FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
SCHOOL OF PHYSICAL SCIENCES
DEPARTMENT OF GEOLOGY

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BTech GEOLOGY
2017/2018 SESSION

COURSE CODE: GEL 325 **UNIT:** 2

COURSE TITLE: INTRODUCTION TO GEOCHEMISTRY

INSTRUCTIONS: ANSWER ANY THREE QUESTIONS

TIME ALLOWED: 2 HOURS **DATE:** 21ST SEPT., 2018

Q1 (a) What is aqueous geochemistry?
(b) List and explain any three types of reactions that occur in the Earth's hydrosphere.
(c) Define the terms oxidant and reductant and give one example of each in nature.
(d) If silicate weathering and erosion impart primary alkalinity on water, what does carbonate dissolution provide?
(e) Write equations for the following reactions in aqueous geochemistry.
(i) Albite dissolution.
(ii) Carbonic acid dissociation.

Q2 (a) Define the terms compatible elements and incompatible elements and explain their behaviour during partial melting and fractional crystallization.
(b) With the aid of a diagram, show the distribution of compatible and incompatible elements as a function of magma evolution.
(c) In a tabular form, outline the Goldschmidt geochemical classes of elements and give three examples of elements in each class.

Q3 (a) What is an isotope? Outline the applications of radiogenic isotopes in geology.
(b) An isotope was found to have a decay constant (λ) of 1.41×10^{-4}/yr. What is the half life of this isotope?
(c) List the isotopes of the following elements that you know: O, H, C, Cl and S.
(d) Explain how replacing a lighter isotope with a heavier one lowers the energy of and stabilizes a molecule.

Q4 (a) Define the term geochemistry and outline the branches of the subject.

(b) (i) What is geochemical environment?

(ii) Outline the characteristics of the two major geochemical environments and state the processes associated with each of them.

Q5 Write short notes on the following:

(i) Geochemical mobility.
(ii) Geochemical dispersion.
(iii) Geochemical anomaly.
(iv) Geochemical background.