SIGNATURE OF EXAM STAFF: .....

UNIVERSITY OF FORT HARE

GLG 511
Economic Geology, Geophysics, Mining and Exploration Geology

Main Examination: May/June 2018

Time: 3 Hours
Subject: Geology

Marks: 100
One paper

This paper consists of 3 pages including the cover pages

Internal Examiners:

Dr K Madi

Prof K Liu

Prof O Gwavava

Mr C Gunter

External Examiner:

Dr M Demlie

INSTRUCTIONS

Answer both questions from Section A, one question from Section B and one question from Section C.

SECTION A: ECONOMIC GEOLOGY

QUESTION 1 [25]

Discuss the formation of petroleum, your discussion should include an introduction, the occurrence of biomolecules living in organisms, the preservation of organic matters, the source rock of organic matters, the conversion of organic matters to hydrocarbons, and the generation and expulsion of petroleum.

QUESTION 2 [25]

With assistance of diagrams and tables, write an account on the iron rich minerals and occurrences of iron ore-deposits in South Africa. Further discuss the similarity and difference between iron-stone and iron formation ore-deposits, and between Superior type and Algoma type iron-ore deposits.

SECTION B: GEOPHYSICS

QUESTION 3 [25]

(a) List the four modern magnitude scales for measuring earthquake sizes. Which one of these best describes the earthquake size and explain why? [6]

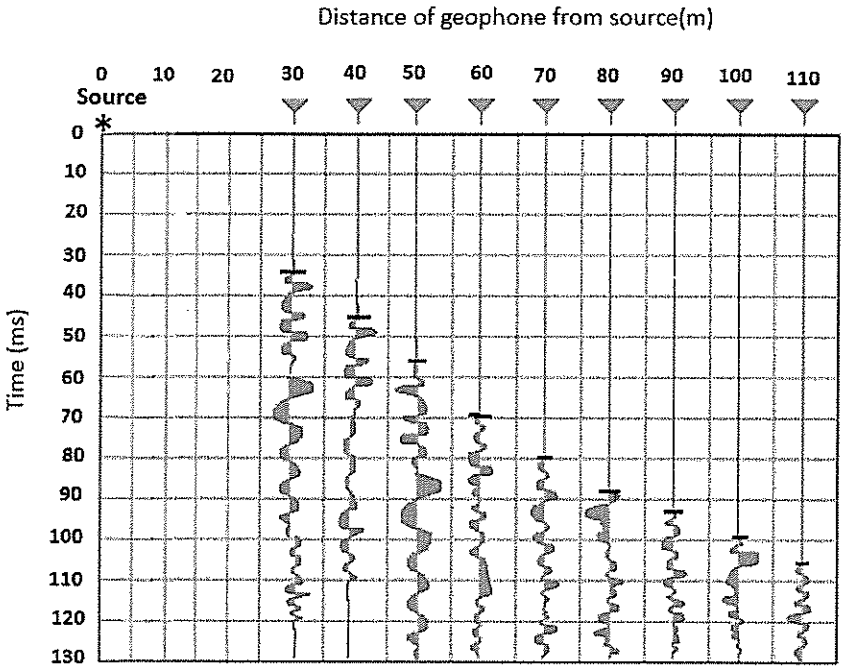
(b) Briefly explain why earthquakes can occur up to 700 km depths. [7]

(c) Draw a simple diagram of a modern seismometer and explain how it works. [12]

QUESTION 4 [25]

(a) Concisely explain the following type of noise encountered in exploration seismic refraction and give examples*: uncontrolled, electronic and geologic noise.* [9]

(b) The figure below shows a field seismogram. The geophones are represented by the symbol Y. The first geophone is located 30 m from the shot point. The geophones are spaced at 10 m intervals. The timing lines are at 10 ms intervals. The total timing record length displayed is 130 ms. The first arrival picks on each trace are marked by dash (—).



i. Pick the arrival times and tabulate them. [5]

ii. Plot a time distance graph. [5]

iii. Calculate the layer velocities and the thickness h of the top layer given that

$$h = \frac{X_{crossover}}{2}\sqrt{\frac{V_2 - V_1}{V_2 + V_1}},$$

where the symbols have their usual meanings. [6]

SECTION C: MINING & EXPLORATION GEOLOGY

QUESTION 5 [25]

Explain considerations in the choice of a drilling method for surface mineral exploration.

QUESTION 6 [25]

Discuss budget considerations in drilling for mining and exploration.

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