

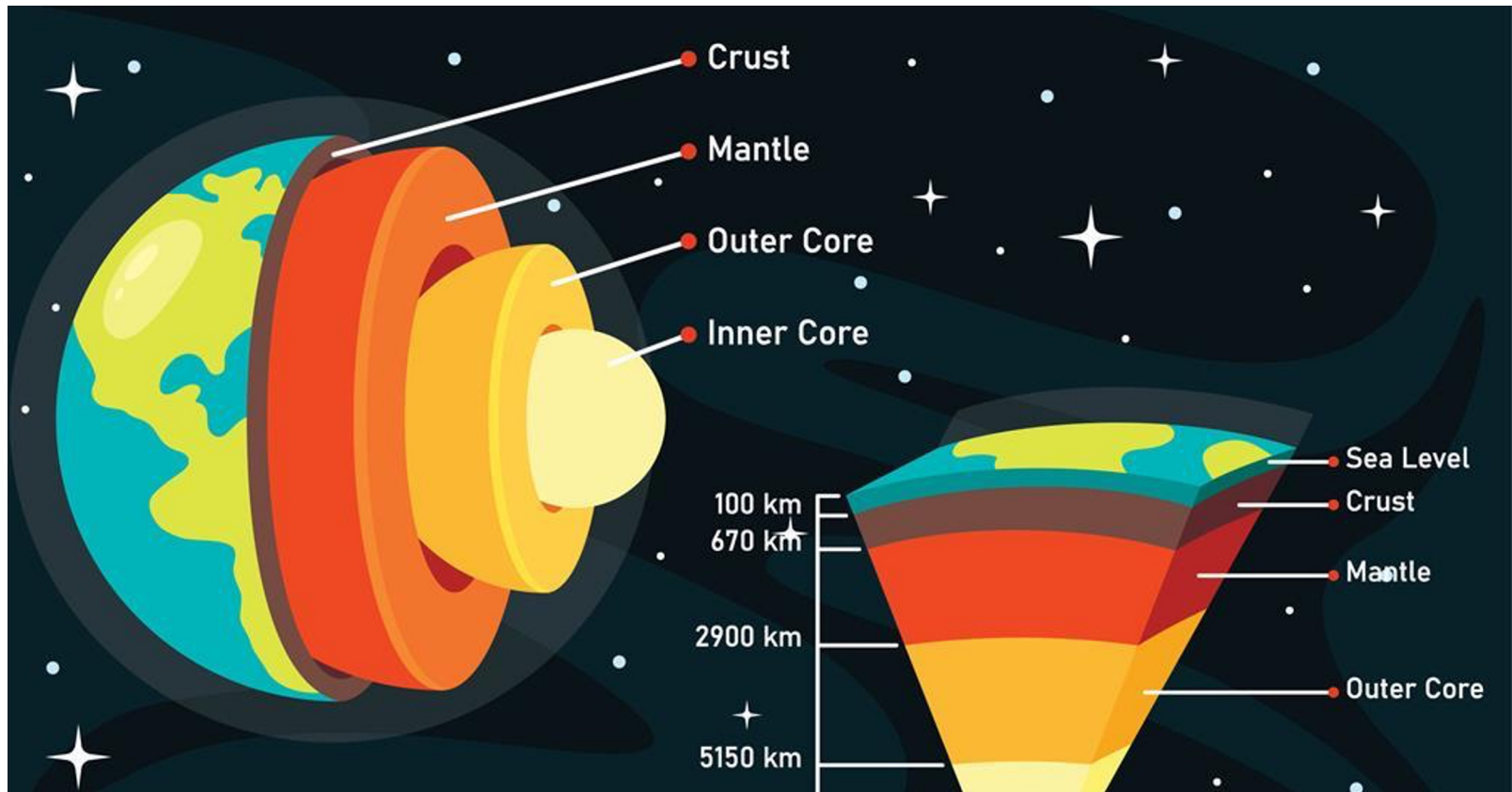


**SNS COLLEGE OF TECHNOLOGY**  
**(AN AUTONOMOUS INSTITUTION)**  
**COIMBATORE-35**

**II YEAR / III