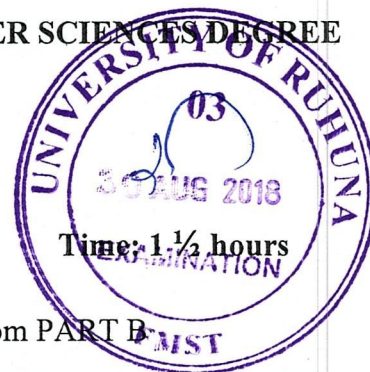


UNIVERSITY OF RUHUNA

BACHELOR OF SCIENCE HONOURS IN MARINE AND FRESHWATER SCIENCES DEGREE

Level I Semester I Examination – August 2018

OCG 1132 – Earth Materials



Answer the **Question 1** in PART A and **Two (2)** Questions from PART B

PART A

1.

- a. What is the difference between crystalline and non-crystalline solids? (*explain with the help of a simple diagram*)
- b. Define the term “MINERAL”?
- c. Give one example for each category (i) carbonate minerals, (ii) oxide minerals and (iii) sulphide minerals.
- d. Describe and compare “Ionic Bonds” and “Covalent Bonds”.
- e. Graphite and diamond are composed of same chemical element. Why diamond is much harder than graphite, and layers of graphite can easily slip over each other?
- f. What do you understand when it refers to “Unit Cell Parameters”? Compare unit cell parameters of cubic and orthorhombic systems.
- g. Comment on (i) “Coordination Number” and (ii) relate “Cation/Anion Radius Ratio” to “Pauling’s 1st law”.
- h. Why are the silicate minerals very common in the earth crust?
- i. What is the fundamental building block of silicate minerals?
- j. Explain the structural difference between “Neso (Island)-Silicates” and “Soro-Silicates”
- k. Arrange “Quartz”, “Corundum”, “Diamond” and “Calcite” in increasing order of their Hardness.
- l. Mention two notable differences between ferromagnesian (Fe/Mg rich) minerals such as Biotite and Pyroxene and non-ferromagnesian minerals such as feldspar and quartz.
- m. Name four (4) elements of crystal symmetry. What is a 4-fold symmetry axis? Describe the symmetry elements of a “CUBE”.

(40 Marks)

PART B

2.

- i. Give at least three examples for each Endogenous and Exogenous processes. What are the major differences between these two types of processes?
- ii. What are the 3 categories of sedimentary rocks? Give an example for each category.
- iii. What are the 4 major stages of clastic sedimentary rock formation?
- iv. What happens during lithification?
- v. What are the agents of sediment transport?
- vi. Arrange following terms used to indicate the size of particles in order of increasing size: "SAND", "COBBLE", "PEBBLE", "SILT", "BOULDER", "CLAY".
- vii. Relate (i) sediment size to energy of deposition and (ii) roundness of sediments to distance travelled.
- viii. What is the name given to sedimentary rock mainly composed of sand?
- ix. What is the name given to sedimentary rock mainly composed of sand and little amount of feldspar?
- x. What is "Conglomerate"? What is the difference between "Conglomerate" and "Breccia"?
- xi. Name 02 sedimentary structures and indicate their environment of formation.
- xii. What do you understand by the word 'FOSSILS'? What is the importance of fossils and trace fossils in Geology?

(30 Marks)

3.

- i. What is the reason for melting of rocks at great depths inside the earth? What are the factors that affect melting temperature of rocks?
- ii. Magma is molten rock material. Igneous rocks are solidified magma.
 - a) What is the name used for magma that came to earth surface?
 - b) What is the name used for magma solidified at depths?
 - c) What is the name used for magma solidified on earth's surface?
- iii. What are the major sites of Igneous Rock Formation in the earth's crust? (think of Plate Tectonics)
- iv. Briefly describe the difference between Silicic (Felsic) Magma and Mafic Magma in terms of chemical composition (SiO_2 content) and Viscosity.
- v. (i) Arrange the following igneous rocks in order of increasing SiO_2 content: (i) Diorite, Gabbro, Granite. (ii) Rhyolite, Basalt, Dacite.

- vi. What determines the grain (crystal) size in igneous rocks? Describe the following textural terms referring to grain size of igneous rocks.
- a) Phaneritic texture
 - b) Aphinitic texture
 - c) Porphyritic texture
 - d) Glassy texture
- vii. Briefly describe any three (3) of the following,
- a) Pumice
 - b) Lava Types
 - c) Dike
 - d) Sill
 - e) Batholith

(30 Marks)

4.

- a) What is metamorphism?
- b) How do the physical conditions of metamorphism differ from those of sedimentary processes?
- c) How does Burial Metamorphism differ from Regional Metamorphism?
- d) What are the main characteristics of Thermal Metamorphism?
- e) Explain Metamorphic Grade and Metamorphic Facies.
- f) What are the names given to following sedimentary rocks when they are metamorphosed under higher temperature (~800°C) and pressure (~8 kb)?
 - a) Shale
 - b) Sandstone
 - c) Limestone
- g) Describe the rock cycle showing processes and rock names with the help of a suitable diagram.

(30 Marks)

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