UNAM
UNIVERSITY OF NAMIBIA

FACULTY	AGRICULTURE, ENGINEERING AND NATURAL SCIENCES		
SCHOOL	ENGINEERING AND THE BUILT ENVIRONMENT		
DEPARTMENT	CIVIL AND MINING ENGINEERING		
SUBJECT	BUILDING MATERIALS		
SUBJECT CODE	I3682VB		
DATE	NOVEMBER 2023		
DURATION	3 HOURS	**MARKS**	100

FIRST OPPORTUNITY EXAMINATION

Examiner: DR. PHILEMON ARITO

Internal Moderator: PROF. CHINWUBA ARUM

External Moderator: PROF. AKPOFURE TAIGBENU (University of the Witwatersrand)

This question paper consists of **3** pages including this front page.

Instructions

1. This is a **CLOSED BOOK** examination.
2. Read the questions carefully.
3. The paper contains 6 questions. **Attempt all SIX (6) questions** for full marks.
4. Answers should be brief and to-the-point and where necessary be supplemented with neat sketches.
5. Marks for each question are indicated.
6. Make reasonable and logical assumptions where necessary.
7. Write your answers, wherever necessary, to three decimal places.

Question 1 (Wood and Timber) **(15 Marks)**

(i) Distinguish the following terminologies: ***(6 Marks)***

a) Wood and timber. ***(2 Marks)***
b) Rough timber and converted timber. ***(2 Marks)***
c) Star shakes and heart shakes. ***(2 Marks)***

(ii) List four (4) benefits of drying timber prior to its use in construction. ***(4 Marks)***

(iii) List five (5) advantages of seasoning timber. ***(5 Marks)***

Question 2 (Metals) **(20 Marks)**

(i) Describe the process of extraction of iron from its ores and the role of various materials in the blast furnace. ***(15 Marks)***

(ii) Distinguish between yield stress and proof stress. ***(2 Marks)***

(iii) List three (3) common applications of aluminium in construction. ***(3 Marks)***

Question 3 (Cement and Concrete) **(25 Marks)**

(i) Briefly discuss the three (3) types of binders. ***(6 Marks)***

(ii) Describe the manufacture of portland cement. (Marks will be awarded for the correct sequence of the processes involved, Use diagrams if necessary). ***(10 Marks)***

(iii) Discuss the three (3) phases of concrete and the influence of each phase on concrete properties. ***(9 Marks)***

Question 4 (Clays and lime) **(15 Marks)**

(i) Describe, in detail, the three (3) main groups of clay, outlining differences in their mineralogy, chemical structure and response to water. Use simplified diagrams in your descriptions. ***(10 Marks)***

(ii) List two (2) common applications of gypsum in construction. ***(2 Marks)***

(iii) List three (3) uses of lime in construction. ***(3 Marks)***

Question 5 (Bitumen and asphalt) **(15 Marks)**

(i) Briefly discuss five advantages of asphalt cement. ***(10 Marks)***

(ii) List five (5) key mechanical properties of asphalt binders. ***(5 Marks)***

Question 6 (Other materials) **(10 Marks)**

(i) Briefly discuss the three (3) categories of glass based on their principal glass forming oxides. ***(6 Marks)***

(ii) List four (4) applications of rubber in construction. ***(4 Marks)***