SEMESTER**  
**19CET201-ENGINEERING GEOLOGY**



# EARTH'S STRUCTURE

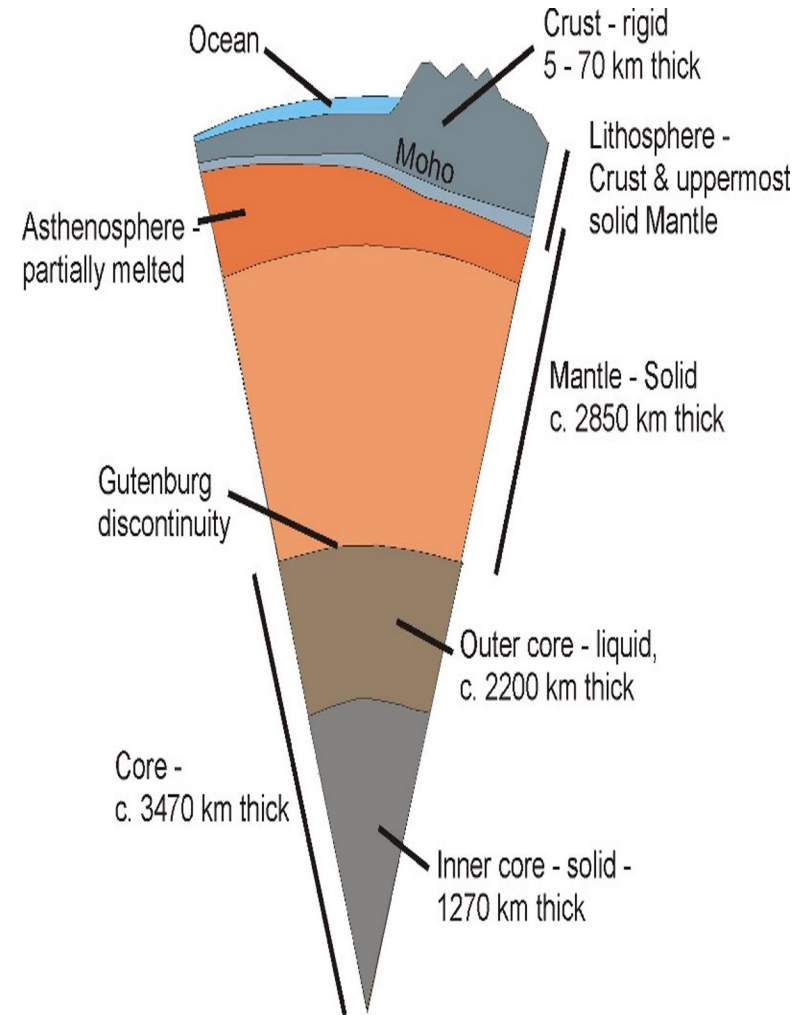
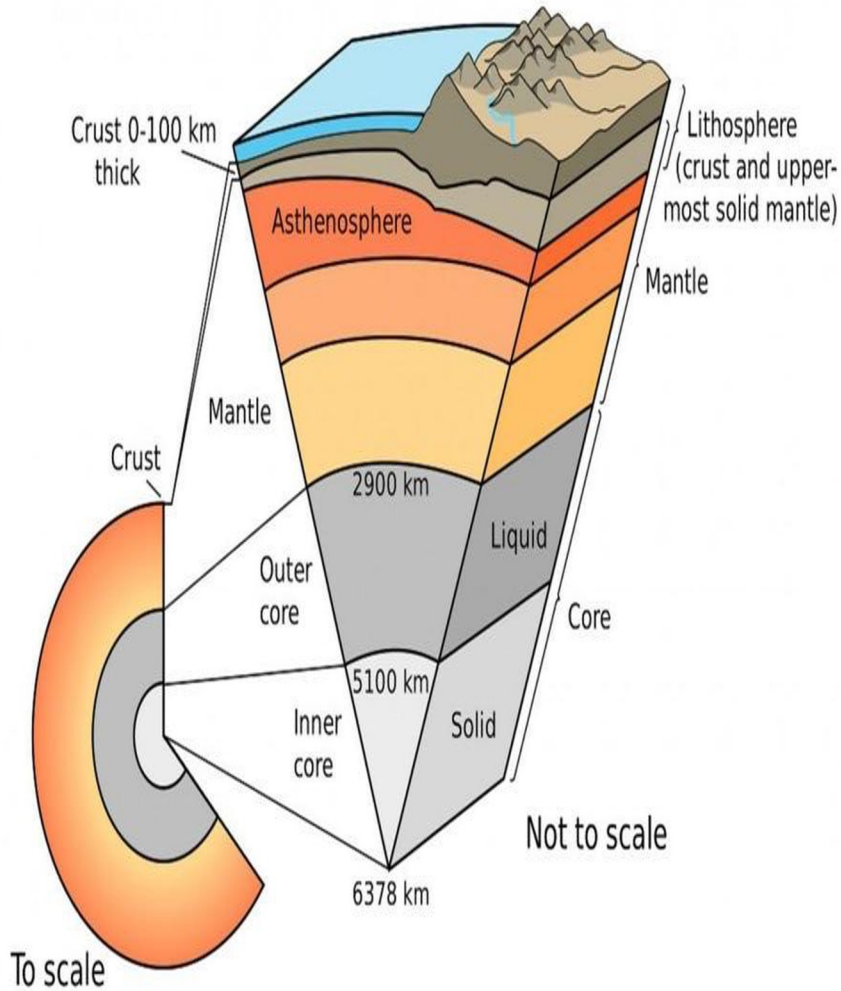




