7. EARTHQUAKE

- An earthquake is a vibration or oscillatio of the surface of the earth caused by the elasticity or the
- An earthquake is a vibration or oscillation of the surface of the earth caused by the elasticity or the isostatic adjustment of the rocks.
- It may be caused by human as well as natural activities.
- Before the earthquake waves hit a region, the amount of 'Radon' gas increases in the atmosphere of that region.
- There are two points of earthquake-
  - **(a) Focus**
  - **(b) Epicentre**

(a) Focus–

- The point, below the surface of the earth, from where the seismic (earthquake) waves originate is called the 'Focus' of the earthquake.

Figure-Epicentre and Focus

(b) Epicentre–

- The place perpendicularly above the fouse on the surface.

Measurement of an Earthquake:

Seismograph–

- The instruments sensitive to the seismic waves which help us to measure the intensity of an earthquake is called 'Seismograph'.

Scales for measuring intensity of Earthquake–

Richter Scale–

- It is a mathematical (logarithmic) scale.
- It measures the intensity of an earthquake between 0 to 9.
- For each unit of increase in the Richter Scale, the amplitude of the earthquake wave increases by a factor of 10.

Seismic Waves

- The waves generated during an earthquake are lled Seismic Waves.
- Seismic Waves are classified into 3 types:
  - **(1) Primary Waves**
  - **(2) Secondary Waves**
  - **(3) Surface Waves**

(1) Primary Waves–

- These are simply known as P-Waves.
- These are longitudinal waves.
- Primary Waves are analogous to the sound waves.
- These waves have the maximum velocity among the three types of seismic waves.
- These waves can pass throuth the solid as well as liquid medium.
- Though their velocity gets slowed down in the liquid medium.

(2) Secondary Waves–

- These are also called as S-Waves.
- These are transversal waves.
- Secondary Waves analogous to the light waves.
- The velocity of these waves is about 40% more than the velocity of the 'P' waves.
- These waves can travel only through the solid medium.
- Secondary Waves disappear in the liquid medium.
- These waves do not pass through the core of the earth.
- They give an idea about the core being in liquid state.

(3) Surface Waves–

- These are also known as 'L' waves
- These waves Originate when 'P' wave hits the surface.
- These waves affect only the surface of the earth.
- These are the most destructive.
- These waves cover the longest distance among the

three types of waves.

- ***On the basis of the depth of the focus Earthquakes are divided into three groups –***
  - (a) Moderate Earthquake. 0-50 km
  - (b) Intermediate Earthquakes. 50-25 km
  - (c) Deep Focus Earthquakes. 250 - 700 km.

Isoseismal lines

- The lines joining the regions of same seismic intensity are called as Isoseismal Lines.

Homoseismal Lines

- The lines joining the places which experience the earthquake tremors at the same time are called Homoseismal Lines.

World Distribution of Earthquakes

- A close view on the world map showing the distribution of earthquakes reveals that the earthquakes are associate with the weaker and isostatically disturbed areas of the earth.
- **Different earthquake belts of the world are-**

A. Circum-Pacific Belt–

- This belt accounts for about 63% of the total earthquakes of the world.
- The regions included in this belt are Chile, California, Alaska, Japan, Philippines, New Zealand etc.
- The earthquakes are directly related to faults or fractures of the rock strata and to the active volcanoes.

B. Mid-Continental Belt–

- This belt accounts for about 21% of the total earthquakes of the world. This belt is also known as mediterranean or alpine-himalayan belt.
- This belt represents the weaker zones of folded mountains where isostaic and fault-induced earthquakes occur.
- Starting from Mexico and crossing the Atlantic Ocean, this belt extends to Alps, Caucasus, Himalayas and then turn towards south and in the region of Southeastern islands.
- It culminates into the Circum-Pacific belt.
- Seismic zone of India is a part of this belt.

C. Mid-Atlantic Belt-

- This belt records moderate and shallow focus earthquakes.
- The earthquakes in this region are caused due to creation of transform faults and the fractures because this region represents the divergent plate margin.
- Most of the earthquakes in this belt occur near the equator.

Tsunami

- '**Tsunami**' is a Japanese word.
- Tsunami means oncoming oceanic waves.
- These waves are very long and with less oscillation which originate in the oceans due to earthquakes that occur on the ocean-bed.
- The movement of water with the Tsunami waves is upto complete depth which makes them more catastrophic.
- From the Tsunami point of view, **Pacific Ocean** is in the most dangerous position.
- These are the most powerful in the convergence zone of the oceanic plates.
- The tsunami that occurred on the **26th of December 2004** in the **Sumatra island of Indonesia** in the Indian Ocean was the result of subduction of Indian plate below the Burmese plate.
- The intensity of the earthquake was recorded at 8.9, which caused catastrophic tsunami waves.
- Eleven countries, including Indonesia, Malaysia, Sri Lanka and India came under the influence of these waves.
- Nagapttinam district in Tamil Nadu was the most affected area in India.
- In **October 2007**, India started the most advanced Tsunami Warning System.
- India will provide information received from it to its neighbour countries.
- The system will reveal the intensity, depth and centre of the tsunami.
- It will provide the information of every earthquake tremor of Indian Ocean in 20 minutes, after calculation, to the nearest regions.