Standard Answer Key for the Geology I Exam: 1st Year LMD, 1st Semester 2025-2026

Answers:

I. Mark the correct answer(s) with a (+) sign (10.50 pts)

1- The phenomenon responsible for the formation of mountain ranges is:

* [ ] Diagenesis
* [ ] Deposition
* [+] Orogenesis

2- In the outer core, heat evacuation is possible thanks to the movements of:

* [ ] Expansion
* [ ] Compression
* [+] Convection

3- In the lithosphere, rocks are:

* [+] Brittle
* [ ] Molten
* [ ] Viscous

4- The focus (hypocenter) of an earthquake:

* [+] Is located deep underground
* [ ] Is located on the Earth's surface
* [ ] Is also called the epicenter

5- Earth is said to be a geoid, which means:

* [ ] Its surface is rocky
* [+] It does not have a perfectly spherical shape
* [ ] Its shape is very regular

6- Magnetic declination represents:

* [+] The relative angular difference between Magnetic North and Geographic North
* [ ] The distance between the North and South magnetic poles
* [ ] The geographic reference longitude (Greenwich)

7- From a seismogram, the distance to the epicenter can be determined by studying:

* [ ] The arrival time of S-waves
* [+] The time interval between P-waves and S-waves
* [ ] The arrival time of P-waves

8- The average distance between the Earth and the Sun is:

* [ ] 15 billion km
* [+] 150 Million km
* [ ] 15 million km

9- **An Anticline:**

* [ ] Exhibits a form of brittle tectonics
* [ ] Is characterized by recent layers at its core
* [+] Is a fold whose concavity is oriented downwards

10- If a region is subjected to extensional forces, the following appear:

* [ ] Reverse faults
* [ ] Thrusts
* [+] Normal faults

11- In a thrust sheet (nappe), a "window" (fenêtre) presents:

* [ ] A klippe on the Autochthonous unit
* [+] A part of the underlying unit (Autochthonous)
* [ ] A part of the front of the allochthonous unit

12- The Earth's magnetic field is formed in:

* [+] The Outer Core

* [ ] The Inner Core
* [ ] The Mantle

13- The 'Moho' corresponds to the boundary between:

* [+] The Crust and the Mantle
* [ ] The Outer Core and the Inner Core
* [ ] The Mantle and the Core

14- The terrestrial zone called the 'Lithosphere' corresponds to:

* [+] The Crust + the upper part of the Mantle
* [ ] The Lower Mantle
* [ ] The Upper Mantle

II. 1) Plate tectonics is a scientific model explaining the global dynamics of the Earth's lithosphere. The lithosphere, the Earth's rigid outer layer consisting of the crust and part of the upper mantle, is subdivided into plates, known as tectonic or lithospheric plates. The theory of plate tectonics assumes that the lithosphere is divided into several rigid plates that float on the viscous asthenosphere and move relative to each other. Plate boundaries consist of mid-ocean ridges, trenches, and transform faults, which lead to continental drift and the formation of relief such as mountains or volcanoes. Lithospheric plates move a few centimeters per year in different directions, resulting in the formation of divergence, subduction, collision, and sliding zones.

2) This theoretical model was built from the concept of continental drift, developed by Alfred Wegener at the beginning of the 20th century. (1 pt)

A) Rocks and geological layers are subject to two main modes of deformation. On one hand, brittle tectonics manifests as ruptures, creating fractures such as faults (normal, reverse, or strike-slip), joints, and shear zones. On the other hand, ductile (soft) tectonics results in the formation of folds, notably anticlines and synclines. These two mechanisms often coexist on a large scale, working together to build mountain ranges and establish thrust sheets. (1.25 pt)

B) Among the arguments confirming the hypothesis of tectonic plate drift:

* Geographic argument: the almost perfect complementarity of coastlines on either side of the Atlantic.
* Geological argument: the coincidence of geological contours on either side of the South Atlantic.
* Structural argument: the main structural directions of Africa coincide with those of South America.
* Paleontological argument: identical fossil fauna and flora found on the coasts of the continents.
* Magnetic argument: magnetic rocks in the Southern Hemisphere possess a magnetic dipole characteristic of their formation site in the Northern Hemisphere. (1.25 pt)

