

Ch-8Earthquakes

Earthquake - An earthquake is defined as a tremor below the surface of the earth which causes shaking of the crust.

Causes of Earthquakes -

- i) Volcanoes - During the volcanic eruptions hot gases are pushed upward violently causing earthquakes. They are inter related.
- ii) Plate tectonics - Most earthquakes occur on account of plate movements. When two plates slip past each other or collide against each other, their edges produce faults along the lines of weakness.
- iii) Folding and faulting - Internal horizontal and vertical movements due to compressional and tensional forces cause displacement of rocks in the crust. Such an imbalance causes earthquakes.
- iv) Man-made causes - Human activity like construction of huge dams, nuclear explosion, blasting of rocks, mining, etc., near fault zones are responsible for earthquakes. Chemical wastes dumped into the ground cause underground explosions.

Anatomy of an earthquake -

The tension caused by the movement of the earth's plates is released in the form of powerful vibrations known as seismic waves. These vibrations travel in three types of waves: P - Primary waves, S - Secondary (or shear waves) and L - Long waves (or surface waves).

Primary waves

1. They are first earthquake waves to be recorded on a seismogram of an earthquake.
2. The particles vibrate in the direction of movement of the wave.
3. They can pass through solids, liquids and gases.

Secondary waves

1. They are recorded on a seismogram after the P waves.
2. The particles vibrate at right angles to the direction of movement of the wave.
3. They cannot be transmitted by liquids.

~~L (Surface or Long) - These waves travel along the surface of the earth and are recorded after P and S waves. Two types of L waves are identified: Love waves and Rayleigh waves.~~

Seismic focus - The point of origin of seismic waves below the earth's surface.

Epicentre - The point on the earth's surface directly above the seismic focus.

Measurements -

Seismograph - The direction of movement of waves and their passage at a particular point is recorded by an instrument called seismograph.

Richter scale and the Mercalli scale -

Richter scale	Mercalli scale
1. The Richter scale measures the absolute intensity of an earthquake with mathematical precision.	1. The Mercalli scale grades the earthquakes on the basis of observed effects.
2. It measures on a scale of 1 to 9.	2. It measures on a 12-point scale.

Effects of earthquakes -

(i) Constructive effects

1. Energy release - Earthquakes help earth release its stored energy. This energy release helps to keep the earth in good shape.

2. landforms - On account of both vertical and lateral displacement of the earth's crust, earthquakes may raise or lower parts of earth. They may also cause formation of lakes.

(ii) Destructive effects

1. collapse of structures
2. submergence
3. course of rivers
4. Danger to human life
5. landslides
6. fires

7. Tsunami - A tsunami is a large destructive ocean wave that can be generated by any disturbance that rapidly displaces a large mass of water, such as an earthquake. The name 'tsunami' is from the Japanese words: 'tsu' and 'nami' meaning 'harbour' and 'wave' respectively. So tsunamis are harbour waves.

Ex - The 2004 Indian Ocean Earthquake triggered a series of lethal tsunamis on December 26, 2004 that killed approximately 2,75,000 people.

8. Flash floods - Strong shock waves damage dams and embankments and the water stored there spreads speedily causing flash floods.

Distribution of earthquakes -

The main earthquake belts of the world are

- i) The Circum Pacific Mountain Belt - It This belt has 70% of all earthquakes. A part of San Andreas lies in this belt.
- ii) The Midworld Mountain Belt - It stretches from Eastern Europe covering Alpine - Himalayan ranges in Europe and Asia. About 20% of all earthquakes occur in this zone.
- iii) The Mid-Atlantic Ridge - This belt comprises area along the mid-oceanic ridges as well as many islands near the ridges of the Atlantic Ocean. 10% of earthquakes occur in this belt.

Predicting earthquakes -

Japanese use the methods of measuring changes in sea level and variations in Earth's magnetic field to predict earthquakes.