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The Open University of Sri Lanka
Faculty of Natural Sciences
B.Sc. Degree Programme

Department	: Physics
Level	: 5
Name of the Examination	: Final Examination
Course Code and Title	**: PHU5305 Essentials of Geology**
Academic Year	: 2019/20
Date	: 28.12.2019
Time	: 9.30 am- 11.30 am
Duration	: 2 hours

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **six (06)** questions in three (03) pages.
3. Answer any **four (04)** questions only selecting **two (02)** questions from each of the sections **A** and **B**. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. Draw fully labelled diagrams where necessary
5. Relevant log tables are provided where necessary.
6. Having any unauthorized documents/ mobile phones in your possession is a punishable offense
7. Use blue or black ink to answer the questions.
8. Circle the number of the questions you answered in the front cover of your answer script.
9. Clearly state your index number in your answer script

SECTION A - Earth and Surface Processes

1. (i) Discuss the "Solar Nebular Hypothesis" *(25 marks)*

(ii) Briefly discuss the "Singularity" and the "Big-Bang Theory". *(25 marks)*

(iii) Explain the use of paleo-magnetism as a tool for relative dating in sedimentary and igneous rocks? *(25 marks)*

(iv) Suggest a possible radioactive method with reasons to calculate the ages of *'Precambrian rocks'* of Sri Lanka. *(25 marks)*

2 (i) What evidence used by Alfred Wagner to support his theory of continental drift? *(25 marks)*

(ii) Describe the concept of 'Plate Tectonics' and how its influence the nature of the Earth's surface. *(25 marks)*

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

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

(a) at Middle of the Atlantic Ocean
(b) in Iceland
(c) at East African Rift Valley
(d) at Red Sea
(e) at San Adreas Fault *(5 marks each)*

3. (i) Define the weathering terms 'exfoliation' and 'crystal growth'. *(20 marks)*

(ii) Describe the process of freeze- thaw weathering. *(20 marks)*

(iii) Briefly describe spheroidal weathering. *(20 marks)*

(iv) Explain how chemical weathering is influenced by climate, rock type and rock Structure giving examples from Sri Lanka. *(20 marks)*

(v) With the help of a diagram, explain the formation of landforms at the destructive plate margin formed by the meeting of two oceanic plates. *(20 marks)*

SECTION B – Earth Materials

4 (i) Mica, amphiboles and pyroxenes are mineralogically different. Explain how these mineral groups are structurally different. *(25 marks)*

(ii) Sulphide minerals are common 'ore' minerals. List the name and chemical formula for molybdenum, zinc, nickel, lead and copper bearing sulphide minerals. *(25 marks)*

(iii) Explain the following. Use examples and diagrams define the each term and also explain the difference between the two where applicable.

(a) Mohs scale of hardness

(b) Mineral vs mineraloid

(c) Pyroxene vs Amphibole

(d) Gold vs Pyrite

(e) Cleavage vs Fracture *(10 marks each)*

5. (i) For the following minerals give the diagnostic properties you would use to identify them in hand specimen.

(a) Citrine
(b) Malachite ($Cu_3(CO3)_2(OH)_2$)
(c) Microcline
(d) Pyrite
(e) Phlogophite *(5 marks each)*

(ii) What are the building blocks of clay minerals? Explain the different structures of clay minerals. *(25 marks)*

(iii) Explain the Bowen's Reaction Series *(25 marks)*

(iv) Describe the concept of the rock cycle. *(25 marks)*

6. (i) Define the following rock types.

(a) gneiss
(b) quartzite
(c) chert
(d) gabbro
(e) conglomerate

(10 marks each)

(ii) List at least three type of chemical sedimentary rocks. Explain, which minerals they contain and how they might be formed. *(25 marks)*

(iii) Define the process of metamorphism. And explain the different types of foliated metamorphic rocks with respect to its characteristic metamorphic grade and grain size variation. *(25 marks)*