The Open University of Sri Lanka
B.Sc. Degree Programme (Level – 05)
PHU5305 – Essentials of Geology
Final Examination 2024/25

Date: 15th December 2024 Time Allowed: 2 hours (9.30-11.30)

Paper consists of ***Six (06)*** questions. Answer ***Four (04)*** questions selecting ***Two (02)*** questions from each of the sections **A** and **B**. Answers should be illustrated with sketch maps and diagrams where appropriate. Each question carries equal marks.

SECTION A - Earth and Surface Processes

1. (i) Why are the inner planets "terrestrial" and the outer planets "gaseous?" *(25 marks)*

(ii) Explain how seismic waves provide evidence for the composition and structure of Earth's interior. *(25 marks)*

(iii) How do the crust, mantle, and core differ in terms of physical and chemical properties? *(25 marks)*

(iv) How does Earth's interior work, and how does it affect the surface? *25 marks)*

2 (i) What is the law of superposition used in geological history? *(25 marks)*

(ii) How do scientists study the history of the Earth? *(25 marks)*

(iii) What is the importance of fossils when understanding the geologic time? *(25 marks)*

(iv) Why is Carbon-14 a good radioisotope for dating archaeological finds? Why is Uranium-238 a good radioisotope for dating very old rocks? *(25 marks)*

3 (i) What evidence supports the theory of plate tectonics? *(25 marks)*

(ii) What drives the motion of plates? *(25 marks)*

(iii) Describe type of plate moments at the following locations using your knowledge in plate tectonics.

(a) At Mariana Trench
(b) at Iceland
(c) at Himalayas
(d) at Red Sea
(e) at Japanese islands

(5 marks each)

(iv) What produces the Earth's magnetic field? *(25 marks)*

SECTION B – Earth Materials

4. (i) Describe the methods used in identifying minerals in a laboratory setting. *(25 marks)*

(ii) What key properties are used to identify the following minerals?

a. Pyroxene from Amphibole
b. Phlogophite from Biotite
c. Galena from Pyrite
d. Feldspar from Quartz
e. Gypsum from Calcite *(5 marks each)*

(iii) Write in detail about chemistry and economic importance of the carbonate group of minerals? *(25 marks)*

(iv) Examine the role of earth materials in the development of sustainable energy solutions. *(25 marks)*

5 (i) Explain the processes involved in the formation and transformation of igneous, metamorphic, and sedimentary rocks using the rock cycle. *(25 marks)*

(ii) Discuss different structures of the formation of clay minerals. *(25 marks)*

(iii) What are the key properties used to identify the following rock types?

a. granite and rhyolite
b. breccia and conglomerate
c. quartz and marble
d. slate and gneiss
e. limestone and sandstone *(10 marks each)*

6. (i) How does the rate of cooling affects the crystal growth and size of igneous rocks during the crystallizing of magma or lava? *(25 marks)*

(ii) Explain Bowen's reaction Series. *(25 marks)*

(iii) What are non-foliated metamorphic rocks? *(25 marks)*

(iv) Describe the differences and similarities between the various types of clastic sedimentary rocks. *(25 marks)*