

Quadrant II – Transcript and Related Materials (Notes)

Programme	: Bachelor of Science (First Year)
Subject	: Geology
Paper Code	: GEG 101
Paper Title	: Minerals and Rocks
Unit	: 2
Module Name	: Structure and Composition of the Earth's Crust, Mantle and Core-1
Module No	: 10
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Notes:

The science of Seismology helps determine the condition of the Earth's interior.

Earthquakes are recorded on a sensitive instrument called as **Seismograph**. The Drum is rotated by a clock work mechanism so the time of the recording is noted, this chart is called as **Seismogram**.

The earthquake wave **Primary or P-waves** travel faster, are first to be recorded and can transmit through water, rocks. These are longitudinal or Compressional waves. P-waves have the highest velocity of all seismic waves and thus will reach all seismographs first.

The secondary wave shear or **S-waves** are the next to be recorded as their velocity is less than the P-waves, and cannot be transmitted through liquids. These are Transverse waves.

P waves are the first to be recorded at any station, S waves reach later and **L waves (surface waves)** are the last to be recorded.

The time elapsed between the occurrence of the earthquake and its recording on the seismograph is called the **travel time** of the waves

Velocity- Depth Curve

These waves travel with characteristic velocities through different media (density and composition), these waves reach the stations after being reflected and refracted at various depth.

From the velocity- depth curves, it is possible to get the medium through which the waves travelled at different depths.

A change in the velocity at specific depth below the surface shows the change in the nature of the material (medium) at that depth, a major change in the velocity of the seismic waves is called as **seismic discontinuity**.

Two significant discontinuities are **Mohorovicic** and **Mantle–Core** discontinuity.

- The **Mohorovicic discontinuity** occurs at depths 30-40km below continents and 5-10km below Oceans and 60-75km below mountains. Both P & S wave on reaching these depth show sharp increase in their velocities, from 5.4km/sec to 7.75km/sec with P waves and 3.35km/sec to 4.35km/sec as in S-waves, this thus marks the lower limits of the skin of the earth: **The crust**
- The **mantle-core discontinuity**: The seismic waves that cross the Moho discontinuity travels downward with a uniform increase in velocities. Thus indicating that the density of the medium increases with depth. At 2900km below the surface the P waves become very sluggish and suffer decrease in velocity from 13.64km/sec to 8.1km/sec. And the S-waves stop going deeper.
- Accordingly the Earth is divided into three main parts: **The Core, the mantle and crust**.