

Chapter – 12: Some Natural Phenomena

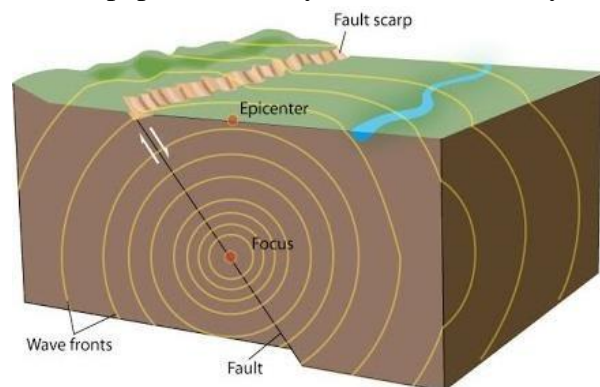
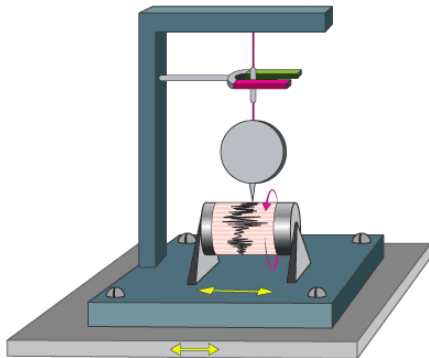
- Over years – humans – developed many machines – invented new technologies
- All these technology – cannot compare to power of nature
- One storm, tsunami, earthquake – wipe out years of construction and machinery
- Power of nature – cannot be controlled – BUT – effects can be reduced – understand them better
- Events, incidents – due to natural forces – natural phenomena
- Destructive events – loss of life and property – natural calamities (disasters)

Earthquake

- Slight vibration, violent shaking – earth's surface
- Natural phenomena – very dangerous if intensity – very high
- Magnitude (intensity) – measured using Richter scale
- Magnitude – 3 or lower – hard to notice
- Magnitude – 4-6 – moderate – disturb loose structures and objects
- Magnitude – 7 or higher – very dangerous – damage permanent structures

How are Earthquakes Caused?

- Earthquake – result of release of energy – stored in earth's crust – creates seismic waves
- Seismic wave – wave of vibration – travel through earth
- Seismic waves – recorded by seismographs – intensity of waves
- Seismograph – simple instrument – consist suspended pendulum – pen attached to it – rotating drum with paper – spins under the pen
- During earthquake – pendulum vibrates – pen moves on paper – intensity measured this way



- Earth's crust, part of mantle – made of large slabs of solid rocks – tectonic plates
- These plates – under land and oceans – seems to float and move – internal pressure
- Sometimes – plates stuck – instead of sliding – puts stress on the ground
- After some time – stress increases – rocks break and slide – causing earthquake – ground failure
- Boundary of tectonic plates – fault plane
- Failure at fault plane – result in violent displacement of earth's crust – result is earthquake
- Point – under the surface – rocks break – focus
- Point – directly above the focus – on the surface – epicentre
- Magnitude – maximum at or near the epicentre
- After earthquake – tremors (vibrations) of lower magnitude – aftershocks

- May also occur – volcanic regions – tectonic faults – movement of magma
- Such earthquakes – early warning of volcanic eruptions

Effects of Earthquake

- Shaking and ground rupture –
 - Main effects of earthquake – cause damage to buildings, other rigid structure
 - Level of damage – depend on – magnitude of earthquake, distance from epicentre, local geological features
- Landslides and avalanches –
 - Damage caused in hilly and mountainous regions
- Fires –
 - After earthquake – fires start – broken electrical or gas lines
- Tsunamis –
 - Underwater earthquake – cause tsunamis
 - Example – 2004 Indian Ocean tsunami
- Human impacts –
 - Damage to property, roads, bridges, buildings, etc
 - May damage the foundation of buildings

