TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS AND PHYSICS

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN ENVIRONMENTAL PHYSICS &RENEWABLE ENERGY (BTRE)

APS 4217: GEOPHYSICS

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

<u>**Instructions to Candidates**</u>
You should have the following for this examination
-Answer Booklet, examination pass and student ID
This paper consists of **FIVE** questions.
Attempt question **ONE (COMPULSARY)** and any other **TWO** questions
Do not write on the question paper.

Question ONE (30 Marks)

(a) Explain the term 'gravimeter drift'.   (2mks)

(b) Explain any two differences between P-wave and S-wave.   (2mks)

(c) Explain what is meant by IGRF and its importance in magnetic reduction (2mks)

(d) Explain what is meant by 'non-uniqueness' of magnetic modeling and how this can be dealt with in exploration   (2mks)

(e) Define the following terms
   (i)   Diurnal variation.   (2mks)
   (ii)   Koensberger ratio   (2mks)

(f) State any two disadvantages of Wenner array over Schlumberger array   (2mks)

(g) Describe the following types of Remanent magnetization
   (i) Thermo Remanent magnetization   (2mk)
   (ii) Chemo Remanent magnetization   (2mk)
   (iii) Detrital Remanent magnetisation   (2mk)

(h) Give two reasons why most resistivity meter employ low frequency A.C than D.C.   (2mks)

(i) Explain two differences between oceanic and continental crust   (4mks)

(j) State and explain any two corrections done on magnetic data   (4mks)

(k) Briefly explain the term regional anomaly   (2mks)

Question TWO (20 Marks)

(a) i. Describe the self-exciting dynamo theory on the origin of geomagnetic field (4mks)

ii. The source of external geomagnetic field is mainly in the ionospheric atmosphere. Briefly explain this. (4mks)

iii. With the aid of a diagram, define the magnetic elements necessary to fully describe magnetic field at a point on earth's surface. Show their relationship. (5mks)

(b) i. Explain what is meant by local magnetic anomaly and clearly explain its distribution (3mks)

ii. Explain what is inferred in 'Qualitative and Quantitative' interpretation of magnetic data (4mks)

Question THREE (20 Marks)

(a) State the assumptions made in seismic refraction method. (4mks)

(b) Derive the expression for direct and refracted travel times and overburden layer depth for a single horizontal interface. (12mks)

(c) You wish to determine the depth to the water table before drilling a well. Using small explosions and seismographs, it is found that the P-wave velocity in the surface sediment is 300m/s and velocity in a subsurface layer presumably water is 750m/s. The intercept time is 0.4s. How deep is the water table? (4mks)

Question FOUR (20Marks)

(a) Draw a well-labelled cross-section of the internal structure of the earth showing the crust, mantle, outer and inner cores and transition zones. (5mks)

(b) Discuss the principle of Magneto telluric (MT) and Static shift. (11mks)

(c) Outline the two types of magnetometers, stating the component of the magnetic field each measures (4mks)

Question FIVE (20Marks)

(a) State three reasons why 'drift' correction is done on gravity data (3mks)

(b) Explain the effects of terrain on gravity data. How is it corrected (4mks)

(c) Why is Bouguer correction done on gravity data (2mk)

(d) Write down the expression for complete Bouguer Anomaly (2mk)

(e) i. Define gravity potential (2mks)

ii. Show that gravity potential $V = -\dfrac{GM}{r}$ (3mks)

(f) What inference may be made in qualitative interpretation of gravity data (4mks)