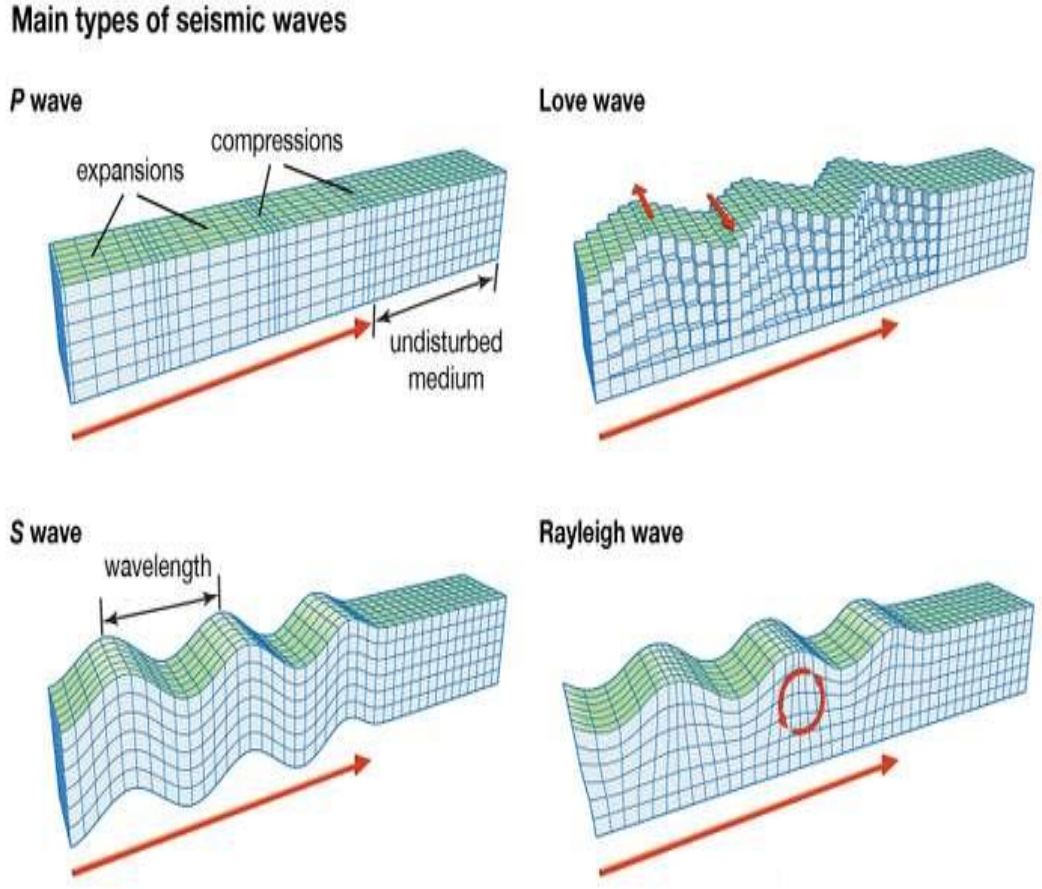
Seismic Waves (Earthquake Waves)

- Seismic waves are the waves of energy caused by earthquakes or an explosion. They are the energy that travels through the earth and is recorded on seismographs.
- Earthquake waves are basically of two types — **body waves and surface waves.**
- **Body waves** are generated due to the release of energy at the focus and move in all directions travelling through the body of the earth. Hence, the name body waves.
    - There are **two types of body waves.** They are called **P and S-waves.**
    - **P-waves** move faster and are the first to arrive at the surface. These are also called 'primary waves'. The P-waves are similar to sound waves. They travel through gaseous, liquid and solid materials.
    - **S-waves** arrive at the surface with some time lag. These are called secondary waves. An important fact about S-waves is that they can travel only through solid materials.
- The body waves interact with the surface rocks and generate a new set of waves called **surface waves.** These waves move along the surface.
- The surface waves are the last to report on seismographs. These waves are more destructive. They cause displacement of rocks, and hence, the collapse.
- Thus, the characteristics of the seismic waves are quite important. It has helped scientists to **understand the structure of the interior of the earth.**



D.K. Upadhyay Sir

EARTHQUAKES

- . All natural earthquakes occur in the lithosphere.
- Seismic wave studies offer a full picture of the layered interior
- An earthquake is, simply put, shaking of the earth's crust.
- It is caused due to the energy release, which triggers waves that travel in all directions.
- The emanation of energy occurs along a fault.
- A fault is a sharp break in the crustal rocks.
- Rocks along a fault generally move in opposing directions

