



FACULTY	Faculty of Agriculture, Engineering & Natural Sciences		
DEPARTMENT	Geosciences		
SUBJECT	INDUSTRIAL MINERALS AND GEMSTONES		
SUBJECT CODE	GLY3801		
PAPER	1: combined theory & practical		
DATE	June 2026		
DURATION	180 min (3 hours)	MARKS	100

FIRST OPPORTUNITY EXAMINATION

Examiner/s: Prof. A. Tse, Dr. C.I. UAHENGO & Mr. J. Naimhwaka

Internal Moderator: Dr A Vatuva

External Moderator:

This question paper consists of 3 pages (including this one)

Instructions

- Closed book examination
- This question paper consists of two (2) sections, **A** and **B**.
- Answer all questions in **section A** and any **two (2)** from **section B**.
- Recommendation: read first all subordinate questions before you answer.

UNIVERSITY OF NAMIBIA EXAMINATIONS

Section A [50 Marks]

Question 1

Critically analyse the physicochemical processes responsible for colour in gemstones and evaluate how these processes influence both gemological classification and economic value. (10 marks)

Question 2

Assess the significance of different geological environments in gemstone formation and evaluate their relative contributions to economically viable deposits. (10 marks)

Question 3

Analyse existing gemstone classification systems and construct an integrated classification framework that incorporates geological origin, formation processes, and economic relevance. (10 marks)

Question 4

Evaluate the principal factors controlling gemstone value and assess their relative importance within the context of global gemstone markets. (10 marks)

Question 5

Critically evaluate the effectiveness of the diamond grading system (4Cs) as a universal standard for gemstone quality assessment. (10 marks)

Part B: [50 Marks]

Question 1

- 1.1 What is Artisanal and Small-Scale (ASM) mining of industrial minerals? (5 marks)
- 1.2 In what ways can geological mapping contribute to mineral exploration success? (6 marks)
- 1.3 State the obstacles faced by artisanal miners in developing industrial minerals and propose potential solutions. (8 marks)
- 1.4 How can the integration of environmental policies and development strategies contribute to sustainable development in mineral resource management? (5 marks)

Question 2

Industrial minerals are defined by Franks et al., (2016) as, 'minerals and materials that are mined, processed, manufactured and used domestically in industries such as construction, manufacturing, and agriculture.

Show how the named industrial mineral fits into the definition of Franks et al., (2016) using the following as a guide

- 2.1 Name of an industrial mineral (2 marks)
- 2.2. Geological Mode of occurrence (2 marks)
- 2.3. Chemical composition (2 marks)
- 2.4. Method of mining (2 marks)
- 2.5. How it is processed (2 marks):
- 2.6. How it is used in either construction, manufacturing or agriculture (3 marks)
- 2.7. Name a location in Namibia where the named industrial mineral in 1.1 occurs. (2 marks)
- 2.8. The quality of a mineral can be upgraded by beneficiation. Explain the term beneficiation (2 marks)
- 2.9. Industrial minerals have a place value. Explain the term place value of industrial minerals. (2 marks)
- 2.10. State the importance of place value of industrial minerals. (6 marks)

Question 3 [25 marks]

- 3.1 In Namibia any right in relation to the reconnaissance, prospecting, mining sale/disposal and exercise of control over, any mineral or group of minerals are vested in the state and are provided for by the Minerals (Prospecting and Mining) Act, 1992 and administered by the Mining Commissioner. Any person interested in undertaking mining activities should apply to the Ministry of Mines and Energy in the prescribed forms.

Itemise the major steps you will take to own and operate a mine in Namibia.

- i. Apply and Register a Mining Claim (2 marks)
 - ii. Obtain Environmental clearance (2 marks)
 - iii. Apply for Mining Licence. (3 marks)
 - iv. Apply for Reconnaissance Licence (RL) (3 marks)
 - v. Apply for Exclusive Prospecting Licence (EPL) (3 marks)
 - vi. Obtain a Mineral Deposit Retention Licence (MDRL) (3 marks)
 - vii. Obtain a Mining Licence (ML) (3 marks)
- 3.2 State the importance of an Environmental Impact Assessment in mining. (6 marks)

END OF EXAMINATION