# STRUCTURE OF EARTH AND ITS CLASSIFICATION

The structure of the earth is divided into four major components: **the crust, the mantle, the outer core, and the inner core**. Each layer has a unique chemical composition, physical state, and can impact life on Earth's surface.

- The **outer crust** that we live on
- The plastic-like **mantle**
- The liquid **outer core**
- The solid **inner core**





# STRUCTURE OF EARTH

- ❖ When differentiating the layers, geologists lump subdivisions into two categories, either rheologically or chemically.
- ❖ Rheological differentiation speaks to the liquid state of **rocks under tremendous pressure and temperature**
- ❖ If we subdivide the Earth based on rheology, we see the lithosphere, asthenosphere, mesosphere, outer core, and inner core.
- ❖ However, if we differentiate the layers based on chemical variations, we lump the layers into crust, mantle, outer core, and inner core.



# EARTH'S CRUST





# EARTH'S CRUST

- The crust is what you and I live on and is by far the thinnest of the layers of earth.
- The thickness varies depending on where you are on earth, with **oceanic crust** being 5-10 km and **continental mountain ranges** being up to 30-45 km thick.
- Thin oceanic crust is denser than the thicker continental crust and therefore 'floats' lower in the mantle as compared to continental crust.
- In comparison, **when two continents collide** as in the case of the **India Plate** and Eurasia Plate, you get some of the thickest sections of crust as it is crumpled together.