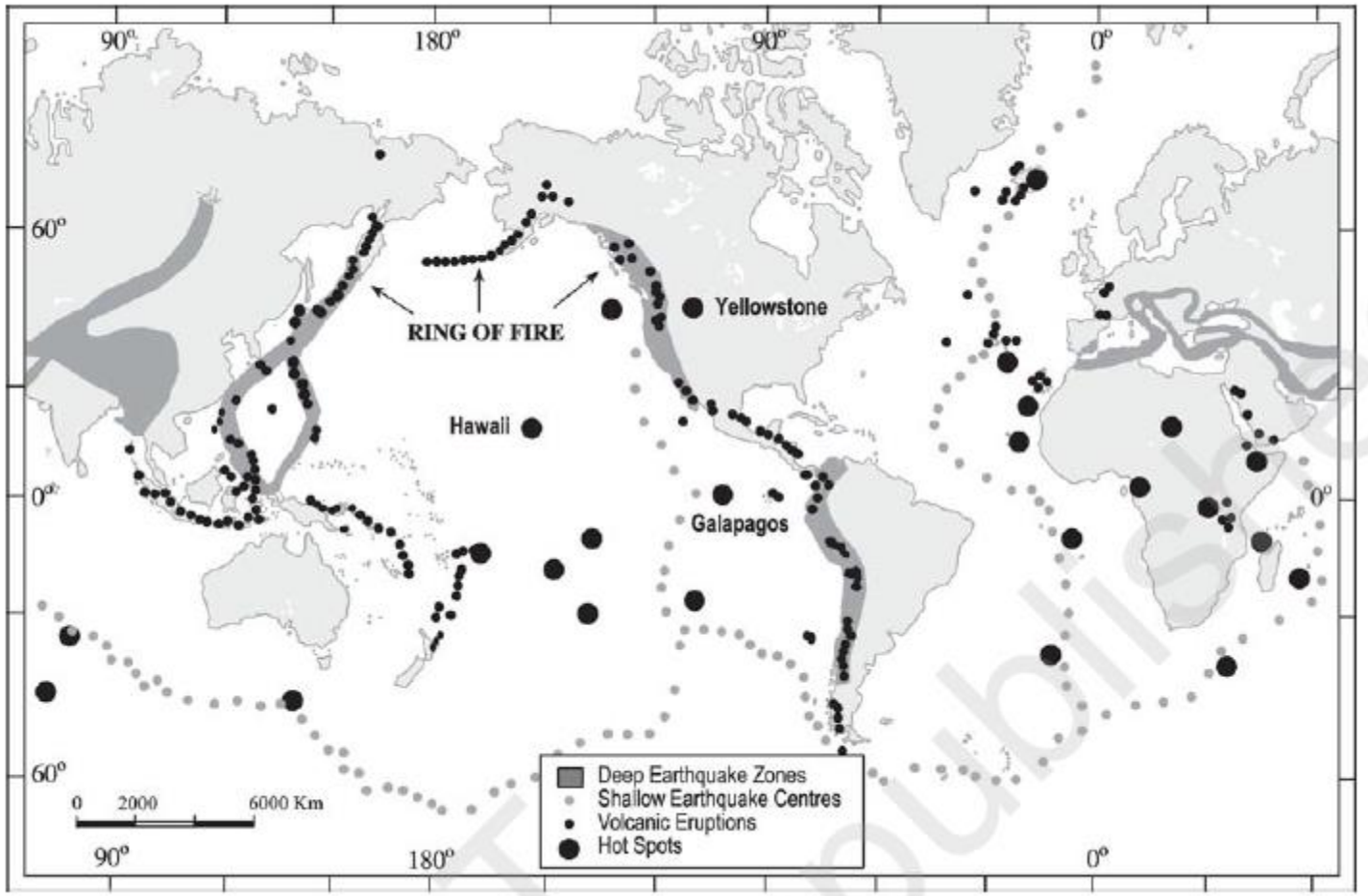
TYPES OF EARTHQUAKE

- **Tectonic earthquakes:** The most common form of earthquakes, is caused by the movement of loose fragmented pieces of land on earth's crust knowns as tectonic plates.
- **Volcanic earthquake:** The less prevalent compared to the tectonic variety, these earthquakes happen before or after the eruption of a volcano. It is caused when magma leaving the volcano is filled by rocks being pushed to the surface.
- **Collapse earthquake:** This earthquake occurs in underground mines. The main cause is due to pressure generated within the rocks.
- **Explosion earthquakes:** The occurrence of this type of earthquake is artificial. High-density explosion such as nuclear explosions is the primary cause.

