



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL AND WATER ENGINEERING

Engineering Geology

ECW/TCW 2105

Examination Paper

August 2024

This examination paper consists of 5 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: NONE

Examiner's Name: P. Kamwemba

INSTRUCTIONS

1. Answer any four (4) questions
2. Each question carries 25 marks
3. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
6.	25

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QUESTION 1

(a) Draw the planetary system in the order of their distance from the sun . (5 marks)

(b) Illustrate with sketches the following : (i) lopolith , (ii) laccolith , (iii) sill and (iv) dyke.
(8 marks)

(c) Describe the processes involved in chemical weathering. (12 marks)

QUESTION 2

Describe wind as a geological agent. (25 marks)

QUESTION 3

How does the rate of cooling and depth of formation result with the formation of so many different types of igneous rocks ? (25 marks)

QUESTION 4

(a) Define metarmorphism. (3 marks)

(b) List any three agencies of metamorphism . (3 marks)

(c) Describe the following types of metamorphism : (I) geothermal (5 marks) , (ii) hydrothermal (5 marks) and (iii) contact (9 marks).

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Question 5

Three vertical boreholes were drilled to test for a coal seam as shown in fig. question 5.

Given the following information about the boreholes

Borehole	Depth of coal interception (m)	Direction of borehole on plan
A	- 304 , 800	-
B	- 335,280	310 ⁰
C	- 365,760	210 ⁰

Borehole directions are being measured from the north (i.e. zero north) .

Calculate

- (I) the major (true) dip . (20 marks)
- (ii) the direction of true dip . (3 marks)
- (iii) the direction of strike . (2 marks)

Question 6

- (a) Differentiate between intrusive and extrusive formations. (2 marks)
- (b) List three intrusive and three extrusive rocks that you know . (6 marks)
- (c) Define a mineral . (3 marks)
- (d) Give eight most abundant elements in rocks . (8 marks)
- (e) Give a mineral which belongs to the following groups :
(1) native element , (2) sulphides , (3) halides , (4) oxides and hydroxides , (5) carbonates , and (6) sulphates . (6marks)

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List of formulae

$$\tan d_1 = \tan D^0 \times \cos C_1$$

$$\tan d_2 = \tan D^0 \times \cos C_2$$

$$\tan C_1 = \operatorname{cosec} (c_1 + c_2) [(\cot d_1 \times \tan d_2) - \cos (c_1 + c_2)]$$

$$\tan C_2 = \operatorname{cosec} (c_1 + c_2) [(\cot d_2 \times \tan d_1) - \cos (c_1 + c_2)]$$

Diagram

Fig. question 5

Plan