Protective Measures for Earthquake

- Experts suggest – earthquakes don't kill people – buildings do
- Most casualties (deaths) – collapse of human constructions
- Earthquakes – not predictable – BUT – loss of damage – reduced – preventive measures
- 4 basic protective measures –
 - Mitigation –
 - Efforts – reduce loss of life and property – lesser impact of disasters
 - Achieved through – risk analysis, reduction
 - Some steps –
 - Use lightweight materials – construction of buildings – reduce damage during collapse
 - Constructing buildings – solid grounds – follow building norms
 - Fixing heavy equipment, furniture to walls – do not fall during earthquake
 - Preparedness –
 - Many things – everyone must know – survival during earthquake –
 - Disaster first aid kit –
 - Food and water- at least 3 days
 - Basic medical supplies, tool kit, sanitation, family documents, etc
 - Home earthquake plan –
 - All family members – practice emergency situations
 - Safe areas in house – identified
 - Advisable – take training – emergency first aid, fire extinguishers, emergency exit plans
 - Response –

- Keep calm during earthquake – very imp.
- Basic safety steps –
 - When indoors – drop down to floor – take cover – under desk, table, etc – duck and drop technique – stay away from windows
 - When outside – go into open areas – away from buildings, power lines, trees, etc
 - When inside a car – stop the car – open areas – away from bridges, flyovers, etc
- Recovery –
 - Earthquake – lot of damage – life and property
 - Effects of earthquake – long term – people – may be evacuated
 - Govt. – use disaster management plan – certain steps taken –
 - Check for injuries –
 - Do not move injured person – until very necessary
 - Provide first-aid – wherever required
 - Check for hazards –
 - Earthquakes – create other dangers
 - Very imp. – check for hazards, gas leaks, electrical wirings
 - Telephone line – functional – left free – emergency use
 - Expect aftershocks –
 - Most – smaller than main earthquake
 - Some – large enough – additional damage

Thunderstorms

- Another natural phenomenon – thunderstorm – lots of damage
- Storms – very dangerous – lightning strikes – responsible – killing people – damage property
- Moist air – rise up – form clouds – thunderstorms are formed
- Thunder clouds – also called – cumulonimbus clouds
- Warm air moves up – moisture condenses – forming ice crystals
- Condensed moisture – comes down – gravity – air still going up
- This instability – upward, downward movement – formation of static electrical charges
- This electricity – discharged – seen as thunder and lightning

Lightning

- Most beautiful display in nature – BUT – most deadly as well
- Lightning bolt – speed – 45 km/s (160,000 km/hr) – temperature – 28,000⁰ C

The phenomenon of lightning

- Thundercloud – move around – equal and opposite charge – induced (developed) at the ground
- Negative charges – travel downward – thundercloud to earth
- Electrical field – strong enough – electrical discharge between clouds
- During strike – air – works as conductor and expands – produce shock waves
- Shock wave – heard as thunder

- Lightning – seen before hearing thunder – speed of light greater than speed of sound
- 1752 – Benjamin Franklin – proved – electricity, lightning – same thing
- He flew his kite in thunderstorm – bottom part of string – dry
- Attached a key to the bottom part – kite – stuck by lightning
- Spark – travelled from key to his hand
- He was – lucky – didn't die
- Next 2 persons – tried this experiment – died

Safety Measures During Lightning Strikes

- People – stuck by lightning – receive electric shock – may be burnt
- These people – carry no charge – handled safely
- Someone – looking dead – may be revived – quick actions
- Lightning conductor – pointed metal – not attached to roof – BUT – connected to copper, aluminium piece – connected to conductive grid in the ground
- This conductor – protects building from lightning
- Purpose – lightning rods – low resistance path – to ground – conduct electrical currents – during lightning
- Lightning rod – current flows to ground – without damage
- Safety measures –
 - Never take shelter – under tall tree or only tree in the area
 - Do not stand – high ground
 - Don't fly kite – in thunderstorm, near power line, near air field
 - Stay away – wire fences, clothesline, metal pieces, etc – metal objects
 - When in vehicle – stay inside – vehicle – act as bad conductor