

National University of Lesotho

Faculty of Agriculture

Department of Soil Science

Final Examination – January 2023

SSR 2501 – Physical Geology and Geomorphology of Lesotho

January 2023

100 Marks

Time: 3 Hours

Instructions

Section 1: Answer All Questions

Section 2: Answer Any Three Questions

Section 1: Answer All Questions

Question 1

a) Identify and discuss the origin and nature of the phenomena illustrated (4 marks each)

i)



ii)



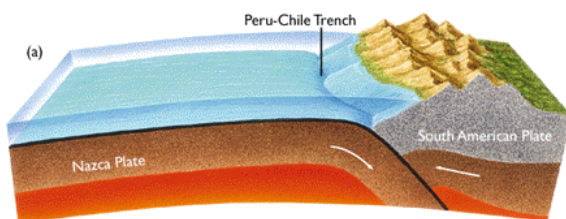
iii)



iv)



v)



Question 2

Answer true or false on the following (2 marks each)

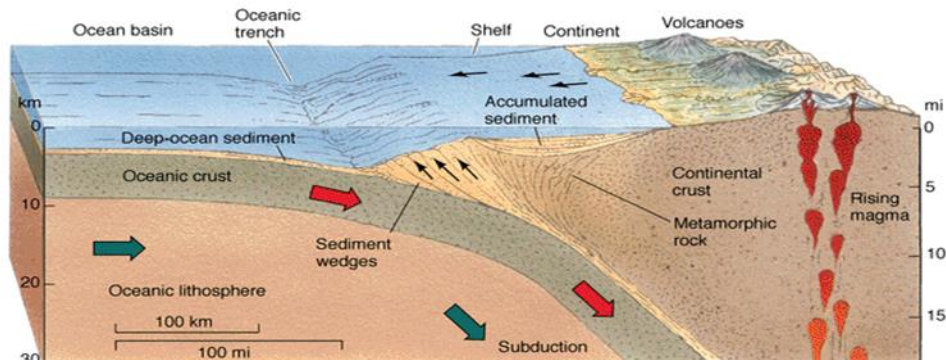
- 1) The principle of original horizontality states that sedimentary rocks were laid down essentially vertically.
- 2) The surface of the earth is composed of the troposphere, stratosphere and the upper atmosphere.
- 3) The structure of the atmosphere is composed of the lithosphere, hydrosphere and biosphere.
- 4) The principle of superimposition holds that younger sedimentary beds lie on top of older sedimentary beds..
- 5) The principle of uniformitarianism holds that geological processes which are currently happening are essentially different to those which happened in the past and which led to the formation of the old rock that we can observe.
- 6) the significant points of plate tectonic theory are that:
 - a) The earth's crust is made up of a number of semi-rigid plates
 - b) The plates move around with respect to one another, largely in response to activities on the surface of the earth
 - c) The process has been going on for much of the 19th century
 - d) Most of the major geological features of the earth can be explained by processes which take place at plate
- 7) Wegner encountered two ideas about global geology:
 - The dis-similarity of the shapes of the western margin of Africa and the eastern margin of South America
 - The geological and paleontological match ups between the continents on either side of the Atlantic Ocean.
- 8) The internal structure of the earth is as follows:
 - The upper most 100 km of the mantle is solid and this zone along with the crust is known as the lithosphere
 - The mantle is essentially solid but behaves like a liquid
 - The asthenosphere behaves more like a solid than the rest of the mantle
 - Convective motion of the mantle drives plate tectonics
 - The Convective motion of the liquid outer core generates the earth's magnetic field
 - The outer core is solid metal and is in motion
 - The inner core is liquid metal

- 9) A mineral must satisfy the following conditions
- inorganic solid that occurs naturally
 - atoms are arranged in a crystal structure
 - definite chemical structure that varies only within certain predefined limits
 - definite and defined physical properties
 - stability within a definite temperature and density range
- 10) When a mass of rock is exposed by weathering and by removal of the overlying rock there is a decrease in the confining pressure on the rock, and a slight contraction of the rock volume occurs.

Section 2: Answer Only Three Questions

Question 3

Discuss the phenomenon taking place in the illustration and highlight major processes (20 marks)



Question 4

Briefly discuss the role of water in mass movement of unconsolidated materials (20 marks)

Question 5

Discuss the Bowen's Reaction Principle and hypothesis (20 marks)

Question 6

Briefly discuss the principle and occurrence of metamorphic processes (20 marks)

Question 7

Identify the following phenomena (4 mark each)

a)



b)



c)



d)



e)

