The Open University of Sri Lanka

B.Sc. Degree Programme (Level – 05)

PHU 3257 – Essentials of Geology

Final Examination 2007/08

Date : 10th July 2008   Time Allowed: 3 hours (1.00-4.00)

Paper consists of Nine (09) questions. Answer *FIVE (05)* questions selecting at least *ONE (01)* question from each of the sections **A, B** and **C**. Answers should be illustrated with sketch maps and diagrams where appropriate. Each question is allocated 20 points, and the marking scheme is given in *italics*

SECTION A- Earth Processes

1. (i) Give a general view of the internal structure of the Earth as revealed by seismological evidences. *(5 points)*

    (ii) Briefly describe the different methods that have been used for determining the age of the Earth. *(5 points)*

    (iii) *'Earthquakes occur frequently at or near plate margins'.* Comment on the statement using your knowledge on the plate tectonics. *(5 points)*

    (iv) Write an account on the hypotheses regarding the origin of the solar system. *(5 points)*

2. Explain the formation of following landforms.

    (i) Ridge and Valley topography *(4 points)*

    (ii) Plateau *(4 points)*

    (iii) Delta *(4 points)*

    (iv) Waterfalls *(4 points)*

    (v) U- shaped valleys *(4 points)*

3. (i) What is weathering? *(5 points)*

    (ii) What is a residual soil? *(5points)*

    (iii) Distinguish between chemical and physical weathering. *(5 points)*

    (iv) How does carbonic acid come from and what is its role in weathering? *(5points)*

SECTION B – Earth Materials

4. (i)   What is the basis of the classification system of minerals that is used today? *(5 points)*

   (ii)   What are the two main types of feldspars and how do they differ? *(5 points)*

   (iii) Compare the structural and compositional changes/similarities in diamond and graphite? *(5 point)*

   (iv)   What is it that makes "rose quartz" look "pink colour"? What is the origin of vein quartz? *(5 points)*

5. (i)   What is meant by a "pegmatite" deposit? Name at least three economically important minerals that are found in exploitable concentrations in a pegmatite. *(5 points)*

   (ii)   Differentiate between granite and rhyolite *(5 points)*

   (iii) What is metamorphism? How does it differ from metasomatism? *(5 points)*

   (iv)   Describe the classification of foliated smetamorphic rocks. *(5 points)*

6. (i)   What is diagenesis? *(5 points)*

   (ii)   List three chemical sedimentary rocks. Explain which minerals they contain and how they might be formed. *(5 points)*

   (iii) Why do you expect to see fossils **ONLY** in sedimentary rocks? *(5 points)*

   (iv)   How does coal and petroleum form? *(5 points)*

SECTION C – Geological Applications

7) (i) What are the main methods and concepts in the field of hydrogeology?
(5points)

(ii) What is an aquifer? What type of rock would make a good aquifer? *(5 points)*

(iii) Draw a simple sketch that shows how artesian conditions form in a confined aquifer. Label the vadose zone, confining layer, aquifer and water table.
(5 points)

(iv) Define Darcy's Law and hydraulic gradient *(5 points)*

8. The government of Sri Lanka designed a series of hydropower and irrigation projects under Mahaweli Development Project.

(i) List and classify the hydropower/irrigation projects in the entire catchment of river Mahaweli *(5 points)*

(ii) What factors would you considers when you design the damsite and reservoir? *(5 points)*

(iii) Write a short note on possibility of reservoir leakage problems encountered in Sri Lanka? (*5 points*)

(iv) What are the alternatives to hydropower in Sri Lanka? *(5 points)*

9. A particular location in a landslide prone area to be investigated for possible treat to a village. The area concerned has experienced Landslides during prolonged period of rain fall.

(i) Describe the different types of landslides occur in Sri Lanka *(5 points)*

(ii) Explain how water contribute to the slope failures *(5 points)*

(iii) State soil overburden and rock fractures that may contribute towards such slope failures *(5 points)*

(iv) List out the signs of possible future landslides you may observe during such survey *(5 points)*