The Open University of Sri Lanka

B.Sc. Degree Programme (Level – 05)

Final Examination - Essentials of Geology

PHU 3257/PHE 5257

108

Date: 9th June 2007 **Duration: 3 Hours**

Answer ***FIVE (05)*** questions selecting at least ***ONE (01)*** question from each of the sections **A, B** and **C. SHORT ANSWERS ARE PREFERRED**. Answers should be illustrated with sketch maps and diagrams where appropriate. Each question is allocated 100pts, and the marking scheme is given in *italics*

SECTION A- Earth Processes

1. (a) What causes the plates to move?
   (b) Discuss the differences and similarities in S and P waves
   (c) What is sea floor spreading?
   (d) How can magnetic rocks provide evidence for sea floor spreading?

(25 pts each)

2. (a) Discuss how fossils used in relative dating of a rock sequences
   (b) Describe the terms 'relative dating' and 'absolute dating' used in geological time scale
   (c) Describe the use of radioactive methods in geo-historical calculations
   (d) Suggest a possible radioactive method to calculate the ages of *'inland corals'* located in the south-western part of Sri Lanka.

(25pts each)

3. (a) Discuss the generalized soil profile
   (b) Discuss the soil erosion of hill country of Sri Lanka and suggest possible preventive measures
   (c) *'Quartzites are ridgemakers and marbles are valley makers in the hill country of Sri Lanka'*. Discuss this statement with your knowledge of the state of weathering of rocks
   (d) '*Clay minerals are composed of two basic building blocks'*. Discuss.

(25pts each)

SECTION B – Earth Materials

4 (a) Be able to write a statement (of a few sentences) that distinguishes a mineral from an element and from a rock, and that relates elements, minerals, and rocks.

(b) What do the terms euhedral, subhedral, and anhedral mean in describing a mineral occurrence?

(c) Describe the basis of the classification system of minerals that is used today?

(d) What is "solid solution" in minerals?

(25pts each)

5 (a) Name some environments in which you might find clastic sediments.

(b) Explain the difference between a following.

(i) Boulder and a conglomerate

(ii) Sand and a sandstone

(iii) Clay and a shale

(c) List at least three types of chemical sedimentary rocks. Explain which minerals they contain and how they might be formed.

(d) Do igneous rocks contain fossils? Explain your answer

(25pts each)

6. (a) How are granite and rhyolite similar? How are they different?

(b) If plutonic igneous rocks are formed deep inside the crust of the Earth, will we ever see them on the surface of the Earth? Explain your answer.

(c) Discuss how the metamorphic rocks are formed.

(d) Describe the classification of foliated metamorphic rocks.

(25pts each)

SECTION C – Geological Applications

7. (a) Define porosity and permeability. Compare the porosity and permeability of clay and sand. Under what circumstances can a rock have a high porosity but not be a good aquifer?

   (b) Draw a completely labelled cross-section of an artesian water system. Briefly state the geologic criteria, which must be satisfied before a water system can be considered artesian.

   (c) What is the water table? Use a labelled diagram to explain the relationship between the topography of an area and the water table.

   (d) If it were discovered that radioactive waste from a nuclear processing plant had seeped into groundwater in the immediate vicinity of the plant, what kind of information would you want in order to predict the length of time before that waste might appear in a groundwater aquifer many kilometres away?

(25pts each)

8. (a) Write gemmological account of the mineral *'corundum'*

   (b) List the gem minerals found in Sri Lanka

   (c) Describe the colour enhancement techniques in gemmology

   (d) Discuss the value addition of minerals

(25pts each)

9. (a) Discus the advantages and disadvantages of hydropower projects in Sri Lanka

   (b) Write a geologist view on oil prospecting in off-shore Sri Lanka

(50pts each)