7. EARTHQUAKE

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- 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



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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 earth-quakes 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.



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