Distribution of Earthquake

- Earthquakes can strike any location at any time, but history shows they occur in the same general patterns year after year, principally in three large zones of the earth:
- The world's greatest earthquake belt, the **circum-Pacific seismic belt,** is found along the rim of the Pacific Ocean, where about 81 percent of our planet's largest earthquakes occur.
    - It has earned the nickname **"Ring of Fire".**
    - The belt exists along boundaries of tectonic plates, where plates of mostly oceanic crust are sinking (or subducting) beneath another plate. Earthquakes in these subduction zones are caused by slip between plates and rupture within plates.
- The **Alpide earthquake belt (mid Continental belt)** extends from Java to Sumatra through the Himalayas, the Mediterranean, and out into the Atlantic.
    - This belt accounts for about 17 percent of the world's largest earthquakes, including some of the most destructive.
- The third prominent belt follows the submerged **mid-Atlantic Ridge.** The ridge marks where two tectonic plates are spreading apart (a divergent plate boundary).
    - Most of the mid-Atlantic Ridge is deep underwater and far from human development.

Distribution of Earthquake



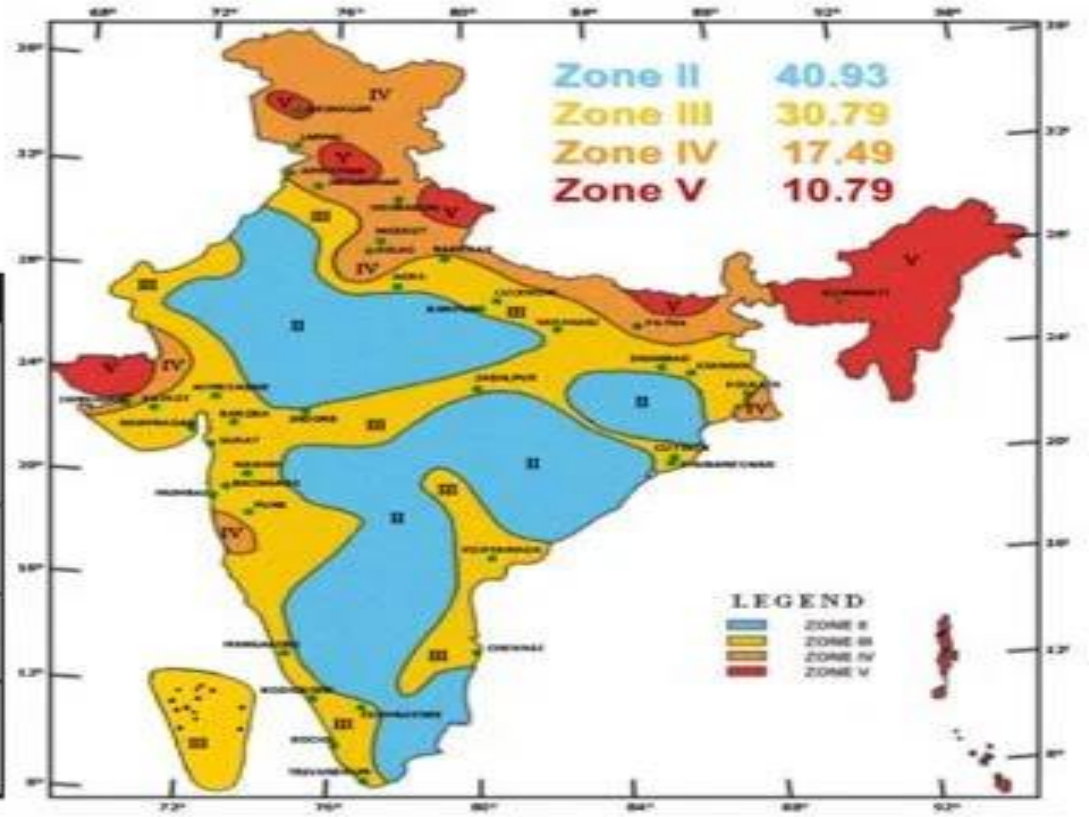
Earthquake in India

- India is one of the highly earthquake affected countries because of the presence of technically active young fold mountains - Himalaya.
- India has been divided into **four seismic zones (II, III, IV, and V)** based on scientific inputs relating to seismicity, earthquakes occurred in the past and tectonic setup of the region.

Seismic Zone Map of India: -2002

About 59 percent of the land area of India is liable to seismic hazard damage

Zone	Intensity
Zone V	Very High Risk Zone Area liable to shaking Intensity IX (and above)
Zone IV	High Risk Zone Intensity VIII
Zone III	Moderate Risk Zone Intensity VII
Zone II	Low Risk Zone VI (and lower)



D.K. Upadhyay Sir