** disadvantages of prolonged mixing of concrete (2 marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 marks)

- a) How does characteristics and relative proportions of the constituents materials of concrete affect its workability? (4 marks)
- b) Explain why the following factors should be considered when choosing materials to be used as aggregates in concrete (4 marks)
- i. Shape and surface texture
 - ii. Grading
- c) Explain **THREE** types deleterious substances in aggregate (3 marks)
- d) Briefly explain **FIVE** causes of shrinkage strains in concrete (5 marks)
- e) List **FOUR** differences between dry process and wet process of manufacture of cement (4 marks)

QUESTION THREE (20 Marks)

- a) i) Define characteristic strength of concrete (2 marks)
- ii) Explain why the strength of concrete increases with age. How does curing and volume of concrete influence the strength of concrete (3 marks)
- b) Briefly explain how the following factors influence the durability of concrete
- i) Concrete cover to steel
 - ii) Crushing strength (4 marks)
- c) Explain **FOUR** factors which influence the rate of carbonation in concrete (4 marks)
- d) Differentiate between flash set and false set and mention the remedy for each type of setting. (4 marks)
- e) Explain **TWO** features of unstable concrete (3 marks)



QUESTION FOUR (20 Marks)

- a) State the main chemical constituents of Portland cement and their contributions to the properties of cement (6 marks)
- b) List **FOUR** factors which affect the setting of cement (4 marks)
- c) List **FOUR** advantages of lightweight aggregates (4 marks)
- d) Describe **TWO** main objectives of testing aggregates (2 marks)
- e) Discuss bulking of sand and its effect on batching of concrete (4 marks)

QUESTION FIVE (20 Marks)

- a) Distinguish between the following terms as used in specification of concrete materials
 - i) designed mix
 - ii) Prescribed (4 marks)
- b) Describe the **THREE** properties of concrete which defines workability (3 marks)
- c) Discuss the merits and limitations of concrete as a construction material. (4 marks)
- d) Describe the characteristic of mass concrete (3 marks)
- e) Give **TWO** methods of non-destructive testing of concrete (2 marks)
- f) Describe **TWO** types of slump obtainable in a slump test (4 marks)