# EARTH'S CRUST

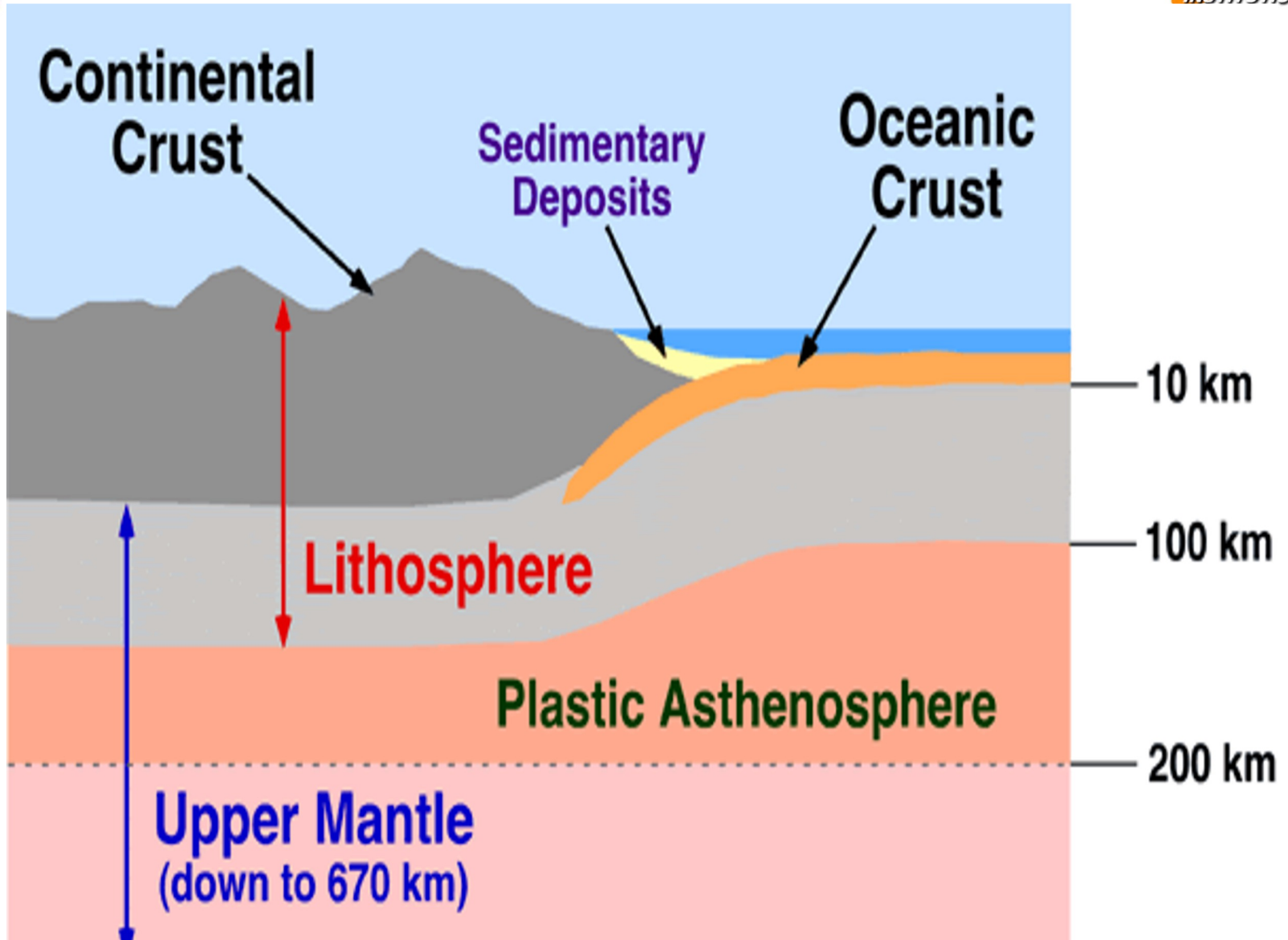
The temperatures within Earth's crust will vary from air temperatures at the surface to approximately 870 degrees Celsius in deeper sections.

At this temperature, you begin to melt rock and form the below-lying mantle.

Geologists subdivide Earth's crust into different plates that move about in relation to one another.

Oceanic crust is made up of basalt and continental crust is made up of rocks similar to granite







# EARTH'S MANTLE

- ❖ The mantle is the layer of the earth that lies below the crust and is by far the largest layer making up 84% of Earth's volume.
- ❖ The mantle starts at the **Mohorovicic Discontinuity**, also known as the Moho. The Moho is defined as the density contrast from less dense crust to denser mantle and where seismic wave velocities increase.
- ❖ The mantle acts similar to plastic and at very high temperatures and pressures the rock is deformable at geologic timescales. This deformation causes a convection like process in the mantle where you have large-scale upwelling and downwelling zones.



# EARTH'S MANTLE

- ❑ The mantle extends down to 2,890 km into the Earth's surface. Temperatures that range from 500 to 900 degrees Celsius in the upper portion to over 4,000 degrees Celsius near the core boundary.
- ❑ Earth's mantle is believed to be composed of bulk mineralogy similar to [peridotite](#).





# Core

- **The core-mantle boundary is positioned at the depth of 2,900 km.**
- **The inner core is in the solid-state whereas the outer core is in the liquid state.**
- **The core is made up of very heavy material mostly constituted by nickel and iron. Hence it is also called the “nife” layer.**



# INTERESTING!!!

- ❖ Peridot is one of only two gems observed to be formed not in the Earth's crust, but in molten rock of the upper mantle. Gem-quality peridot is rare to find on Earth's surface due to its susceptibility to weathering during transportation from deep within the mantle to the surface.
- ❖ In the Middle Ages, the gemstone was considered a stone that could provide healing powers, curing depression and opening the heart. Peridot is the **birthstone** for the month of August.