III. The North African zone is a significant seismic area due to its location at the boundary between the Eurasian plate and the African plate. This border zone is marked by a slow convergence movement, accompanied by various tectonic processes. (1.5 pts)

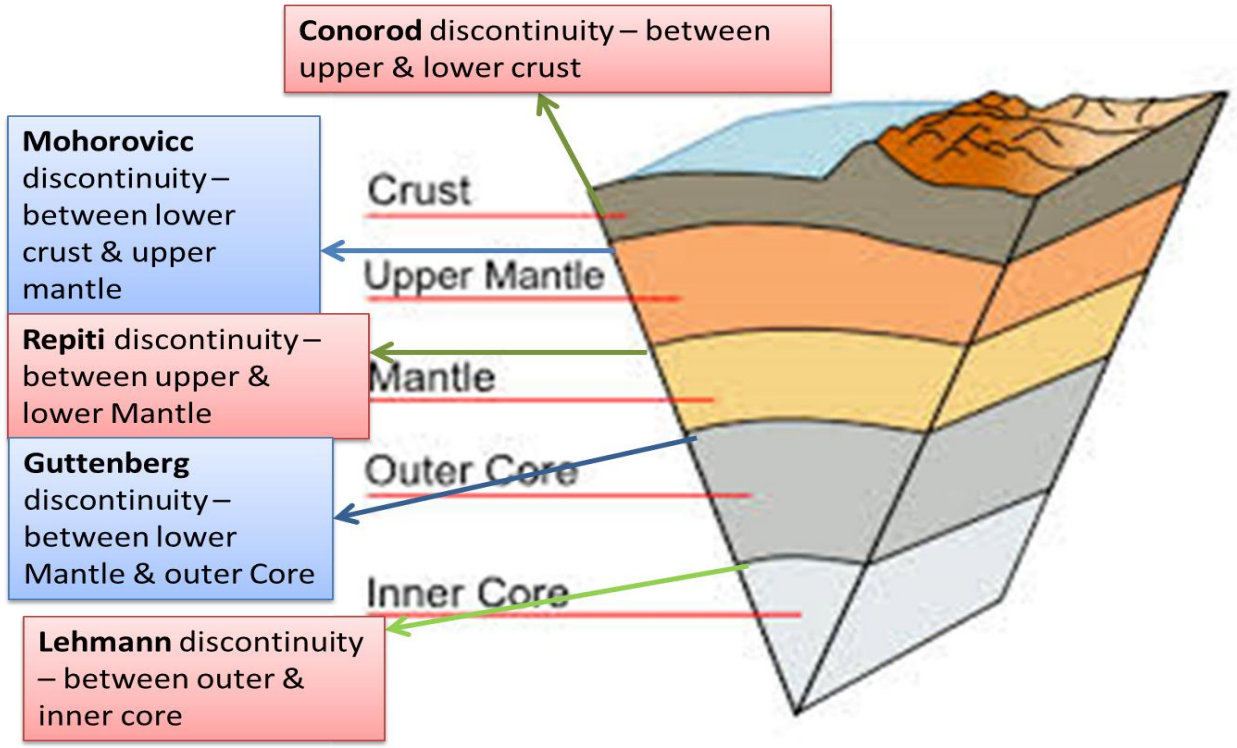
IV. Scientific disciplines according to their object of study:

* Study of rocks: Petrography
* Study of fossils: Paleontology
* Study of relief and the Earth: Geomorphology
* Study of sedimentary layers: Stratigraphy
* Study of chemical properties of rocks: Geochemistry
* Study of minerals: Mineralogy (1.25 pts)

V. Figure Legend: Internal Structure of the Earth

* Atmosphere
* Biosphere & Hydrosphere
* Oceanic Crust (5-15 km) SIMA (d=3.2)
* Continental Crust (30-65 km) SIAL (d=2.7)
* Sedimentary Cover
* Lithosphere
* Asthenosphere (d=3.3)
* MOHO (Boundary)
* Upper Mantle (d=3) (Depth: 70-150 km to 700 km)
* Lower Mantle (d=5.5)
* GUTENBERG Discontinuity (2885 km) (d=9.5)
* Outer Core (d=11.5)
* LEHMANN Discontinuity (5155 km) (d=12)

(Note: Scale not to specification)



Internal Structure of the Earth