

UNIVERSITY OF FORT HARE

GLG323
Statistics and Data Analysis,
Economic Geology

BSc Main Examination
October/November 2025

Time: 3 Hours

Marks: 100

Subject: Geology

One Paper



This paper consists of 4 pages, including the cover page.

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Internal Examiners

External Examiner

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INSTRUCTIONS

The paper has two sections. Answer two questions from each section.

SECTION A: STATISTICS AND DATA ANALYSIS

Question One

[25]

- (a) List and explain three *measures of location* in statistical measurements. [6]
- (b) Grain sizes of sandstones were measured (in mm) and found to be:

2.7	2.3	0.7	1.4	2.6	3.0	1.3	2.7	2.8	1.7	0.9	1.1
1	2	1	5	2	12	4	10	11	6	2	3

Calculate the following statistical parameters and explain each answer:

- i) the mean to two decimal places, the mode, and the median of the marks; [9]
- ii) the interquartile range and the new range; [6]
- iii) the 15% percentile; [4]

Question Two

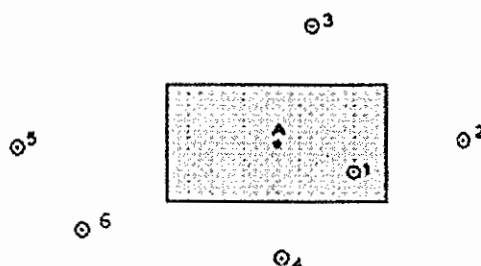
[25]

- (a) For any distribution of data, state *Chebyshev's theorem* for the approximate percentage of data that lie within k standard deviations of the mean. What conclusions can be drawn from the theorem for $k = 1, 2$, and 3 ? [7]
- (b) A coin is tossed four times. What is the probability that it lands on heads exactly three times? Show your work by:
- i) Tabulating the outcomes in a sample space and then finding the probability. [6]
- ii) Using a tree diagram to determine the outcomes and then calculating the probability. [6]
- iii) Using an appropriate expression to work out the probability. [6]

Question Three

[25]

- (a) Estimation of the block value is required from the seven scattered uranium samples (in ppm) shown in the figure below.



- i) The grade and distance of each sample from centre A are indicated in the table below. Use the inverse distance weight to estimate the grade at the centre A. Note that you will need to add more columns to the table below for your computations. [20]

Sample	Grade (ppm) g_i	Distance from centre (m)	$\frac{1}{\text{Distance}}$	Grade $\times \frac{1}{\text{Distance}}$
1	425	29.54	0.03	
2	402	58.00	0.02	
3	475	39.62	0.03	
4	308	38.00		
5	346	78.00		
6	417	50.66		
7	354	61.98		

- (b) Consider the two diamond core samples below, totalling five meters of sample core, and calculate the weighted average grade for resource estimation purposes: [5]

Core 1 – 0.2 m at 44.7 g/t Au.

Core 2 – 4.8 m at 5.3 g/t Au.

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SECTION B: ECONOMIC GEOLOGY

Question Four

[25]

- a) Briefly explain the following terminologies in exploration and mining geology. Where possible, use drawings/diagrams to support your answer:

- i) Opencast. [4]
 - ii) Ascend adit. [4]
 - iii) Mineral prospect. [2]
 - iv) Cut-off grade. [2]
 - v) Trench. [5]
 - vi) Strip. [4]
- b) Briefly discuss the contour mining method. [4]

Question Five

[25]

Discuss the surface methods of mineral exploration. Use diagrams where possible, and your answer should include the following:

- i) Introduction. [5]
- ii) Geological exploration method. [10]
 - a) Review of existing data and fieldwork.
 - b) Geological / Surface Guides.
 - c) Study of Topographic Maps.
 - d) River and glacial floating.
- iii) Geochemical exploration method. [10]
 - a) Soil sampling.
 - b) Stream sediment sampling.
 - c) Rock chip sampling.

Question Six

[25]

- a) List five factors to be considered during an economic analysis of mineral deposits. [5]
- b) List and briefly discuss the five sampling methods in mineral exploration. [20]

***** ** END OF PAPER ** *****



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